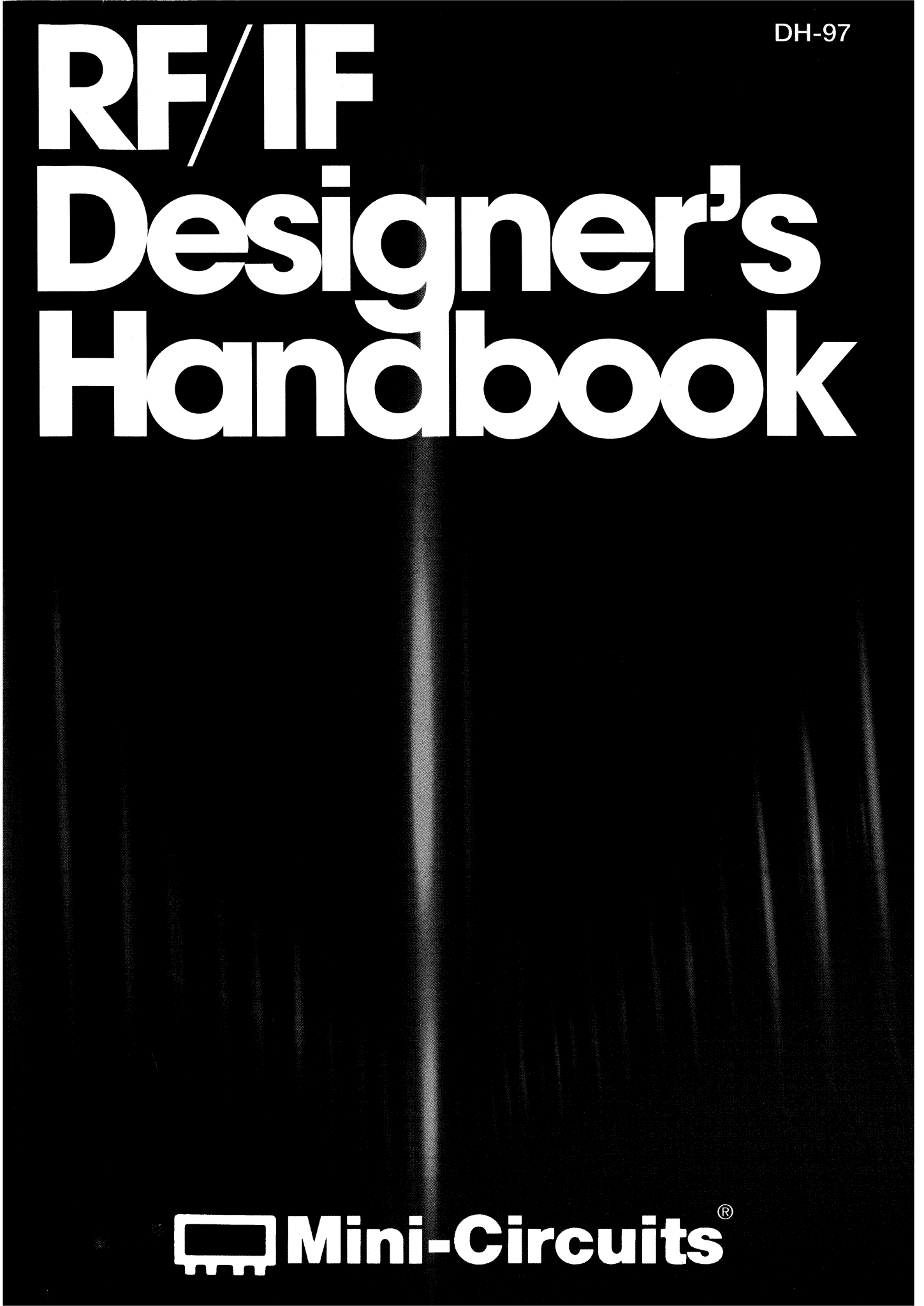
DH-97

RF/IF Designer's Handbook



Mini-Circuits®

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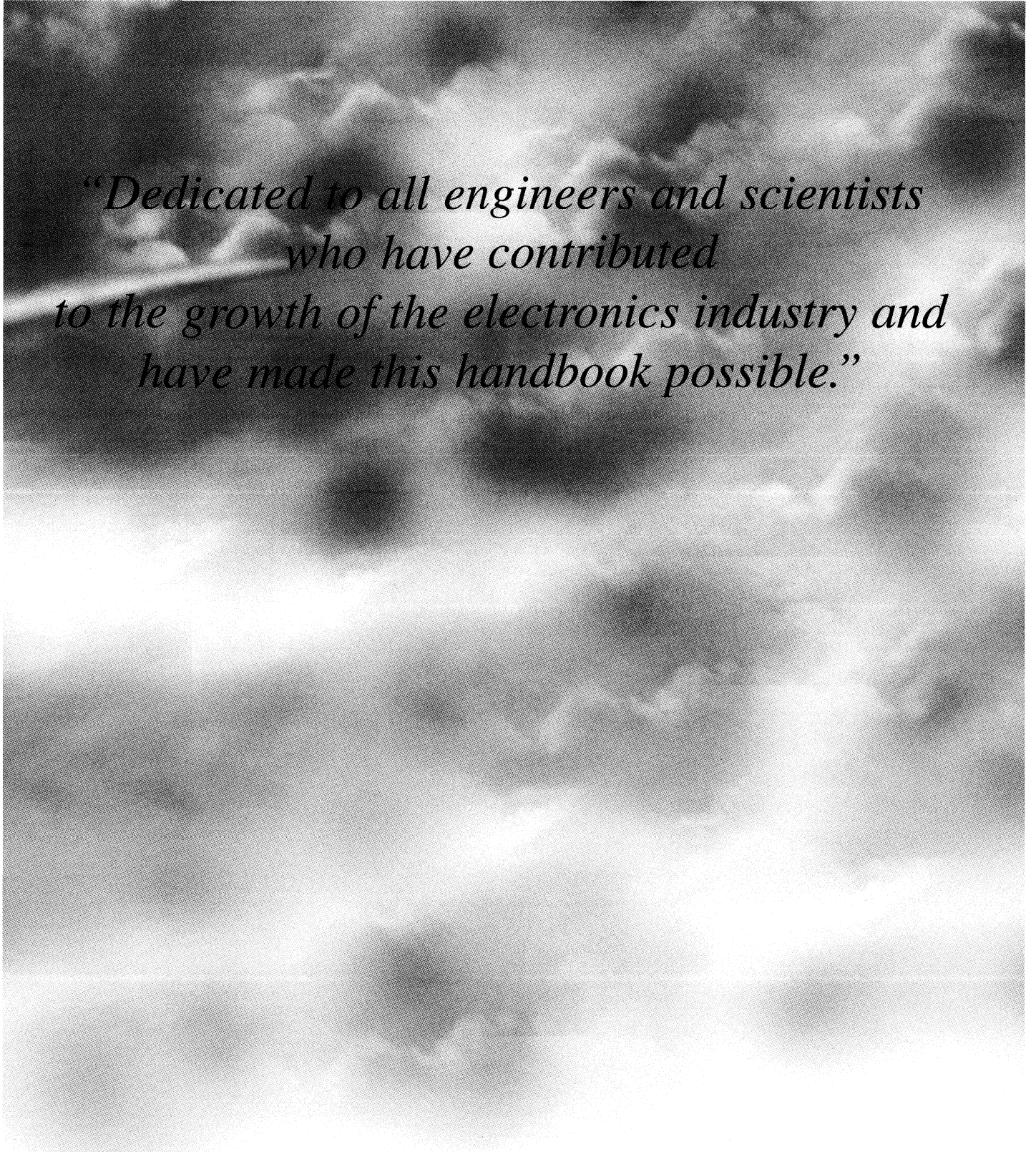

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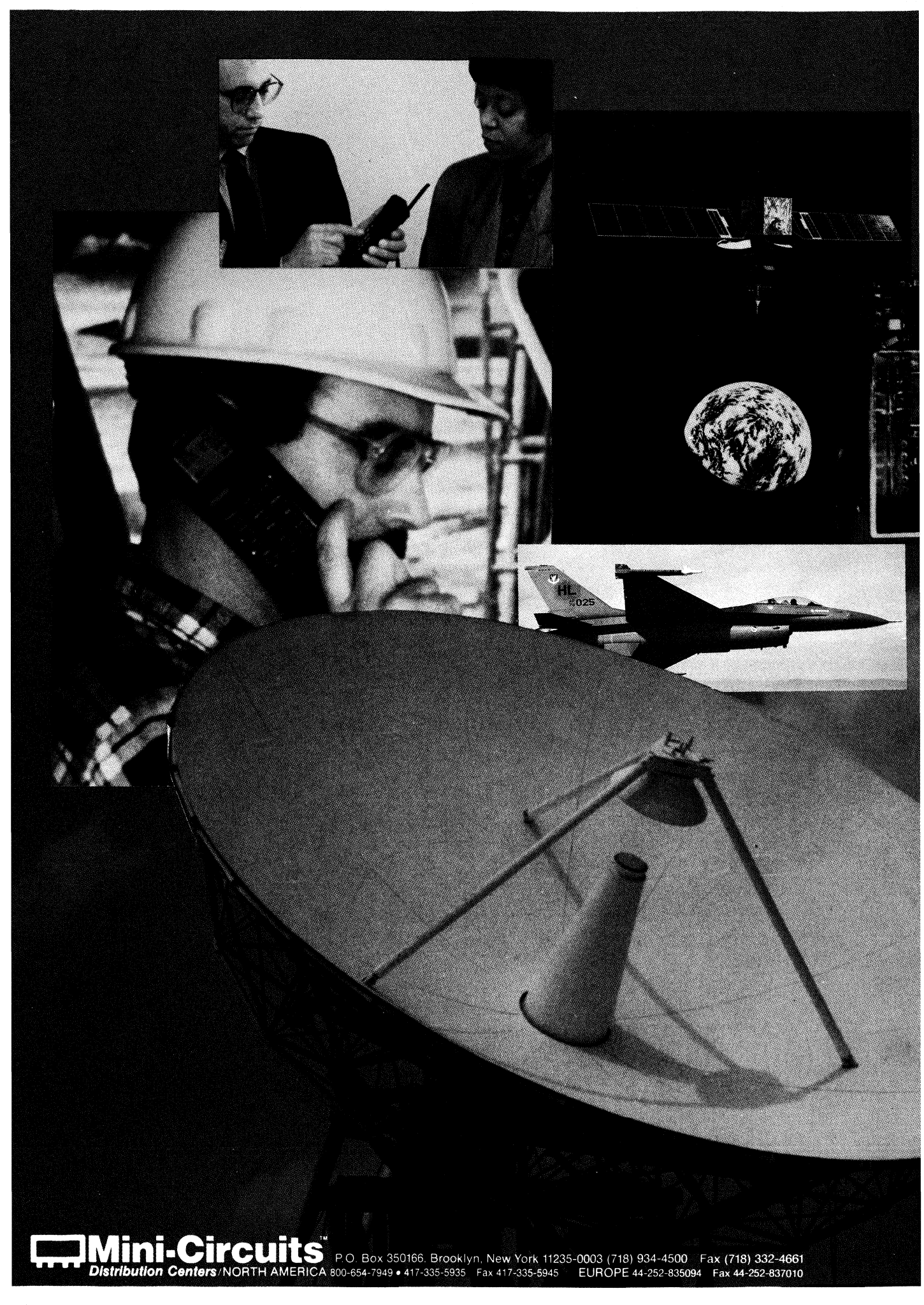

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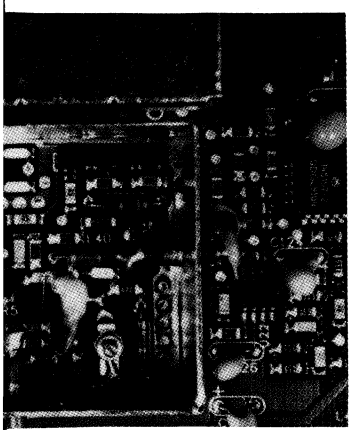

0 General Information
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2 Power Splitters/Combiners
3 Amplifiers
4 Bi-Phase Attenuators
5 Digital Step Attenuators
6 Fixed Attenuators / Terminations / Matching Pads
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11 Modulators / Demodulators (I&Q, QPSK, BPSK)
12 Phase Detectors and Phase Shifters
13 Switches
14 RF Transformers
15 Voltage Controlled Oscillators (VCO's)

Mini-Circuits...dedicated to meeting and exceeding customers' expectations.

finding new ways...

15 product lines with more than 1,000 off-the-shelf catalog models, extensive database on all catalog items plus 5,000 custom designs, manufacturing capability to supply high-volume orders on short notice, and consistent flow of new products to support our customers' future designs.

setting higher standards...

Ultra-Rel™ mixers with the industry's only five-year guarantee, unprecedented 4.5-sigma unit-to-unit repeatability on many models, guaranteed one-week shipment of all catalog items, and the most comprehensive array of innovative quality products for signal-processing requirements.

Our committment to you, our customer, never ends.

finding new ways...
setting higher standards

Mini-Circuits™

QUALITY POLICY

Mini-Circuits quality policy is to provide products and services to our internal and external customers that will:

- ***Meet stated requirements***
- ***Exceed expectations***
- ***Continuously be improved***

CORPORATE VISION

To continue to be a world preferred company for RF, IF and microwave products.

MISSION STATEMENT

Our mission is to provide our customers with products of superior value while promoting growth and prosperity for our members, suppliers, community and company.

Harvey Kaylie

HARVEY KAYLIE
President
Mini-Circuits Laboratory
Brooklyn, New York

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Using This Guide

Over 1000 Mini-Circuits IF/RF/Microwave Signal-Processing components are completely specified and described in this Guide. These Products are all available with guaranteed shipment of one week.

The large number of available models is offered so that the design engineer may select a model that closely fits the application requirement. In situations where there is a need for special electrical performance, mechanical configurations, environmental screening, or very low cost units, please contact our Applications Department. See page 0-25. In many cases, we produce special components in less than two weeks.

table of contents

The table of contents on page 0-3 lists product sub groups with corresponding specification pages and product group technical information including articles.

model number index

In each product group, model numbers are listed in alphanumeric order with page references to electrical specifications. All surface-mount models are highlighted with an indicator. See pages 0-8 thru 0-11

SMD

Surface-mount devices are included in almost every product group. See model number index page 0-8 thru 0-11. Product group specification sections indicate non-hermetic and tape and reel package availability. Technical articles are listed on pages 0-26 thru 0-29.

tape and reel packaging

Designers applying automated assembly procedures for surface-mount components will find a listing for tape width, reel size, package number, and number of devices on a reel; "footprints" for the various packages are shown on pages 0-46, 0-47.

specifications

The specification pages in each section include, for every model, a photo, complete electrical specifications, price, page number for CAPD, schematic diagram, pin connections (for pc board models) or connector markings, and reference designations for the case style and outline drawing. Each model within a series has a case style and outline drawing reference. Comments applicable to the specifications are listed under Notes which appear for each page spread.

Using the latest industry criteria for specifying mixer and I and Q modulator performance, "typical" conversion loss has been deleted and replaced with $\bar{x}$ and σ (sigma) average value and standard deviation of values for conversion loss. A discussion of these new parameter listings is given. See pages 0-14, 0-15.

SURFACE MOUNT

This "quick reference" headline and footer can be found on various product specification pages. It denotes that all the models featured on that page, or spread are surface mount and conveniently packaged on tape & reel.

PARTNER PROGRAM℠

A revolutionary new concept that lets you lower the cost of doing business in the 90's. A true partnership is described where your savings keep growing year in and year out. Details of the program and the easy procedure to join are simply explained. See pages 0-6 & 0-7.

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case style outline drawings

Case Style and Outline Drawings include information on case dimensions, tolerances, case material and finish, bracket options and "footprint" sketches for pc board design using surface-mount units. See pages 0-48 thru 0-65.

The information is arranged in tabular form with alphanumeric reference designations. Each alpha designation refers to a particular outline drawing. A photo of each case style is shown and designated on the model specification page.

computer-automated performance data (CAPD)

This symbol signifies that computer-automated performance data, CAPD, is available. A significant number of pages in our Handbook are devoted to Mini-Circuits' exclusive computer-automated performance data. These pages describe the most complete detailed data and performance curves ever available on characteristics of over 1000 catalogue products. Page numbers referencing this data appear on each product specifications page and refer to Thomas Register catalog volume or our RF/IF Designer's Guide Handbook.

ULTRA-REL™ MIXERS
*5-YR. GUARANTEE**

This symbol identifies products that are manufactured with extra reliability. See page 0-23 for a complete explanation.

prices

The prices shown are the U.S. unit list prices for the quantity indicated. For unit prices in higher quantities, and for a formal quote, contact our nearest distribution center, authorized local distributor, sales office or the factory. See inside back cover.

ordering information and warranty

For warranty, terms of payment, shipping instructions, and one-week guaranteed shipping conditions. See pages 0-12 & 0-13.

applications support/ technical assistance

For literature requests, assistance in selecting models, understanding model specifications, requesting additional model performance data, contact our Applications Engineering Department. See page 0-25.

sales assistance

For assistance in purchasing products, obtaining quotes, opening up an account, requesting order status information, assistance in obtaining same or next day delivery, contact our Sales Department.

NSN numbers

Specification pages contain a listing of Mini-Circuits' models that have been assigned a National Stock Number (NSN).

listing of reps, authorized distributors distribution centers

A complete list of Mini-Circuits' sales representatives, local distributors, and major Distribution Centers puts you in immediate contact with our Sales Support team to answer questions, assist in component selection, and expedite orders. See inside back cover.

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

GUARANTEED SAVINGS...YEAR IN AND YEAR OUT!

How the program works

Wouldn't it be nice to plan next years budget based on costs that decrease instead of increase? When you're a member of Mini-Circuits new Partner Program℠, you can do just that! It's as easy as 2 + 2 = 4... here's how it works.

The minute you join the partner program, the first time you purchase a Mini-Circuits model, the quantity price you pay is based on the sum of all your previous yearly purchases of that model. If you purchased 200 of a particular unit last year, and need another 200 units this year, the price you pay today would be based on a 400 unit quantity discount!

Yes, with the Partner Program℠, your quantity discounts accumulate year after year as your total purchases jump from one quantity discount bracket to another.

Now that's guaranteed savings!

With Mini-Circuits Partner Program℠ you can enjoy a lifetime of volume quantity price reductions on all our catalog and most of our custom products.

The Partner Program℠ makes sense

Today, everybody is talking about the highly competitive business environment and the global challenges of the 90's. In typical Mini-Circuits tradition, we're not talking... we're taking action.

The Partner Program℠ is our way of sharing risks and earning the rewards of doing business with you.

Mini-Circuits is committed to a total partnership for improving quality and reducing manufacturing thru-put time. The end result, lower costs. As Partners, we both share in these savings.

That's what true partnership is all about.

Joining the Partner Program℠

The program is limited to qualified customers at no cost or obligation. Simply request a Partner Program℠ kit to receive information on this revolutionary program.

We'll take care of all the details and manage the statistics for your account.

You can place your orders in the usual manner with Mini-Circuits or any Mini-Circuits Distribution Center. Your purchases will be tallied and tracked in the Mini-Circuits computer. In 1997 you will be eligible to receive automatic discounts based on your purchases starting from 1990.

JOIN THE PARTNER PROGRAM TODAY!

See Details

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CUSTOM PRODUCT NEEDS... ***Let Our Experience Work For You.***

F 172-Rev. Ori

Mini-Circuits

PARTNER PROGRAM℠

TERMS & CONDITIONS

This program is offered to qualified customers for the purpose of maintaining a mutually beneficial long term relationship.

As a participant of this program, you will share in the results of Mini-Circuits' commitment to quality by earning cumulative annual quantity price break reductions on all of your Mini-Circuits purchases.[1]

As the cumulative total enters into a higher quantity price break, the unit price of your present purchase is lowered, and it never stops. You can enjoy a lifetime of volume quantity price reductions on all of our catalog, and most of our custom products.

For a particular purchase of quantity C in the present year, the price shall correspond to quantity A according to the following formula.

$$QTY\ A = QTY\ B + QTY\ C$$

where QTY B = cumulative annual quantity purchased in preceding years as of January 1, 1990.

joining the program

Qualified customers automatically join the Partner Program by making a purchase of a Mini-Circuits model[2] from a Mini-Circuits distribution center, authorized local distributor, or from the factory direct.

qualified customers

The program is limited to original users. Companies reselling Mini-Circuits products do not qualify. Original users shall mean approved companies, universities, schools, organizations, a division or subsidiary of a corporation, and a department or location of a government agency. For corporations issuing a corporate contract to Mini-Circuits, a division of the corporation may combine quantities purchased by other divisions for cumulative total quantity calculations. In absence of a corporate contract, each division must join the Partner Program℠ individually.

maintaining qualification

A good credit standing with Mini-Circuits is a criteria to remain a participant of the program.

purchase location eligibility

Purchases from Mini-Circuits or a Mini-Circuits distribution center qualify for the program. Purchases from an authorized participating distributor qualify for the program when documentation of purchase is supplied to Mini-Circuits.

product eligibility

All catalog models and most special models are included in the program.

product ineligibility

Purchases made for the following do not qualify for the program: special testing, lot testing, serializing, source inspections, and qualification testing. Furthermore, purchases during special promotions or for multi-year or special contracts do not qualify. Highly specialized custom designed models may not be included in the program. Please consult with the Partner Program manager.

purchase quantities

Quantities credited to the program include only the net quantity of each model shipped to the customer in a specific calendar year. Different models may not be combined.

minimum purchase quantities

The base year quantity equals the total cumulative consecutive annual quantity purchased in preceding years as of January 1, 1990. However, if the quantity purchased for a model in a year is less than 2% of the quantity purchased in the previous year, then the cumulative total for the previous years shall revert to zero, i.e., base year quantity equals zero.

partner program changes

Mini-Circuits reserves the right to make changes to the program without prior notice.

partner program validity

The partner program is void where prohibited by law.

[1]Subject to the provisions of the terms and conditions given herein.
[2]All catalogs and most special products are eligible.

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ordering and delivery information

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how to order

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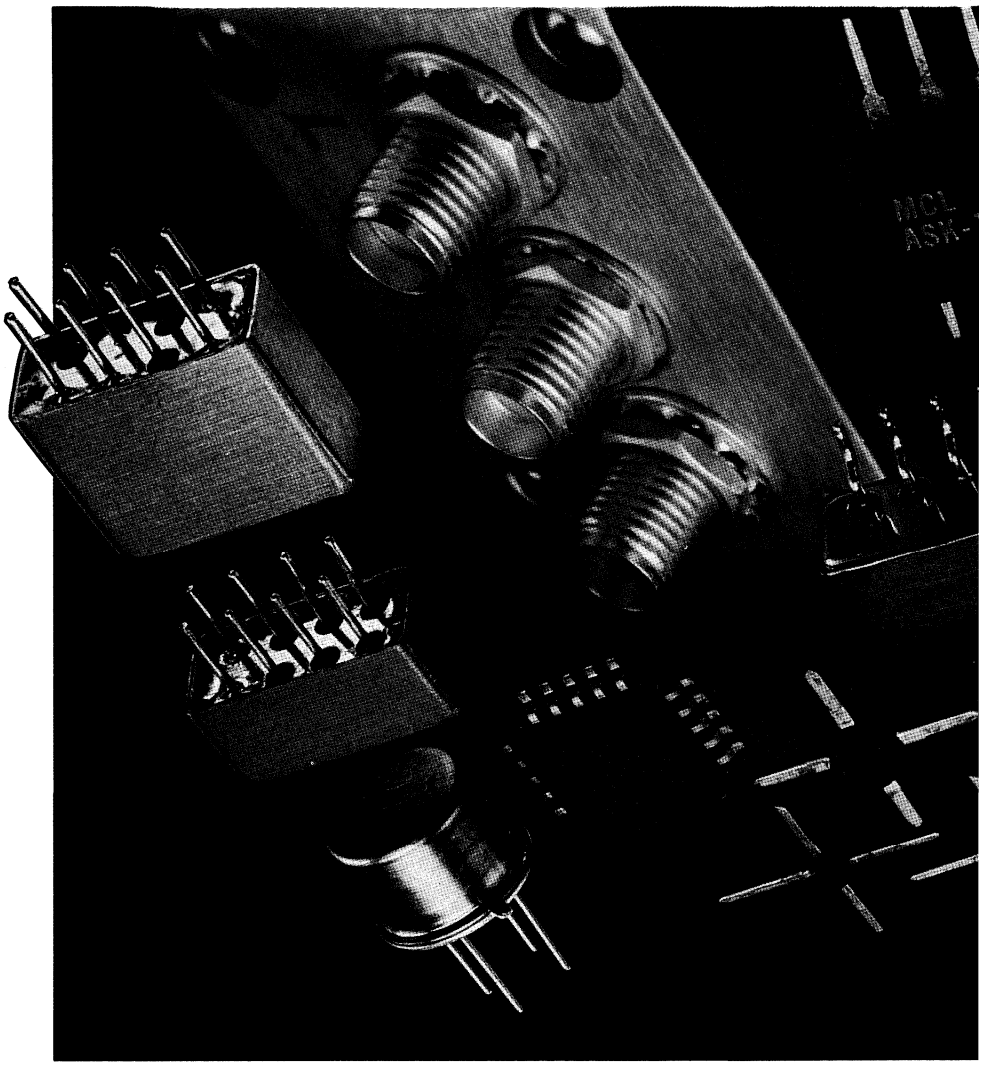

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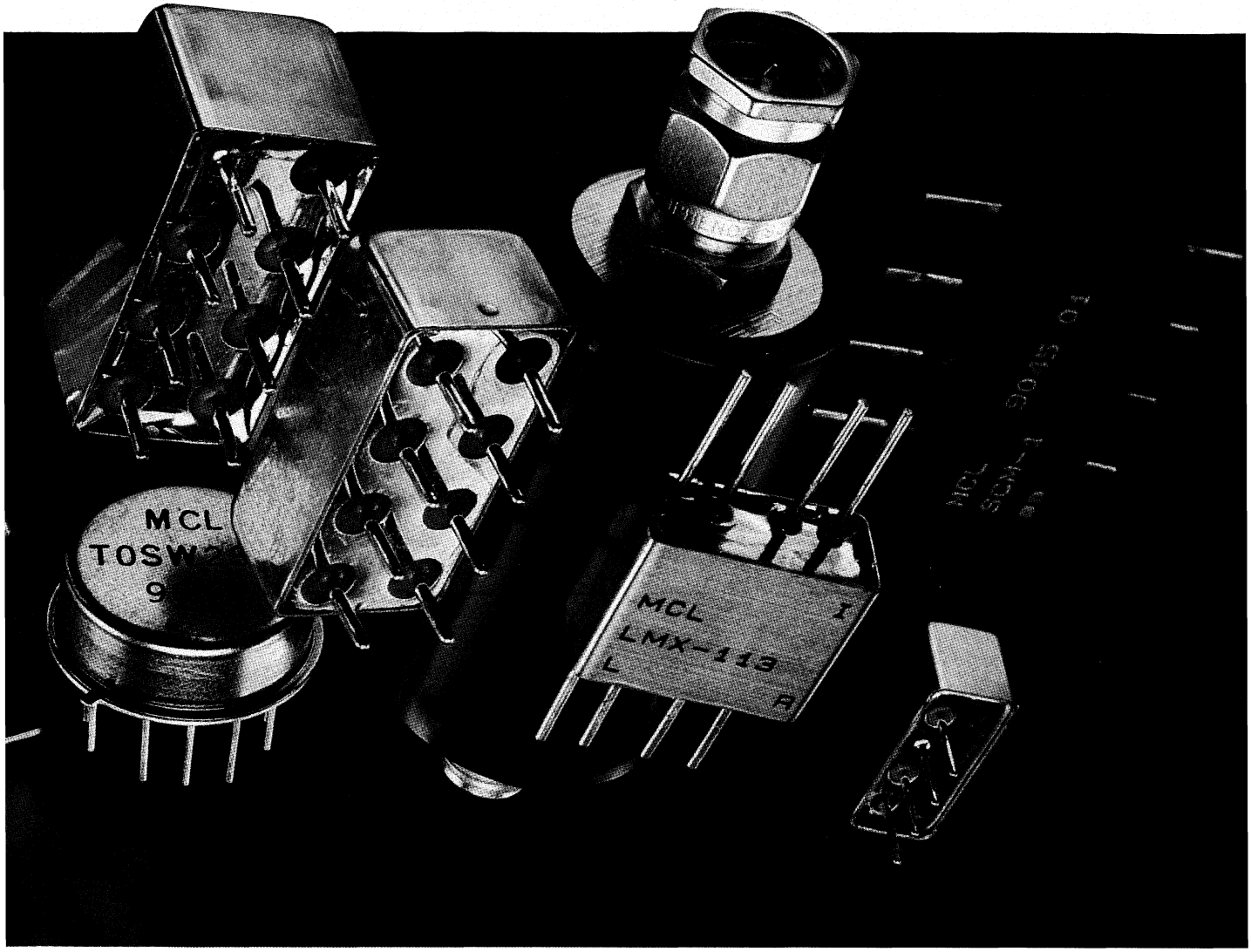

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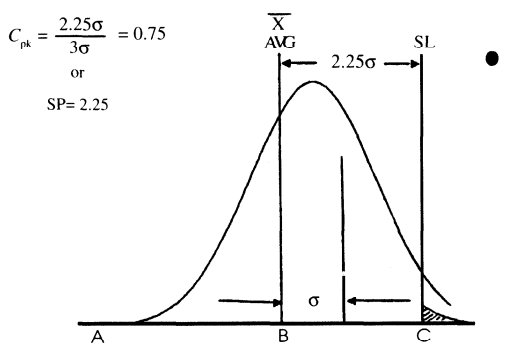
F144 REV. B

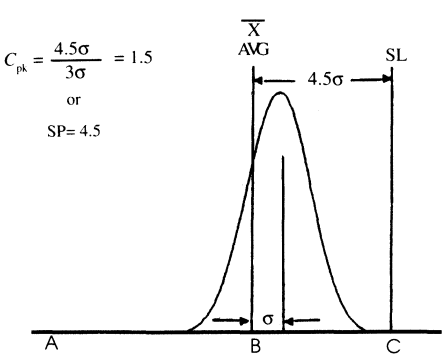
statistical process control... key to competitive manufacturing

In today's tough world market environment, the need to be better is more demanding, and the need to be more competitive is a necessity to survive. A company cannot rest on the success of past performance and expect to continue to remain successful. There are many well known examples of companies both large and small that were once leaders in their field and now are skeletons of themselves or just plain dead and buried.

How does one get more competitive? The answer is simple. Exceed your customers' needs and expectations ...provide, in the manner required by the customer, a quality product at low cost, on time, every time. In most manufacturing organizations a significant cost factor is attributed to the cost of purchased materials and they may range from 25% to 80% of the cost of the entire product. Because of the significance of purchased material to total cost, the quality of the purchased material is important and essential to the competitiveness of the manufacturing organization.

This paper will discuss the effects of quality on the direct and indirect causes that contribute to the *real cost* of the purchased material. A measure of the quality of the material will be described by a quality factor, Cpk. The higher the value of Cpk, the better the quality of the product. Cpk is a measure of the repeatability of material performance. The higher the number, the better is the consistency of performance or the less is the variation in performance. Therefore, once designed in, the material should be consistent enough so that its variations are not transparent to the final product.





In manufacturing, variation is evil! If the value of Cpk for a purchased part is low, and Cpk varies from production lot-to-lot, then it can be projected the process for manufacturing the part is not in control, performance will be inconsistent, rejects can be expected, and the true cost of the purchased part will be significantly higher than the price shown on the purchase order.

With the abundance of low cost computers and hand held scientific calculators, the ability to calculate Cpk is easily attainable. Cpk is a quality factor that is based on the statistical calculation of mean value, $\bar{x}$ and standard deviation, sigma. Cpk is the difference in value between the mean value and the closest spec limit divided by 3 sigma.

$$\text{Cpk} = \frac{\text{(spec limit - mean value)}}{\text{3 sigma}}$$

At Mini-Circuits we use SP (Sigma Performance) = 3 times Cpk. We must *measure* variation to control it. If we can measure it we can tell when it gets better or worse. We need to know what works and what doesn't work. How much a manufacturing process varies is measured by Sigma (σ). In the figures shown, the average (AVG) tells us where the process is centered. The spread or width is measured by sigma. The figures show how the product is distributed. The height of the graph measures how often values occur. The spread measures how far the values are from the AVG. If the product is well controlled, there will be little variation, more values of units will occur nearer the target, $\bar{x}$, and sigma will be small.

Manufactured products are either good or bad depending on whether they do what the customer wants them to do. Specification limits *were* the measure of success, where product within spec was good and out of spec bad. It is not enough in today's market place to *just* meet spec! In the figures shown, a spec limit (SL) is compared to the product distribution. Product built outside, or to the right of the spec limit, is very bad; even product built just to the left of the spec limit is not good. Small (skinny) Sigma means the product will be far from the spec limit and close to the AVG value (very good product, what today's customers demand).

We can compare different processes by measuring variation and the distance from the average to the spec limit. But only if we measure the distance in terms if sigma, as shown in the figures. The real distance is the same for both figures (C-B), meaning both processes are centered and the AVG values are equal. But, in terms of product quality, the figure on the bottom is far superior (4.5>2.25) because the variation between units is much less as given by the skinnier value of sigma.

For convenience, we normalize by dividing the distance (C-B) by sigma (considered a relative ideal), and get the capability index, Cpk, a figure of merit. The skinnier the σ is, the higher the Cpk, and the less variation, unit-to-unit.

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The "goodness" of the purchased parts, Cpk, will affect the actual *real cost* of the purchased material. This real cost can vary and will depend on the original design and the specifications describing the purchased material. The real cost depends on the sum of both direct and indirect costs. These are:

Costs additive to the cost of purchased parts:

A. Direct costs of poor quality parts:

1. Warranty
2. Scrap and repair
3. Inspection/test

B. Indirect costs of poor quality parts:

1. Lost sales-customers switching to competition
2. Field trips, retrofits, settlements
3. Downtime, line shut downs, delinquencies, rescheduling
4. Inventory build-up, obsolete material, MRB, material expediting, material shrinkage
5. Engineering changes and redesign, documentation changes, material selection and separation

C. Indirect costs, demands of the manufacturing system on company's resources

1. Space
2. Manpower, receiving, production control, manufacturing, sales, finance, engineering, QA, accounting, maintenance, house cleaning
3. Utilities (lighting, heating, air conditioning, telephone)
4. Capital equipment (testing, incoming inspection and production, data processing)
5. Finances, cost to maintain higher inventory of material
6. Data processing and data entry

Description of costs to the manufacturer of poor quality parts received.

When poor quality parts are received, the manufacturer must maintain an incoming inspection department to check parts for conformance to specifications. *If* all parts were received with a Sigma Performance = 4.5 or, Cpk =1.5, then the demands for incoming inspection would evaporate. However, this is not the case in the real world today. Therefore, the cost of the inspection department is visually spread out and amortized as a percentage of the total cost of all material received. However, when poor quality parts are received, there are direct additional costs that are incurred by the manufacturing organization. These costs include additional testing and inspection so that additional manpower and capital equipment are required. In addition, there are added costs associated with documents DMR, RTV etc.; MRB meetings; purchasing costs such as expediting, search for alternatives, rescheduling and issuing of p.o. change orders; and engineering costs for evaluation and test.

In addition to incoming inspection costs, the delays of incoming material to the production floor will generate additional manufacturing costs. These include rescheduling and smaller production runs (less parts available); inefficiency of resources, such as manpower and machines, increased space requirements and WIP; increased material shrinkage and increased manufacturing throughput time.

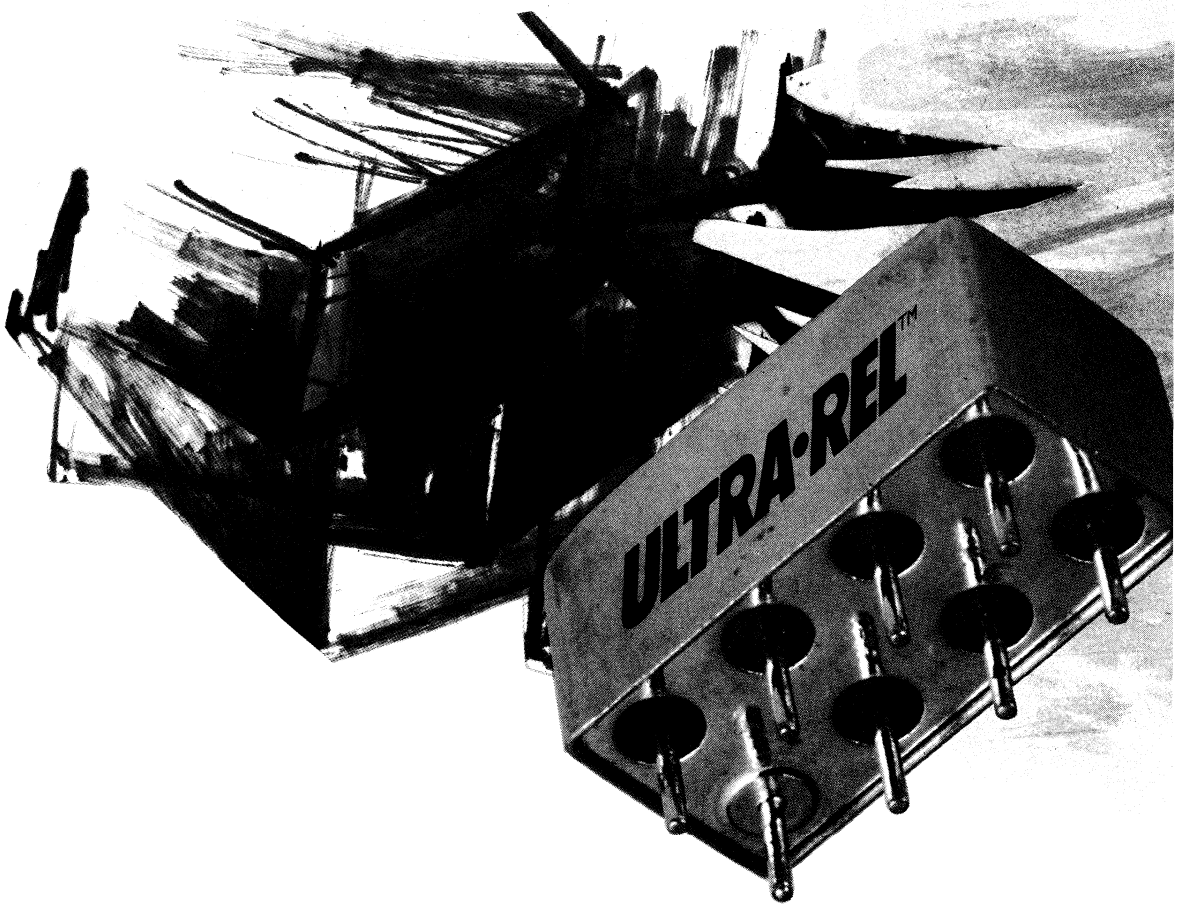
The results of these manufacturing delays and costs will cause shipment delays and increased manufacturing costs that may be passed on to customers. Both factors contributing to a less competitive position!

To pursue Mini-Circuits' goal to exceed our customer's expectations, Mini-Circuits is striving to achieve an SP of 4.5 or, Cpk = 1.5. All mixer and I&Q modulator conversion loss is specified in statistical terms. We are vigorously pursuing statistical process control and statistical specifications on all our products to enable our customers to receive the highest quality and value, at the lowest cost... the key to competitive manufacturing.

CAPD now available! computer-automated performance data

In Stock...Immediate Delivery

For custom versions of standard models consult our applications dept.

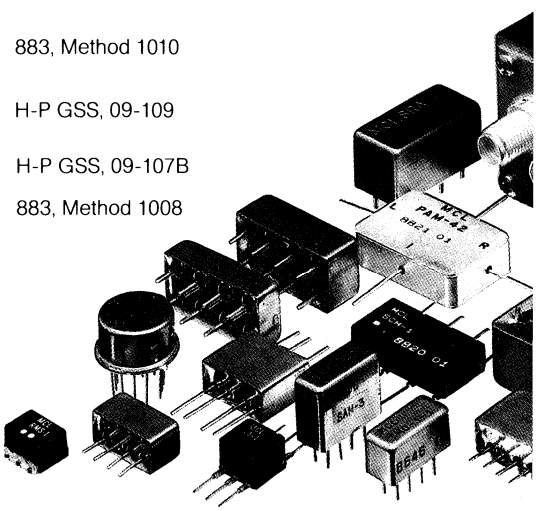


ULTRA-REL™ MIXERS

ULTRA-REL DIODE TEST PROGRAM*

TYPE OF TEST	CONDITIONS	MIL-STD- or H-P
LIFE	1,000 hrs, T_A +125°C 50mA ac	750, Method 1026
THERMAL SHOCK	-65°C to +125°C, 200 cycles 5 min. dwell	883, Method 1011
MECHANICAL SHOCK	1.5Kg's, 0.5μsec pulse	883, Method 2002
VIBRATION	variable frequency 20 to 2,000 Hz	750, Method 2056
TEMPERATURE CYCLE	-65°C to +125°C 200 cycles, 10 min. dwell	883, Method 1010
AUTOCLAVE (pressure pot)	14.7psi, T_A +121°C, 96 hr.	H-P GSS, 09-109
85/85	85°C @ 85% humidity 168 hr., no bias	H-P GSS, 09-107B
ACCELERATED HI-TEMPERATURE STORAGE	300°C, 325°C, 350°C storage until 50% failures	883, Method 1008

*Stringent Mini-Circuit/Hewlett-Packard Qualification Tests



finding new ways...
setting higher standards

Mini-Circuits

5 YEAR GUARANTEE.

There are no mixers more reliable than Mini-Circuits' new Ultra-Rel™ mixers. Go ahead, expose Mini-Circuits' Ultra-Rel™ mixers to scorching heat, subzero freezing, soggy humidity, and severe mechanical shock and vibrations. They will survive and perform perfectly.

The secret to this reliability breakthrough is an Ultra-Rel diode capable of withstanding considerably more torture than specified by MIL-STD-883. These diodes achieve an order of magnitude improvement over currently-available Schottky diodes due to an improved monolithic processing technique, resulting from an intensive two-year, one million dollar joint development program by Mini-Circuits and Hewlett-Packard.

Take a look at the eight harsh tests these Ultra-Rel diodes are qualified to pass. To put it bluntly, these new Ultra-Rel diodes can meet and exceed MIL-STD-883 tests with ease. For example, MIL-STD-883 temperature stresses diodes for 25 cycles from -65°C to +125°C; Ultra-Rel diodes (unpackaged) have no trouble with 200 cycles from -65°C to +175°C. No problems with the other tests either.

These diodes when exposed to a brutal accelerated high-temperature test of 250°C for 981 hours, didn't fail; even at 300°C for 168 hours, none failed. Could diodes other than Ultra-Rels survive such stresses? Hardly. And, for extra measure, Ultra-Rel devices can withstand up to ten times the mechanical pull test requirements of MIL-STD-883.

And since mixer reliability is primarily determined by the reliability of the diodes in the assembly, the more reliable the diodes, the more reliable the mixer. So now all of our Standard Level (+7dBm LO) mixers* are built with Ultra-Rel diodes...and are guaranteed for five years.

Most likely your application does not require such demanding levels of endurance. But high product reliability and quality are demanded in today's marketplace. Consider how enhanced reliability of your products will strongly influence your reputation and customers' satisfaction.

Don't settle for "imitations" or "equivalents"...***insist on Ultra-Rel™ mixers, available only from Mini-Circuits.***

* except as noted in catalog

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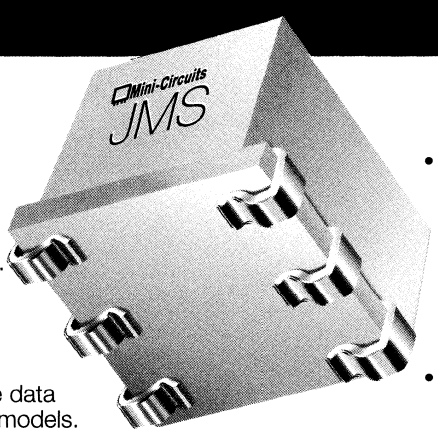
MINI-CIRCUITS®...

THE SOLID SOURCE

signal processing components dc to 10GHz



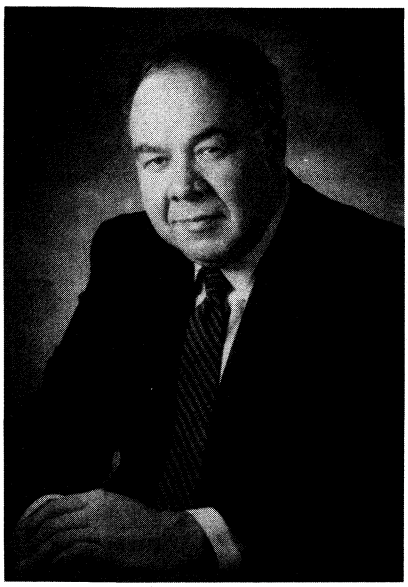
In today's competitive, evolving wireless and digital communication markets, Mini-Circuits provides that extra edge! From initial design to full scale production, we offer *total support* to satisfy or exceed your specific requirements.

- **WIDEST SELECTION OF COMPONENTS** 17 product lines with more than 1,000 off-the-shelf catalog models.
- **EXTENSIVE DATABASE** actual performance data on all catalog items plus over 5,000 custom models.
- **STRONG APPLICATIONS SUPPORT** an engineering team ready to recommend optimum catalog models, discuss custom designs, and provide solutions to your specific needs.
- **ONE WEEK SHIPMENT GUARANTEE** catalog items will be shipped within one week from when the order is received, or we'll deduct 1% off the price for each day we're late.
- **UNRIVALED QUALITY** providing products and services to our customers that will:
  Meet Stated Requirements
  Exceed Expectations
  Continuously Be Improved
  Maintaining statistical process control with 4.5 sigma repeatability on most components and a 5 year guarantee on all Ultra-Rel® mixers
- **UNMATCHED PRICES** often thirty to fifty percent lower than the competition.
- **HIGH VOLUME CAPABILITY** worldwide manufacturing facilities to supply large quantity production needs on short notice.
- **CONSISTENT NEW PRODUCT DEVELOPMENT** and process improvement to meet our obligation to support your future designs and needs.

MIXERS • POWER SPLITTERS/COMBINERS • AMPLIFIERS • ATTENUATORS • FILTERS • DIRECTIONAL COUPLERS • LIMITERS • FREQUENCY DOUBLERS • IMPEDANCE PADS
PHASE SHIFTERS • I&Q MODULATORS/DEMODULATORS • OSCILLATORS (VCO's) • SWITCHES • TERMINATIONS • PHASE DETECTORS • TRANSFORMERS • BIAS TEES

Mini-Circuits®

Quality ... World Class Definition



Harvey Kaylie
President
Mini-Circuits Laboratory
Brooklyn, New York

The message of the 80's to U.S. manufacturers was loud and clear. Deliver quality products or slip into obscurity. It's now up to manufacturers to take action, from the shipping clerk responsible for getting the right address on a shipping label to top management for implementing a workable quality assurance program. Customers don't merely want quality, they strongly insist on it. Deliver it and flourish; ignore it and lose business.

What does quality mean to you?

But what exactly is quality? Even the experts can't agree on a common definition. Some maintain that a quality product is defect-free. Others note this isn't enough, it must also meet specs.

We need a new definition, one for "world class quality"

A more encompassing definition, to which Mini-Circuits strongly adheres, is that a quality product must not only be defect-free and meet specs, it must satisfy the customer's expectations, even under adverse field conditions, and do so in a very consistent manner. Let's call this *world class quality.*

Of profound concern to design engineers is the need for consistency, that is, lot-to-lot and unit-to-unit repeatability. Suppose an engineer checks out a prototype system or subsystem design using a dozen samples provided by a vendor, and all goes well. Then a production order is placed, and 2,500 units arrive several months later. But while these too meet data sheet specs and all applicable control drawings, there is a wide variation from one unit to the next. Depending on their resulting interaction with other components in the system, such variation could produce disappointing consequences.

Contrast that case with a production shipment of 2,500 units which exhibit minimal unit-to-unit variation, units which show a high degree of consistency both among themselves and with the samples provided earlier for the prototype tests. Obviously this production lot instills much more customer confidence in the vendor's control over manufacturing.

Part uniformity means lower costs for the customer and high esteem for the vendor.

The customer should find that parts received today perform the same as parts furnished a year ago to the same part identification. Such product uniformity reduces problems on the customer's production floor, reduces his need for inspections, re-work, work space, trouble-shooting, test personnel and equipment. The customer also expects parts to continue working even under adverse field conditions. To do so they must be conservatively rated.

Conservatively rated, consistent parts provide better value to the customer. They have world class quality and from them both vendor and customer derive enormous "rewards."

The vendor enjoys gains similar to the customer's for consistency — reduced inspection labor and personnel, diminished needs for specialized test equipment, fewer manufacturing personnel and less production space, less downtime during production, less work in progress, and

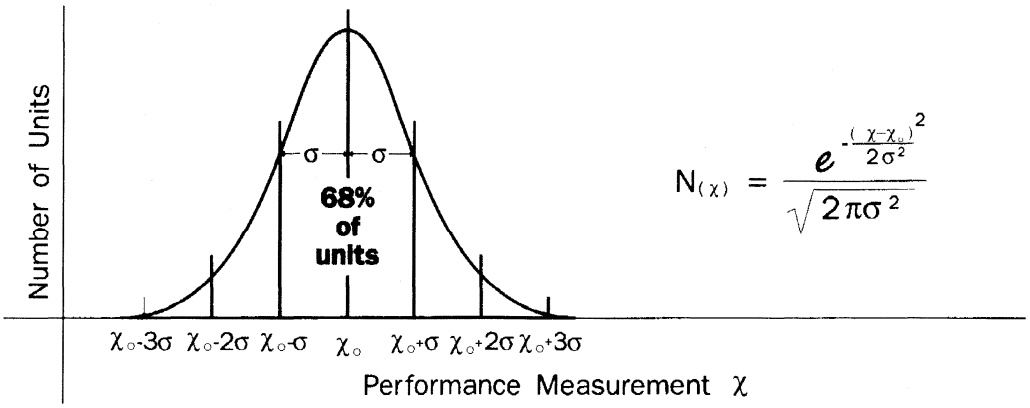


Figure 1. The normal curve, or Gaussian distribution of units, having a standard deviation of sigma, σ.

faster throughput. The benefits are interactive and multiplicative in scope. Together they produce enormous reductions in the vendor's manufacturing costs, placing him in a more competitive and profitable position.

The customer's benefits go on. Parts that are low-cost, defect-free, that offer high consistency and reliable performance even under adverse field conditions, assure the customer of a smooth flow of complex system production runs. What better "super-salesperson" can a vendor find than having its components on the customer's assembly line which meets this *world class* definition?

Good yesterday isn't good enough today.

How does a company produce highly consistent, reliable, high performing products? By the dedication of its people and resources to this lofty objective. By religiously applying statistical process control (SPC), pre-control, design of experiments (DOE), and test of its manufacturing processes and product quality. By the ongoing re-evaluation of its designs, manufacturing methods and test techniques, no matter how time proved they are thought to be. Being good enough yesterday is just not good enough for today's market. You've got to be better. It's necessary to apply religious zeal to the learning of new ways and their application to world clas quality.

Achieving world class quality requires a religious pursuit of design and manufacturing control

Of course, it's easy and convenient to live with old, established methods that everyone finds familiar; it's both difficult and an investment of time to learn new tricks. But the quest for quality improvements demands changes. New or revised references and criteria will be required for many steps in the manufacturing process. All details and drawings relating, for example, to such procedures as dispensing epoxy to seal a package or performing a wire-to-metal conductor weld must be closely examined, and the criteria to be met for each operation carefully specified. Then, means to monitor performance must be devised. When it is found that the criteria are not met, steps must follow immediately to improve the manufacturing procedure. Sure, it's a long, demanding undertaking; but that's how you really learn how to control your manufacturing processes. It's an investment that pays off.

The Sigma Connection

At Mini-Circuits, a ±4.5-sigma criterion defines acceptable unit-to-unit repeatability. Let's discuss what this means. Sigma is a statistical measure of the Gaussian variability around a mean value (as many measurements fall above as below the mean value). In a "normal distribution," described by the familiar bell-shaped Gaussian curve (Figure 1), the number of units which fall within one standard deviation (a 1-sigma) is 68 percent of the total number. Accordingly, 32 percent fall outside (either above or below) the 1-sigma limits. Measurements of components that have equal chances of being higher than a given measurement and lower often can be approximated by a Gaussian distribution, which is symmetrical about a mean value. Also, due to symmetry, the mean and average values for Gaussian distributions are identical.

With 99.7% acceptability (a 3-sigma criterion) of everyday events, expect 18 airplanes crashing per day, 8,000 pieces of mail lost per hour.

Thus, if a lot consists of parts which meet a 1-sigma acceptance criterion, then 68 percent of them, the integrated area under the curve between the + and - one sigma along the x coordinate, are acceptable. Tightening the process control such that the usable parts meet a 3-sigma limit means that 99.7 percent of the lot are acceptable. Sounds good? Not today. By this measure there would be 2,700 rejects in a 1 million piece lot. Keep in mind that you would be required to locate those 2,700 bad ones by screening the million (or live with this many rejected parts in the application for which they are intended). The goal of Motorola, Mini-Circuits and other quality-conscious firms is +6-sigma, translating to a non-centered distribution of less than 3.4 rejects in a one million piece lot.

Someone might ask: what's wrong with a 99.7 percent defect free process? Good question. Consider these applications of that criterion and decide how comfortable we might be with its implications. Expect about 18 airline crashes each day, expect the Postal service to lose 18,000 pieces of mail each hour, and think of pharmicists mixing 3,700

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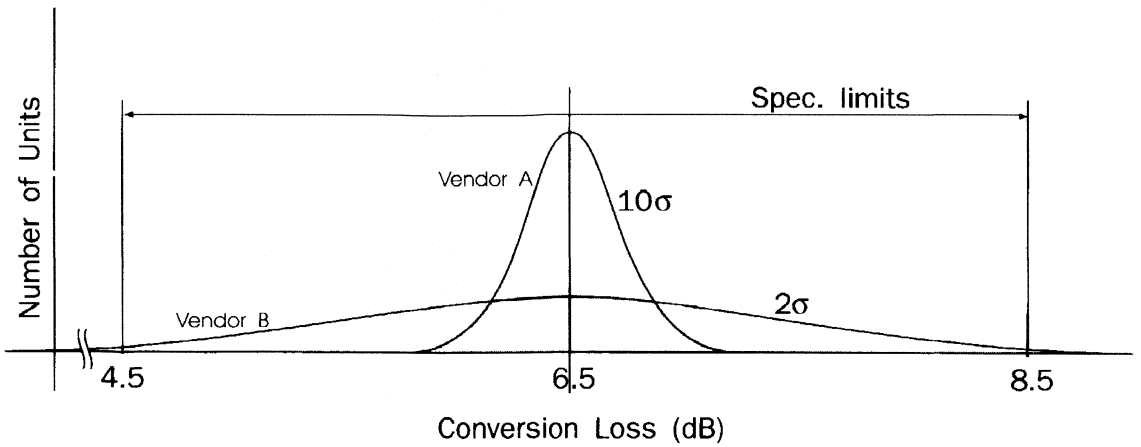

Figure 2. A comparison of mixers with 2σ and 10σ conversion loss distributions.

incorrect prescriptions daily. Then how does 99.7 percent defect-free sound? Not good enough.

Let's return to the concept of quality, repeatability and sigma. But first a word of caution. Real manufacturing processes can be approximated by Gaussian distributions, but this may not always be exact. For example, in making 1dB average insertion loss switches, it might be possible to experience a loss in one unit of 2dB (1dB above spec), but it's not equally likely to measure an insertion loss of 0dB (1dB below spec). Discretion must be used to limit the Gaussian model to excursions about the mean (or average), for which the Gaussian's symmetry and shape are applicable.

Now consider an example. Assume that two vendors are advertising mixers with the same conversion loss spec: 6.5 dB typical, 8.5 dB maximum. Vendor A provides its customers with product which has a standard deviation of 0.2 dB, Vendor B provides 1dB (Figure 2). The conversion loss variation from the average value to the spec limit is $10\sigma_A$.

It's obvious from Figure 2 that Vendor A's parts will have a better repeatablitiy than those of Vendor B,

$$\text{SP (Sigma Performance)} = \frac{\text{Spec. Limit - Average}}{\text{Standard Deviation}}$$

$$= \frac{8.5 - 6.5}{0.2} = 10$$

and that therefore Vendor A's parts will be of greater value. The fact that Vendor A supplies 0.2dB standard deviation is clear evidence that it has better control over its manufacturing process than does Vendor B. The two curves in Figure 2 have been drawn so that their total areas are equal, corresponding to the same number of parts built by both vendors.

Consider another example. One of our components has a VSWR spec corresponding to an input impedance between 25 ohms (min) and 50 ohms (max). To assure close unit-to-unit repeatability, we set our criterion of 4.5-sigma. Since the average is 37.5 ohms and the total variation is 12.5 ohms either way, the standard deviation is 2.8 ohms (12.5/4.5). Thus, even though the specification allows a variation from 25 to 50 ohms, the majority (68%) of the units will be within 2.8 ohms of the average value of 37.5 ohms, that is from 34.7 - 40.3 ohms.

If unit-to-unit repeatability is indeed critical, shouldn't engineers include sigma limits in the specifications that they write. Absolutely. We have been delivering production orders for quite some time with sigma limits specified. In fact, we are presently updating our data sheets and ads to include guaranteed sigma levels. That's how important we feel sigma specifications are to the design community. We at Mini-Circuits have dedicated ourselves to achieve the goal of sigma performace (SP) of 4.5.

The sigma limits, to define unit-to-unit repeatability, offer a new opportunity horizon for competitiveness

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The concept of sigma and statistical process control opens a new horizon of requirements and opportunities for communicationg and measuring product performance and reliability. More importantly, it is the new playing field of competition. I strongly advise managers to become familiar with these concepts, and to invest in in-house training seminars to teach them to all personnel.

Convince your staff that you welcome their inputs to achieve world class quality for your products. Then listen attentively to their suggestions for process refinements, and encourage active participation by all levels of personnel in quality enhancements.

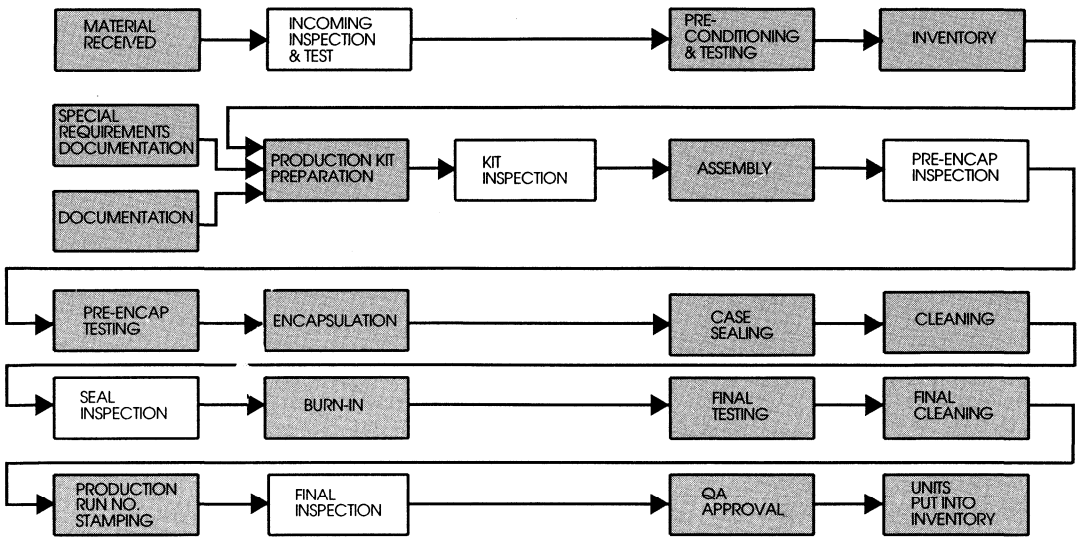
I'm damn mad and won't take it anymore.

The recent hit song *Be happy, don't worry* carries a pleasant and joyful message. But the philosophy expressed doesn't apply to recapturing lost market share or to restoring lost profits. More appropriate is the proposition expressed in the movie *Network* by which parties are urged to stand up and shout, "I'm damned mad and won't take it anymore." There has been enough talk about trade imbalances and restrictions. Let's get back to the basics. Learn how to produce products better than the competition, with world class quality. That is the way to restore our leadership position.

Mini-Circuits Guarantees Quality

Although we have gone beyond our past objective of exceeding 0.1% AQL- no rejects, not even one per 1000 units-this is not satisfactory anymore. Our present commitments are to achieve a Cpk of 1.5, or 4.5 sigma: not even 4 rejects per million units. Mini-Circuits' process controls using SPC, pre-control and design of experiments reduce variability of performance. "Skinny Sigma" is our way of life and it can be yours. Specify Mini-Circuits RF signal processing components to reduce your inspection costs and improve your production yields.

How Mini-Circuits achieves high reliability



Environmental Specifications

All MCL products are manufactured under exacting quality assurance and control standards. As a minimum they will meet published specifications after being subjected to any or all of the following physical and environmental tests of MIL-STD-202, unless otherwise noted. For amplifiers, see the table of environmental specifications at the beginning of the amplifier section of the Handbook.

Rating or Test	MIL-STD-202		Package Type			
	Method	Condition	Hermetic	Nonhermetic		
				Metal	Plastic	Connectored
Temperature Operating, °C (1)	—	—	-55 to 100	-55 to 100	-22 to 85	-55 to 100
Temperature Storage, °C (1)	—	—	-55 to 100	-55 to 100	-55 to 100	-55 to 100
Altitude: 150,000 feet	105	E	Yes	Yes	Yes	Yes
Humidity: 90% RH, 65°C	106	—	Yes	Yes(2)	(3)	Yes (2)
Thermal Shock: -65 to 125°C	107	B	Yes	Yes	-55 to 100	-55 to 100
Fine Leak, atm-cc/s	112	C	$1x10^{-7}$	Not Appl.	Not Appl.	Not Appl.
Gross Leak, atm-cc/s	112	D	$1x10^{-5}$	Not Appl.	Not Appl.	Not Appl.
Drop: random, 45 minutes	203	—	Yes	Yes	Yes	Yes
Vibration: 2 to 2000 Hz, 20 G's, 12 hours	204	D	Yes	Yes	Yes	Yes
Solderability: 95% coverage	208	—	Yes	Yes	Yes	Not Appl.
Solder heat: 260°C 10 seconds	210	B	Yes	Yes	Yes	Not Appl.
Terminal tensile strength: 4-1/2 lbs, 10 seconds	211	A	Yes	Yes	Yes	Not Appl.
Terminal fatigue: 2 lbs 3 cycles	211	C	Yes	Yes	Yes	Not Appl.
Mechanical shock: 100 G's, 6ms	213	I	Yes	Yes	Yes	Yes
Solvent resistance	215	—	Yes	Yes	Yes	Not Appl

For surface mount models, see surface mount environmental specifications in General Information (section 0).

Notes:
1. Extended temperature ranges are available for some models; consult factory.
2. Nonhermetic metal-cased units may require bake-out after test to restore full performance.
3. Humidity capabilities of plastic-cased units available on special request.

CAPD now available! computer-automated performance data

In Stock...Immediate Delivery

For custom versions of standard models consult our applications dept.

Product Testing For High Reliability

Ultra-Rel

Mini-Circuit's mixers, phase detectors, frequency doublers and limiters are "Ultra-Rel": They carry a five-year guarantee, a reliability breakthrough attributed mainly to unique Ultra-Rel diodes that easily meet and exceed MIL-STD-883 tests. Each type of diode must pass the following grueling tests:

LIFE	1000 hrs. TA + 125°C, 50 mA ac
THERMAL SHOCK	-65° to +125°C, 200 cycles, 5 min. dwell
MECHANICAL SHOCK	1.5k G's, 0.5 μsec pulse
VIBRATION	variable frequency 20 to 2,000 Hz.
TEMPERATURE CYCLE	-65°C to +125°C, 200 cycles, 10 min. dwell
AUTOCLAVE (pressure pot)	14.7 psi, TA + 121°C, 96 hr.
85/85	85°C/@85%humidity 168 hr., no bias
ACCELERATED HI-TEMPERATURE STORAGE	300°C, 325°C, 350°C storage until 50% failures

HTRB Testing

Certain models, identified individually in the catalog, instead have their diodes subjected to high-temperature, reverse-bias (HTRB) testing. This is an accelerated-life screening test generally reserved for space applications. Here the Schottky and PIN diodes are subjected to a one volt negative bias at 150°C for 168 hours. The objective of this accelerated aging stress is to force time/temperature related failures and thus screen out potentially unreliable devices.

/MIL, TX, and Hi-Rel Products

All hermetically sealed MCL models can be subjected to screening and to environmental testing. These tests are designed to eliminate early failures and to ensure performance in hostile environments. Many models having such testing performed are available from stock parts, designated by a /MIL, TX or Hi-Rel suffix to the model number. For your convenience, the table below summarizes availability and applicable MIL Spec by product line. A brief description of the test procedures follows the table.

Of course, if you have a specific screening requirement for any model, which is not available from a stock item, or for a non-hermetic model, contact our Applications Engineering staff and they will suggest the most cost-effective means of satisfying your reliability needs.

/MIL Models

Mixers, Frequency Doublers and Phase Detectors are tested in accordance with MIL-M-28837. Pre-conditioning, Group A (screened) and Group B are performed on each inspection lot.

Power Splitters are tested in accordance with MIL-P-23971. Group A and Group B are performed on each inspection lot.

These models may be ordered by adding the suffix /MIL to the model number.

Product Line	Applicable Suffix *TX	*Hi-Rel	*/MIL	Applicable Std. or Specification for reference
Amplifiers	Not applicable	No	No	MIL-STD-883
Digital Step Attenuators	Not applicable	No	No	MIL-STD-883
Directional Couplers	Not applicable	Yes	No	MIL-C-15370
Electronic Attenuators/ Switches	No	Yes	Yes	MIL-M-28837
Filters	Not applicable	Yes	No	MIL-F-18327
Fixed Attenuators	Not applicable	Yes	No	MIL-A-3933
Frequency Doublers	Yes	Yes	Yes	MIL-M-28837
I & Q Modulators and Demodulators	No	No	No	MIL-M-28837
Limiters	No	No	No	MIL-M-28837
Mixers	Yes	Yes	Yes	MIL-M-28837
Phase Detectors	No	Yes	Yes	MIL-M-28837
Phase Modulators	No	No	No	MIL-M-28837
Power Splitter/ Combiners	Not applicable	Yes	Yes	MIL-P-23971
Switches	Not applicable	Yes	No	MIL-STD-883
Terminations	Not applicable	No	No	MIL-D-39030
Transformers	Not applicable	Yes	No	MIL-T-55631

*Check with our Sales Department for specific models available as Hi-Rel. /MIL or TX..

TX Models

TX Models employ hermetically sealed diodes which have passed the following tests in accordance with MIL-STD-750:

1) HIGH TEMP. STORAGE	Method 1032
2) TEMP. CYCLING	Method 1051, Cond. C
3) CONSTANT ACCELERATION	Method 2006 (Y1 Orientation, 20,000 G's)
4) FINE AND GROSS LEAK	Method 1071, Cond. C and H
5) BURN-IN	Method 1038, Cond. B

The end product is then further screened by being subjected to:

1) THERMAL SHOCK	MIL-STD-202, Method 107, Cond. A (100°C)
2) BURN-IN	96 hours at 100°C with 8mA at 1KHz
3) FINE AND GROSS LEAK	MIL-STD-202, Method 112, Cond. C and D

These models may be ordered by adding the suffix TX to the model number. Also, some models in the product lines having a "No" entry in the TX column of the table may be available with similar screening on special order.

Hi-Rel Models

Mixers, Phase Detectors, Frequency Doublers and Electronic Attenuators/Switches are tested to the following per MIL-STD-202:

1) THERMAL SHOCK	Method 107, Cond. A (100°C)
2) BURN-IN	Method 108, Cond. A (100°C, 8mA ac)
3) FINE AND GROSS LEAK	Method 112, Cond. C and D

Powersplitter/combiners, Directional Couplers, Transformers, Fixed Attenuators, Filters and Limiters are tested to the following per MIL-STD-202:

1) BAKE-IN	Method 108, Cond. A (100°C, no excitation)
2) THERMAL SHOCK	Method 102, Cond. A (100°C)
3) FINE & GROSS LEAK	Method 112, Cond. C and D

Switches incorporating PIN diodes are tested to the following per MIL-STD-202, as a minimum:

1) THERMAL SHOCK	Method 107, Cond. A (100°C)
2) BURN-IN	Method 108, Cond. A (100°C, diode current applied)

For additional tests applicable to specific switch models, please consult our Sales Department.

These models may be ordered by adding the suffix Hi-Rel to the model number.

Meeting Customer Needs

The following table outlines generic types of tests we do to satisfy customer's needs per specific contractual requirements. Each entry encompasses one or more QCPs (Quality Control Procedures) which are particularized as to test conditions. The principal MIL standards referenced in the QCPs are listed as a guide.

MINI-CIRCUITS QCP GROUP	TEST	METHODS OF MIL-STD -202	-810	-883
02-00	THERMAL SHOCK	107	503	1010
03-00	RANDOM VIBRATION	214		
04-00	MECHANICAL SHOCK	207,213	516	
05-00	CONSTANT ACCELERATION	212		2001
06-00	BAKE-IN/BURN-IN	108		1015
07-00	SEAL TESTS	112		
08-00	MOISTURE RESISTANCE	106	507	
09-00	RADIOGRAPHIC	209		2012
10-00	SINE VIBRATION	201	514	
11-00	HIGH FREQUENCY VIBRATION	204		
12-00	HUMIDITY	103		
13-00	ALTITUDE (BAROMETRIC PRESSURE)	105	500	
14-00	SALT-SPRAY	101	509	
15-00	TERMINAL STRENGTH	211		
16-00	RESISTANCE TO SOLVENTS	215		
17-00	SOLDERABILITY	208		
18-00	RESISTANCE TO SOLDERING HEAT	210		
19-00	IMMERSION	104		
20-00	EXPLOSION	109	511	
21-00	SAND AND DUST	110	510	
22-00	FUNGUS TEST		508	
25-00	PARTICLE IMPACT NOISE DETECTION (PIND)			2020

Connector Specifications

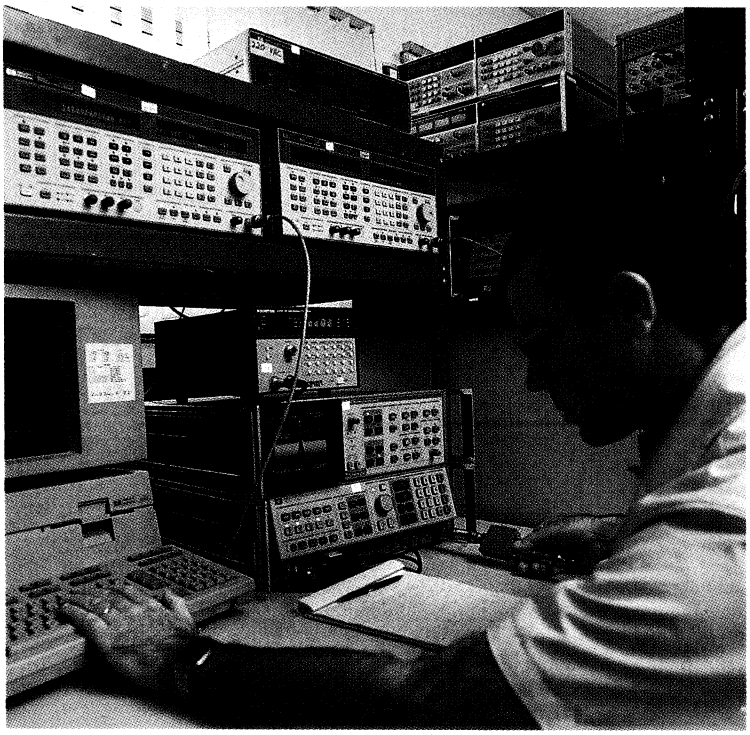
All coaxial connectors used in MCL products meet applicable requirements of MIL-C-39012 including mating compatibility, coupling proof torque, contact retention, materials and finish durability.

In Stock...Immediate Delivery

For custom versions of standard models consult our applications dept.

QUICK RESPONSE
TO SUPPORT YOUR APPLICATIONS

...guides the customer through decision making on spec requirements...



...offer test procedures and statistical data...

Our team of dedicated Applications engineers are prepared to respond courteously, promptly, knowledgeably and patiently to questions and challenges posed by customers.

Although Mini-Circuits offers a wide variety of over 1,000 signal processing components listed in the Designer's Guide, there is often a need to meet a spec somewhat different than one listed for a standard catalog item. In such instances, here is how our Applications engineer proceeds:

1) Customers will be asked to review a Specifications Check List for the component requested. This sheet guides the customer through decision making on spec requirements and the most critical parameters for the intended application.

2) Our Applications engineer will work with our Design Engineering team to check the feasibility of designing a new product to meet the specific spec; of course, if modification of an existing product is possible, this approach can slash development time and costs.

3) If the design is indeed feasible, samples will be fabricated and tested to insure they meet the intended design goals, then shipped to the customer for final evaluation in the intended application.

Here is a brief summary of services available from our Applications Support team:

•Respond to technical questions regarding specs and performance of catalog components and applications of our products.

• Although our published Computer Automated Performance Data (CAPD) is very comprehensive, we strongly urge our customers to request more detailed data when their application needs dictate a closer look at specific measurement points. Our enormous database on catalog and custom models is offered, at no extra charge, to eliminate any need for guesswork.

•Analyze customer specifications and recommend, wherever possible, a catalog component that provides the optimum cost/performance selection.

•Discuss in detail MIL-specs that may appear confusing to customers first encountering them. What they mean, definitions of terms, and how to be in conformance are explained.

•Correlate customer's test requirements with those of our Computer Test department.

•Review customer's environmental requirements and suggest, where applicable, cost-effective solutions.

•After determining critical parameters dictated for a customer's requirement, offer test procedures and statistical data to most effectively focus on those parameters.

•Keep customers aware of our latest new products during discussions of applications and new system designs.

•Interface with customers requesting Return Merchandise Approval (RMA). Quite often a courteous and thorough discussion relating to a component's failure to meet specs may be traced to improper test setup, poor matching, or other problems at the customer site. Suggested solutions often negate the need to return the product.

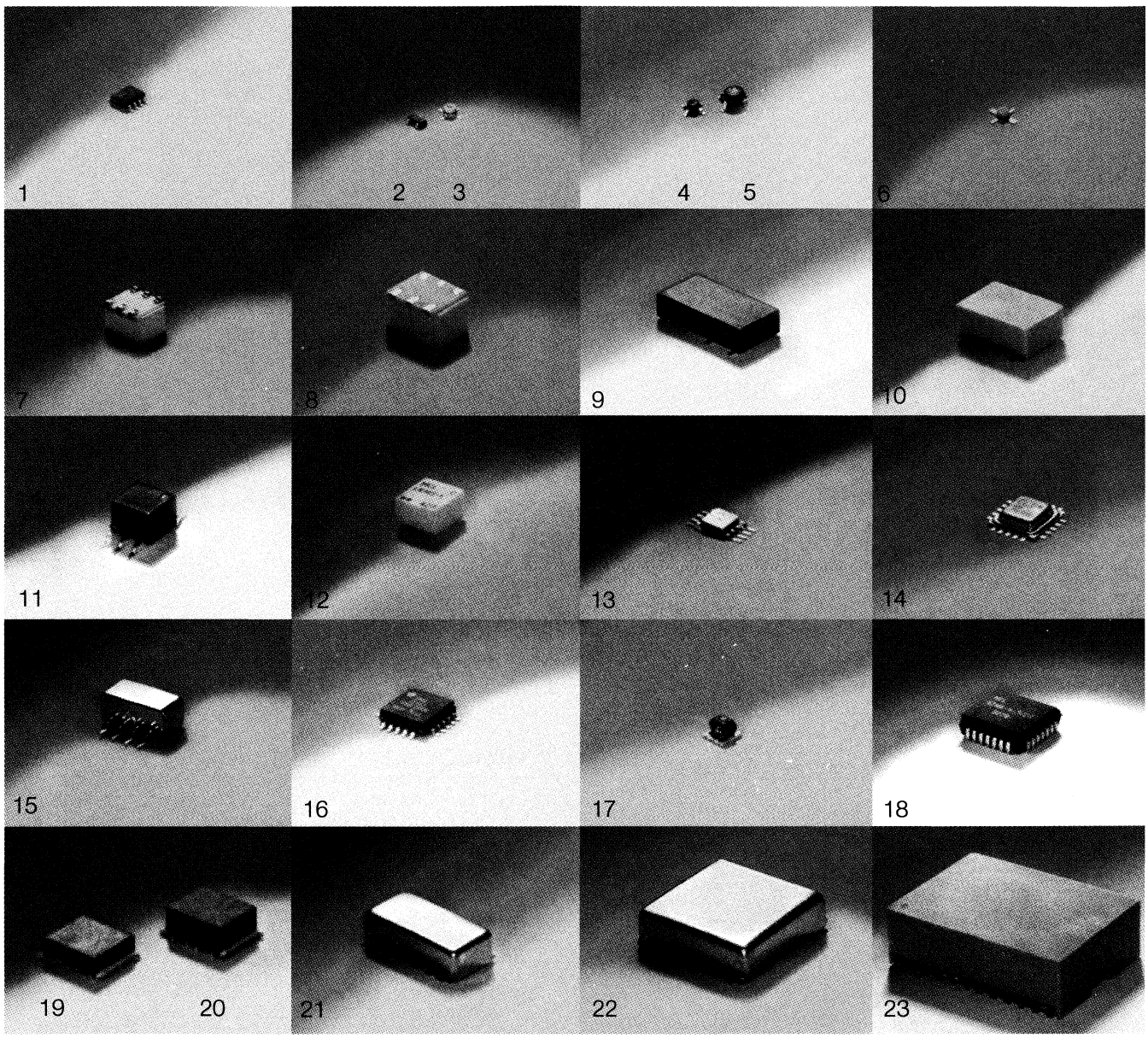
•Respond to customers requests for literature. Quickly send catalogs, notes, computerized test data, statistical data or new product data.

We encourage our customers to take full advantage of our Applications Support group's expertise. Contact us with any questions you may have, problems we may be able to solve for you, and assistance on recommending products in our catalog line or developing new designs for your next generation system. We promise a prompt, courteous, and perceptive response.

Mini-Circuits® P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 Fax 417-335-5945 EUROPE 44-1252-835094 Fax 44-1252-837010

Mini-Circuits®

surface mount devices actual size



Case Style		Series Name
1	XX211	VNA, MSWT, MSW, MSWA
2	MMM168	VAM
3	AF190	RAM
4	WW107	MAR-SM, ERA-SM
5	RRR137	MAV-SM
6	AF320	PAT
7	BH292	JMS, JPS, JDC
8	TT100	RMS, RPQ, RAS, TX
9	YY101	SCM, SCPQ, SCP
	YY161	SCPJ, SCPQ, SCDC, SCLF
10	BJ293	JYM, JYPS
11	KK81	ASK, T, TT
12	QQQ130	LRMS, LRPQ, LRPS, LRAS, LRDC
13	XX112	KSW, KSWA, KSWHA

Case Style		Series Name
14	AG191	VSW, VSWA
15	NNN150	TUF-SM
16	KKK155	YSW, YSWA
17	AT224	TC
18	AN213	GSWA
19	TTT166	SYM, SYAS
	TTT167	SYM, SYPD, SYAS, SYPS
20	AH202	SYPQ
21	BK276	JSIQ, JSPQW, JSPHS
	BK343	JSPQ
	BK377	JTOS
22	BG291	JCIQ, JCPS
	BG419	JCOS
23	BL301	JEBT

ALL CATALOG ITEMS GUARANTEED TO BE ***SHIPPED WORLDWIDE WITHIN 1 WEEK!***

FOR CUSTOM PRODUCTS AT CATALOG PRICES CONTACT OUR APPLICATIONS DEPT.

AVAILABLE ON TAPE & REEL

surface mount environmental specifications

All MCL products are manufactured under exacting quality assurance and control standards. As a minimum they will meet published specifications after being subjected to any or all of the following physical and environmental tests of MIL-STD-202, unless otherwise noted.

Rating or Test	MIL-STD-202		Package Type	
	Method	Condition	Hermetic	Nonhermetic
Temperature Operating, °C (1)	—	—	-55 to 100	-20 to 85
Temperature Storage, °C (1)	—	—	-55 to 100	-55 to 100
Altitude: 150,000 feet	105	E	Yes	—
Humidity: 90% RH, 65°C	106	—	Yes (2)	—
Thermal Shock	107	B	-65 to 125°C	-55 to 100
Fine & Gross Leak	112	C&D	$1x10^{-7}$	Not Appl.
Solderability: 95% coverage	208	—	Yes	Yes
Solder heat (3)	—	—	Yes	Yes
Solvent resistance	215	—	Yes	Yes

Notes:
1. Extended temperature ranges are available for some models; consult factory. Operating Temperature for RAM models, -55°C to 125°C and VNA, -40°C to 70°C, or as noted on spec. page.
2. Humidity not guaranteed for VSW, VSWA models.
3. Peak temperature during reflow soldering 230°C, see typical profiles page 22, Technical Section.

understanding surface mount

The main reason for the utilization of surface mount technology today is PWB area efficiency and the corresponding reduction of the system volume. Small surface mount components are used to manufacture electronic assemblies that are significantly smaller than the similar function assemblies using thru-hole components. Usually, the board area for most systems can be reduced by a factor of two for a single sided board. When components are mounted on both sides of the board, size reduction by another factor of two can be achieved. Conversely, the functional density can be doubled in the same area with the use of surface mount components. Since the height of surface mount components are generally smaller, significant reduction in system volume can also be achieved. Fewer, denser assemblies and correspondingly fewer connectors, less mechanical hardware and shorter lead lengths can yield another reduction factor of 2 to 4. Add to that the use of Application Specific IC's (ASIC's), and a total volume amounting to approximately 20 percent of the original system can result.

Size reduction however, is not the only SMT benefit. As a secondary benefit, the ever increasing demand for higher speed circuitry causes time delay reductions of even nanoseconds to be beneficial. Typically, an SMT package will have significantly lower values of inductance, capacitance and resistance compared to dual in-line packages (DIP). This is shown in the table below.Surface mount assembly essentially is a four step manufacturing process:

1 Print the solder paste
2 Place components
3 Reflow the paste to form the solder interconnection between the component and the land area on the PWB
4 Clean-up

The use of a pick-and-place machine can perform the equivalent function handled by 3 to 4 machines in a standard thru-hole assembly area. Additionally, an automated SMT manufacturing line conserves space, uses fewer people, has a shorter cycle time and reduces work in progress inventory. This helps achieve higher yields through more rapid feedback and use of statistical process control data. In all, the savings from automated SMT manufacturing can be as great as 50% compared to a thru-hole manufacturing area designed to build a similar electronic function.

SURFACE MOUNT VS. DUAL IN-LINE PACKAGES INDUCTANCE AND CAPACITANCE VALUE COMPARISONS

	DUAL IN-LINE PKG. (DIP)		SMALL OUTLINE (SO)		PLASTIC LEADED CHIP CARRIER (PLCC)	
LEADS	L (nH)	C (pF)	L (nH)	C (pF)	L (nH)	C (pF)
8	3.2-9.3	0.35-1.0	2.3-3.8	0.22-0.48	-	-
14	3.2-10.2	0.38-1.1	2.6-3.8	0.22-0.54	-	-
16	3.3-10.5	0.44-1.1	2.4-4.3	0.22-0.50	-	-
20	3.4-13.7	0.53-1.5	4.9-8.5	0.45-0.85	4.2-5.0	0.60-0.65
24	3.8-18.1	0.53-1.6	4.9-9.5	0.43-1.86		
28	3.8-14.4	0.58-1.7			5.3-6.9	0.70-0.75
40/44	3.8-15.3	0.60-1.9			5.2-6.6	0.75-0.80
64/68	7.1-28.1	0.63-2.4			5.1-6.4	0.78-0.83

Values given are Min. and Max.

most often asked questions about surface mount

Q. *What is the recommended temperature profile to be used for Mini-Circuits surface mount units?*

A. Use as low a temperature as will melt your solder paste and form properly wetting fillets. The solder-melt temperature should be maintained at the surface mount units for the minimum practical time to minimize thermal shock however, preheat at 2°C/second maximum rate and allow at least 2 minutes cool-down time.

Q. *What are some of the defects related to the soldering process that can occur and what is the possible causes?*

A. At a glance...here are some of the cause and effect relationships for common defects that can occur.

DEFECTS \ Possible Causes	Co-Planarity	Solderability	Metallurgy	Solder-Quality	Solder-Volume	Reflow Profile	Placement Accuracy	Land Design
Open Joints	X	X			X		X	
Tombstoning			X	X	X	X		X
Voids		X	X	X		X		
Solder Wicking	X		X			X		
Non-Wetting		X	X	X				
Incomplete Fillets	X				X		X	X
Poor Strength		X	X	X	X	X		
Solder Shorts					X		X	X
Solder Balls		X		X	X	X		
Intermetallics			X	X		X		
Appearance			X			X	X	
Component Cracking			X		X	X	X	X

Q. *Will Mini-Circuits units be capable of meeting performance specs after being subjected to my reflow process?*

A. Yes. As a guide, units built with a ceramic or epoxy-glass PC board base will withstand a reflow temperature profile which peaks for 6 seconds at 225°C, spends 90 seconds maximum above 200°C, 2.5 minutes above 175°C and 5 minutes above 150°C. This includes such units as RMS, JMS and SYM, for example. Unencapsulated models such as TC transformers will take more. They can be reflowed with 230°C peak, 5 minutes above 175°C and 7 minutes above 150°C.

Plastic molded amplifiers in the MAR-SM, MAV-SM and VAM series can be reflowed with 230°C peak, 8 seconds above 220°C, 25 seconds above 200°C and 20 minutes above 150°C. The corresponding maximum times for the ceramic-metal RAM amplifiers are several times longer, as shown on the specification pages.

Plastic GaAs switches with drivers such as YSW can withstand 240°C peak and 200°C for 4 minutes. The ceramic-metal VSW version will take 275°C peak.

Q. *How are Mini-Circuits mixers designed to resist internal solder melting during reflow process ?*

A. Mini-Circuits Ultra-Rel mixers are built tough! All internal connections are welded. Therefore, no solder joints can reflow because there are none.

Q. *With regard to cleaning methods which are being used in accordance with new environmental laws, will Mini-Circuits components stand-up after being subjected to aqueous wash?*

A. External surfaces will not be adversely affected. Many surface mount components are hermetically sealed or moisture proofed, and are not subject to any restrictions on cleaning fluids generally used on customers' assemblies. Moldid plastic units and some units which have polymeric seals may allow seepage, however. After a water rinse, bake-out of such units is usually necessary to remove moisture and ensure restoration of full electrical performance.

Use of defluxing agents which have non-volatile constituents is not recommended for units subject to seepage, because rinsing will not extract them effectively. Mini-Circuits offers low-cost open assembly and wash-through designs for applications using those defluxing agents.

Q. *What is the coplanarity of the leads on Mini-Circuits components?*

A. Mini-Circuits surface mount components meet the applicable coplanarity deviation limit in Appendix C of MIL- M- 38510, which is .004 inch (0.102 mm). This includes the KK81 case style. Some of the other gull-wing case styles may have slightly greater deviation. In any event, customers' stated requirements should be achievable.

Q. *What effect does the land size have on the strength of the solder joints?*

A. The strength of the solder joint is a function of the volume of solder paste, the area of land and the type of component lead. Smaller than optimum land sizes reduce the solder joint strength. Larger sizes provide more tolerance for the screen printer and the pick-and-place machine, but result in little additional joint strength.

Q. *What is the recommended spacing between lands?*

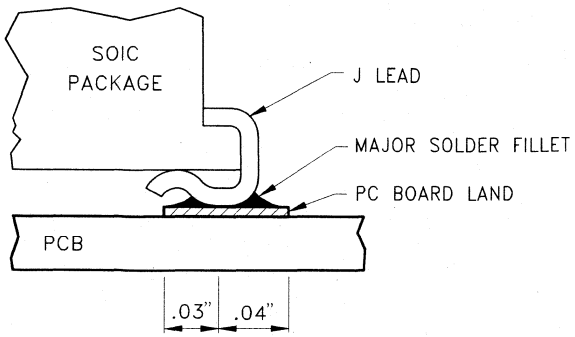
A. Maintaining 25 mil spacing between lands helps to minimize shorting due to solder bridging.

Q. *What are the advantages of JMS models compared with the RMS mixer?*

A. The leads raise the base of the unit above the user's printed wiring board. This higher profile facilitates removal of solder flux after mounting and allows visual inspection of solder connection. The shape of the J lead also allows the device to occupy the minimum area on the board and provides strain relief due to thermal stress. Additionally, the leads allow for easier removal from the printed wiring board for repair or replacement.

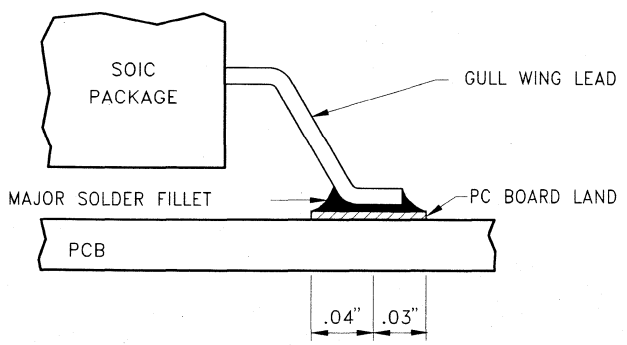
Q. *When using J leads, what is the position of the lands with respect to the package so the major fillet formation is optimized?*

A. The major fillet of the solder joint for the J lead is on the outside (the "heel") lead; therefore the contact point on the land should be slightly to the inside of the center of the land. A 0.07 inch land size is shown for illustration purposes.



Q. *...and what should the position of the land be for gull-wing leads?*

A. The heel of the gull-wing lead is on the inside, next to the package body. The major fillet is at the heel. Therefore, the land should be placed so that the greater portion of the land extends under the lead toward the body of the package.



Q. *Why is there more than one grounding lead on some Mini-Circuits surface mount components?*

A. Many components perform over wide frequency bands with high isolation between specific signal ports and low VSWR. To achieve this performance, reactances of ground-return paths of the units have to be controlled. Therefore, all ground leads should find a short electrical path to the ground plane, preferably via plated-through holes in the PC board. The holes should be located under or near the unit.

Q. *How much latitude does one have in bending the leads on a surface mount component?*

A. Leads can be bent at angles up to 90 degrees. Hold each lead near the body of the unit while bending, so as not to cause stress where it exits the body. Avoid repeated bends which might fatigue the material.

Q. *When soldered to PC board, are crimp leads mechanically strong enough to hold the unit down,or is additional anchoring needed?*

A. All Mini-Circuits surface mount components are designed so that normal soldering procedures are sufficient to hold them without additional anchoring.

Q. *Does Mini-Circuits 4.5σ repeatability apply to surface mount units?*

A. The 4.5σ repeatability specification applies to the same performance characteristics as for functionally equivalent Mini-Circuits models in other packages.

Q. *My application dictates a rugged surface mount mixer, but price is critical. What would you recommend?*

A. Consider Mini-Circuits TUF series. With all-welded internal and external construction, TUF models are the most rugged surface mount mixers in the world. These 0.5x0.2x0.25 inch metal cased units employ only four gull wings to simplify lead placement on PC boards. TUF mixers are priced low... from $3.95 each (qty. 10).

glossary of terms

COPLANARITY: The relationship between the leads of a component and the lands on a printed wiring board.

INTERMETALLICS: (Intermetallic Compound-IMC) Metallic compounds that form at the surfaces between different metals. IMC's typically have significantly different properties than the original metals, such as tensile strength.

LAND: The metal conductor surface on the substrate or PWB on to which the component lead is attached with solder.

METALLURGY: The art of working metals.

NON-WETTING: The characteristic of a metal surface where the solder comes in contact but does not form an intermetallic or metallurgical bond.

PRINTED WIRING BOARD: (PWB) Also called printed circuit board (PCB). The substrate, generally epoxy glass, used to provide component attachment lands and interconnections to form a functioning electronic circuit.

TOMBSTONING: Refers to a chip capacitor or resistor that is standing on one solder termination (also "drawbridging").

VOIDS: A cavity inside the solder, generally formed by gases trapped during cool down of the soldering step.

WICKING: The action that causes the solder to move from one area to another by wetting the surface of solderable metal.

MINI-CIRCUITS LIFE AND STRESS TEST RESULTS

Many Mini-Circuits mixers, representative of the entire gamut of surface-mount package styles, have been successfully tested under severe and prolonged stress conditions to prove their reliability. Both plastic and metal types, hermetic and non-hermetic are included. Mixers contain semiconductor diodes, in addition to parts and materials which are also used in other kinds of products. Therefore, if high reliability can be demonstrated for mixers, then it is assured for power splitters, directional couplers, transformers and other Mini-Circuits products as well, which are constructed in a similar manner. The results obtained prove the concept of "Ultra-Rel", described in this Handbook.

Tests Performed are in the Following Categories:

1) Thermal shock on 10 models in 8 package styles.
2) Mechanical shock and random vibration, on models in metal, ceramic and plastic case styles.
3) Life tests on TUF mixers. So far, more than 200,000 device- hours of burn-in and 1720 cycles of thermal shock have been accumulated, without failure.

Test Category 1, Thermal Shock:

This test includes the following Mini-Circuits models:

	Case Style	Package Type	Mounted on PC Board Type	Thick	Qty.
LRMS-2	QQQ130	Leaded RMS	OAK 602	.010	5
LRMS-2	QQQ130	Leaded RMS	G10	.020	10
LRMS-5	QQQ130	Leaded RMS	OAK 602	.010	5
LMX-158	BB48	Header, hermetic	OAK 602	.015	10
RMS-2	TT100	Plastic, leadless	OAK 602	.010	5
RMS-2	TT100	Plastic, leadless	G10	.020	10
RMS-5	TT100	Plastic, leadless	OAK 602	.010	5
SAM-2	A03	Header, hermetic	OAK 602	.015	10
SBL-1	A06	Metal, welded	OAK 602	.031	10
SCM-1	YY101	Plastic, short-lead	OAK 602	.031	10
SYM-11	TTT167	Plastic, leadless	OAK 602	.015	10
TUF-2SM	NNN150	Metal, welded	OAK 602	.015	10

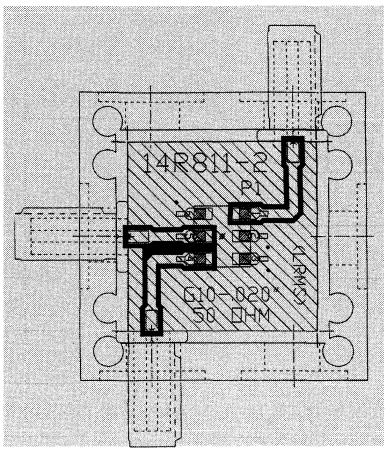
Each of the test samples was hand-soldered to a teflon-glass or epoxy-glass P.C. board, and mounted in an SMA-connectored housing similar to Mini-Circuits case style G15. A cut-out in the board accepts the body of the LMX units; the SAM-2 and SBL-1 units were modified for surface mounting by bending their leads into a gull-wing shape. The other models are all inherently surface-mount.

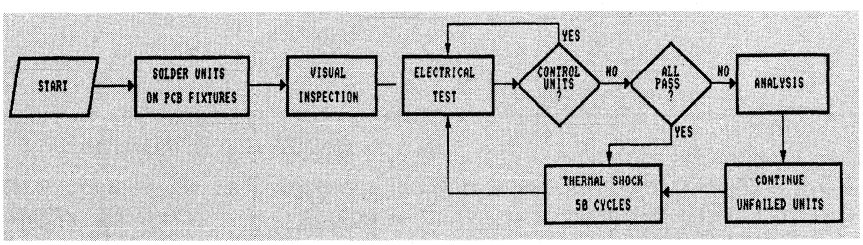
An important feature of this test is that it establishes the reliability not only of the devices themselves, but also their mounting integrity in a configuration representative of practical application. The test fixtures are designed to be optimum both mechanically and electrically. As an example, the fixture for RMS and LRMS models is illustrated at the top of the next column.

The test sequence is shown in the flow chart. Each thermal shock cycle is conducted as follows.

Step	Condition
1	-55°C chamber, 15 minutes
2	25°C transit, 5 minutes maximum
3	100°C chamber, 15 minutes
4	25°C transit, 5 minutes maximum

Initially, and after every 50 cycles of thermal shock, electrical tests are performed: conversion loss and isolation for all of the models, as well as compression and/or DC output at the IF port. One sample of each model is kept as a control, tested electrically each time but omitting thermal shock. At 250 cycles, 2 out of a total of 80 fixtures experienced disconnection at a P.C. board-connector joint. At 350 cycles, the extent of testing as of this writing, the first failure of a mixer itself occurred: one of the RMS-2 units suffered internal disconnection of its welded transformer wires due to loosening of the epoxy holding the cover to the ceramic base of the unit. Note that this is at more than 3 times the greatest number of thermal cycles specified in MIL-STD-202, Method 107 (100 cycles). Because of this failure, 10 more RMS-2 units were added to the test group. Electrical performance will continue to be measured after each 50 cycles of thermal shock.





Test Category 2, Shock and Vibration:

Fifty units each of TUF-1, RMS-1, LRMS-1 and other mixer models, having passed 100% production testing, were subjected sequentially to random vibration and mechanical shock per MIL-STD-202.

Random Vibration: Method 214, Condition I.A

Power Spectral density	.02 G^2/Hz, 100 to 1000 Hz
Overall rms G's:	5.35
Duration of test:	15 minutes per axis

Mechanical Shock: Method 213, Condition A

Peak G's:	50
Nominal duration:	11 ms
Waveform:	Half-sine
Velocity change:	11.3 ft/s

They were all then tested electrically for conversion loss, isolation, and compression.

The same 50 units of each model were then subjected to random vibration per Condition II.F of Method 214:

Power Spectral density .3 G^2/Hz, 100 to 2000 Hz

Overall rms G's: 24.06

Duration of test: 15 minutes per axis

followed by a repeat of Mechanical Shock as above. Finally, they were tested electrically for conversion loss and isolation. No failures occurred.

Test Category 3, Life Test:

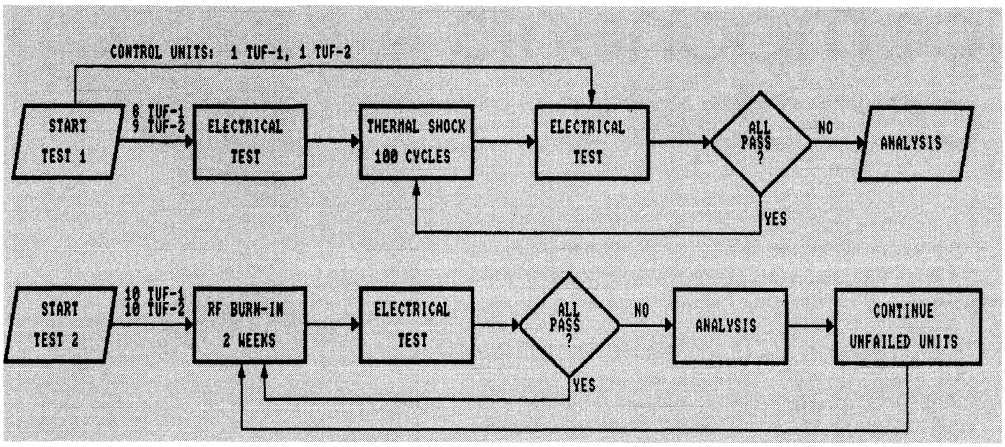
TUF mixers have all-welded construction, both internally for transformer wires and externally for the can-to-header joint. This is a unique design and manufacturing approach, and to establish reliability requires a testing regimen which proves compatibility of the materials and methods used.

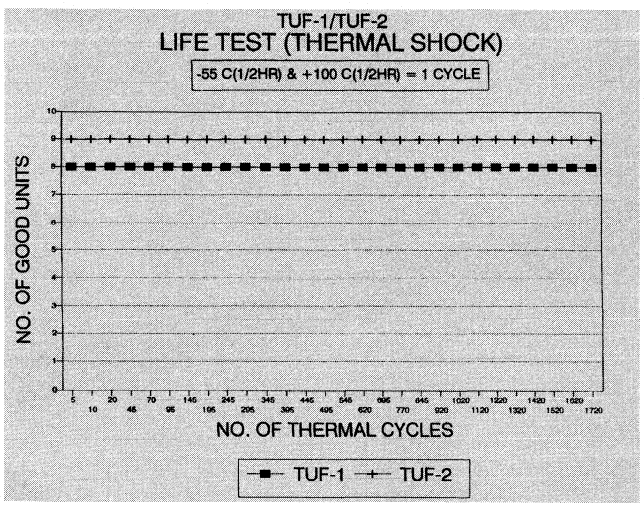
Two continuing life tests are being conducted for this purpose as shown in the flow chart: thermal shock, and RF burn-in at high temperature. Burn-in should determine MTBF. Thermal shock, together with the mechanical shock and vibration on TUF units reported in Test Category 2, evaluates the bonding methods and materials employed in their construction.

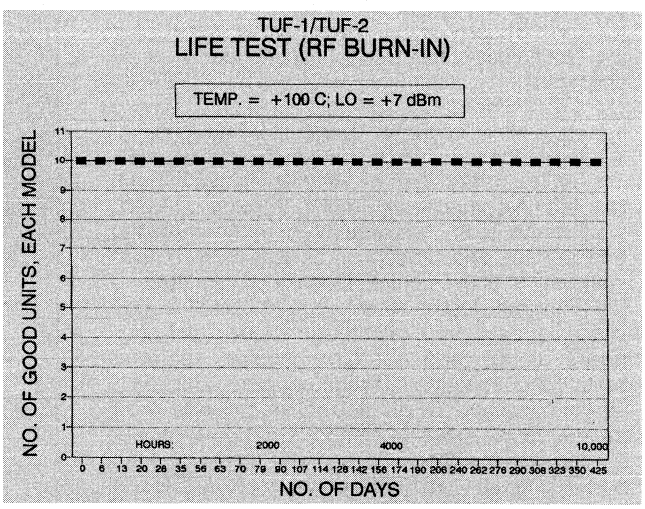
For thermal shock, 8 units of TUF-1 and 9 of TUF-2 are being cycled between temperature chambers at -55 and 100 degrees C, 1/2 hour each, with 5 minutes maximum transit time. Electrical tests - conversion loss, isolation and compression - are done every 100 thermal cycles, using a plug-in fixture. As a control, one TUF-1 and one TUF-2 in addition to the above are not cycled, but are tested together with the thermal shock units.

For burn-in, 10 units each of TUF-1 and TUF-2 are kept in a chamber at 100°C, with +7 dB LO power applied. They are taken out and tested for conversion loss every 2 weeks.

Results are shown in the graphs. With over 10,200 hours of burn-in (204,000 device hours or 23 device years) and 1720 thermal cycles as of this writing, no failures have occurred.







COMING: LASER SEALING FOR GREATEST RELIABILITY AND REDUCED COST!

Mini-Circuits is applying the latest in package sealing technology to its products: laser welding. It is being used to seal units having rectangular case styles such as "A" through "E" in this Handbook. These units are constructed with a cold-rolled steel header and a cupro-nickel can. They have customarily been closed using soft solder or spot welding to achieve hermetic or non-hermetic sealing, respectively. Laser welding has the promise of replacing both of these methods, to achieve hermeticity at a low cost comparable with spot welding.

A welded package has the potential for greater reliability, compared with solder sealing, for the following reasons.

1) There is no chance of loose solder balls being included within the package; this is of concern when particle impact noise detection (PIND) testing is required.

2) No flux is used for sealing. Even in careful soldering operations some flux is forever sealed inside the package. Because a mildly activated (RMA) flux is usually necessary to ensure wetting, there may be concern about long-term contamination in a solder-sealed unit.

3) Unlike solder sealing where the internal parts approach solder-melt temperature, the heat applied by the laser is highly localized and of short duration; the bulk of the unit remains cool.

4) Laser sealing, being an automated process, provides a joint of closely controlled depth and width. It cannot cause anything analogous to a "cold solder joint."

5) Mounting a solder-sealed device to a P.C. board runs some risk of unintentional reflow of the solder, and consequent loss of hermeticity. While minimal when the pins are soldered by hand, the risk is increased in wave or reflow soldering where more heat is conducted to the body of the device.

There are cost and functional advantages also.

1) In a solder-sealed unit the header must be recessed into the can by about .025 inch, to provide an inside corner for a solder fillet. When welding, this is not necessary; the header coin is flush with the edge of the can. This does three things:

a) There is more internal package height, affording greater design latitude for performance in a given overall package size.

b) External appearance is trimmer, and visual inspection is easier.

c) Performance at microwave frequencies improves because there is less unterminated pin length above the circuit traces on the board to which the device is mounted.

2) Solder sealing can raise protrusions and balls of solder inside the unit. These may cause shorting to package pins or other internal connection points, even if they are not loose. To prevent this, the design includes insulating barriers in the assembly. When welding is employed these precautionary materials are unnecessary and a lower-cost assembly results.

HOW IS LASER SEALING DONE?

Header assemblies are placed into cans which are held by a fixture in an X-Y array. The fixture is placed into the chamber of the laser welder, which is programmed to step-and-repeat its operation at each position in the array. The laser tracks the header-can seam all the way around the assembly, including the straight sides and rounded corners. As the seam is traversed the laser is pulsed, so that a series of overlapping dots of metal are melted and resolidified. The result is a continuous welded joint. The sealing operation takes place in the room environment, so that changing fixtures is quick and throughput is high.

custom components capability

• Our expertise in design and production techniques made us the leader in RF/microwave components. Now let it work for you.

• The on-going pressure for "smaller, lighter" low-cost systems with more-detailed specs often dictates the need for custom devices or super components to minimize pc board area to eliminate connectors, to reduce the number of connections to improve quality, and to lower cost of manufacturing. Not an easy task even for experienced systems engineers.

• Turn to Mini-Circuits for your custom designs . . . we've got the experience and talent. As the world's largest manufacturer of RF/microwave signal-processing components ranging from dc to 8GHz, our design team has mastered computer-aided design, test, and production as well as advanced statistical process-control techniques, established an awesome design database, and solved a wide variety of application-oriented problems. Our engineers design and combine mixers, splitters, switches, transformers, filters, couplers, amplifiers, attenuators, and QPSK and IQ modulators on a routine basis. A recent design is a 12-way power divider, well matched in phase and amplitude from port-to-port with specified repeatability from one unit to another and from one production run to the next.

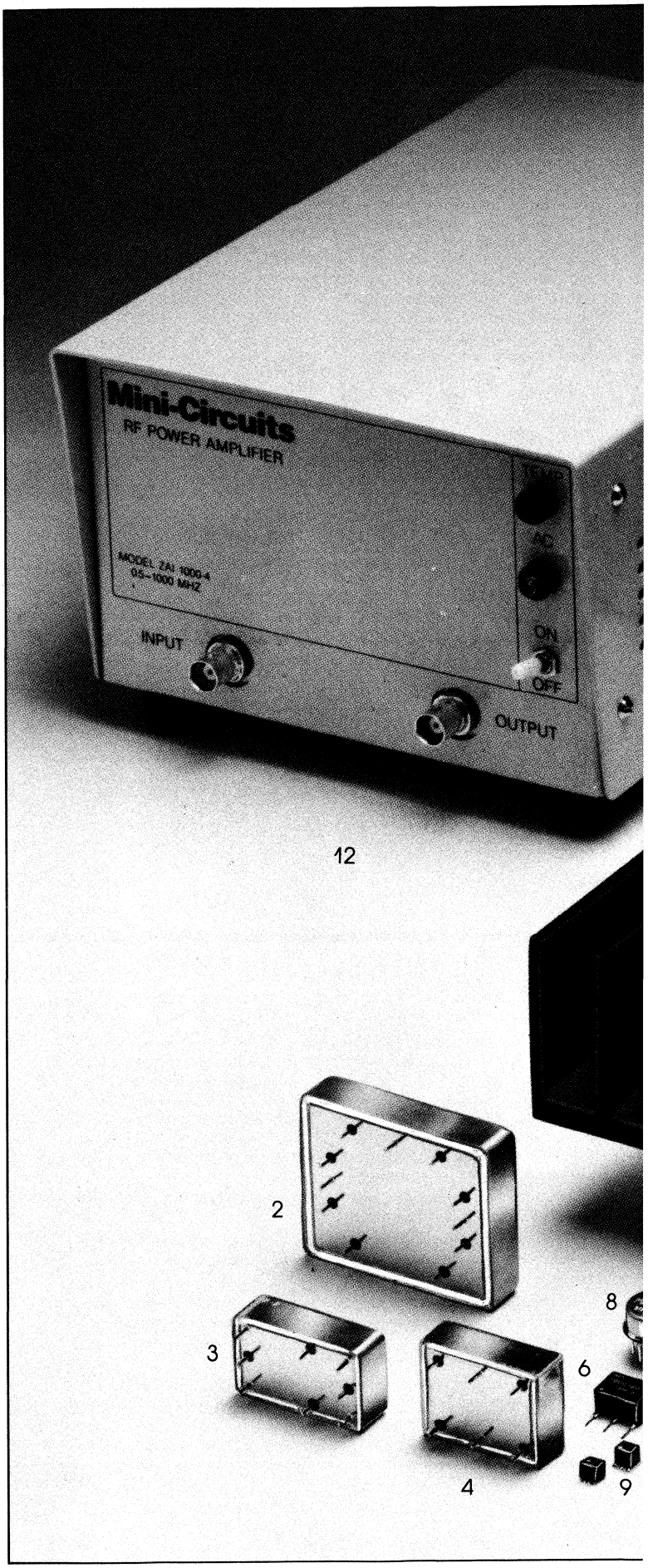
• Take advantage of Mini-Circuits' expertise for your custom design needs whether it be a filter with a very linear phase characteristic or a four-coupled port directional coupler or a sophisticated I-Q modulator . . . in the package you specify. We encourage you to contact our Applications and Design engineers with your systems and subsystems requirements. We'll provide a solid and reliable design, with typically four to six weeks turnaround.

• Mini-Circuits . . . fast, reliable, affordable custom designs.

RF Instrumentation Amplifiers, available now!

Model	Freq. Range (MHz)	Gain dB min	Power min. out (1 dB comp) dBm	Power min. out (1 dB comp) W	NF dB	Price $ ea.
TIA-900-10	100-900	28	+40	10	13	3695.00
TIA-1000-4	100-1000	19	+36	4	12	1995.00
TIA-1000-1R8	0.5-1000	35	+32	1.6	8	1495.00

All models operate from 110/220V ac.



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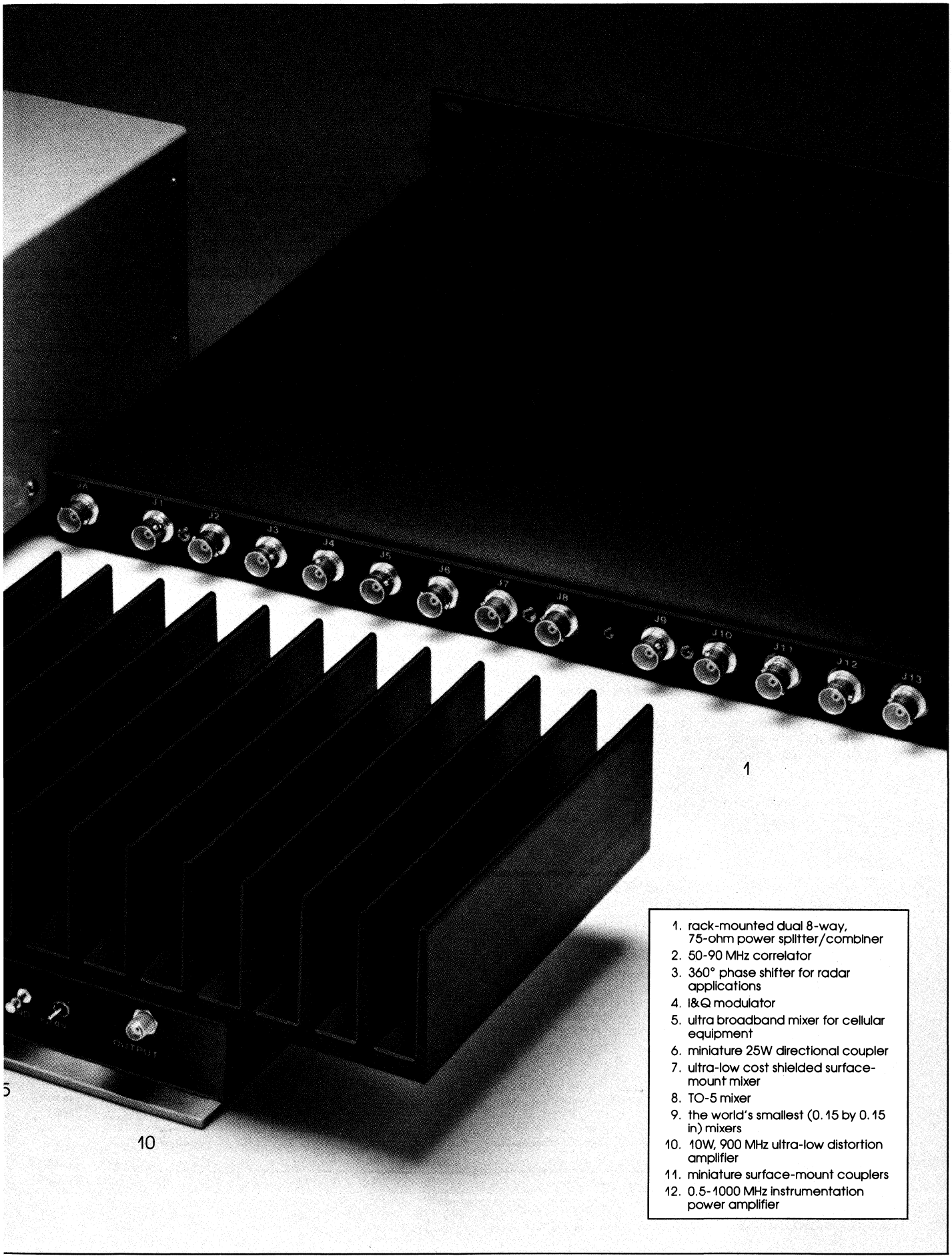
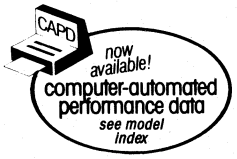


1. rack-mounted dual 8-way, 75-ohm power splitter/combiner
2. 50-90 MHz correlator
3. 360° phase shifter for radar applications
4. I&Q modulator
5. ultra broadband mixer for cellular equipment
6. miniature 25W directional coupler
7. ultra-low cost shielded surface-mount mixer
8. TO-5 mixer
9. the world's smallest (0.15 by 0.15 in) mixers
10. 10W, 900 MHz ultra-low distortion amplifier
11. miniature surface-mount couplers
12. 0.5-1000 MHz instrumentation power amplifier



computer-automated performance data

Eliminate guesswork in systems design. Why extrapolate specs from data sheets when Mini-Circuits provides the most detailed data (CAPD) ever made available for off-the-shelf catalog products?
Traditionally, the system designer selected his RFmicrowave components, such as mixers, power splitters, and amplifiers, using manufacturers' spec sheets to provide spec limits, and environmental ratings. Indeed, the design engineer did receive a workable package of information to see how his design might proceed . . . but it was not a detailed, close-up look. The reason is simple-it has just been too expensive to take comprehensive data at a considerable number of specific frequencies, tabulate the results and then repeat at other parameter levels.
Mini-Circuits' major commitment to customer service is evidenced by this new handbook of computer-automated performance data (CAPD), over 600 pages of data. Based on over 25 years of RF test experience, the CAPD data provides detailed performance characteristics not previously available; specific details will be discussed.

CAPD is a powerful tool

A profound question to address: is CAPD merely a higher stack of paper loaded with numbers or is it really a significant innovation of enormous value to design engineers?
If you are a design engineer, you have been (or will be) troubled by such challenges as: how will a selected +7dBm LO level mixer perform with less than +7dBm LO available, how will a power amplifier designed for +15V operation function with only +12V supplied, are there any narrow-band resonances in a particular filter, to what extent will harmonic and intermod signals plaque your design, and what is the out-of-band performance of an amplifier?
More of the same traditional paperwork won't provide answers to the above issues. You can, by using CAPD.
CAPD is provided for all models in this handbook. Several examples of truncated data are shown on the facing page in order to show samples of the data contained in this handbook.

CAPD is reliable

A heavy investment by Mini-Circuits in computer-controlled HP test equipment, as well as years of engineering time, allows highly precise measurements to be made rapidly. Accuracy is ensured by the use of instruments and standards subjected to rigorous calibration.
Here is an example of the stringency with which the computer-automated setup operated: for the critical measurement of mixer harmonics and intermodulation products, each point is measured three times, with a maximum allowable deviation of less than 0.05 dB between the three; otherwise the test is repeated. Before each measurement is taken, the computer checks the reference voltage level for any variation due to line voltage, temperature, etc., and then makes changes and compensates as required. Such continuous and rapid inspection and correction ensure highly-reliable CAPD data. And, by using a large number of closely-spaced frequency points for component measurement, effect of narrow-band suck-outs or resonances are immediately identified.
For Mixers, Power Splitters the CAPD represents the typical performance of a production unit. For all other models the CAPD is an average of 5 production units and the performance curves are of a production unit.

See the opposite page for an easy-to-view sampling of our data pages found in this handbook

a close-up view of performance

frequency mixers

Assume you are specifying a double-balanced mixer for a wideband front-end design. Here are some questions you may face:

- In a wideband design, the local oscillator (LO) output might vary over the band and could fall below the level required by the mixer spec. Should you spend additional money to flatten LO output or boost LO output if it is not sufficient? . . . Wouldn't it be valuable to know exactly how performance will be affected, since you might find performance acceptable without any additional investment? With CAPD, a close point-by-point printout of key parameters as a function of LO levels lets you make your decision based on a close-up view of LO drive effects on mixer performance.
- How will mixer conversion loss and VSWR affect receiver sensitivity over the full frequency range? CAPD pin-points the details.
- Harmonic and intermod signals invariably may plague your system design. Questions such as the spurious level of a 4th harmonic of the LO mixing with the 5th harmonic of the RF can easily be determined for the particular mixer you have chosen. In addition, by providing harmonic charts at the mid-band LO, and RF input frequencies, the data is extremely useful and realistic.
- In a phase detector, it may be critical to know how DC offset voltage varies with frequency. Most mixer specs list DC offset at only one frequency; with CAPD, this parameter is given over the full range of frequency.

directional couplers and power splitters

If you are specifying directional couplers or power splittercombiners in your system, you can now closely examine how VSWR, insertion loss, isolation and amplitude phase unbalance vary at closely-spaced points over the frequency range of interest.

filters

Filters particularly benefit from the availability of finely- stepped data, because by design they have sharp variations in response with frequency. CAPD provided in this handbook, at 40 frequency points, tabulate amplitude, phase, group delay, and group-delay variation data, as well as VSWR in both passband and stopband.

amplifiers

Amplifier performance is clearly shown with CAPD as a function of DC power supply changes. You'll quickly spot how VSWR, compression point and gain are influenced by DC supply fluctuations; this could reduce your power-supply costs by indicating the degree of voltage regulation required to meet amplifier performance needs. Power output vs. frequency is measured at three values of gain compression: 0.5 dB, 1.0 dB, and 1.5 dB. (The specification table lists the 1dB values.)
Variability from one unit to another is a critical factor in estimating production yields. Such statistical processing information is contained in the handbook with sigma (standard deviation) values listed for amplifier gain and VSWR.

transformers

As an industry first, RF transformer characteristics are now described with CAPD data. The significance . . . providing VSWR and insertion loss data. With closely-spaced CAPD test points, even slight variations which could affect systems performance become apparent.

CAPD was innovated with one uppermost objective-to assist you, the design engineer, in producing a more effective end product. To accomplish this, you may require CAPD data at very specific frequency points not provided by our programmed steps. Not to worry . . . just furnish us with precise needs for your specific application. Be assured we will comply.

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Illustrative Samples of CAPD

mixer, level 7: model SRA-3500

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
500.000	530.000	5.96	5.49	5.22	500.000	43.39	44.57	45.11	34.16	34.18	33.63
676.471	646.471	5.06	4.86	4.80	676.471	42.23	45.01	47.85	32.90	32.1	31.39
852.941	822.941	5.62	5.14	4.87	852.941	40.34	44.31	49.20	31.84	3	
1000.000	970.000	6.31	5.49	5.05	1000.000	39.09	43.00	48.01	31.65		
	4087.647						41.48	44.70	34.38		

see pages of section 1

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. output mV	
500.000	2.20	1.82	1.55	1.92	2.52	3.19	5.000	1.40	1.20	1.08	500.000	+151.79	−.87
576.923	1.44	1.20	1.12	2.00	2.56	3.19	30.513	1.41	1.20	1.08	676.471	+185.23	−.63
730.769	1.16	1.33	1.51	2.27	2.66	3.18	56.026	1.42	1.21	1.09	852.941	+127.03	−.52
884.615	1.51	1.64	1.79	2.62	2.80	3.14	81.539	1.43	1.21	1.09	1000.000	+112.30	−.32
1038.462		1.89	1.99	2.73	2.68	2.82	107.051	1.44	1.21		1117.647		

power splitter/combiner, 2 way-0°: models ZFSC-2-11, ZESC-2-11, MSC-2-11

FREQUENCY (MHz)	INSERTION LOSS (dB) S–1	(dB) S–2	AMPLITUDE UNBALANCE (dB) 1–2	ISOLATION (dB) 1–2	FREQUENCY (MHz)	VSWR S	VSWR 1	
10.000	3.48	3.48	0.00	16.77	10.000	2.06	1.54	
20.000	3.48	3.48	0.00	18.92	20.000	2.06	1.55	
50.000	3.45	3.45	0.00	18.76	50.000	2.06	1.52	
100.000	3.49	3.49	0.00	18.08	100.000	2.06	1.49	1.49
200.000	3.52		0.00		200.000	2.05	1.48	

see pages of section 2

amplifier: model ZHL-1HLD

FREQUENCY (MHz)	GAIN (dB) 23.0V	24.0V	24.5V	σ1	DIRECTIVITY (dB) 23.0V	24.0V	24.5V	SWR IN	σ2	OUT	σ3	N.F. (dB)	P_{out} (dBm) @ 1 dB COMPR)
225.0	28.50	28.49	28.49	.74	32.2	32.4	31.7	1.48	.11	1.84	.16	1.9	
237.3	28.38	28.37	28.37	.73	32.3	33.0	32.2	1.50	.14	1.78	.16	1.	
254.7	28.20	28.19	28.18	.74	33.1	33.2	33.2	1.54	.15	1.71	.16	1.94	
273.5	28.01	28.00	28.00	.76	33.9	33.0	34.0	1.56	.16	1.65	.15	1.97	
293.3	27.92	27.91	27.90	.76		35.5	35.2	1.57	.16	1.60			

see pages of section 3

filter, low pass: model LP-5 series

FREQ. (MHz)	I. LOSS x̄ (dB)	σ (dB)	R.L. x̄ (dB)	FREQ. (MHz)	G. DELAY x̄ (nxec)
1.0	0.08	0.1	25.1	1.9	147.473
2.0	0.13	0.1	32.4	2.0	150.986
3.0	0.34	0.1	15.6	3.0	158.958
3.5	0.69	0.1	14.2	3.5	164.573
4.0	0.71	0.1	15.8	4.0	173.418
4.5	0.73	0.1	25.1	4.5	192.059
5.0	0.91	0.1	25.5	5.0	215.975
5.8	2.41	0.7	15.8	5.3	253.980
6.0	3.35	0.8	7.2	5.8	294.321
6.3	9.49	1.3	2.0	6.0	326.824
6.8	11.67	1.1	1.2	6.3	305.701
7.0	16.87	1.2	0.9	6.8	223.890
7.3	23.49	1.1	0.5	7.0	180.770
7.8	29.30	1.0	0.4	7.3	106.737
8.0	34.55	1.0	0.3	7.8	73.246
8.3	39.27	1.0	0.3	8.0	54.493
8.5	41.68	1.1	0.3	8.3	38.639
8.8	42.05	1.1	0.2	8.5	31.119
9.0	42.44	1.1	0.2	8.8	29.126
9.5	43.73	1.1	0.2	9.0	28.459
10.0	47.90	1.1	0.2	9.5	27.231
12.0	63.04	1.6	0.1	10.0	26.011
16.0	75.52	4.1	0.1	12.0	26.682
22.0	75.62	9.9	0.1	13.0	25.945
35.0	74.63	3.9	0.1	14.0	25.338
	77.85	6.6	0.1	16.0	24.483
		8.6	0.1	18.0	24.079
		2.3	0.1	20.0	23.998
		6.8	0.1	22.0	23.815
			0.1	24.0	

see pages of section 8

fixed attenuator: AT-3 series

FREQUENCY (MHz)	ATTENUATION x̄ (dB)	σ (dB)	RETURN LOSS x̄ (dB)	σ (dB)
	3.07	0.00	53.83	0.75
	3.07	0.01	48.68	0.74
	3.08	0.01	42.96	0.36
	3.11	0.00	42.11	0.69

see pages of section 6

mixer harmonic intermodulation: model SRA-1

Harmonic RF Order	RF CAL	LO at +4 dBm						
0	0	—	36	17	24	24	29	33
1	0	18	—	33	18	35	31	45
2	74	42	49	41	63	45	57	57
9	80	72	72	68	70	71	71	72
10	80	71	72	71	70	72	71	71
11	79	71	72	72	72	71	70	70
12	79	71	71	72	71	72	71	71
13	78	71	71	71	70	72	71	71
14	80	72	71	72	71	71	71	71

Measuring the Electrical Performance Characteristics of RF/IF and Microwave Signal Processing Components

The treatment given here is introductory, and will assist the reader who wishes to consult the standard texts for further detail on measurement techniques. For measurements on mixers and frequency doublers, please refer to the respective product sections of this Handbook.

Linear Measurements, Passive and Active Devices

The instrumentation shown in Figure 1 can be used for a broad range of measurements on devices having one port, two ports, or many ports. Three representative devices are indicated. Properly calibrated per the instrument

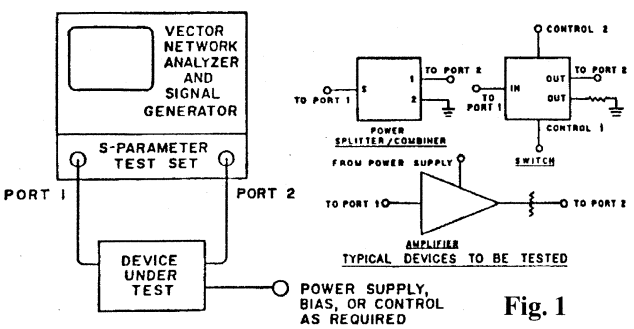

Fig. 1

manufacturer's instructions, the setup will measure the following characteristics as functions of frequency:

Insertion Loss, VSWR, Gain, Isolation, Directivity, Amplitude Unbalance, Phase Unbalance, Group Delay

The S-parameter test set measures four sets of magnitude-and-phase quantities. When the network analyzer commands a signal to be outputted by Port 1, the signal reflected back to Port 1 by the D.U.T. (device under test) is detected and displayed as S11, while the signal passing through the D.U.T. and detected at Port 2 is displayed as S21. Similarly, a signal outputted by Port 2 yields S22, and that portion of the signal originating at Port 2 which passes through the D.U.T. to Port 1 becomes S12.

Before connecting the D.U.T., the test set is calibrated by storing reference reflection and transmission data in the network analyzer. For reflection, each cable which will later go to the D.U.T. has precision short, open, and matched load terminations successively connected to it. For transmission, the two cables are joined directly together for a "through" connection.

Now, consider a two-port D.U.T. Suppose the "input" port of the D.U.T. is connected to Port 1 of the test set, and the "output" is connected to Port 2. The magnitudes of S11 and S22, expressed in dB, will be negative or zero because the reflected power is less than, or at most equal to, the incident power. Dropping the minus sign the S11 and S22 dB values equal the return losses at the D.U.T. input and output ports. From there, VSWR can be calculated. A one-port D.U.T. such as a termination is tested for VSWR the same way, but with only S11 being measured.

Insertion loss is measured directly as S21, and so is isolation of passive components such as switches, power splitter/combiners, and directional couplers. For amplifiers, gain is measured as S21 and reverse isolation as S12. Gain testing may require a fixed attenuator at the amplifier output to avoid overloading the detector in the S-parameter test set; suitable MCL models for this purpose are the SAT and NAT series.

Directivity of a coupler can be measured as a direct quantity by first normalizing the network analyzer for a 0 dB insertion loss reference using the main-line-input to coupled-port path through the D.U.T. The cable connected to the main-line input is then moved to the main-line output for the actual measurement. Each unused port should be connected to a matched termination, such as the MCL BTRM, STRM and NTRM series. Amplitude and phase unbalance of power splitter/combiners and multi-throw switches is measured by first normalizing insertion loss through one path, and making the actual measurement through another path. It is important to note here that whenever a D.U.T. with three or more ports is being tested, each port not actually connected to the test set must have a matched termination. This entire method requires the characteristic impedance of the S- parameter test set to be the same as that specified for the D.U.T.

Compression Measurements

Measurement of insertion-loss compression or gain compression is sufficiently similar to the corresponding linear measurements, that the same setup still applies. Usually the quantity of interest is the input power (for passive devices) or output power (for amplifiers) at which the insertion loss or gain is 1 dB less than the low-power value.

When input power at 1 dB compression is the specified characteristic,the input power is set at the specified 1 dB compression value, and a 10 dB fixed attenuator is placed at the output of the D.U.T. The network analyzer is normalized for transmission response in this configuration. The 10 dB attenuator is then moved to the input of the D.U.T., and insertion loss is measured. The results show directly the amount of compression; if less than 1 dB, the device meets its specification.

The method used for testing 1 dB output power compression of amplifiers is described in the article in this handbook entitled "Automatic Compression Measurement Using Network Analyzers."

Intermodulation Measurements, Two-Tone Third-Order

The test setup is shown in Figure 2. Generator frequencies ("tones") are commonly set 1 MHz apart, near the low end of the specified frequency band. The test is repeated in mid-band and near the high end. Output power of each RF generator and the net path gain or loss up to the D.U.T. are chosen to yield a specified D.U.T. output power for each tone. When the intercept point is to be calculated from the

measured data, the tone levels are set so as not to saturate the D.U.T., 15 dB below the 1 dB compression point as a guide. It is advisable to repeat the test with 5 dB less input for each tone and recalculate the IM intercept point; agreement within 1 dB lends confidence that the setup is yielding valid data. To meet this criterion care must be taken to ensure that

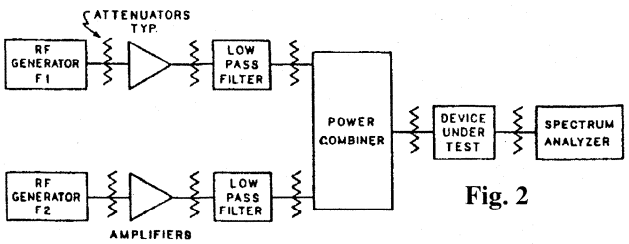

Fig. 2

the test equipment itself does not contribute too much of its own IM. The power combiner and the amplifiers and attenuators ahead of it all promote isolation between the RF generators, which could otherwise produce IM internally. The low pass filters reduce harmonics which could add to any distortion generated by the D.U.T. The attenuators before and after the filters ensure matched terminations so that the filter have their prescribed responses. The attenuator ahead of the spectrum analyzer must ensure that the analyzer is not overloaded.

To perform the measurement, set the spectrum analyzer to obtain a display like that in Figure 3. The applied tones and the IM products shown are 1 MHz apart. The tones should be at equal amplitude, and the two third-order products should be nearly equal to one another. IM suppres-

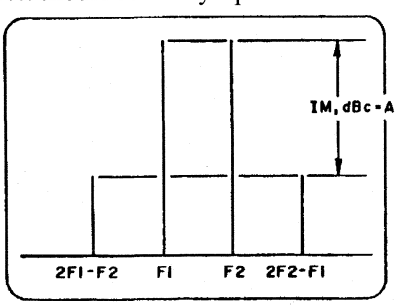

Fig. 3

sion is read as the dB difference between the applied tones and the third-order products.

Third order intercept point is computed from this measurement as $IP_3 = P + A/2$. If P is input power to the D.U.T., this yields input IP3 and if P is output power, output IP3 is computed.

Noise Figure Measurements

The test setup for amplifiers using an automatic noise figure meter is simple, as shown in Figure 4, although much sophistication is implemented in such an instrument. Noise figure and gain readings can be obtained by following instructions furnished by the instrument manufacturer.

For mixers an LO signal is introduced as shown in Figure 5. The band pass filter, tuned to the LO frequency, suppresses any noise sidebands falling at an IF-separation from the LO frequency. The IF commonly used is 30 MHz. During the meter calibration sequence the noise source

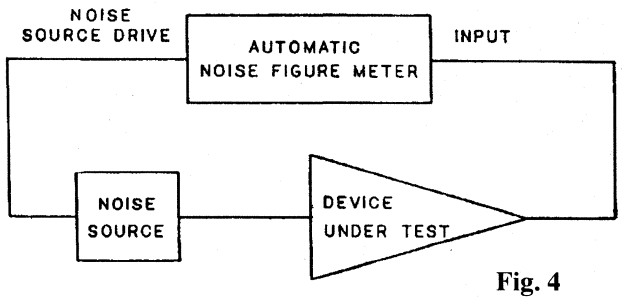

Fig. 4

must be connected directly to the input port of the noise figure meter. The 10 dB attenuator improves impedance match and measurement consistency; its value has to be subtracted from the noise figure reading. When SSB (single sideband) noise figure is the required result, 7 dB is subtracted instead.

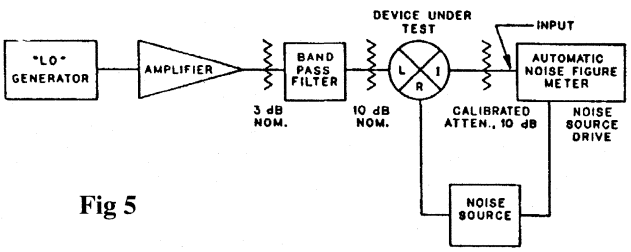

Fig 5

Phase Detector Measurements

Phase detectors behave similarly to mixers, but are specified for common-frequency input to the LO and RF ports. They therefore yield DC output at the port which would be the IF in a mixer. Measurements particular to phase detectors therefore pertain to the DC output: the "maximum voltage" when LO and RF signals are in- phase, and the DC offset occurring when only the LO signal is applied.

Figure 6 illustrates the test set-up. A 0-degree power splitter such as Mini-Circuits' model ZFSC-2-1 applies in-phase signals at +7 dBm each to the LO and RF inputs of the D.U.T. The Maximum DC Output is measured across a 500-ohm load on the output port. To measure DC Offset, disconnect the power splitter from the RF port, place matched terminations on both the D.U.T. RF port and the unused splitter output, and read the DC voltage.

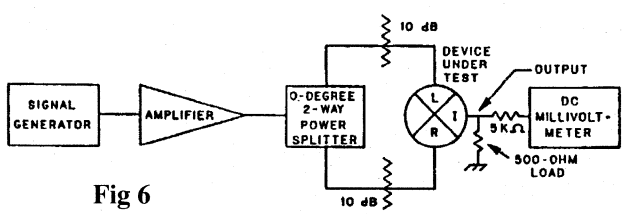

Fig 6

Limiter Measurements

The principal limiter tests — output power and phase change with variation of input power — are readily done with the network analyzer setup in Figure 1, with these

additions ahead of the D.U.T.: an amplifier having 1 dB output compression point of 30 dBm or more, followed by a variable attenuator with 14 dB or greater range in 1 dB steps. To ensure good impedance match a fixed attenuator of at least 3 dB is advisable before and after the variable attenuator.

The limiter output power depends upon the value of control current applied externally. The current is held constant during a test run, usually at the "typical" specified value, and can be of either positive or negative polarity. To run the test, the power input to the D.U.T. is first set at the minimum value to be used and a reference of 0 dB amplitude and 0 degree phase is obtained. Then, the D.U.T. input power is increased by means of the variable attenuator and the changes in amplitude and phase are read.

I&Q Modulators and Demodulators

Please refer to the article in this Handbook entitled "Novel Measurement Schemes Serve I/Q Applications" for a description of measurement methods.

QPSK Modulator Measurements

Insertion loss, VSWR, amplitude and phase unbalance are the most important characteristics. The test set-up at the beginning of this article is used, with the addition of 50-ohm current sources supplying ± 20mA bias to the two control ports.

Insertion loss is measured at all four control-current states: +20 & +20, +20 & -20, -20 & +20, and -20 & -20mA. The worst of the readings represents the insertion loss of the device. The dB difference of the maximum and minimum insertion loss among the four states represents the amplitude unbalance. Phase unbalance is measured by normalizing the insertion phase to 0 degrees with +20 & +20 mA control current. Then, the actual phase is measured at each of the other control-current states, and the deviation from the desired phase value (90°, 180°, 270°) represents the phase unbalance. VSWR is measured the same way as for any two-port device, but at all four control-current states. The worst case represents the VSWR performance of the QPSK modulator.

Switching Speed Measurements

Switching speed is an important characteristic of components which change their transmission state in response to control signals. For PIN diode and GaAs switches, the change of state is from fully OFF to fully ON, and vice-versa. The quantities related to switching speed which are most often specified are:

(1) Rise time and fall time, defined as the intervals between 10% and 90%, and between 90% and 10% of the RF output amplitude respectively.

(2) Turn-on and turn-off time, defined from 50% of the control waveform transitions to 90% and 10% of the RF respectively.

For digital step attenuators, switching speed is defined similarly, but 10% and 90% are taken as fractions of the RF amplitude step resulting from a change in the control signal state.

Testing technique is determined mainly on the basis of the range of switching speeds expected, and the frequency range of the RF signal. For devices using PIN diodes as the switching elements, the time intervals to be measured are typically one microsecond or more. Referring to the setup in Figure 7, the pulse generator has to furnish repetitive transitions between control levels, whether TTL or other voltage/current values as the D.U.T. requires. Control transition times should be at least an order of magnitude shorter than the D.U.T. RF transitions. Where a D.U.T. has two or more control inputs, all must be supplied by the pulse generator with the correct polarities. The RF Generator is set to as high a level as will not cause compression in the D.U.T., so that the detector operates in its linear range and there is enough detected signal amplitude displayed on the oscilloscope. If the D.U.T. has more than one switched port (as in an SPDT or SP4T switch), each port not presently being tested should be terminated with a matched load. An oscilloscope bandwidth of at least 10 MHz should ensure good waveform fidelity, and its input should furnish a 50-ohm load to the detector so that the latter's own turn-off response time does not limit the measurement. If a very wideband oscilloscope is used or if the RF is at a low frequency, a lowpass filter may be needed after the detector to attenuate any RF leaking through the detector. Also, if video leakage (control break-through) at the D.U.T. output causes distortion in the observed waveform, the effect can be reduced by inserting a highpass filter ahead of the detector. This filter should pass the RF and attenuate signals below about 5 MHz; a model from Mini-Circuits SHP or NHP series can be selected for this application.

Some differences in the test setup are necessary for measuring the speed of GaAs switches, which operate in the nanosecond range. Still referring to Figure 7, an oscilloscope with greater than 500 MHz bandwidth should be used. The detector is eliminated and the switched port of the D.U.T. is connected directly to the 50-ohm oscilloscope input. The oscilloscope must be externally triggered by the pulse generator. What results is a modulated RF waveform, with a stable envelope "filled in" by the RF carrier which is not synchronized. To measure turn-on or turn-off time, a dual-trace display also showing the control signal is required, and this may involve using a wideband high-impedance probe. In any case, great care must be exercised to compensate for instrumentation path-length differences including cables (about 1.5 nanoseconds per foot), and inter-channel time skew in the oscilloscope itself. Digital storage oscilloscopes have a calibration adjustment to make this compensation.

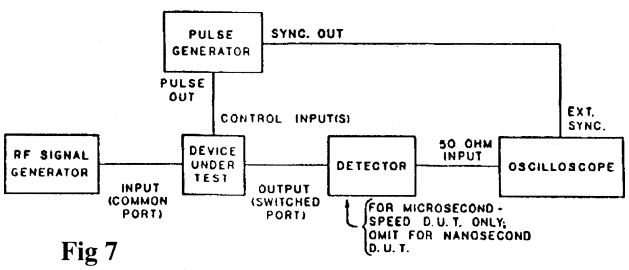

Fig 7

Mini-Circuits
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STEPPED FREQUENCY MEASUREMENTS IMPROVE IM TESTING

Lowpass filters used in IM testing can be remotely controlled to reduce setup time and improve measurement accuracy.

IMPROVEMENTS in communication system designs have resulted in more stringent intercept-point specifications. Measurement of two-tone, second- and third-order intercept points is very tedious, requiring an enormous setup time. By automating measurements through the use of switchable filter banks, both improved accuracy and simplicity can be obtained.

In a two-tone intermodulation (IM) measurement setup for a two-port device (Fig. 1), the outputs of two generators are amplified and merged by a power combiner. The combined output is screened by a lowpass filter to significantly reduce the second and higher-order harmonics of the input signal, and is then applied to the device under test (DUT). The DUT output is connected to a spectrum analyzer for the IM measurement.

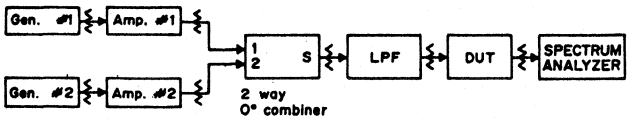

Fig. 1

In order to prevent interaction that creates IM signals, generators must be sufficiently isolated from each other. This is accomplished through proper selection of amplifiers #1 and #2. The amplifiers should have an active directivity (the difference between gain and isolation in dB) of at least 20 dB. This helps reduce the strength of the second-generator signal that reaches the first generator, and vice versa.

Additional isolation is provided by the power combiner and matching pads. The pads also help maintain impedance matches between the generators, amplifiers, combiner, lowpass filter, analyzer, and DUT.

To ensure a proper measurement, the harmonics and IM products of the input signal applied to the DUT must be low enough to avoid errors. The two third-order products are $2f_1 - f_2$ and $2f_2 - f_1$ (where f_1 and f_2 are the two input-signal frequencies). Thus, the input signal to the DUT must have sufficiently low second-harmonic levels at $2f_1$ and $2f_2$. The measurement setup must also minimize generation of third-order products before the DUT.

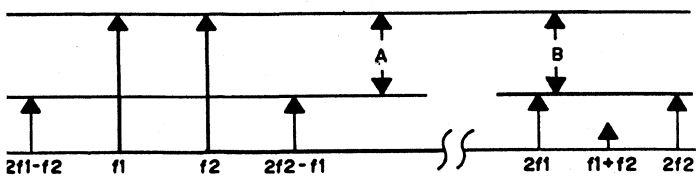

Fig. 2

An example (Fig. 2) using an amplifier as a DUT illustrates the methods of computing acceptable measurement-system IM levels. The amplifier has a third-order intercept point (IP_3) of 50 dBm and a 1-dB compression point of 29 dBm. IM measurements are made at a 15-dBm output-power level. The IM levels at the amplifier output are:

$$IP_3 \text{ (in dBm)} = P_{out} + A/2 \quad (1a)$$

$$50 = 15 + A/2 \quad (1b)$$

where:

$$A = 70 \text{ dB} \quad (1c)$$

P_{out} = output power, and

A = third-order IM level below the carrier.

In order to reduce the measurement error, the IM level at the amplifier input must be at least 80 dB below the carrier (10 dB below A). The second harmonics of the input signals should also be at least 80 dB down.

Second-order products are at $2f_1$, $2f_2$, and $f_1 + f_2$. If the amplifier has a second-order intercept point (IP_2) of 70 dBm, then:

$$IP_2 = P_{out} + B \quad (2a)$$

$$70 = 15 + B \quad (2b)$$

where:

$$B = 55 \text{ dB} \quad (2c)$$

B = second-harmonic or 2nd-order IM level below the carrier.

Thus, the second-harmonic level of the DUT input should be at least 65 dB (B + 10) for accurate IP2 measurement. Since second- and third-order measurements are done simultaneously, the second-harmonic levels should satisfy the requirements of both equations; i.e., they should be at least 80 dB below the carrier.

Accurate measurement of second- and third-order intercept points involves gauging the input-signal IM products and harmonics, and output IM products to determine if the input levels are acceptable. This must be done for each DUT at every measurement frequency. Another important aspect of IM measurement is ensuring that the input-signal strength to the analyzer is not too high, since the analyzer itself can generate IM and produce erroneous readings.

In order to detect this IM distortion, the analyzer attenuation is increased by 10 dB. If the IM level with respect to the main signal (f1 and f2) does not change, the IM is being caused by the DUT. If the level does change, the attenuation should be increased until the IM level is not affected. All these precautions must be exercised for each measurement, and if done manually, will be very time-consuming and tedious.

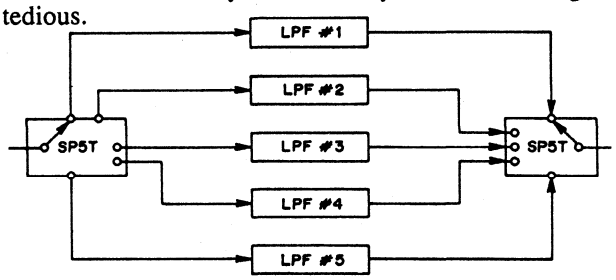

Fig. 3

Wideband measurement of the IM is done by conducting IM tests at several discrete frequencies in the band of interest. One way to automate the test setup is to use an electronically tuned filter that can be remotely controlled. However, such filters are not readily available at RF frequencies.

Another approach is to use an arrangement of fixed frequency lowpass filters and then electronically select the proper filter (Fig. 3). This arrangement of filters replaces the single lowpass filter used in the basic IM test setup. Any number of filters can be utilized in the arrangement.

The frequency of the input signal determines the filter to be selected. This choice is done via computer, and all measurements are repeated to confirm their accuracy. Once output IM measurements are completed, results are compared to the input signal IM and harmonic levels. If sufficient margins exist, the results are validated

To further enhance the usefulness of this setup, test specifications are built into the computer. After completion of the measurements, results are compared to the test specification, with pass/fail status indicated on the computer screen. This method reduces test time substantially (ranging from one third to one fifth of the manual test time) and improves measurement accuracy.

Automatic Compression Measurement Using Network Analyzers

Introduction

The dynamic range of an amplifier is determined by noise figure and compression. In multicarrier applications third order intercept point is also essential. Conventional compression measurements are error prone and tedious. Multichannel and power sweep capability of modern network analyzers can be used to perform automated compression measurements. Power sweep feature also enables compression measurement of any arbitrary value. This is very useful in multistage amplifier design and comparison of amplifiers with similar output powers. One powerful feature of this automated measurements is, that amplifiers can now be tuned for compression by semi-skilled operators. The ease of measurements can enhance the quality and increase production.

1 dB Compression

Compression is a measure of the linearity of a device. 1 dB compression is normally used as a standard of this measure. For an amplifier it is defined as the output power at which the gain decreases by 1 dB from the small signal gain.

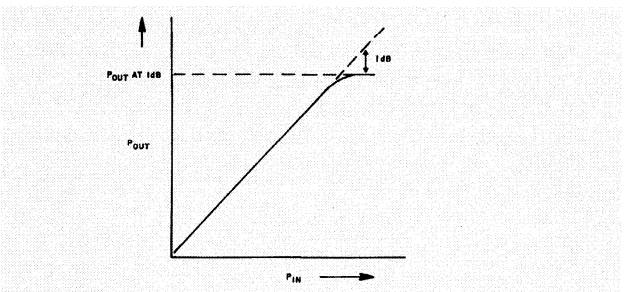

Fig. 1. Definition of 1dB compression.

1dB compression is universally specified by amplifier vendors. This seemingly simple parameter is very tedious to measure and is error prone.

Conventional Compression Measurement

Conventional compression measurements are performed by switching a 10 dB attenuator from input to output and noting the gain change. The output power at which the gain differs by 1 dB is called output power at 1 dB compression.

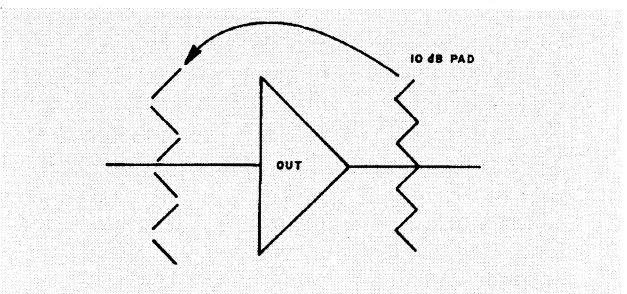

Fig. 2. Conventional compression measurement.

This set up eliminates the need for computing gains, but the input power has to be adjusted till the gains differ by 1 dB. This measurement needs few iterations and also involves twice as many connect, disconnect operations. When measurement over a band of frequencies are required, it takes innumerable iterations and connect, disconnect operations and the final results are basically a reflection of operators skill or fatigue.

Modern Compression Measurements

Thanks to advances in instrumentation, now power sweep is available in modern network analyzers and sweep oscillators. This feature enables compression measurements much more faster and accurate.

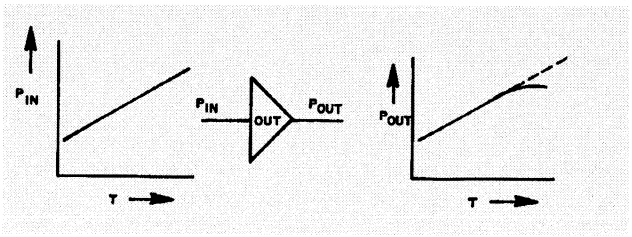

Fig. 3. Compression measurement using power sweep.

As shown in Figure 3, input power to the DUT is swept at a fixed frequency. In the linear range of the device, the output power rises linearly and starts deviating from linearity at compression. It is difficult to determine compression parameters in this mode. If the network analyzer is normalized with a through, then linear gain and compression can be seen clearly, as shown in Figure 4. But the troubles are far from over. One has to determine the output power at 1 dB compression. This is normally done by placing a marker at the compression point and returning the network analyzer to absolute power measurement mode and determine the output power.

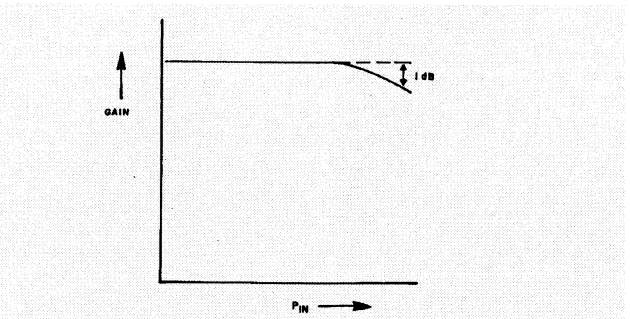

Fig. 4. Gain compression measurement with power sweep.

Normally the output of the DUT is padded to prevent analyzer saturation and damage; in which case the attenuation of the pad has to be added to determine output power at 1 dB compression. When compression measurements are needed at several frequencies, this procedure is tedious as normalization has to be done at each frequency which again involves connect and disconnect operations.

Automated Compression Measurements

Power sweep feature of automatic network analyzers can be utilized in a novel way to accomplish accurate, automated compression measurements. Figure 5 shows the setup for automatic compression measurement. In this set up input power to the DUT is sampled and measured at the same time with the output power. If the coupler is precalibrated, the input to the DUT can be

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computed in the computer and this enables gain to be computed as a function of the input power. From the computed gain values 1 dB compression can be determined.

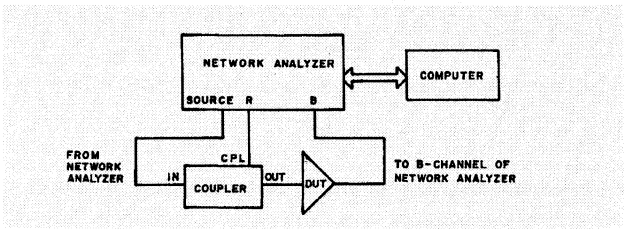


Fig. 5. Automatic compression measurement.

Where Do You Get A Coupler

It is hard to get a coupler which covers the frequency range of the analyzer. Surprisingly, is is not necessary to look for one. All vector analyzers need a sample of the input signal to accomplish phase lock. This is done using resistive splitters and are part of Bridges or S-parameter set ups and are an integral part of the network analyzer. These bridges/S-parameter set ups cover the frequency range of the instrument and have excellent return loss. The sample output is also used in ratio measurements to eliminate error due to power changes.

By pre-calibrating the coupler over the frequency range of measurement input power to the DUT can be determined by measuring power in the R-channel.

Effect of Bad Return Loss of DUT

Network analyzer couplers have good directivity. When the device return loss is bad, the reflected signal from the DUT gets sampled due to the finite directivity of the coupler and can result in errors of the order of magnitude of few tenths of a dB. This comes as error in gain. To increase the accuracy, an input attenuator can be added between the coupler and DUT. This increases the apparent directivity of the coupler by twice the value of the input attenuator or the return loss of the input attenuator, whichever is less. When they are comparable the vectorial sum of the signals reflected from attenuator and that reflected by the DUT and attenuated by the input attenuator arriving the coupler have to be considered. Normally 6 to 10 dB attenuator will do the job. The draw back of this approach is, it decreases the available drive to the DUT.

Safe Attenuator At Output

With high drives, network analyzers are driven into compression which can result in measurement errors. With excessive drives the analyzer can be damaged. It is a good practice to add a "safe" attenuator at the output of the DUT to avoid these problems. This, even though it is a good practice, adds additional measurement steps. Attenuators have frequency response. To avoid errors with assumed safe attenuator values it is a good practice to measure the frequency response of safe attenuators and store it in computer. Normally this is done at low powers. Care should be taken to choose an attenuator which does not change attenuation value at high power.

Calibration Of Network Analyzer

Network analyzers are not basically designed for absolute power measurments. So, they have to be calibrated with power meters. It is a good practice to calibrate both B & R channels to avoid errors.

Step By Step Measurement Of Compression

Figure 6 shows the complete set up for compression measurement of an amplifier using HP8753A automatic vector network analyzer. Step by step measurement of compression is as follows:

1. Calibrate B & R channels with power meter, store the correction factors in computer.

2. Connect B channel to input of Bridge. Keep network analyzer in frequency sweep. The difference in B & R channel readings gives the correction to be applied to R Channel power to obtain input to DUT. If DUT return loss is bad, have input attenuator while performing these measurements.

3. Connect Safe attenuator after input attenuator and measure its frequency response and store it.

4. Connect DUT as shown in figure 6. Set up instrument for CW frequency and power sweep. Apply power sweep. Read R & B channel powers. Apply correction factors to determine input and output powers as described above. Compute gain. Fine the output power at which gain drops by a dB from the lowest power. If 1 dB point is not found increase drive level. Repeat measurement. If drive levels at low and at 1 dB compression point are less than 10 dB decrease lower end of drive level, repeat measurement.

5. Repeat step 4 at each frequency of interest.

All the decisions in steps 4 can be done automatically in the computer. These measurements do not involve repeated connect, disconnect operation and hence are very reliable.

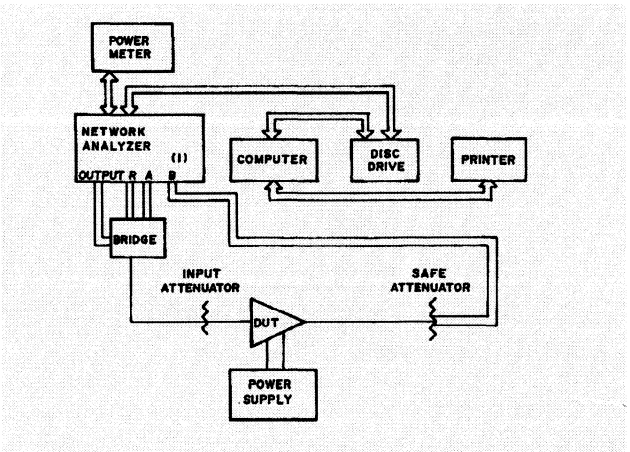


Fig. 6. Automatic compression measurement set-up of an amplifier.

Uses Of Arbitray Compression Measurements

The strength of this procedure is compression point of any arbitrary value can be determined without an execessive number of measurements. This is useful in cascaded amplifier design when the contribution of each stage to the overall compression can be accurately determined.

Compresssion measurement at arbitrary values of compression is also useful for system analysis. One important parameter called figure of merit of compression is defined as the ratio of change of power output to change in compression. For example, if the ouput power is 32 dBm at 0.5 dB compression and 33dBm at 1.0 dB compression, then the figure of merit.

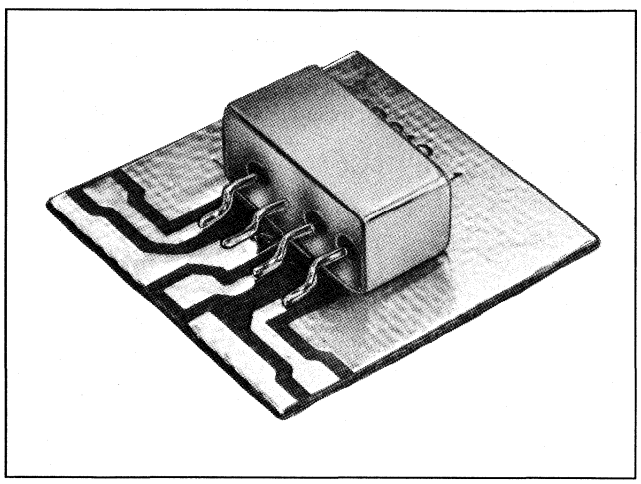
$$F = \frac{\Delta \text{ Pow.}}{\Delta \text{ Comp.}} = \frac{33-32}{1.0-0.5} = 2$$

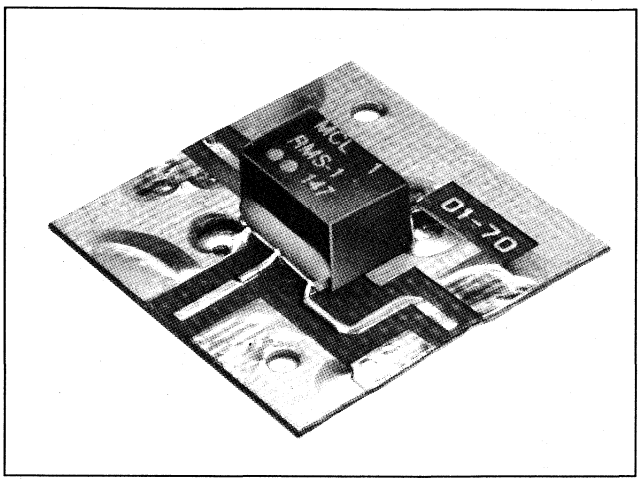
Low values of F indicates that unit goes rapidly into compression and high values indicate that it goes slowly into compression.

Conclusion

A novel adoption of the existing components of the network analyzer and the power sweep feature is used to automate compression measurements. Figure of merit is defined for compression which can be used to compare amplifiers of same output power for a particular application.

practical considerations for attaching surface-mount components





The photos included illustrate some of these components soldered to circuit boards.

What automated soldering methods can be considered for Mini-Circuits surface-mount components? There are two basic methods: reflow and wave soldering. Generally, reflow soldering can be done when (1) there are only surface-mount components, or (2) these are present together with through-hole components and the latter will be soldered in a separate (wave-soldering) step. The surface-mount components can be located on both the upper and lower sides of the board, when reflow is used. Wave soldering is suitable for through-hole components mounted on top of the board as well as for surface-mount components on the bottom of the board. Both ceramic and polymer-based boards can be accommodated.

reflow

Reflow requires applying a controlled amount of solder and flux to the areas where connections are to be made. A common technique is to print a pattern of solder paste on the board, and then put the components onto their places. They tend to stay in position because of the stickiness of the paste. Optionally, components can be held with chip-bonding epoxy. When heat is applied, it must produce a time-temperature profile suitable for accomplishing several process steps as illustrated in Figure 1.

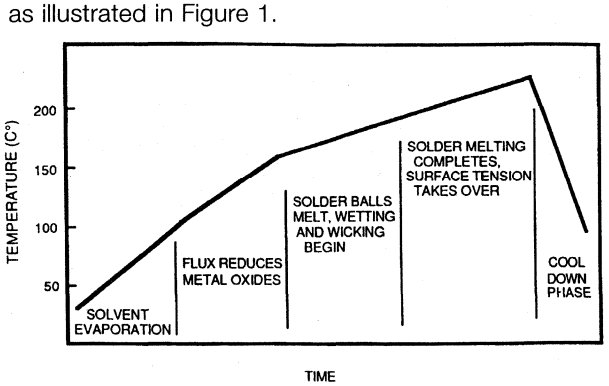


Fig. 1 Solder Reflow Phases

First, solvent evaporation is done at temperatures up to about 100°C. Second, flux reduces metal oxides as temperature rises to the solder melting point, typically 183°C. Third, as temperature continues to rise, the solder particles in the paste melt and wetting and wicking in the joint area begin. In the next step when temperature reaches a peak around 215°, surface tension shapes the fillet of fully molten solder. It takes only a few seconds for proper solder wetting at that temperature. The length of time that the work is actually above 200° is usually limited to one or two minutes to avoid damage. Many plastic-encapsulated components can withstand several minutes of solder-melt temperature when reflowed. Even at the higher temperature experienced in wave soldering (see below), such components tend to withstand several seconds immersion in molten solder.

There are several techniques for applying the heat needed for reflow. Two of the most common are infrared and vapor-phase. Infrared heat sources operate at very high temperature and are placed at the inner walls of the chamber, not in contact with the work. The actual temperature of the work is strongly affected by its mass, geometry and composition, as well as belt speed. Organic materials such as epoxy-based boards tend to absorb the IR radiation and conduct the heat to metal parts which, by themselves, would tend to reflect the IR away. On the other hand, in the vapor-phase soldering process the vapor surrounding the work is maintained at the optimum solder-wetting temperature. This is accomplished by boiling an inert liquid in a tank. The boiling point is approximately 215°C. When the work is held in the vapor just above the liquid, the heat at that temperature is transferred to all surfaces quite uniformly.

Figures 2 and 3 illustrate profiles obtained with both reflow processes. Separately controlled heating zones in an IR oven provide an opportunity to shape the profile more optimally than is typical of the vapor phase process. However, the infrared method may require more careful setup to avoid undesired nonuniformity of heating.

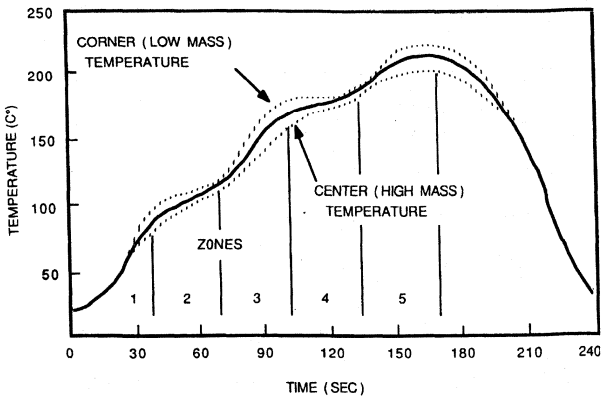


Fig. 2 Typical Five-Zone Infrared Profile.

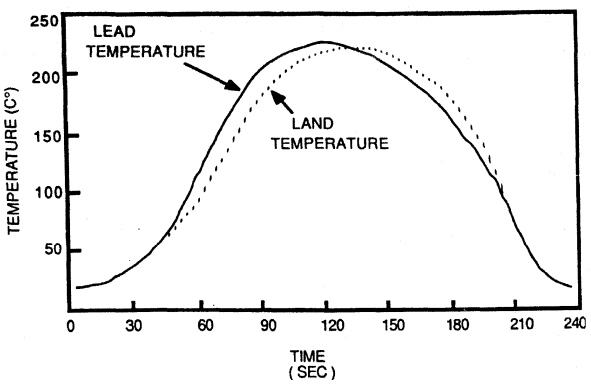


Fig. 3 Typical Vapor Phase Profile

wave soldering

This method applied molten solder to the bottom side of a circuit board after a preheating sequence, with cool-down following the soldering. There are variations to the method, mainly characterized by the shape of the solder wave; the choice among them is influenced by the type of assembly and the components being mounted. Solder temperature, typically 260°C , is higher then the peak temperatures used in the reflow method. The temperature profile experienced by the board and components increases during preheat to about 150° at a rate similar to reflow, but then rises rapidly when the solder wave impinges.

Components housed in molded plastic cases may be better suited to reflow soldering because of the possibility of microcracks developing at the leads if they are wave soldered. Resistance to this defect is enhanced when moisture is baked out of the plastic material before soldering by either method; 24 hours at 125°C is usually effective.

some pointers

Among the considerations for successful attachment of surface-mount components are:

- Lead coplanarity,and wettability by the solder.
- Compatibility of solder composition with finish on components and circuit boards.
- Amount of solder deposited.
- Internal heating of components.
- Component placement and orientation accuracy.

Leads on a component should all be in the same plane. More departure from coplanarity can be tolerated in the reflow method than in wave soldering because in reflow the surface tension in the molten solder tends to bridge small gaps and ensure an acceptable fillet. In wave soldering, special techniques are used to counteract the tendency of surface tension to deposit excess solder and cause undesired bridging between metallization areas. Even so, better coplanarity may be required when wave soldering to ensure good joints.

Wetting, or the ability of solder to adhere to the entire joint surfaces uniformly, is enhanced when clean surfaces on the component leads and circuit board are provided. If the quality of initially suitable surface finishes is preserved by proper handling and storage, the flux applied in the soldering operation should suffice to remove any metallic oxides. Compatibility of the solder includes closeness of its melting point with that of the metallization finishes, and the minimization of materials such as gold which promote the formation of brittle intermetallic compounds with tin-lead solder. The amount of solder to be deposited depends upon joint geometry, but once determined the deposition can be controlled to a few thousandths of an inch by using preforms or printing the solder pattern.

Concern about internal heating of components during soldering becomes greater when the size or complexity of individual components increases, or where assembly contains a mix of large and small components. In the latter case the heating rates can be disparate, or a large component may mask a small one from the source of heat. Careful study and experimentation may be needed to optimize the process. Measurement of air temperature in the processing chamber, even at several points, may not be sufficient with infrared heating. Monitoring with a surface temperature profiler can ensure that small components are not being overheated.

While high accuracy is needed for component placement on a circuit board, this requirement is eased somewhat in the case of reflow because surface tension in the molten solder has a self-centering action. This assumes that a proper metallized footprint has been provided.Correct orientation of components requires assurance that when they are supplied in tape-and-reel, all have been inserted into the tape in a constant and known orientation. Also, the tape

cavity dimensions must ensure that the orientation is maintained. Especially when component placement is done manually, a clear orientation index is necessary on each component. The following considerations tend to keep the components, once placed, from becoming dislodged before the solder solidifies: When all surface-mount components are on top of the board, the stickiness of solder paste and then the surface tension of molten solder usually suffice. Components on the bottom of the board may need pre-attachment with an adhesive such as epoxy. Caution is then necessary to prevent low -viscosity constituents of the adhesive from spreading onto the metallization areas ("creep"), which could inhibit solder wetting.

automated soldering of Mini-Circuits surface-mount components

Of course, the surface-mount models listed at the beginning of the article can also be mounted by hand-soldering techniques. But, pertinent to the advantage afforded by automated assembly is that most can be soldered in their standard configurations, or require simple modification to their internal connection method or omission of a plastic enclosure, depending upon the particular temperature profile specified for a customer's application.

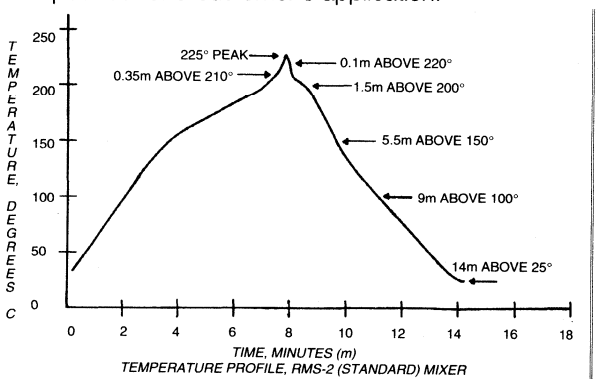


Fig. 4 Temperature Profile, RMS-2 Mixer

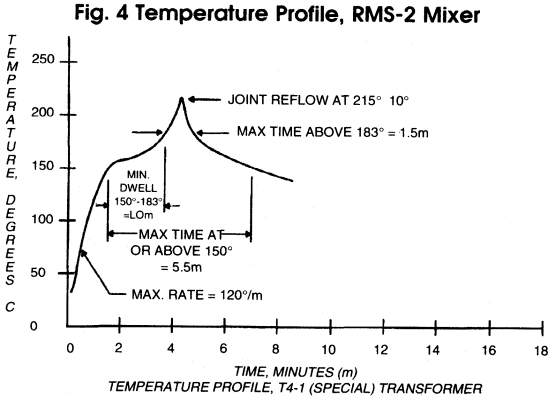


Fig. 5 Temperature Profile, T4-1 Transformer

examples of soldering temperature profiles for Mini-Circuits Components

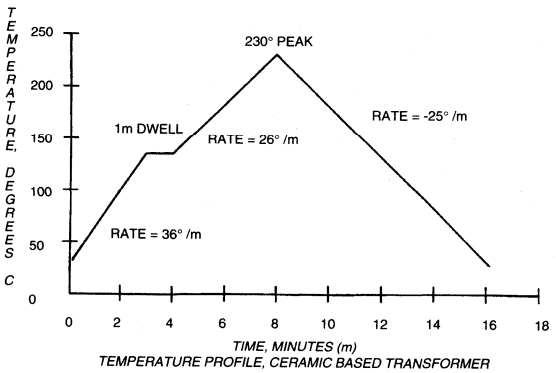


Fig. 6 Temperature Profile, Ceramic-Base Transformer

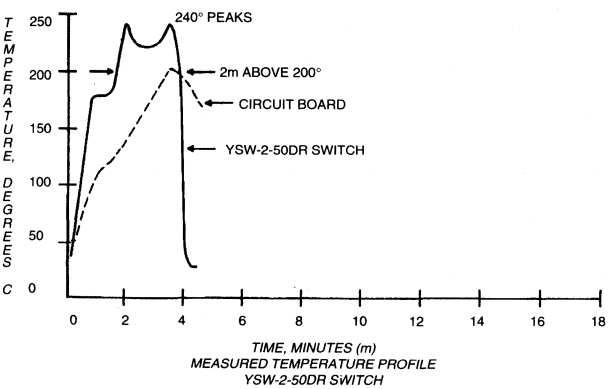


Fig. 7 Temperature Profile, YSW-2-50DR Switch

Mixer model RMS-2 meets the temperature profile shown in Figure 4 in its standard configuration. Transformer model T4-1 meets the profile in Figure 5 when a solder having 260°C solidus is used for its internal connections. A special transformer model designated TC, having a smaller version of case style TT100, has a ceramic base and no lid. It accepts the temperature profile shown in Figure 6. All three of these profiles were set by customer's specifications. As a final example, GaAs switches with drivers, in plastic case style KKK155 are designed to withstand a reflow heating and cooling cycle lasting 4 minutes, in which the component itself exceeds 200°C for 2 minutes. Figure 7 shows actual temperatures measured on a switch and on the circuit board to which it is being mounted, using an infrared reflow machine having four zones and seven source panels in a 72-inch overall length. The same GaAs switches in metal-ceramic case style AG191 will withstand a peak case temperature up to 275°C.

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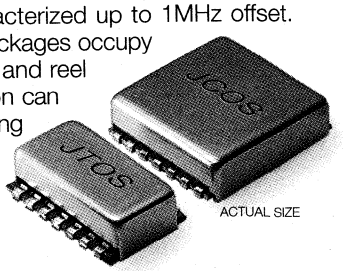

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JTOS-50	25-47	-108	-19	15V	20	13.95
JTOS-75	37.5-75	-110	-27	16V	20	13.95
JTOS-100	50-100	-108	-35	16V	18	13.95
JTOS-150	75-150	-106	-23	16V	20	13.95
JTOS-200	100-200	-105	-25	16V	20	13.95
JTOS-300	150-280	-102	-28	16V	20	15.95
JTOS-400	200-380	-102	-25	16V	20	15.95
JTOS-535	300-525	-97	-28		20	15.95
JTOS-765	485-765	-98	-30	16V	20	16.95
JTOS-1025	685-1025	-94	-28	16V	22	18.95
JTOS-1300	900-1300	-95	-28	20V	30	18.95
JTOS-1650	1200-1650	-95	-20	13V	30	19.95
JTOS-1910	1625-1910	-92	-13	12V	20	19.95
JCOS-820WLN	780-860	-112	-13	20V	25 (@9V)	49.95
JCOS-820BLN	807-832	-112	-24	14V	25 (@10V)	49.95
JCOS-1100LN	1079-1114	-110	-15	20V	25 (@8V)	49.95

Notes: *Prices for JCOS models are for 1 to 9 quantity. **Required to cover frequency range. See "RF/IF Designer's Guide" or "VCO Designer's Handbook" for complete specifications.

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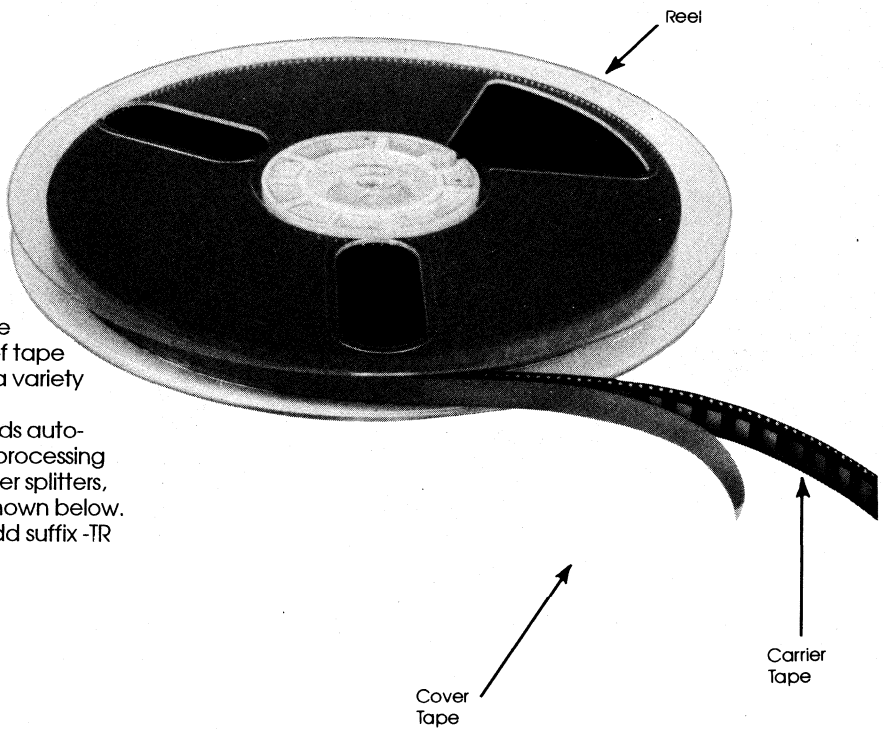
tape and reel packaging for surface mount devices

Design-For-Assembly (DFA) and Design-For-Manufacture (DFM) stand tall alongside CAD/CAM in the quest to optimize profitability, production efficiency and equipment operating usage.

Automation of surface-mount assembly by the use of pick-and-place equipment to handle tiny components has been enhanced by evolutionary improvements in tape-and-reel systems which can accommodate as many as 4000 parts on a 13-inch reel. This results in less frequent component reloading and less downtime of the assembly equipment. Other advantages of tape feeders include versatility or the ability to handle a variety of parts.

Mini-Circuits has kept pace with the trend towards automated assembly and offers RF/Microwave signal-processing components (mixers, amplifiers, transformers, power splitters, switches and others) in tape-and-reel format as shown below.

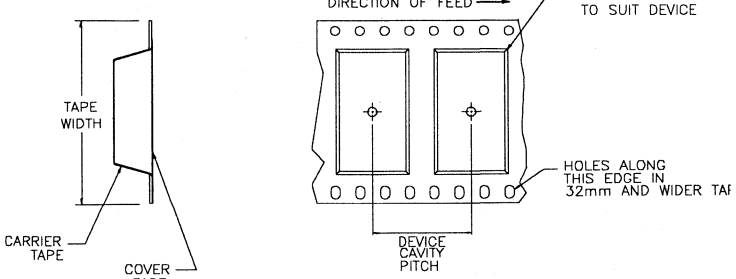
To order a tape-and-reel packaged product, add suffix -TR to its model number.



packaging information

Packaging Part No.	Case Style	Tape Width (mm)	Reel Size (inches)	Device Cavity Pitch (mm)	Devices per Reel	Orientation Figure No.
F1	KK81	24	13	12	500	T-001
F2	TT100	16	13	12	500	T-002
F3	TT240	16	13	12	500	T-002
F4	WW107	12	7	8	1000	T-003
F5	YY101	32	13	16	500	T-004
F6	YY161	32	13	16	500	T-004
F7	KKK155	24	13	16	500	T-005
F8	MMM168	8	7	4	3000	T-006
F9	NNN150	24	13	16	500	T-007
F10	QQQ130	24	13	16	500	T-008
F11	RRR137	12	7	8	500	T-009
F12	TTT166	24	13	12	500	T-010
F13	TTT167	24	13	12	500	T-010
F14	AF190	12	7	8	500,1000	T-011
F15	AG191	16	13	12	500	T-005
F16	XX211	12	7	8	500	T-004
F17	AT224	12	7	8	500	T-012
F18	AN213	24	13	16	500	T-013
F19	XX112	16	7	8	500	T-014
F20	CTT248	16	13	12	500	T-002
F21	BG291	32	13	32	200	T-015
F22	BK276	32	13	16	500	T-015
F23	BJ293	24	13	16	500	T-015
F24	BH292	16	13	12	500	T-015
F25	BL301	44	13	32	130	T-015
F26	AF320	12	7	8	1000	T-011
F27	BK343	32	13	16	500	T-015
F28	BK377	32	13	20	500	T-015
F29	BJ398	24	13	12	500	T-015

tape illustration



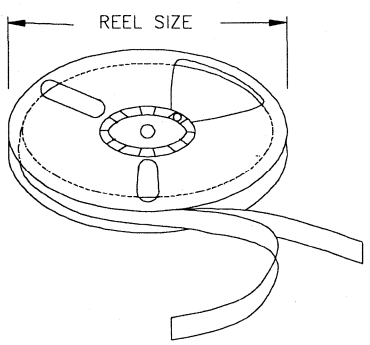


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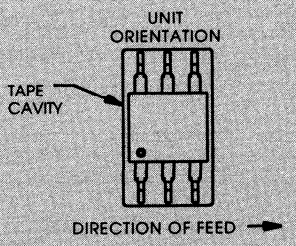
Fig. T-001



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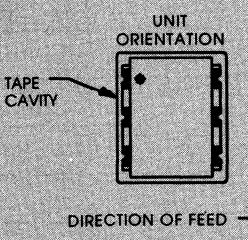

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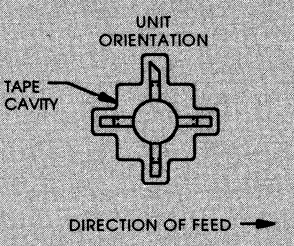

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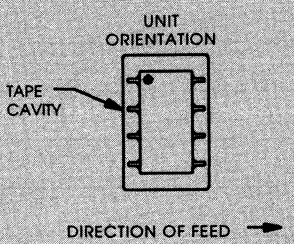

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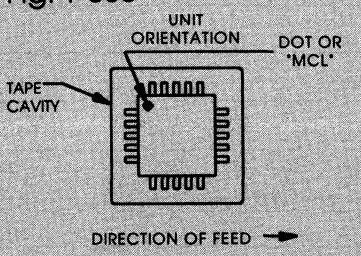

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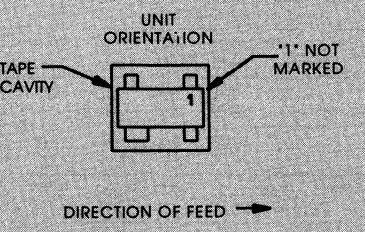

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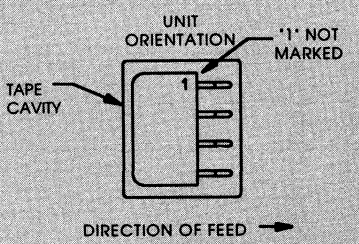

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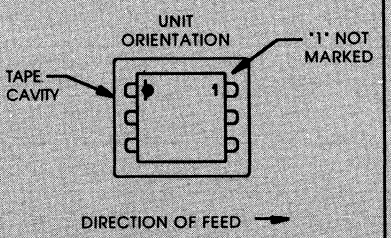

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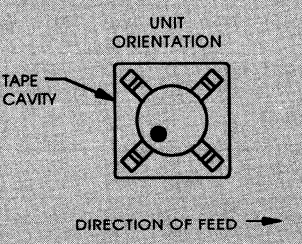

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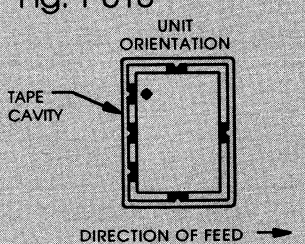

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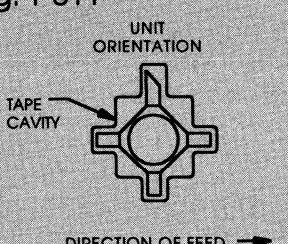

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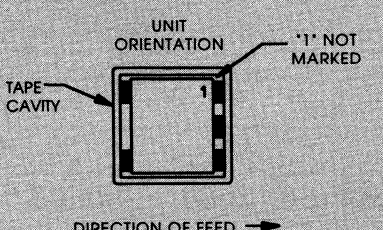

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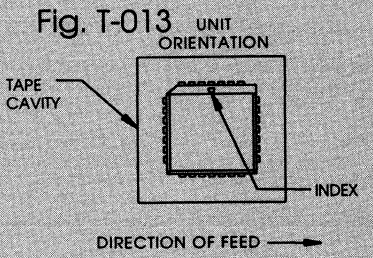

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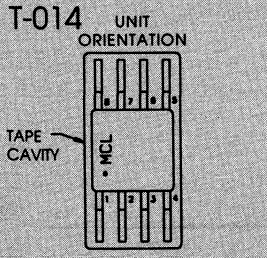

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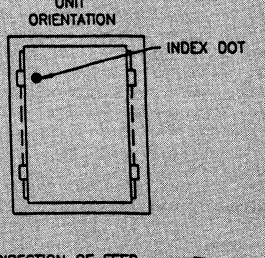

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
A01	.770 19.56	.800 20.32	.385 9.78	.400 10.16	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									5.2	A1,B3,E1,B7
A03	.480 12.19	.500 12.70	.390 9.91	.405 10.29	.210 5.33	.230 5.84	.100 2.54	.20 5.08	.14 3.56	.020 .51									2.3	A1,B4,E1,B7
A04	.770 19.56	.800 20.32	.200 5.08	.210 5.33	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									3.7	A1,B3,E1,B7
A05	.770 19.56	.800 20.32	.240 6.10	.250 6.35	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									3.7	A1,B3,E1,B7
A06	.770 19.56	.800 20.32	.285 7.24	.310 7.87	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									5.2	A1,B3,E1,B7
A11	.480 12.19	.500 12.70	.240 6.10	.255 6.48	.210 5.33	.230 5.84	.100 2.54	.20 5.08	.14 3.56	.020 .51									1.9	A1,B4,E1,B7
B02	.480 12.19	.500 12.70	.240 6.10	.255 6.48	.210 5.33	.230 5.84	.16 4.06	.100 2.54	.14 3.56	.20 5.08	.020 .51								1.9	A1,B4,E1,B7
B13	.480 12.19	.500 12.70	.390 9.91	.405 10.29	.210 5.33	.230 5.84	.16 4.06	.100 2.54	.14 3.56	.20 5.08	.020 .51								2.3	A1,B4,E1,B7
C07	.770 19.56	.810 20.57	.380 9.65	.410 10.41	.030 .76	.200 5.08	.20 5.08	.14 3.56											11.0	A1,E1,B7
C145	.770 19.56	.810 20.57	.380 9.65	.410 10.41	.030 .76	.200 5.08	.20 5.08	.14 3.56											11.0	A1,E1,B7
D08	1.000 25.40	1.025 26.04	.390 9.91	.430 10.92	.500 12.70	.525 13.34	.025 .64	.300 7.62	.200 5.08	.09 2.29	.13 3.30	.150 3.81	.20 5.08	.14 3.56					8.5	A1,E1,B7
D09	1.000 25.40	1.025 26.04	.240 6.10	.280 7.11	.500 12.70	.525 13.34	.025 .64	.300 7.62	.200 5.08	.09 2.29	.13 3.30	.150 3.81	.20 5.08	.14 3.56					7.5	A1,E1,B7
E10	1.580 40.13	1.620 41.15	.380 9.65	.410 10.41	.770 19.56	.810 20.57	.030 .76	.200 5.08	.10 2.54	.20 5.08	.14 3.56								23.0	A1,E1,B7
F14	2.00 50.80	2.00 50.80	.75 19.05	1.00 25.40	.25 6.35	1.500 38.10	.125 3.18	.39 9.91	1.00 25.40	.50 12.70	1.00 25.40								170.0	A10, C1,D2
F53	2.00 50.80	2.0 50.80	.75 19.05	1.00 25.40	.13 3.30	1.750 44.45	.125 3.18	.39 9.91	1.00 25.40	.50 12.70	1.00 25.40								170.0	A10 C1,D2
F183	1.26 32.00	1.00 25.40	.70 17.78	.200 5.08	.200 5.08	.860 21.84	.125 3.18	.35 8.89	.63 16.00	.38 9.65	.50 12.70								24	A4,B1,D17
G15	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.61 15.49	— —	.80 20.32	.80 20.32	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10,A18,B1, D1,D7
G144	1.25 31.75	1.25 31.75	— —	.63 16.00	.38 9.65	.61 15.49	— —	— —	— —	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10,A18, B6,D6
H16	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				70.00	A10,A18,B1, D2,D3,D4
J17	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				75.0	A10,A18, B1,D2,D3
K18	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				70.0	A10,A18,B1, C1,D2,D3
L19	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.31 7.87	1.19 30.23	— —	.66 16.76	— —	— —	.150 3.81		37.0	A6,A11,A18, B2,D6
L20	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.40 10.16	1.86 47.24	— —	.64 16.26	— —	— —	.150 3.81		74.0	A6,A11,A18, B2,D5
M21	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.31 7.87	.75 19.05	1.19 30.23	.66 16.76	— —	— —	.150 3.81		40.0	A6,A11,A18, B2,C1,D6
M22	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.40 10.16	1.15 29.21	1.86 47.24	.64 16.26	— —	— —	.150 3.81		74.0	A6,A11,A18, B2,C1,D5
M23	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.63 16.00	1.06 26.92	1.63 41.40	.69 17.53	— —	— —	.150 3.81		70.0	A6,A11,A18, B2,C1,D6

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A1. Header material: C.R.S. Pin material: #52 alloy. Finish: electro tin, hot-oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: iridite per MIL-C-5541
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A18. Mounting bracket finish: iridite or clear anodize.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B2. Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and $5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add $1.50 to unit cost.
- B3. Insulated spacer available. Request P/N B14-045-01.
- B4. Insulated spacer available. Request P/N B-14-047-01.
- B6. Bracket version only.
- B7. Pin's meniscus (of header): 0.015" max.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.

D. CONNECTORS
- D1. Connectors: SMA Standard. BNC on request (no charge). Male SMA on request, consult factory.
- D2. Connectors: please specify, unless otherwise noted; BNC is standard, TNC, SMA and Type N, consult factory. (ZAPD -4 units not available with BNC).
- D3. For Bracket Version, Option B, this dimension, "C**", changes from 0.75 to 0.94 inches.
- D4. FTB Models available:
  - *A15 female BNC/isolated female BNC.
  - *C15 male BNC/isolated female BNC.

  FT Models available:
  - *A16 female BNC/female BNC 75 ohms.
  - *B16 female BNC/male BNC 75 ohms.
  - *C16 male BNC/female BNC 75 ohms.
- D5. Connectors: BNC standard, TNC consult factory.
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D7. For ZFSC-5 a fifth connector is offered as Port 5 in-line and opposite of sum(s) port.
- D17. Connectors: Female SMA only.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.

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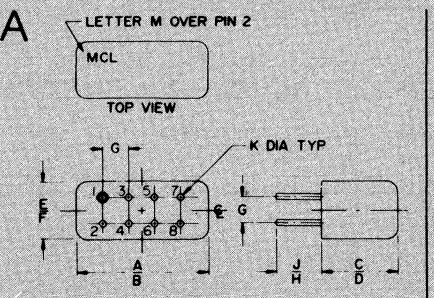
outline drawings

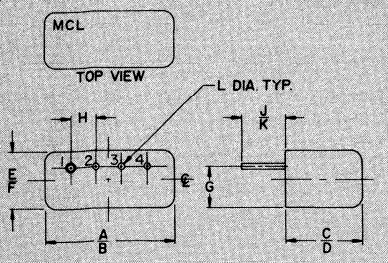
Mini-Circuits

A



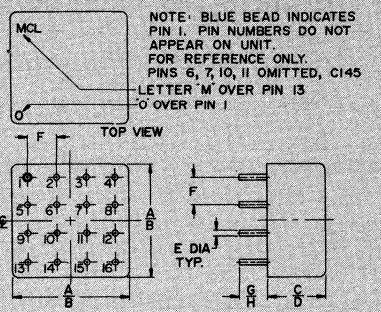
NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

B



NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

C



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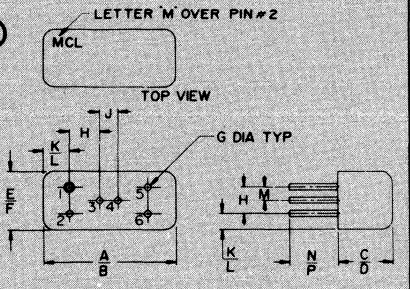
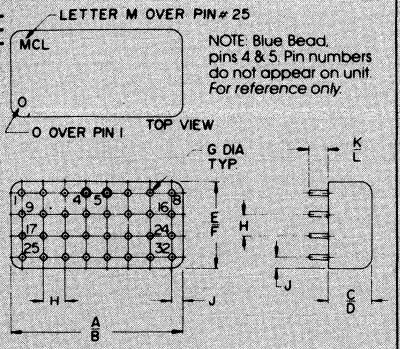


NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

E



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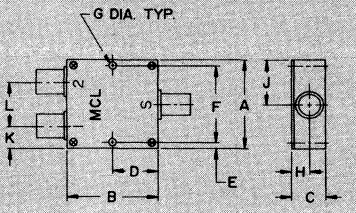

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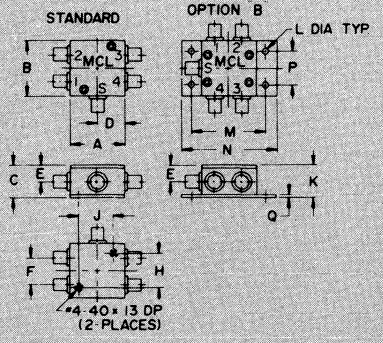

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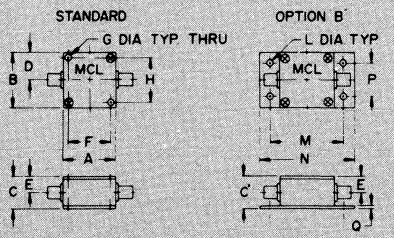

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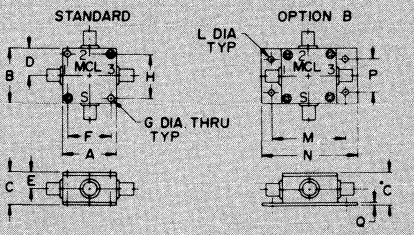

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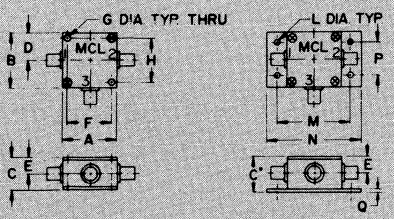

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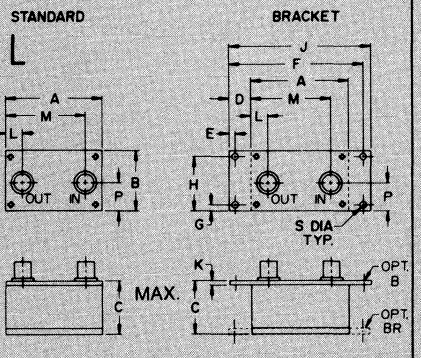

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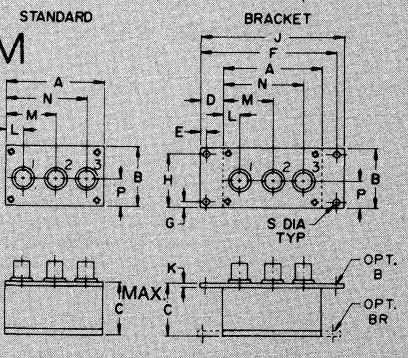

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case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
N24	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.32 8.13	.75 19.05	1.18 29.97	.31 7.87	.56 14.22	.81 20.57	.150 3.81		45.0	A6, A11, A18, B2, D6
N27	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.48 12.19	1.13 28.70	1.78 45.21	.36 9.14	.69 17.53	1.01 25.65	.150 3.81		92.0	A6, A11, A18, B2, D8
P25	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.78 19.81	1.47 37.34	— —	.38 9.65	1.00 25.40	— —	.150 3.81		86.0	A6, A11, A18, B2, D8
P26	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.50 12.70	1.00 25.40	— —	.31 7.87	.81 20.57	— —	.150 3.81		42.5	A6, A11, A18, B2, D6
Q28	4.06 103.12	1.60 40.64	1.50 38.10	3.56 90.42	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.53				300.0	A10, A18, D9
R29	4.06 103.12	1.60 40.64	1.50 38.10	3.56 90.42	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.53				300.0	A10, A18, C2, D9
R30	6.69 169.93	1.60 40.64	1.50 38.10	6.22 157.99	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	.55 13.97	.66 16.76	5.72 145.29	.81 20.57	.06 1.53				500.0	A10, A18, C2, D9
R31	9.31 236.47	1.60 40.64	1.50 38.10	8.84 224.54	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	.54 13.72	.66 16.76	8.34 211.84	.81 20.57	.06 1.53				700.0	A10, A18, C2, D9
R67	6.69 169.93	1.60 40.64	1.50 38.10	6.22 157.99	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	1.22 30.99	.66 16.76	5.72 145.29	.81 20.57	.06 1.53				500.0	A10, A18, D9
S32	3.75 95.25	2.00 50.80	1.8 45.72	.19 4.83	3.375 85.72	.19 4.83	1.625 41.27	.156 3.96	.6 15.24	.4 10.16	.5 12.70	1.30 33.02	.09 2.29	.38 9.65	3.00 76.20	.30 7.62	2.60 66.04		220.0	A7, A18, D9
T34	4.75 120.65	2.00 50.80	2.21 56.13	.19 4.83	4.375 111.13	.23 5.84	1.540 39.12	.144 3.66	.58 14.73	.34 8.64	.50 12.70	1.50 38.10	1.00 25.40	.12 3.05	.38 9.65	4.00 101.60	.30 7.62	2.60 66.04	440.0	A7, A8, A18, D16
T35	4.75 120.65	2.00 50.80	2.40 60.96	.19 4.83	4.375 111.13	.23 5.84	1.540 39.12	.144 3.66	.58 14.73	.34 8.64	.50 12.70	1.50 38.10	1.00 25.40	.12 3.05	.38 9.65	4.00 101.60	1.50 38.10	5.00 127.00	700.0	A7, A8, A18, D16
U36	7.00 177.80	3.25 82.55	2.13 54.10	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.73 18.54	.88 22.35	.63 16.00	1.13 28.70	2.23 56.64	.125 3.17	.50 12.70	6.00 152.40			900.0	A7, A8, A18, D6
U111	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.43 10.92	.88 22.35	.63 16.00	1.00 25.40	2.63 66.80	.125 3.17	.50 12.70	6.00 152.40	2.23 56.64		1100.0	A8, A18, D6
U200	7.00 177.80	3.25 82.55	2.13 54.10	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.53 13.46	.73 18.54	.20 5.08	.70 17.78	1.25 31.75	.125 3.17	.50 12.70	6.00 152.40	2.15 54.61	.50 12.70	1000.0	A7, A18, D6
V37	.83 21.08	.83 21.08	.75 19.05	.37 9.40	.42 10.67	1.25 31.75	.100 2.54	1.150 29.21	.095 2.41	.735 18.67	.21 5.33	.106 2.69	.06 1.52						34.0	A10, A18, C1, D17
W38	.30 7.62	.27 6.86	.23 5.84	.010 0.25	.042 1.07	.020 0.51	.100 2.54	.05 1.27	.09 2.29	.37 9.40	.036 0.91								.50	A3, E2
X65	.30 7.62	.27 6.86	.23 5.84	.010 0.25	.042 1.07	.020 0.51	.100 2.54	.05 1.27	.04 1.02	.12 3.05	.300 7.62	.35 8.89							.50	A3, E2
Y39	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.36 9.15	1.000 25.4	1.000 25.4	.125 3.2	.125 3.2	.46 11.7	2.18 55.4	1.688 42.9	.07 1.8	.750 19.0	.50 12.7	.80 20.3	.45 11.4	.29 7.4	50.0	A4, A18, B1, D6, D22
Y460	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.36 9.15	1.000 25.4	1.000 25.4	.125 3.2	.125 3.2	.46 11.7	2.18 55.4	1.688 42.9	.07 1.8	.750 19.0	.50 12.7	.80 20.3	.45 11.4	.29 7.4	50.0	A4, A18, B1, D6
Z40/Z41	7.06 179.32	3.13 79.50	.88 22.35	.250 6.35	1.750 44.45	5.310 134.87	6.810 172.97	.250 6.35	2.875 73.03	.144 3.66	3.53 89.66	.44 11.18	.415 10.54	.89 22.61					800.0	A10, D11 A4(Z41)
Z54	3.50 88.90	2.13 54.10	.88 22.35	.250 6.35	— —	— —	3.250 82.55	— —	— —	.125 3.17	1.750 44.45	.44 11.18	.415 10.54	.89 22.61	.250 6.35	1.813 46.05			250	A10, D11
Z184	2.26 57.40	2.00 50.80	.70 17.78	.200 5.08	— —	— —	2.060 52.32	— —	— —	.125 3.17	1.13 28.70	.35 8.89	.38 9.65	.500 12.70	.200 5.08	— —			59	A4, D17
Z259	7.06 179.32	3.13 79.50	.88 22.35	.250 6.35	1.750 44.45	5.310 134.87	6.810 172.97	.312 7.92	2.875 73.03	.144 3.66	3.53 89.66	.44 11.18	1.31 33.27	.89 22.61					800	A4, C2 D24

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A3. Case material: epoxy. Pin material: iron-nickel alloy. Finish: bright tin-plate per MIL-T-10727
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate irridite per MIL-C-5541.
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink: black anodize.
- A10. Case material: aluminum alloy. Finish: grey paint, or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A18. Mounting bracket finish: irridite or clear anodize.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B2. Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and $5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add $1.50 to unit cost.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.
- C2. Consecutive marking, n = no. of way power-splitter.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D8. Connectors: BNC only.
- D9. Connectors: BNC standard. TNC or Female SMA on request, consult factory.
- D11. Connectors: Please specify; Type N or SMA.
- D16. Connectors: Please specify, unless otherwise noted SMA is standard for model ZHL-2-12 for all other models BNC is standard. TNC, N, or SMA available on request. consult factory.
- D17. Connectors: Female SMA only.
- D22. Gain Control Terminal on Models ZFL-1000G and ZFL-1000GH only.
- D24. Connectors: Female BNC standard. Type N or SMA consult factory.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.

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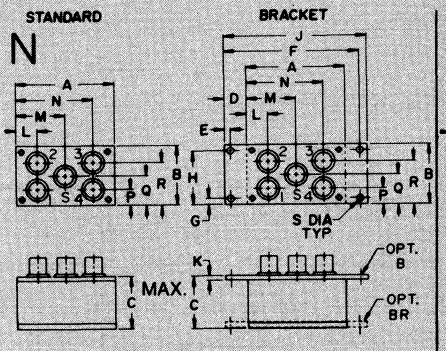
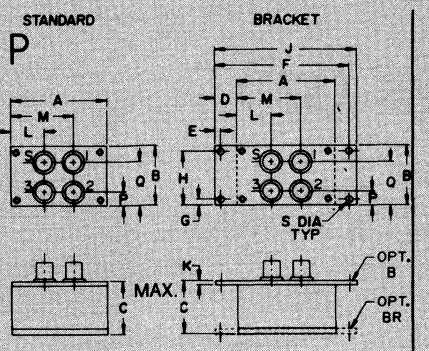
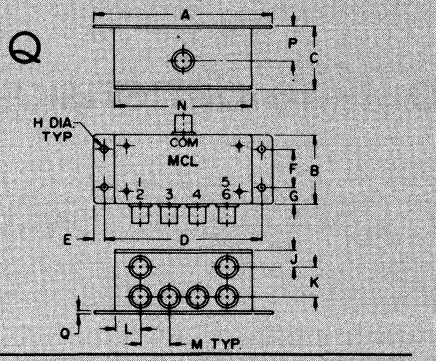
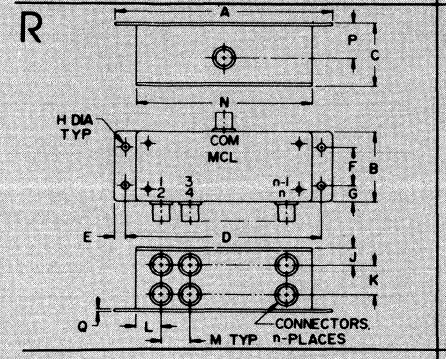
outline drawings

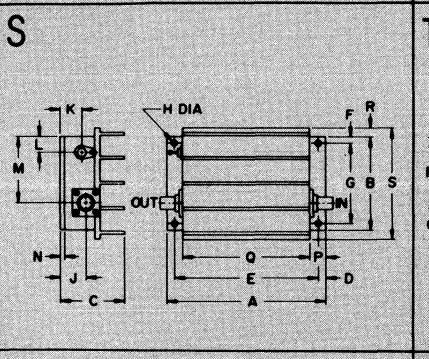
Mini-Circuits

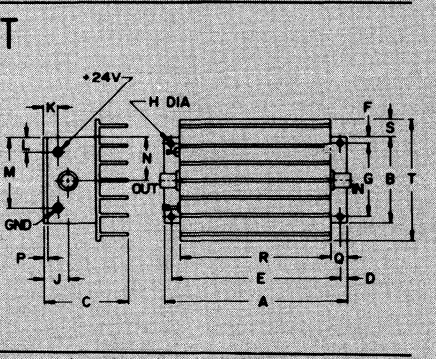


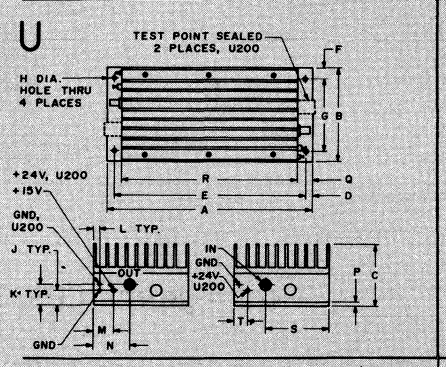


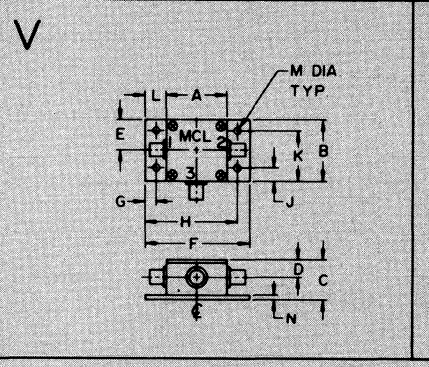


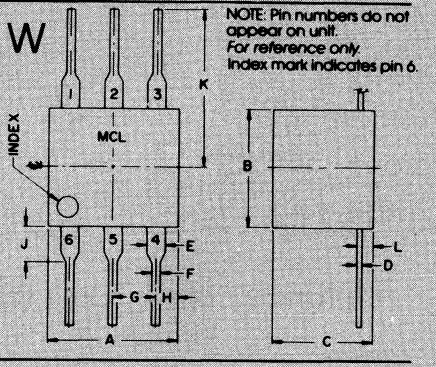


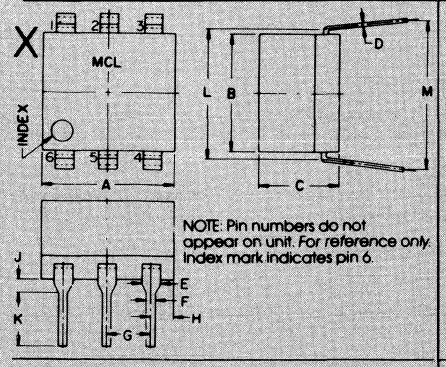


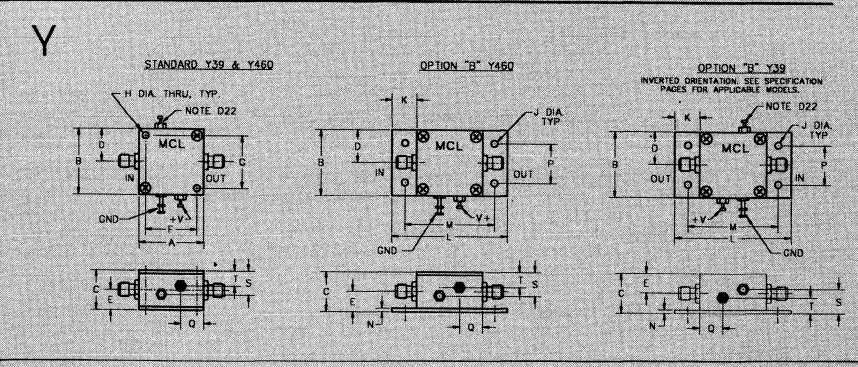


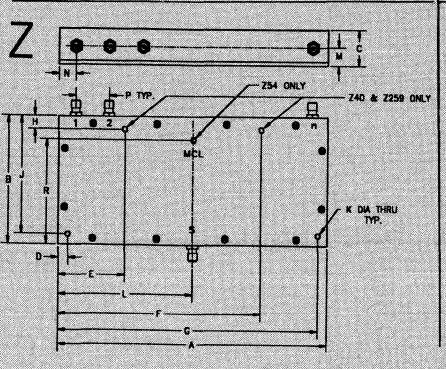












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CAPS now available! computer-automated performance data

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
AB185	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.50 12.70	.25 6.35	1.13 28.70	.500 12.70								183	A4, D17
AB186	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.38 9.65	.25 6.35	.88 22.35	.500 12.70								153	A4, D17
AB204	6.13 155.70	3.00 76.20	.53 13.46	.162 4.11	5.962 151.43	1.500 38.10	.116 2.95	.50 12.70	.25 6.35	1.13 28.70	.50 12.70								215	A4, C2, D17
AF190	.180 4.57	.090 2.29	.020 .51	.100 2.54	.083 2.11	.076 1.93	.005 .13	.022 .56	.210 5.33	.060 1.52	.060 1.52	.060 1.52	.020 0.51						.04	A16, C6, E3, F14
AF320	.200 5.08	.100 2.54	.020 .51	.070 1.78	.068 1.73	.057 1.45	.005 .13	.020 .51	.230 5.84	.065 1.65	.060 1.52	.080 2.03	.040 1.02						.04	A28, C8, E3, F26
AG191	.310 7.87	.400 10.16	.095 2.41	.003 .08	.007 .18	.035 .89	.055 1.40	.020 .51	.050 1.27										.40	A17, C7, E4, F15
AH202	.375 9.53	.500 12.70	.25 6.35	.020 .51	.035 .89	.050 1.27	.140 3.56	.180 4.57	.320 8.13	.360 9.14	.450 11.43	.465 11.81	.095 2.41	.135 3.43	.240 6.10	.280 7.11			.80	A19
AN213	.456 11.58	.487 12.37	.170 4.32	.020 .51	.029 .74	.017 .43	.050 1.27	.035 .89											2.0	A23, E6, F18
AR214	2.25 57.15	1.38 35.05	1.25 31.75	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.69 17.53	1.50 38.10	.30 7.62	.41 10.41	.71 18.03	.41 10.41	.150 3.81		74.0	A6, A18, D17
AT224	.150 3.81	.150 3.81	.150 3.81	.050 1.27	.030 .76	.025 .64	.028 .71	.050 1.27	.160 4.06	.030 0.76									.15	A21, F17
AV243	1.01 25.65	1.63 41.40	1.59 40.39	.30 7.62	1.05 26.67	.14 3.56	.46 11.68	.12 3.05	.030 .76										18	A22, D17
AW254	3.00 76.20	2.06 52.32	1.90 48.26	.100 2.54	2.500 63.50	1.525 38.74	.125 3.18	1.000 25.40	.50 12.70	2.00 50.80									280	A8, C2, D24
AW256	4.50 114.30	2.25 57.15	1.69 42.93	.125 3.18	4.000 101.60	1.625 41.28	.125 3.18	.890 22.61	.44 11.18	3.50 88.90									500	A8, C2, D24
AW257	8.06 204.72	3.25 82.55	2.38 60.45	.125 3.18	7.560 192.02	2.625 66.68	.125 3.18	.890 22.61	.44 11.18	7.06 179.32									1240	A8, C2, D24
AX255	3.00 76.20	2.00 50.80	1.90 48.26	.100 2.54	2.500 63.50	1.525 38.74	.125 3.18	.125 31.75	.50 12.70	— —									300	A8, D24

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite.
- A8. Case material: aluminum alloy. Finish: case irridite, heat sink black anodize.
- A16. Case material: ceramic. Lead material: #42 alloy. Finish: tin plate.
- A17. Case material: CRS. Lead material: kovar. Finish: gold plate 50 micro inches.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material plastic, G-10 base. Termination finish: solder plate
- A21. Open-style, ceramic base. Termination finish: solder plate over nickel.
- A22. Case material: aluminum alloy. Finish: nickel plate; heat sink: black anodize.
- A23. Case material: plastic. Lead finish: solder plate.
- A28. Case material: ceramic. Lead material: Kovar. Finish: Solder plate over nickel.

C. MARKING
- C2. Consecutive marking n = no. of way power splitter.
- C6. RF input lead (1) identified by diagonally cut lead.
- C7. Lead #6 is identified by diagonally cut lead.
- C8. No diagonal cut at lead (1). Input and output interchangeable.

D. CONNECTORS
- D17. Connectors; Female SMA only.
- D24. Connectors: BNC female standard. Type N or SMA consult factory.

E. SPECIAL TOLERANCES
- E3. Lead width ±.005; lead thickness ±.002; cap diameter ±.005 inch.
- E4. All tolerances are ±.005 except where minimum or maximum limits are shown.
- E6. Lead width ±.005 inch.

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to mode

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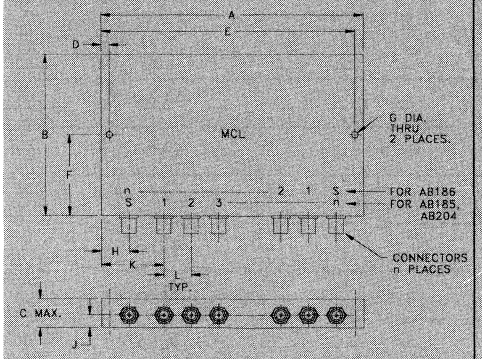
outline drawings

Mini-Circuits®

AB



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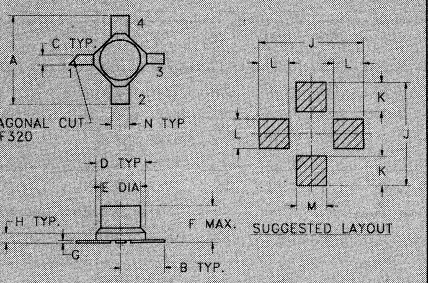

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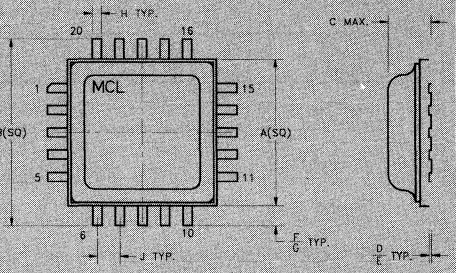

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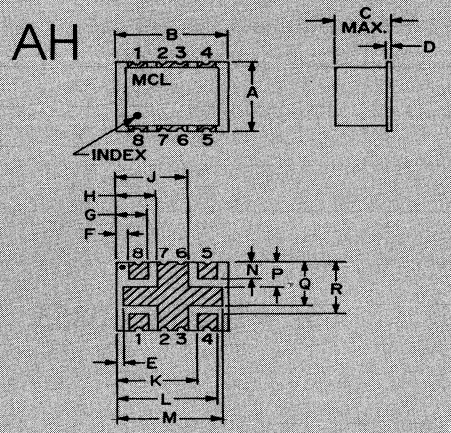

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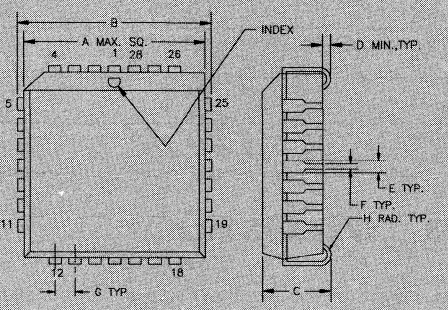

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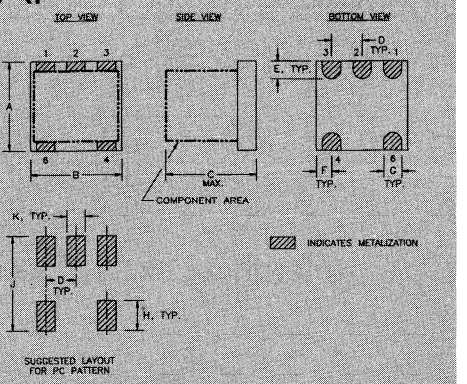

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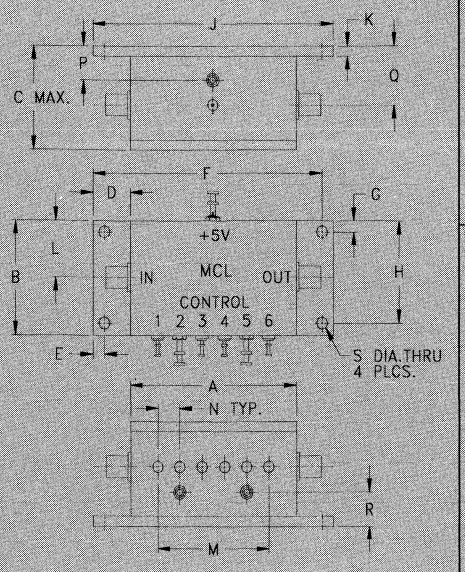

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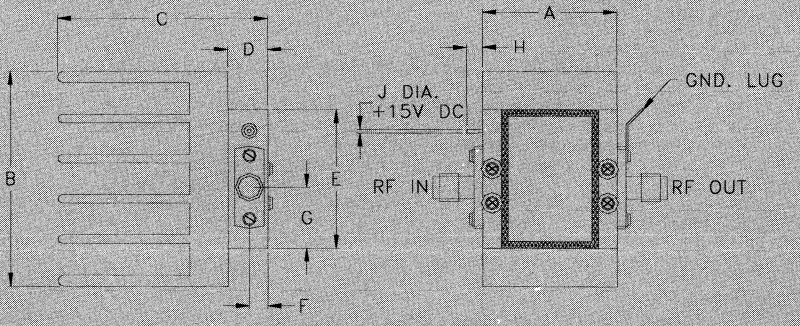

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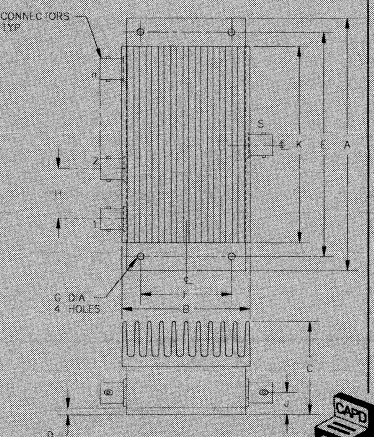

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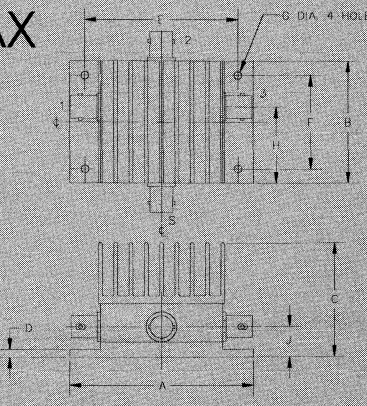

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case styles
outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
BB48	.50 12.70	.39 9.91	.225 5.72	.025 0.63	.07 1.78	.100 2.54	.250 6.35	.350 8.89	.06 1.52	.31 7.87									3.0	A1, E1
BG291	.870 22.09	.800 20.32	— —	.100 2.54	.250 6.35	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.890 22.60								4.0	A27, F21
BG419	.870 22.09	.800 20.32	— —	.100 2.54	.400 10.16	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.890 22.60								6.4	A27
BH292	.280 7.11	.310 7.87	— —	.100 2.54	.225 5.71	.055 1.39	.100 2.54	.047 1.19	.065 1.65	.060 1.52	.300 7.62								.45	A24, F24
BJ293	.395 10.10	.500 12.70	— —	.100 2.54	.230 5.84	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.060 1.52	.425 10.41								.80	A19, F23
BJ398	.305 7.75	.390 9.91	— —	.100 2.54	.100 2.54	.045 1.14	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.325 8.26								.20	A19, F29
BK276	.470 11.94	.803 20.40	— —	.100 2.54	.250 6.35	.102 2.59	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.490 12.45								3.0	A27, F22
BK343	.460 11.68	.768 19.51	—	.100 2.54	.155 3.94	.084 2.13	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.480 12.19								1.5	A27, F27
BK377	.517 13.13	.789 20.04	— —	.100 2.54	.250 6.35	.102 2.59	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.540 13.72								3.0	A27, F28
BL301	.940 23.88	1.260 32.00	— —	.100 2.54	.390 9.91	.080 2.59	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.970 24.64								7.2	A19, F2
BN333	1.680 42.27	2.130 54.10	3.6 91.44	7.5 190.50	.740 18.80	.42 10.67	1.32 33.53	.30 7.62	.55 13.97	.14 3.56									755	A22, D17
BR386	3.25 82.55	1.38 35.05	1.25 31.75	.71 18.03	1.13 28.70	.125 3.18	2.25 57.15	.71 18.03	.41 10.41	.98 24.89	1.28 32.51	2.950 74.93	.15 3.81	1.100 27.94	.14 3.56	.150 3.81			180	A4,A18,D17

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A1. Header material: C. R. S. Pin material: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink black anodize.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material: plastic, G-10 base. Termination finish: solder plate
- A22. Case material: aluminum alloy. finish: nickel plate. Heat sink: black anodize.
- A24. Case material: ceramic, Lead finish: tin plate
- A27 Header: Glass epoxy laminate. Cover: Cupro-nickel, bright-burnish Leads: Solder-plated iron-nickel alloy.

C. MARKING:
- C1. For port markings 1,2, and 3 see specification data sheet.

D. CONNECTORS
- D6. Connectors: female SMA only. Male SMA available on request, consult factory.
- D16. Connectors: please specify. Unless otherwise noted SMA is standard for ZHL-2-12; for all other models BNC is standard. TNC, N, SMA available on request, consult factory.
- D17. Connectors: Female SMA only.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

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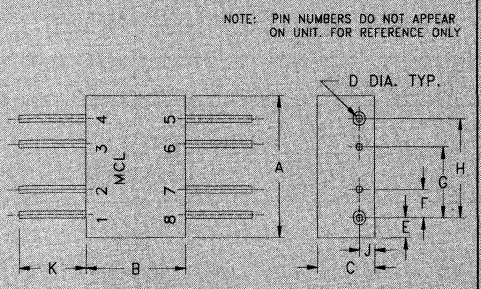
outline drawings

Mini-Circuits

BB



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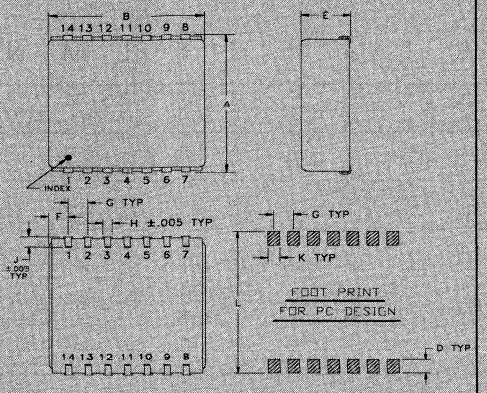

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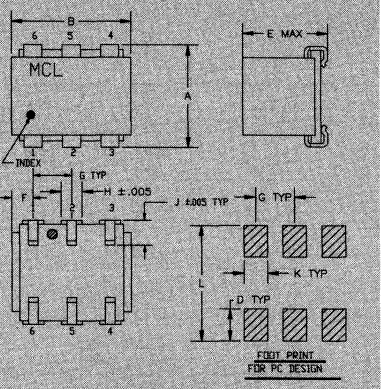

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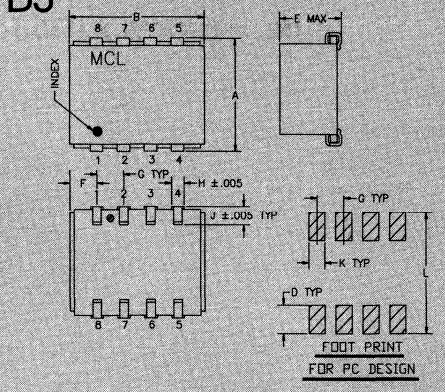

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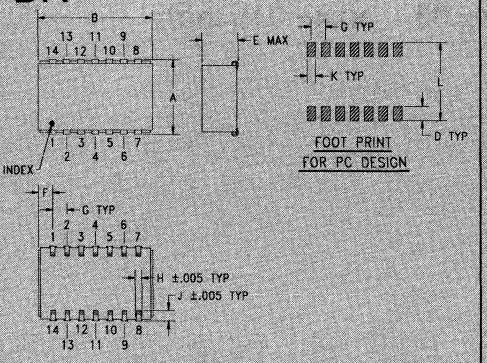

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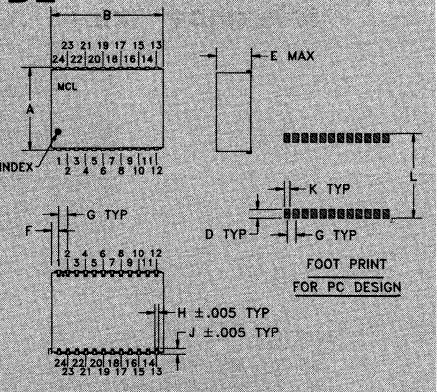
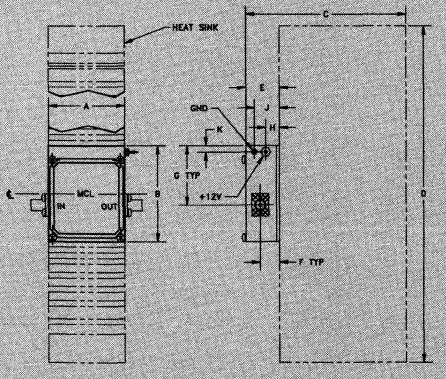


BN



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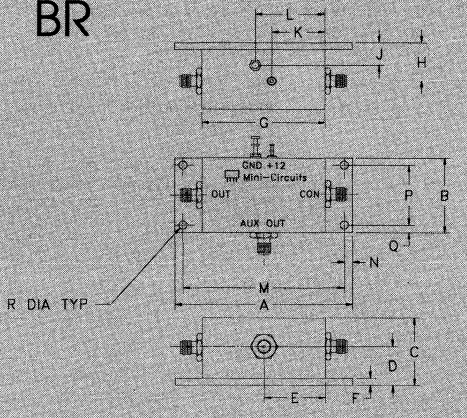

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case styles
outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
BT412	9.50 241.30	7.3 185.42	6.3 160.02	6.00 152.40	1.00 25.40	3.75 95.25	.13 3.30	.75 19.05	.30 7.62	1.00 25.40	.48 12.18	1.91 48.51	1.3 33.02	2.50 63.50	.9 22.86	5.30 134.62	5.1 129.54	5.2 132.08	4000	A8, D17
BT451	9.50 241.30	7.3 185.42	6.3 160.02	6.00 152.40	1.00 25.40	3.75 95.25	.13 3.30	.78 19.81	.31 7.87	1.48 37.59	1.48 37.59	2.45 62.23	1.1 27.94	2.95 75.00	.5 12.7	6.00 152.40	5.1 129.54	5.2 132.08	4000	A8, D17
BU413	1.00 25.40	.75 19.05	.58 14.73	.50 12.70	.29 7.37	.38 9.65	1.40 3.56	— —	.687 17.45	— —	.32 8.13	.13 3.30	.10 2.54	.16 4.06	— —	— —			25	A4,C1,D6
BV278	6.00 152.40	4.50 114.30	1.38 35.05	.15 3.81	5.700 144.78	.15 3.81	4.200 106.68	.38 9.65	2.25 57.15	.75 19.05	.75 19.05	.156 3.96							960	A8,D16
BW459	1.00 25.40	.75 19.05	.61 15.49	.38 9.65	.29 7.37	.25 6.35	.26 6.60	.35 8.89	.65 16.51	.688 17.48	.156 3.96	.13 3.30	1.07 27.18	.140 3.56					25	A4,A18,D17
BY493	1.38 35.05	1.00 25.40	.75 19.05	.125 3.18	.35 8.89	.52 13.21	.27 6.86	.78 19.81	.68 17.27	.125 3.18	1.50 38.10	1.281 32.54	1.000 25.40	.19 4.83	.11 2.79	.35 8.89			40	A4,D17
BZ476	.525 13.34	.525 13.34	.22 5.59	.220 5.59	.215 5.46	.185 4.70	.100 2.54	.535 13.59	.204 5.18	.233 5.92	.238 6.05	.130 3.30	.135 3.43	.100 2.54	.065 1.65				1.1	A29,E6,F0

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink black anodize.
- A18. Mounting bracket finish: irridite or clear anodize.
- A29. Base: Glass epoxy laminate. Cover: Brass, tin-plated. Leads: Solder plated iron-nickel alloy.

C. MARKING:
- C1. For port markings 1,2, and 3 see specification data sheet.

D. CONNECTORS
- D6. Connectors: female SMA only. Male SMA available on request, consult factory.
- D16. Connectors: please specify. Unless otherwise noted SMA is standard for ZHL-2-12; for all other models BNC is standard. TNC, N, SMA available on request, consult factory.
- D17. Connectors: Female SMA only.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E6. Lead width ±.005 inch.

F. PACKAGING
- F0 Not available in Tape & Reel.
- F1-29. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

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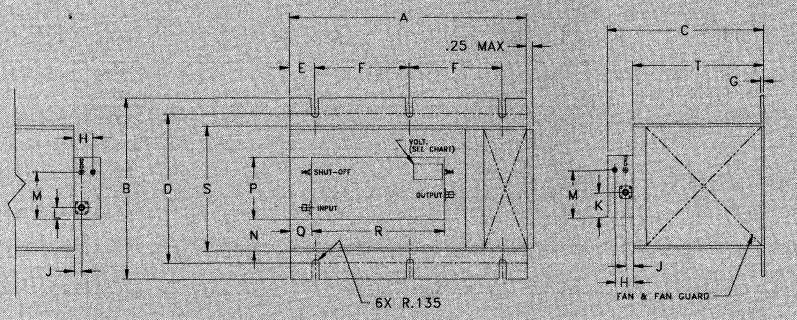
outline drawings

Mini-Circuits

BT



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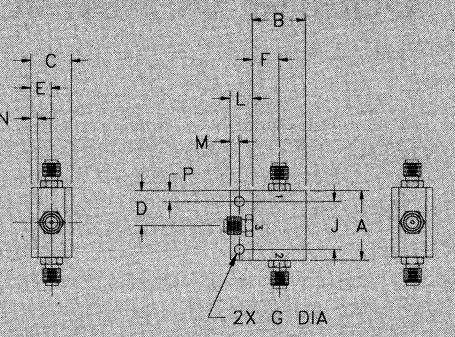

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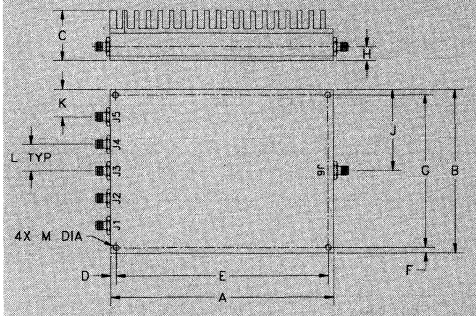

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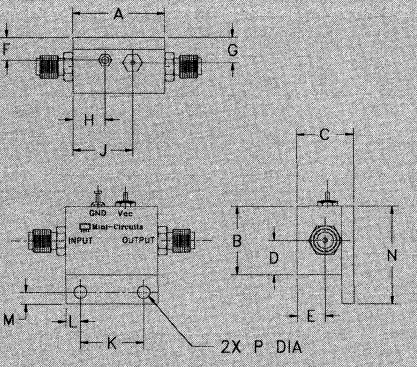
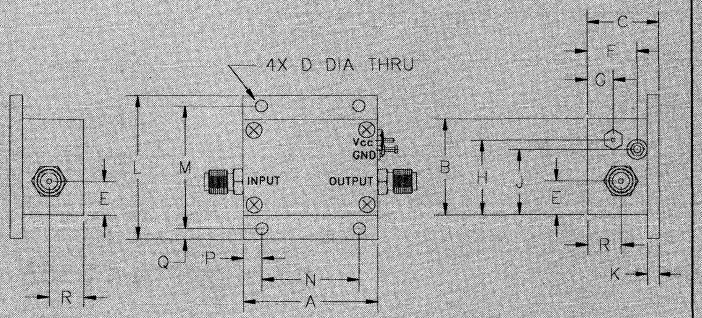


BY



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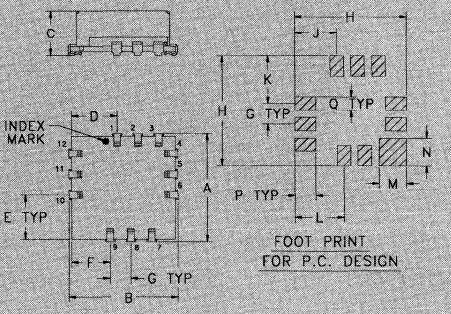

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case styles
outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
CC51	2.00 50.80	2.00 50.80	.75 19.05	.938 23.83	.13 3.30	1.750 44.45	.125 3.17	.38 9.65	1.00 25.40	1.25 31.75									120.0	A10, D11
CC258	2.00 50.80	2.00 50.80	.75 19.05	.938 23.83	.13 3.30	1.750 44.45	.125 3.17	.38 9.65	1.00 25.40	1.25 31.75									200.0	A4, D24
DD52	2.00 50.80	2.00 50.80	.75 19.05	.90 22.86	.156 3.96	1.688 42.88	.125 3.18	.392 9.96	1.00 25.40	.50 12.70	1.00 25.40	1.25 31.75							225.0	A10, D11
FF55	1.40 35.56	.58 14.73	.73 18.54	2.59 65.79	— —														40.0	A9, D12
FF56	.98 24.89	.43 10.92	.47 11.94	1.70 43.18	— —														18.0	A9, D13
FF57	1.54 39.12	.72 18.29	.93 23.62	3.08 78.23	.82 20.83														90.0	A9, D14
FF99	1.27 32.26	.72 18.29	.47 11.94	1.98 50.29															42.0	A9, D13
GG60	2.31 58.67	1.20 30.48	.60 15.24	.125 3.18	2.062 52.37	.30 7.62	.53 13.46	.63 16.00											75.0	A10, D10
HH68	9.31 236.47	1.60 40.64	3.57 90.68	8.84 224.54	.25 6.35	.88 22.35	.36 9.14	.160 4.06	.34 8.64	.69 17.53	.54 13.72	.66 16.76	8.34 211.84	.33 8.38	.06 1.52				1090.0	A5, A18, D10
JJ77	1.50 38.10	1.13 28.70	.97 24.64	.50 12.70	.155 3.94	2.345 59.56	.14 3.56	.850 21.59	2.50 63.50	.10 2.54	.44 11.18	.75 19.05	.63 16.00	.54 13.72	.37 9.40	.43 10.92	.150 3.81	.73 18.54	50.0	A6, A11, A18, D17
KK81	.30 7.62	.27 6.86	.23 5.84	.010 .25	.042 1.07	.020 .51	.100 2.54	.05 1.27	.05 1.27	.035 .89	.036 .91	.26 6.60	.575 14.61						.50	A3, E2, F1
LL85	1.43 36.32	.58 14.73	.75 19.05																21.5	A9, D18
LL86	1.19 30.23	.58 14.73	.51 12.95																14.0	A9, D19
LL87	1.43 36.32	.82 20.83	.68 17.27																48.5	A9, D20
LL88	1.43 36.32	.61 15.49	.75 19.05																24.0	A9, D21
NN92	3.66 92.96	3.25 82.55	2.13 54.10	.25 6.35	3.16 80.26	.38 9.65	2.50 63.50	.156 3.96	.72 18.29	.64 16.26	.74 18.80	1.78 45.21	2.30 58.42	.125 3.18	.50 12.70	2.66 67.56			440.0	A7, A8, A18, D6
PP94	.360 9.14	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.200 5.08												1.5	A26, C3
PP120	.50 12.70	.21 5.33	.150 3.81	.016 .41	.020 .51	.04 1.02	.300 7.62												1.5	A12, C3
PP163	.360 9.14	.400 10.16	.350 8.89	.016 .41	.020 .51	.040 1.02	.200 5.08												2.9	A12, C3
PP230	.50 12.70	.250 6.35	.240 6.10	.016 .41	.020 .51	.04 1.02	.300 7.62												1.8	A12, C3
QQ95	.500 12.70	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.300 7.62	.150 3.81	.150 3.81	.075 1.91									3.5	A12, C3
QQ96	.600 15.24	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.400 10.16	.200 5.08	.200 5.08	.100 2.54									4.0	A12, C3
RR93	4.06 103.12	1.60 40.64	2.125 53.98	3.56 90.42	.25 6.35	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.52	.33 8.38			350.0	A10, A18, D9

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A3. Case material: epoxy. Pin material: iron-nickel alloy. Finish: bright tin-plate per MIL-T-10727.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A5. Case material: C.R.S. Finish: grey paint over hot-tin dip.
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate iridite per MIL-C-5541.
- A8. Case material: aluminum alloy. Finish: case iridite. Heat sink: black anodize.
- A9. Case material: brass. Finish: nickel plate.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A12. Header and lead finish: gold plate per MIL-G-45204. Case material: Nickel
- A18. Mounting bracket finish: irridite or clear anodize.
- A26. Header material: C.R.S., pin material: #52 alloy; finish: electro tin, hot-oil flowed. Cover material: nickel.

C. MARKING
- C3. For Pin designations see specification data sheet.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D9. Connectors: BNC standard. TNC or Female SMA on request, consult factory.
- D10. Connectors: BNC standard. SMA on request, consult factory.
- D11. Connectors: Please specify; Type N or SMA.
- D12. Connectors: Male BNC, Female BNC standard. Other combinations with SMA, TNC available on request, consult factory.
- D13. Connectors: Male SMA. Female SMA only.
- D14. Connectors: Male N, Female N standard. Combinations with BNC, SMA, TNC available on request, consult factory.
- D17. Connectors. Female SMA only.
- D18. Connectors: Male BNC only.
- D19. Connectors: Male SMA only.
- D20. Connectors: Male Type N only.
- D21. Connectors: Male TNC only.
- D24. Connectors: female BNC standard. Type N or SMA consult factory.

E. SPECIAL TOLERANCES
- E2. Lead width ±.010; lead thickness ±.005 inch.

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to model.

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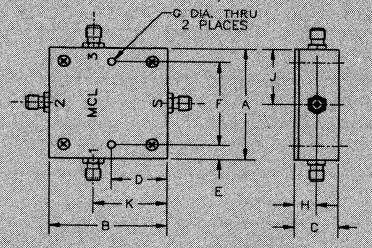
CC



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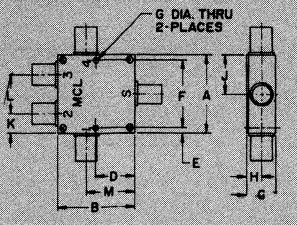

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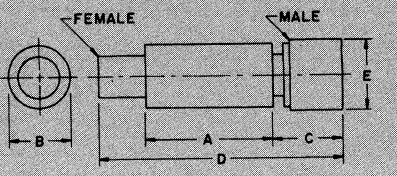

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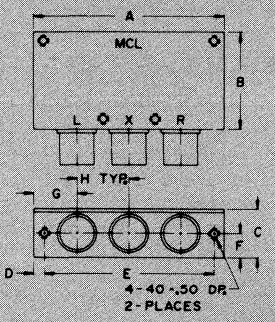

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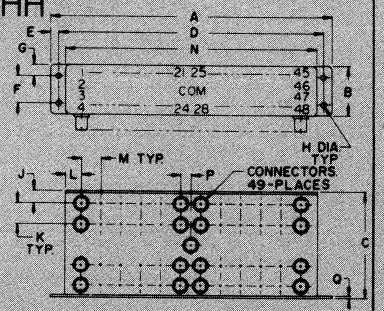

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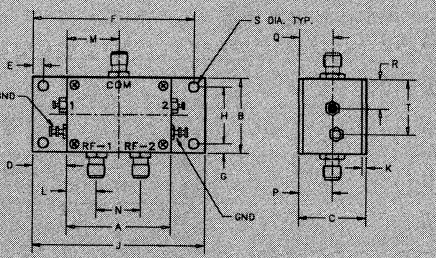
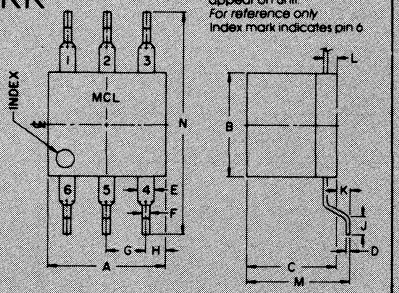


KK

NOTE Pin numbers do not appear on unit. *For reference only* Index mark indicates pin 6



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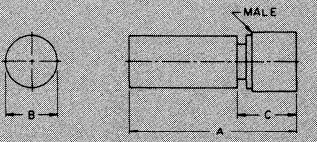

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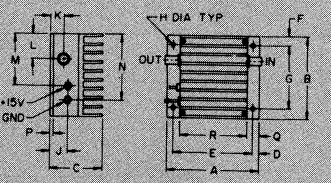
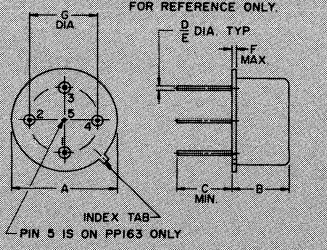


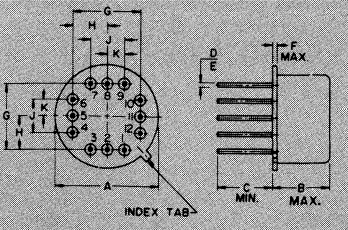
PP

NOTE: PIN NUMBERS DO NOT APPEAR ON UNIT. FOR REFERENCE ONLY.



QQ

NOTE Pin numbers do not appear on unit *For reference only*



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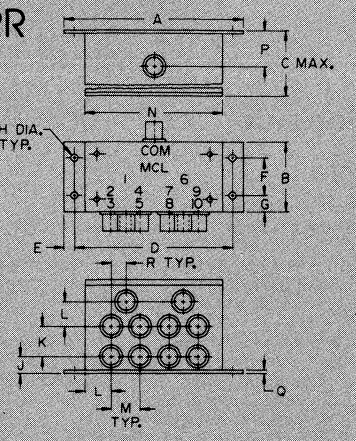

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case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
SS98	1.25 31.75	1.56 39.62	.75 19.05	.63 16.00	.39 9.91	1.50 38.10	1.000 25.40	— —	.125 3.18	.46 11.68	2.18 55.37	1.688 42.88	.07 1.78	.750 19.05	.50 12.70	.80 20.32	.45 11.43	.29 7.37	85.0	A8, A18, B1, D6
TT100	.250 6.35	.310 7.87	.20 5.08	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A14, F2
TT146	.250 6.35	.310 7.87	.275 6.99	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A14, F0
TT240	.250 6.35	.310 7.87	.20 5.08	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A20, F3
TT241	.250 6.35	.310 7.87	.275 6.99	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A20, F0
UU102	3.50 88.90	2.00 50.80	.50 12.70	.150 3.81	3.350 85.09	1.00 25.40	.125 3.18	1.75 44.45	.20 5.08	.55 13.97									120.0	A10, C2, D17
UU179	8.50 215.90	3.95 100.33	.75 19.05	.250 6.35	8.250 209.55	— —	.187 4.75	4.250 107.95	.38 9.65	.500 12.70	.475 12.07	3.475 88.27							282	A4, D17
UU181	2.25 57.15	2.30 58.42	.63 16.00	.125 3.18	2.125 53.98	— —	.125 3.18	1.13 28.70	.31 7.87	.500 12.70	.125 3.18	2.175 55.24							51	A4, D17
UU182	2.75 69.85	2.80 71.12	.63 16.00	.125 3.18	2.625 66.68	— —	.125 3.18	1.38 35.05	.31 7.87	.500 12.70	.125 3.18	2.675 67.95							67	A4, D17
UU187	6.00 152.40	1.62 41.15	.88 22.35	.250 6.35	5.750 146.05	.810 20.57	.144 3.66	3.00 76.20	.44 11.18	1.00 25.40	— —	— —							274	A4, D23
UU188	3.50 88.90	2.13 54.10	.88 22.35	.150 3.81	3.350 85.09	1.06 26.92	.125 3.18	1.75 44.45	.44 11.18	.89 22.61	— —	— —							184	A4, D23
UU215	4.00 101.60	1.25 31.75	.38 9.65	.125 3.18	3.875 98.43	.500 12.70	#2-56 —	2.00 50.80	.19 4.83	.500 12.70	— —	1.125 28.58							77	A4, D17
UU233	1.50 38.10	1.00 25.40	.38 9.65	.125 3.18	1.375 34.93	.500 12.70	#2-56 —	.75 19.05	.19 4.83	.50 12.70									28.0	A8, B8, C2, D17
UU244	2.25 57.15	1.25 31.75	.50 12.70	.150 3.81	2.100 53.34	.62 15.75	.125 3.18	1.12 28.45	.19 4.83	.50 12.70									70	A4, C2, D17
UU449	9.78 248.41	3.13 79.50	.88 22.35	.200 5.08	9.580 243.33	— —	.144 3.66	4.89 124.21	.44 11.18	.89 22.61	.200 5.08	2.930 74.42							840	A4, D25
VV105	.085 2.16	.060 1.52	.008 .20	.020 .51	.256 6.50	.012 .30	.025 .64												.015	A13, C4, E2
WW107	.020 .51	.10 2.54	.020 .51	.092 2.34	.085 2.16	.060 1.52	.008 .20	.026 .66											.015	A13, C4, E2, F4
XX112	.18 4.57	.18 4.57	— —	.40 10.16	.36 9.14	.050 1.27	.015 .38	.005 .13	.005 .13	.07 1.78	.06 1.52								.15	A15, E2, F19
XX211	.163 4.14	.202 5.13	.077 1.96	.25 6.35	.22 5.59	.050 1.27	.017 .43	.009 .23	.025 .63	.03 .76	— —								.10	A13, E2, F16
YY101	.75 19.05	.38 9.65	.20 5.08	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.450 11.43	— —	.47 11.94	.100 2.54	.150 3.81					1.6	A13, E2, E5 F5
YY109	.75 19.05	.38 9.65	.20 5.08	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.72 18.29	— —	.74 18.80	.100 2.54	.150 3.81					1.6	A13, E2, E5, F0
YY161	.75 19.05	.38 9.65	.28 7.11	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.450 11.43	— —	.47 11.94	.100 2.54	.150 3.81					1.6	A13, E2, F6
ZZ121	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.61 15.49	— —	.800 20.32	.800 20.32	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10, A18, B1, D6

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A1. Header material: C.R.S. Pin material: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: iridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A8. Case material: aluminum alloy. Finish: case iridite Heat sink, black anodize.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A13. Case material: plastic. Lead finish: Tin or tin-lead plate.
- A14. Case material: ceramic or plastic, ceramic base. Terminations: palladium platinum silver.
- A15. Case material: kovar. Lead material: kovar. Finish: gold plate per MIL-G-45204 .
- A18. Mounting bracket finish: iridite or clear anodize.
- A20. Case material: ceramic. Terminations: solder plate over nickel. Board edges straight.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B7. Pin's meniscus (of header) 0.015" max.
- B8. #2-56 UNC-2B mounting holes provided to .32" deep minimum.

C. MARKING
- C2. Consecutive marking n = no. of way power splitter.
- C4. RF input lead (1) identified by diagonally cut lead; the cut may be 45°(ref) either direction. It may also have an additional orientation mark. Model dash number identified by color dot or alphanumeric code on case. See specification data sheet.
- C5. RF output is identified by index mark, model dash number by alphanumeric code.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D17. Connectors: Female SMA only.
- D23. Connectors: Please specify female type N or SMA.
- D25. Connectors: Female N standard. For other connectors consult factory.

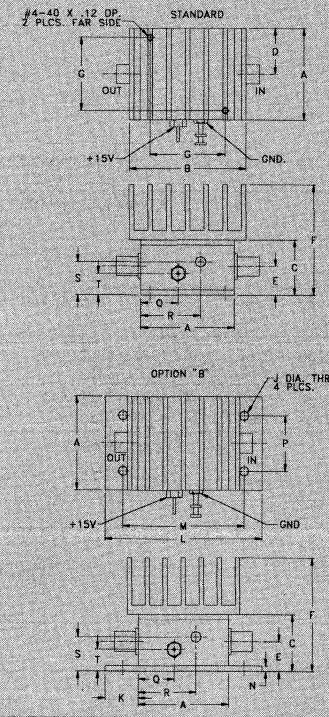
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.
- E5. For SCM mixers, long lead version (YY109) is available upon request; consul factory. To order short lead version (case YY101) add -NL suffix.

F. PACKAGING
- F0. Not available in Tape & Reel.
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to mod

outline drawings

Mini-Circuits

SS



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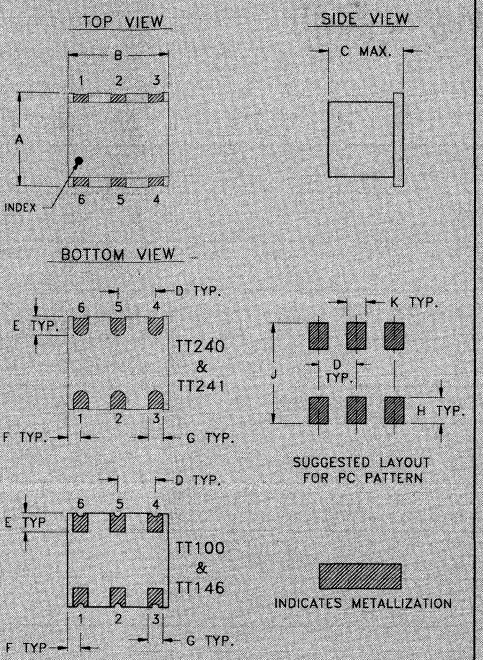

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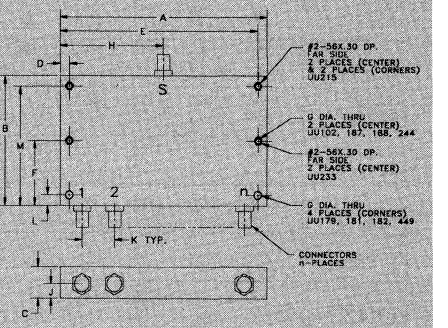

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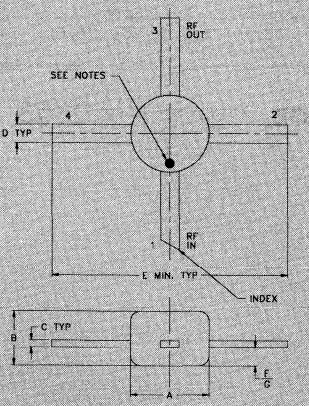

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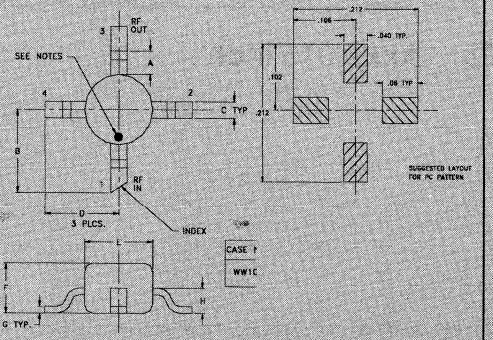
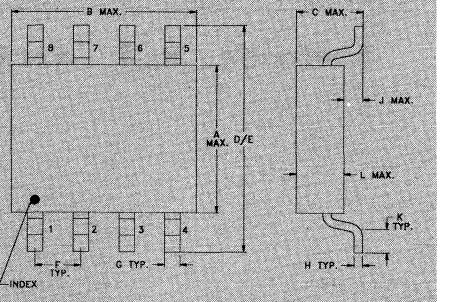


XX



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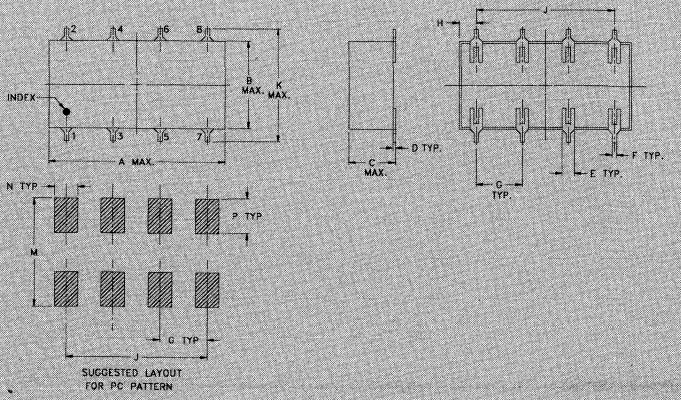

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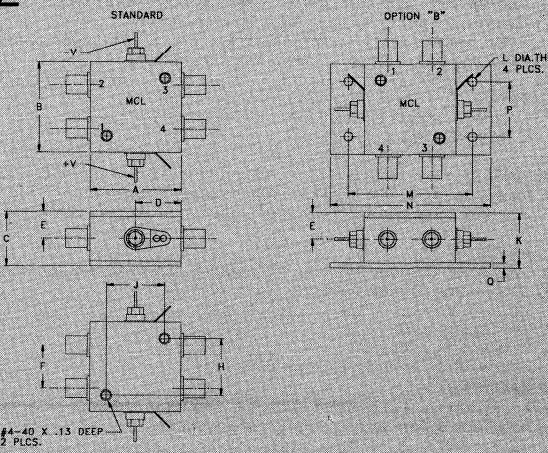

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case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
AAA118	1.50 38.10	.50 12.70	.935 23.75	.040 1.02	1.100 27.94	.19 4.83	.400 10.16	.15 3.81	.600 15.24	.300 7.62	.20 5.08	.14 3.56							19	A1, E1, B7
BBB123	.145 3.69	.100 2.54	.04 1.02	.006 .15	.030 .76	.488 12.40													.015	A13, C5, E2
CCC127	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.80 20.32	.69 17.53	1.60 40.64	.60 15.24	1.200 30.48	.52 13.21	.82 20.83	.150 3.81	80.0	A6, A11, A18, D17
DDD131	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.88 22.35	.43 10.92	.62 15.75	1.00 25.40	2.63 66.68	.125 3.18	.50 12.70	6.00 152.40	2.23 56.64	8.35 212.09	1884.0	A7, A18, D6
DDD338	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.88 22.35	.73 18.54	.62 15.75	1.13 28.70	2.23 56.64	.125 3.18	.50 12.70	6.00 152.40	2.23 56.64	8.35 212.09	1884.0	A7, A18, D6
EEE132	.90 22.86	.90 22.86	.675 17.15	.245 6.22	.45 11.43	1.34 34.04	.09 2.29	1.152 29.26	.09 2.29	.712 18.08	.22 5.59	.106 2.69	.05 1.27						50.0	A4, A18, D6
FFF122	.83 21.08	.83 21.08	.18 4.57	.10 2.54	.100 2.54	.600 15.24	.95 24.13	.017 .43	.15 3.81										5.0	A15, E1
GGG126	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.80 20.32	.69 17.53	— —	.60 15.24	1.200 30.48	.52 13.21	.82 20.83	.150 3.81	80.0	A6, A11, A18, D17
HHH141	2.00 50.80	2.00 50.80	.95 24.13	1.062 26.98	0.125 3.18	1.75 44.45	.125 3.18	0.575 14.60	1.00 25.40	1.35 34.29									200.0	A10, C1, D6
JJJ142	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.32 8.13	— —	.80 20.32	.80 20.32										70.0	A10, D17
JJJ245	.75 19.05	1.00 25.40	.58 14.73	.38 9.65	.29 7.37	.35 8.89													22.0	A4, B9, D6
KKK155	.32 8.13	.445 11.30	.090 2.29	.006 .152	.012 .30	.070 1.78	.050 1.270	.010 .254	.015 .38	.030 .762	.050 1.270	.050 1.270							.40	A13, F7
MMM168	.045 1.14	.055 1.40	.110 2.79	.120 3.05	.041 1.04	.005 .13	.083 2.11	.104 2.64	.070 1.78	.080 2.03	.018 .46	.024 0.61	.030 .76	.036 0.91	.015 .38	.021 0.53	.023 0.58	.006 .15	1.0	A13, F8

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A1. Header material C.R.S. Pin material: #52 alloy. Finish: clectro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite.
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate irridite per MIL-C-5541.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A12. Header finish: gold plate per MIL-G-45204. Case material: cupro-nickel.
- A13. Case material: plastic. Lead finish: Tin or tin-lead plate.
- A15. Case material: kovar. Lead material: kovar. Finish: gold plate per MIL-G-45204.
- A18. Mounting bracket finish: irridite or clear anodize.

B. MOUNTING
- B7. Pin's meniscus (of header) 0.015" max.
- B9. No mounting holes.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.
- C5. RF output is identified by index mark, model dash number by alphanumeric code.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D17. Connectors: Female SMA only.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details.
- To order Tape & Reel version add -TR suffix to model.

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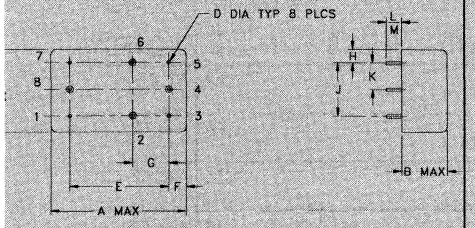
outline drawings

Mini-Circuits

AAA



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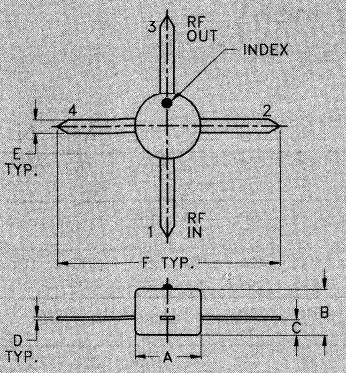

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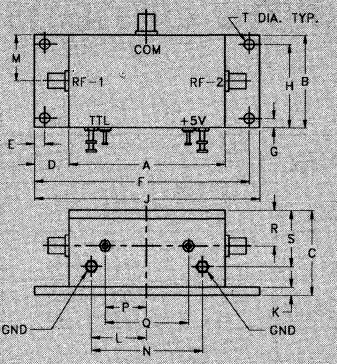

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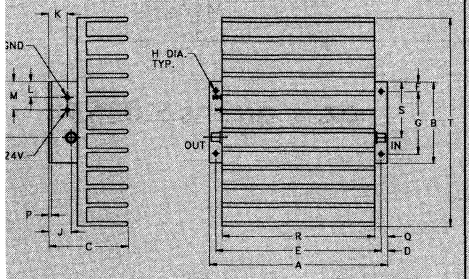

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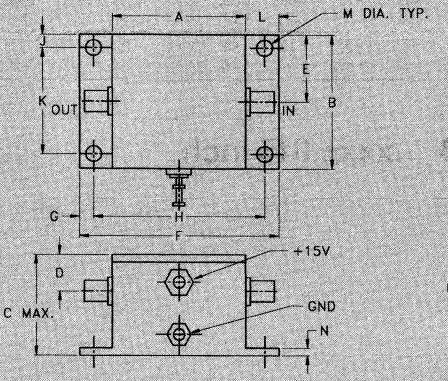

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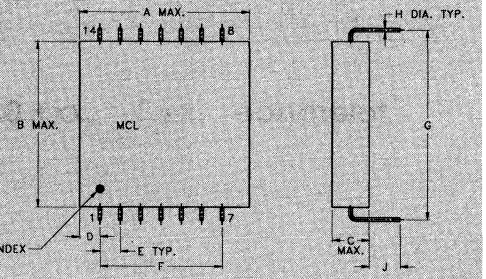

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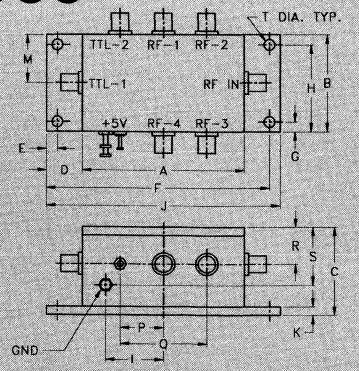

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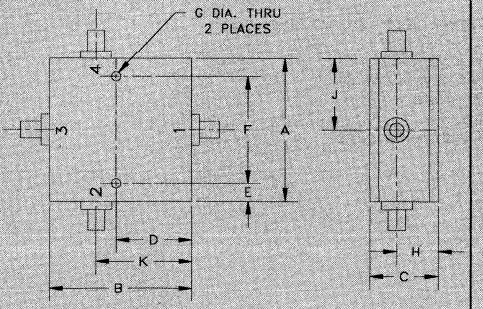

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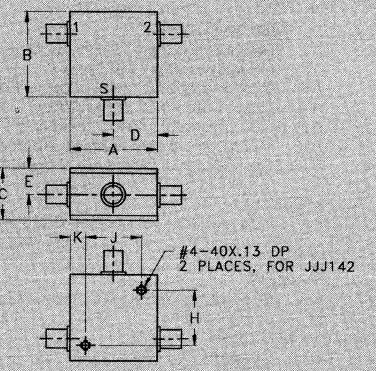

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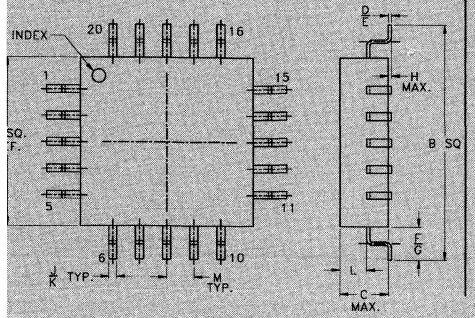

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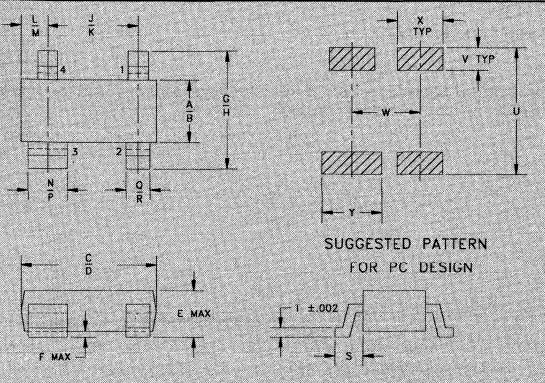

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case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
NNN150	50 12.70	.48 12.19	.255 6.48	.240 6.10	.23 5.84	.21 5.33	.06 1.52	.100 2.54	.09 2.29	.16 4.06	.020 .51	.09 2.29	.005 .13						1.9	A1, E1, F9, B7
PPP83	.75 19.05	.38 9.65	.20 5.08	.010 .25	.05 1.27	.020 .51	.200 5.08	.075 1.91	.200 5.08	.14 3.56	.060 1.52								1.6	A13, E2
QQQ130	— —	.310 7.87	.20 5.08	.10 2.54	.010 .25	.100 2.54	.050 1.27	.400 10.16	.420 10.67	.120 3.05	.060 1.52	.100 2.54	.02 .51						.55	A13, E2, F10
RRR137	.28 7.11	.14 3.56	.030 .76	.020 .51	.145 3.68	.110 2.79	.006 .15	.010 .25	.030 .76										.015	A13, C5, E2, F11
SSS173	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.38	.75 19.05	.07 1.78				75	A10, A18, D17
TTT166	.375 9.53	.500 12.70	.15 3.81	.020 .51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54	.8	A19, F12
TTT167	.375 9.53	.500 12.70	.23 5.84	.020 0.51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54	.8	A19, F13
VVV180	1.80 45.72	1.75 44.45	.50 12.70	.125 3.18	1.675 42.55	.125 3.18	.125 3.18	1.625 41.28	.23 5.84	.63 16.00	1.13 28.70	.88 22.35							34	A4, D17

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A1. Header material C.R.S Pin materal: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A13. Case material: plastic. Lead finish: Tin or tin-lead plate.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material plastic, G-10 base. Termination finish: solder plate

B. MOUNTING
- B7. Pin's meniscus (of header) 0.015" max.

C. MARKING
- C5. RF output is identified by index mark.

D. CONNECTORS
- D17. Connectors; Female SMA only.

E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

outline drawings

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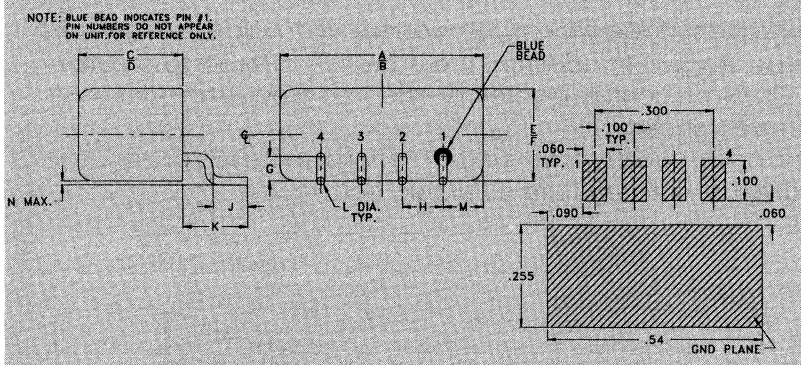
NNN



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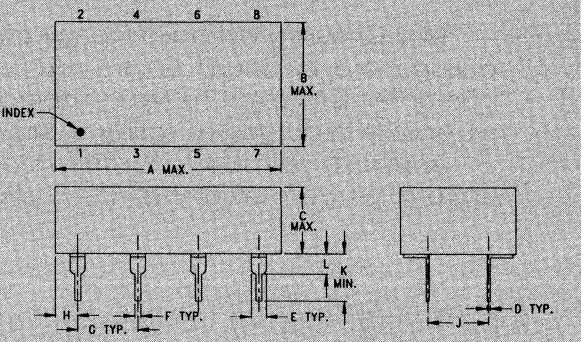

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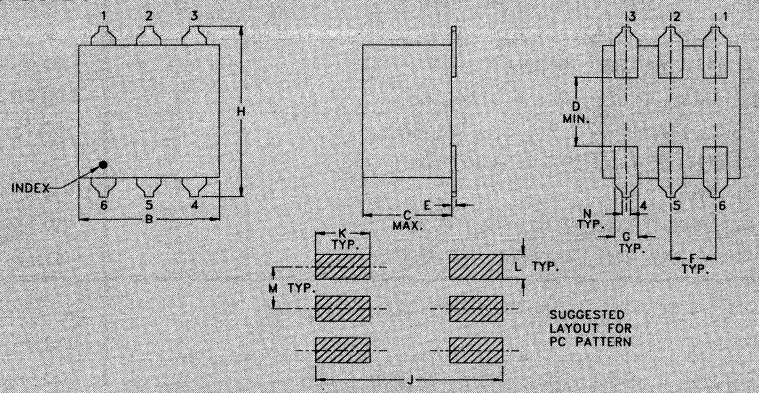

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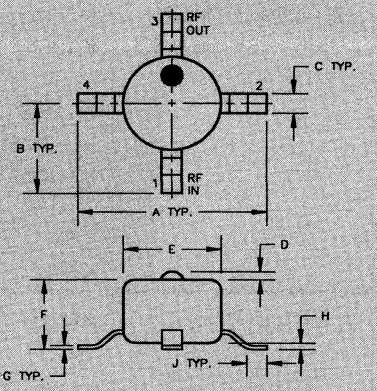

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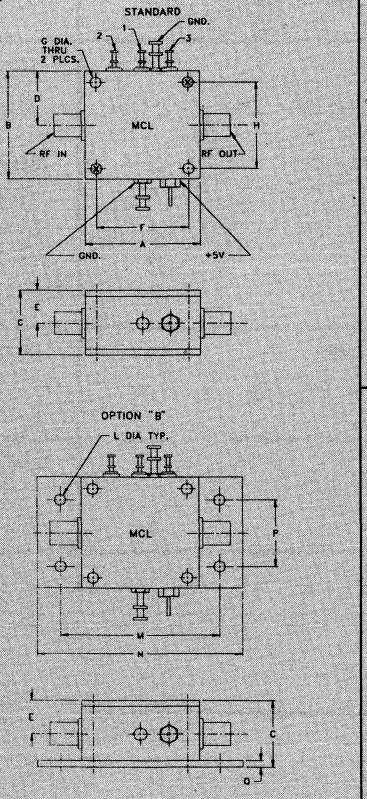

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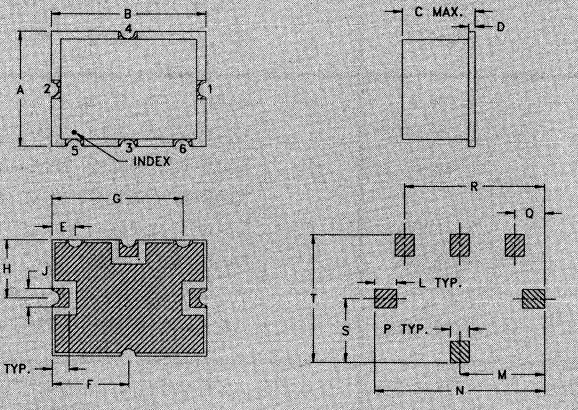

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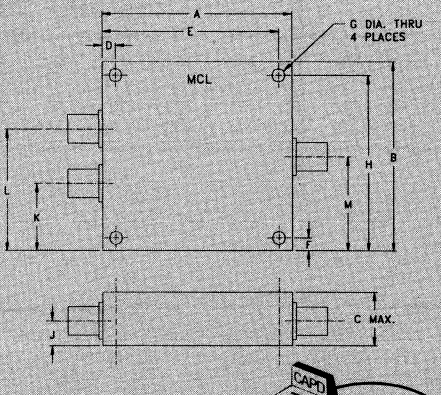

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As an example of Mini-Circuits quest to exceed our customer's expectations, these kits are priced up to 40 percent lower than the cost of individual units and are available from stock.

TYPE	KIT NO.	QTY. EACH MODEL	MODEL NUMBERS	TOTAL QUANTITY UNITS	PRICE
FREQUENCY MIXERS	K-SYM*	1	SYM-2, -11, -860, -11LH, 11MH, 11H	6	59.95
	K-TUF*	1	TUF-1, 1SM, -2, -2SM, -3, -3SM, -5, -5SM, -11A, -11ASM, -860, -860SM	12	79.95
	K1-RMS*	1	RMS-1, -1W, -2, -2D, -2U, -5, -11A, -860	8	59.95
	K1-LRMS*	1	LRMS-1, -1W, -2, -2D, -2U, -5, -11A, -860	8	59.95
	K2-LRMS*	1	LRMS-1LH, -2LH, 5LH, -1MH, -2MH, 5MH, -1H, -2UH, -5H	9	89.95
	K-SM*	2	SYM-2, RMS-2, LRMS-2, SCM-2, TUF-2SM	10	59.95
	K-860*	2	SYM-860, RMS-860, LRMS-860, TUF-860SM	8	82.60
POWER SPLITTERS	K1-PS*	1	SCP-2-1A, SCP-3-1, SCPQ-21.4, SCPQ-90, SCPQ-180,		
			SCPQ-400	6	59.95
	K2-PS	1	PSCQ-2-21.4, -2-50, -2-90, -2-180, -2-250, -2-400	6	99.95
	K3-PS	2	PSC-2-1-75, -3-1-75, -4-1-75	6	99.95
	K4-PS	2	PSC-2-1, PSCJ-2-1, AND 1 EACH PSC-3-1A, PSC-4-3	6	99.95
AMPLIFIERS	DAK-2	5	MAR-1, -2, -3, -4, -6, -7, -8	35	59.95
	DAK-2SM*	5	MAR-1SM, -2SM, -3SM -4SM, -6SM, -7SM, -8SM	35	61.95
	DAK-3*	3	MAR-1, -1SM, -2 -2SM, -3, -3SM, -4, -4SM MAR-6, -6SM, -7, -7SM, -8, -8SM, MAR-11, -11SM	48	59.95
	K1-MAN	1	MAN-1LN, 1HLN, -1, -2	4	59.95
	K2-MAN	1	MAN-1AD, 11AD, 2AD	3	59.95
	K-ZFL	1	ZHL-6A, ZFL-1000, ZFL-2000	3	395.00
	KZHL-318	1	ZHL-6A, ZHL-1042J, ZRON-8G	3	1095.00
CHIP CAPACITORS	KCAP-1	50	10PF, 22PF, 47PF, 68PF, 100PF, 220PF, 470PF, 680PF, 1000PF, 2200PF, 4700PF, 6800PF, .010UF, .022UF, .047UF, .068UF, .100UF	850	99.95
DIGITAL STEP ATTENUATORS	K-TOAT	1	TOAT-124, -3610, -51020	3	149.95
	K-ZFAT	1	ZFAT-R512, -124, -3610, -51020	4	299.95
ELECTRONIC ATTENUATORS	K-PAS	1	PAS-1, -3, -2000	3	99.95

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TYPE	KIT NO.	QTY. EACH MODEL	MODEL NUMBERS	TOTAL QUANTITY UNITS	PRICE
FIXED ATTENUATORS/ TERMINATIONS	K1-AT	4	AT-3, -6, -10, -20	16	49.95
	K2-AT	1	AT-1, -2, -3, -4, -5, -6, -7, -8, -9, -10, AT-12, -15, -20, -30, -40, -3-75, -6-75, AT-10-75, -15-75, -20-75	20	49.95
	K1-MAT	2	MAT-3, 6, 9, 10, 12, 15, 20, 40	16	49.95
	K2-MAT	1	MAT-1, -2, -3, -4, -5, -6, -7, -8, -9 MAT-10, -12, -15, -20, -25, -30, -40	16	49.95
	K1-CAT	2	CAT-3, -6, -10, -20	8	89.95
	K2-CAT	1	CAT-1, -2, -3, -4, -5, -6, -7, -8, -9, CAT-10, -12, -15, -20, -30, -40	15	199.95
	K-CAT-75	1	CAT-3-75, -6-75, -10-75, -15-75, -20-75	5	74.95
	K1-SAT	2	SAT-3, -6, -10, -20	8	109.95
	K2-SAT	1	SAT-1, -2, -3, -4, -5, -6, -7, -8, -9, -9, SAT-10, -12, -15, -20, -30, -40	15	219.95
	K-NAT	2	NAT-3, -6, -10, -20	8	149.95
	K-TRM	2	BTRM-50, STRM-50, NTRM-50	6	49.95
DIRECTIONAL COUPLERS	K1-DC	1	ZFDC-10-5, -15-5, -20-5 (BNC CONNECTORS)	3	199.95
	K2-DC	1	ZFDC-10-1, -20-4 (BNC CONNECTORS)	2	89.95
	K3-DC	1	PDC-10-6, -15-21, -20A-5	3	79.95
	K4-DC	1	PDC-10-1-75, -15-6-75, 20-3-75, 20-6-75	4	59.95
	K5-DC	1	PDC-10-1, -10-54, -10-6	3	53.95
	K6-DC	1	ZFDC-10-21-75, -20-3-75, -3375 (BNC CONNECTORS)	3	119.95
	K7-DC	1	ZEDC-10-2B, -15-2B, ZFDC-20-4 (SMA CONNECTORS)	3	149.95
FILTERS	K-SCF*	1	SCLF-21.4, -30, -45, -135, -190, -380, -420	7	59.95
	K-PHP	1	PHP-50, -100, -150, -175, -200, -250, -300, PHP-400, -500, -600, -700, -800, -900, -1000	14	149.95
	K-LHP	1	SLP-50, -100, -300, -550, -1000, SHP-200, -400, -700	8	249.00
	K-PLP	1	PLP-5, -10.7, -21.4, -30, -50, -70, -90, PLP-100, -150, -200, -250, -300, -450, -550, PLP-600, -750, -800, -850, -1000, -1200	20	159.95
PHASE DETECTORS	K-PD*	1	MPD-1, MPD-2, MPD-21, SYPD-1, SYPD-2	5	79.95
SWITCHES	K1-KSW*	1	KSW-2-46, KSWA-2-46, KSWHA-1-20	3	99.95
	K-YSW*	2	YSW-2-50DR, YSWA-2-50DR	4	59.95
	K2-KSW*	1	KSW-2-46, KSWA-2-46, KSWHA-1-20, YSW-2-50DR, YSWA-2-50DR	5	124.95
	K-ZFSW	1	ZFSW-2-46, ZFSWA-2-46	2	139.95
RF TRANSFORMERS	TTK-1	2	TT1-6, 1.5-1, 2.5-6, 4-1, 4-1A, 16-1, 25-1	14	79.95
	TK-5	2	T1-1T, T1-6T, T2-1T, T2.5-6T, T3-1T, T4-1T, T4-6T, T5--1T, T8-1T, T13-1T, T16-6T	22	79.95
	TK-6	2	T1-1, 1.18-3, 1-6, 1.5-1, 1.5-6, 2.5-6, 4-6, 9-1, 16-1, 36-1	20	79.95
	THK-1	3	T1-1H, T4-1H AND 2 EACH T9-1H, T16-1H	10	59.95
	TMK-2	2	TMO-1-1, -2-1, -4-1, -9-1, -16-1	10	59.95

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dBm - volts - watts conversion

(50-ohm system)

dBm	V	P_o	dBm	V	P_o	dBm	mV	P_o	dBm	μV	P_o
+53	100.0	200W	0	.225	1.0 mW	−49	0.80		−98	2.9	
+50	70.7	100W	−1	.200	.80 mW	−50	0.71	.01 μW	−99	2.51	
+49	64.0	80W	−2	.180	.64 mW	−51	0.64		−100	2.25	.1 pW
+48	58.0	64W	−3	.160	.50 mW	−52	0.57		−101	2.0	
+47	50.0	50W	−4	.141	.40 mW	−53	0.50		−102	1.8	
+46	44.5	40W	−5	.125	.32 mW	−54	0.45		−103	1.6	
+45	40.0	32W	−6	.115	.25 mW	−55	0.40		−104	1.41	
+44	32.5	25W	−7	.100	.20 mW	−56	0.351		−105	1.27	
+43	32.0	20W	−8	.090	.16 mW	−57	0.32		−106	1.18	
+42	28.0	16W	−9	.080	.125 mW	−58	0.286				
+41	26.2	12.5W	−10	.071	.10 mW	−59	0.251		**dBm**	**nV**	
+40	22.5	10W	−11	.064		−60	0.225	.001 μW	−107	1000	
+39	20.0	8W	−12	.058		−61	0.200		−108	900	
+38	18.0	6.4W	−13	.050		−62	0.180		−109	800	
+37	16.0	5W	−14	.045		−63	0.160		−110	710	.01 pW
+36	14.1	4W	−15	.040		−64	0.141		−111	640	
+35	12.5	3.2W	−16	.0355					−112	580	
+34	11.5	2.5W				**dBm**	**μV**		−113	500	
+33	10.0	2W	**dBm**	**mV**		−65	128		−114	450	
+32	9.0	1.6W	−17	31.5		−66	115		−115	400	
+31	8.0	1.25W	−18	28.5		−67	100		−116	355	
+30	7.10	1.0W	−19	25.1		−68	90		−117	825	
+29	6.40	800 mW	−20	22.5	.01 mW	−69	80		−118	285	
+28	5.80	640 mW	−21	20.0		−70	71	.1 nW	−119	251	
+27	5.00	500 mW	−22	17.9		−71	65		−120	225	.001 pW
+26	4.45	400 mW	−23	15.9		−72	58		−121	200	
+25	4.00	320 mW	−24	14.1		−73	50		−122	180	
+24	3.55	250 mW	−25	12.8		−74	45		−123	160	
+23	3.20	200 mW	−26	11.5		−75	40		−124	141	
+22	2.80	160 mW	−27	10.0		−76	35		−125	128	
+21	2.52	125 mW	−28	8.9		−77	32		−126	117	
+20	2.25	100 mW	−29	8.0		−78	29		−127	100	
+19	2.00	80 mW	−30	7.1	.001 mW	−79	25		−128	90	
+18	1.80	64 mW	−31	6.25		−80	22.5	.01 nW	−129	80	.1 *f*W
+17	1.60	50 mW	−32	5.8		−81	20.0		−130	71	
+16	1.41	40 mW	−33	5.0		−82	18.0		−131	61	
+15	1.25	32 mW	−34	4.5		−83	16.0		−132	58	
+14	1.15	25 mW	−35	4.0		−84	11.1		−133	50	
+13	1.00	20 mW	−36	3.5		−85	12.9		−134	45	
+12	.90	16 mW	−37	3.2		−86	11.5		−135	40	
+11	.80	12.5 mW	−38	2.85		−87	10.0		−136	35	
+10	.71	10 mW	−39	2.5		−88	9.0		−137	33	
+9	.64	8 mW	−40	2.25	.1 μW	−89	8.0		−138	29	
+8	.58	6.4 mW	−41	2.0		−90	7.1	.001 nW	−139	25	
+7	.500	5 mW	−42	1.8		−91	6.1		−140	23	.01 *f*W
+6	.445	4 mW	−43	1.6		−92	5.75				
+5	.400	3.2 mW	−44	1.4		−93	5.0				
+4	.355	2.5 mW	−45	1.25		−94	4.5				
+3	.320	2.0 mW	−46	1.18		−95	4.0				
+2	.280	1.6 mW	−47	1.00		−96	3.51				
+1	.252	1.25 mW	−48	0.90		−97	3.2				

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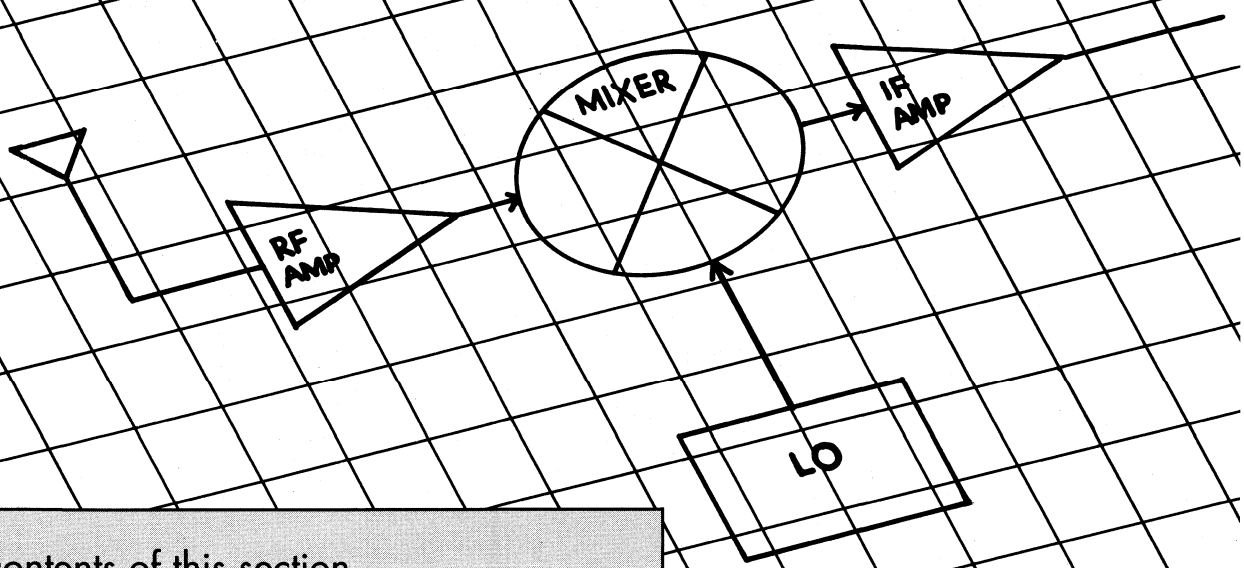
FREQUENCY MIXERS



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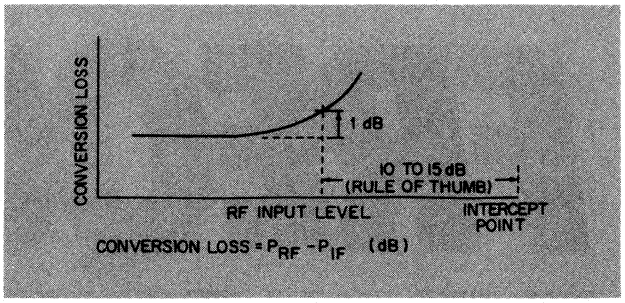
understanding mixers

Often a mixer data sheet does not specify intercept point, so a rule-of-thumb estimate can easily be made by examining the IdB compression point. As RF input level is increased, there is a point where the conversion loss will increase. A convenient point of reference is a 1 dB compression point. As RF input is increased, IF output should follow in a linear manner. However, after a certain point, the IF output increases at a lower rate until the mixer output becomes fairly constant. When the IF output cannot follow the RF input linearly, and deviates by 1 dB, this point is called the 1 dB compression point. Now, the conversion loss is 1 dB higher than it was when the RF input signal was smaller. The importance of this figure is its utility in comparing dynamic range, maximum output and two-tone performance of various mixers.

As a rule-of-thumb, the intercept point is approximately 10 to 15 dB higher than the 1 dB compression point; at low frequencies about 15 dB, and at higher frequencies about 10 dB. See Fig. 7.



7. The 1 dB compression point is an indication of a dbm's dynamic range and maximum power capabilities.

how to measure mixer performance

A manufacturer with integrity does not play the "numbers game" when preparing specification data on his product line. Mini-Circuits' policy for product measurement and specification is straightforward—present the honest facts so the design engineer can evaluate product data for his circuit and system requirements and arrive at a proper design decision.

A 50-ohm broadband system is used for all factory measurements. It offers the customer a convenient and consistent means to obtain correlation with data prepared by Mini-Circuits.

conversion loss measurements

For conversion loss measurements, Fig. 8a, fixed attenuator pads are connected to all three ports so the mixer sees 50 ohms at the frequency of interest and all harmonics. An RF input level of −11 dBm is deliberately selected. Here's why: assuming a typical 6 dB conversion loss, the IF output would be −17 dBm. Mini Circuit's mixers provide LO-IF isolation typically in the order of 50 to 60 dB. Normally, the LO input is +7 dBm and thus with 50 dB isolation, the LO leakage level of −43 dBm would be much lower than IF output. Therefore the RF input level is high enough to operate the mixer in its linear range and not low enough to allow LO leakage to destroy the integrity of the measurement.

For the IF power level measurement, a filter is included before the broadband RF voltmeter, to reject all responses other than the desired IF. When a crystal filter is used, LO leakage would have no effect on the conversion loss measurement since it would not reach the RF voltmeter.

two general techniques for measuring isolation

There are two general techniques for measuring isolation, both requiring 50 ohm terminations at the unused ports. When measuring LO-RF isolation, see Fig. 8 (b), a pad is placed between the generator and DBM to ensure a 50-ohm-impedance. Also, a 50-ohm termination is connected to the IF port and the power at the RF port is measured to obtain the isolation performance.

When measuring isolation from RF-IF or RF-LO, the power applied at the RF port is set at a high level to make sure the diodes have sufficient drive power. This RF power level will be higher than encountered in actual DBM usage. However, the measurement results can be considered quite accurate.

The RF voltmeter technique actually produces isolation specs that are conservative since many applications normally involve narrowband circuits and filters that would eliminate harmonics. By assuming everything measured on the RF voltmeter is due to the fundamental and that harmonics are not present, mixers supplied by Mini-Circuits perform better than expected from the data sheet specs.

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Replacing the RF voltmeter by a spectrum analyzer enables the following improvement in measurement integrity. First, the power at the fundamental frequency of measurement can be observed. Now, for broadband applications, the effects of harmonics can be judged. For narrow-band applications, only the fundamental need be considered. By using the spectrum analyzer technique, the design engineer can avoid overspecifying his DBM isolation requirement with subsequent cost savings.

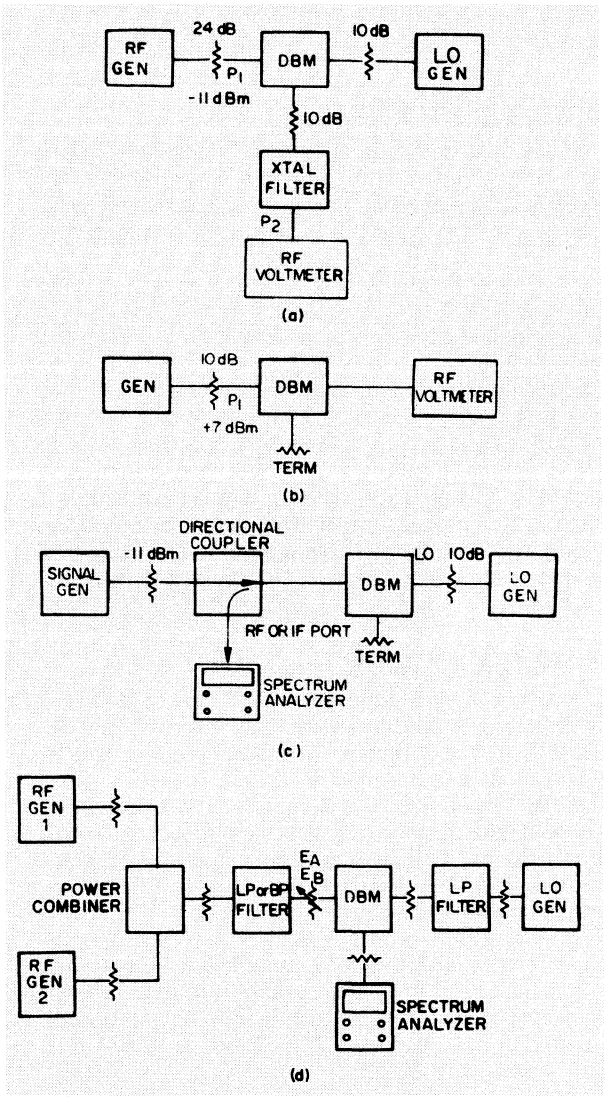
Here's another important advantage of the spectrum analyzer technique. When RF-IF or RF-LO measurements are made, the RF and LO levels can now be set at the normal operating level under which the DBM will be used.

VSWR measurements

VSWR measurements are made under the same dynamic conditions that the mixer would encounter in practice, see Fig. 8 (c). First, let's consider VSWR measurement at the RF port. An LO signal is applied to its port and the unused IF port is terminated in 50 ohms. The RF generator supplies an input level corresponding to linear mixer operation. With the double-balanced mixer disconnected from the directional coupler, a reference level is obtained (all the RF power is reflected back). The amount of reflected signal depends on the directional coupler used; a 20 dB coupler would establish a reference level 20 dB below the RF input. Next, the mixer is connected to the output of the directional coupler. The spectrum analyzer acts as a narrow-band filter and allows observation at the RF input frequency. The RF power reflected back from the mixer is displayed and can be measured by the calibrated scale on the spectrum analyzer.

The VSWR at the IF port is measured in a similar fashion. In this case, the RF port is terminated in 50 ohms.

Broadband mixers, it should be noted, exhibit a different VSWR characteristic at different frequencies. Factors causing this include circuit resonances and changes in diode impedances as the LO power level changes. Also of importance is the fact that the input impedances of the various ports are load dependent, even though they are isolated from each other. At high frequencies, this effect is more noticeable since isolation tends to drop as frequency increases.



8. Test measurement setups for (a) conversion loss, (b) isolation, (c) VSWR and (d) two-tone, third-order distortion.

two-tone, third-order intermodulation distortion

Two-tone, third-order intermodulation distortion takes place when two incoming signals arrive at the mixer RF port and interreact. The signals resulting from the interreaction may be objectionable within the IF response.

For specific details on checking two-tone, third-order response, see "Improve two-tone, third-order testing", on the following pages.

modern mixer terms defined

Statistical Processing

Today's stringent demands for precise electronic systems places a heavy burden on circuit and systems design engineers. Mini-Circuits provides the most comprehensive database for its RF/MW signal-processing components with its exclusive computer-automated performance data or CAPD and its specification charts which include $\bar{X}$ and sigma σ values.

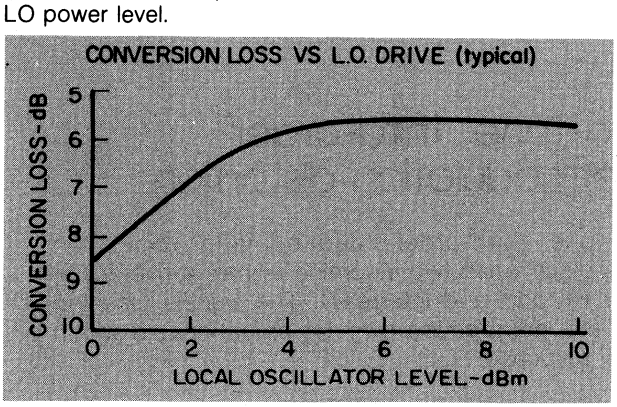
Statistical process control combined with the most modern automated production and test equipment are responsible for Mini-Circuits exclusive 5-year guarantee on mixers along with guaranteed 4.5 sigma, which basically means only four units in a million-lot production run approach the spec limit. For a full explanation of statistical process control terms such as $\bar{X}$, (average value of a group of samples), sigma (standard deviation unit), Cp (process capability), and Cpk (modified process capability factor), please refer to "Statistical Processing" in the General section, see Table of Contents for page number.

conversion loss

Conversion loss is a measure of the efficiency of the mixer in providing frequency translation between the input RF signal and the output IF signal. For a given frequency translation, two equal output signals are produced, a lower sideband and an upper sideband signal. Since only one sideband is generally of value, the specifications given in this handbook are for a single sideband output. If two sidebands are useful, then the conversion loss is 3 dB lower than in the single sideband case.

Conversion loss of a mixer is equal to the ratio of the IF single sideband output to the RF input level. All measurements are based on a 50 ohm system and with a local oscillator level specified in accordance with the appropriate mixer type. For example, level 7, +7 dBm; level 17, +17 dBm; and level 23, +23 dBm.

When the local oscillator power level deviates from the recommended level, the conversion loss will change slightly. The data sheets provide a curve of conversion loss vs. LO power level.



conversion compression

Conversion compression is a measure of the maximum RF input signal for which the mixer will provide linear operation. Normally, the IF output signal level is equal to a constant ratio of RF input signal level. However, when the RF signal level is within 10 dB of the LO drive level, the constant ratio between IF and RF levels will exhibit a change of about 0.1 dB. As the RF level increases further, there will be a greater change in the constant ratio. The conversion loss will increase as the RF input level increases. The IF output level does not exactly follow the increase in RF input level.

The criteria used to describe the deviation from linearity between the RF input level and the IF output level is a fixed amount of compression. Mini-Circuits specifies the 1 dB compression point. Naturally, if a higher compression point were selected, the corresponding RF input level would be higher.

Conversion compression provides an indication of the mixer two-tone performance. The compression point is useful when selecting a mixer for maximum linear operation. The compression point will change as a function of LO drive level. Therefore it is meaningful to specify the actual LO drive level when discussing the compression point.

Conversion loss desensitization is a measure of the nonlinearity caused by an unwanted RF signal at the mixer input. When the undesired RF input level causes the mixer conversion loss to increase by 1dB, for the desired low-level RF input signal, then the 1dB desensitization level is reached and the maximum undesired RF input level is defined.

isolation

Isolation is a measure of the circuit balance within the mixer. When the isolation is high, the amount of "leakage"or "feed thru" between the mixer ports will be very small. Typically, Mini-Circuit's mixer isolation falls off with frequency due to the unbalance in the transformer, lead inductance, and capacitive unbalance between diodes. Generally, at the highest frequency of operation, Mini-Circuits' mixers provide isolation of 30 dB.

The L to R isolation is the amount the LO drive level is attenuated when it is measured at the RF port; the IF port is terminated with 50 ohms. The L to I isolation is the amount the LO drive level is attenuated when it is measured at the IF port; the RF port is terminated with 50 ohms. Normally, only the LO isolation is specified since for RF isolation the RF signal power is much lower than the LO drive level; therefore, RF leakage is usually not a problem.

dynamic range

Dynamic range is the power range over which a mixer provides useful operation. The upper limit of the dynamic range is limited by the conversion compression point. The lower limit of the dynamic range is limited by the noise figure of the mixer. Since the mixer noise figure is only about 0.5 dB higher than its conversion loss, the lowest conversion loss is desirable to obtain the largest dynamic range.

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DC polarity

DC polarity defines the polarity of the IF voltage output when the mixer is used as a phase detector. Normally, the RF and LO signals are in phase, 0°, and are of equal amplitude. Mini-Circuits' mixers provide a negative polarity except where noted.

DC offset

DC offset is a measure of the unbalance of the mixer. For an ideal mixer, the DC offset is zero. DC offset defines the IF voltage output when the mixer is used as a phase detector and only the LO signal is applied, the RF-port is terminated in 50 ohms.

two-tone third order intermodulation distortion

This distortion term describes the degree by which the mixer conversion loss is non-linear. The two-tone third order distortion term is the amount of signal level at the IF output generated as a result of a third order frequency term. One frequency term corresponding to third order is (2 f R2 − f R1) ± fL, where f R represents the RF input signal and fL represents the LO drive.

Normally, this parameter is not specified on the data sheet because it is dependent upon frequencies, terminating impedances, and levels.

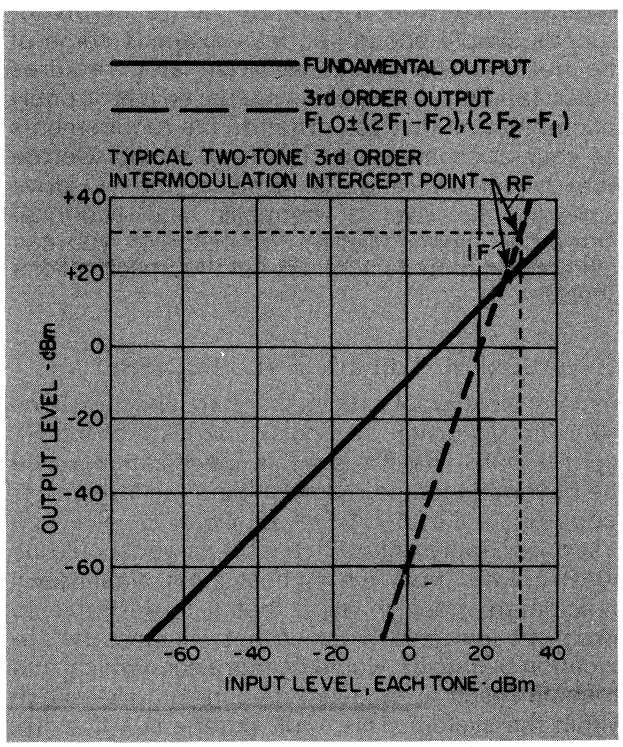
intercept point

Two-tone third-order intermodulation distortion is a measure of the third-order products generated by a second input signal arriving at the R port of a mixer along with the desired signal. A popular method of determining the suppression capapbility of a mixer is the "third-order intercept" approach. The third-order intercept point is a theoretical point on the RF input versus IF output curve where the desired input signal and third-order products become equal in amplitude as RF input is raised.

A convenient way to describe intermodulation products relative to input signal level is to state the relative difference between the two in dB; for example, a mixer may be specified as 60 dB down for two-20 dBm input signals. This means the mixer, with two-20 dBm signals as its input, will suppress third-order products by 60 dB. Now if the input level is reduced an additional 10 dB, the third-order product level would decrease by a factor of three, or 30 dB. The difference between the two would be 20 dB and thus, the mixer would offer 80 dB suppression with two −30 dBm signals at its input. With another 10 dB drop in signal level, third-order products would drop another 30 dB with a difference of 20 dB between the two. Thus, two −40 dBm signals would produce third order products suppressed by 100 dB. When will the two types of signal (input and third-order) theoretically become equal? The original input levels were −20 dBm and thus, the third-order products were 60 dB lower, or −80 dBm. Now if the input is raised 30 dB to +10 dBm, the third-order products would be increased by a factor of three or 90 dB; a 90 dB increase added to the original −80 dBm or +10 dBm, thus establishing equal amplitude for the desired and distorted signals.

Graphically, the intercept point is obtained by linearly extending the desired signal curve past the compression point until it intersects the third order curve.

A rule-of-a-thumb method for determining the intermod level is as follows: (1) find the 1 dB compression level (this is the RF input power level that caused the conversion loss to increase by 1 dB). (2) determine the intercept point. At the low end of the frequency range, this point is about 15 dB above the 1 dB compression point. As the mid to upper frequency range is approached, the intercept point drops to about 10 dB above the 1 dB compression point. (3) Multiply the difference between the intercept point and RF input level (equal RF levels) by the order of harmonic. (4) Subtract this number from the intercept point. This is the intermod level. For example: given a) 1 dB compression point at RF input of +1 dBm. b) RF input level −10 dBm, RF at low end of range. c) what is third-order intermod level? Solution: (1) Compression point is +1 dBm. (2) Intercept point equals 1 dBm +15 dBm = +16 dBm. (3) +16 dBm—(−10 dBm) equals +26 dBm. 26 dBm times third-order= +78 dBm (4) Intermod level equals +16 dBm −78 dBm = −62 dBm.



how to select a mixer

Select the proper mixer for your needs. There are hundreds of models available. Underspecify and face marginal performance, overspecify and pay for more than you need. Here's the proper approach.

Mixers are abundant in electronic systems ranging from inexpensive consumer products to sophisticated military hardware. You'll find them in video games, TV sets and video cassette recorders as well as communications gear, test instruments, radar units and countermeasure systems. Mini-Circuits offers well over a hundred different off-the-shelf models with thousands of variations. Different connector configurations, tighter specs, Hi-Rel, MIL, TX options are available on request. Improper mixer selection bears a penalty—underspecify and face marginal performance; overspecify and pay extra for unnecessary performance characteristics.

making the right choice

Simply stated, there are three basic steps—(1) Selecting the mixer level required in the applications, (2) deciding on a printed-circuit [PC] or connector version, and (3) picking a model that extends over the frequency range involved. Sounds simple enough so let's examine some of the details. The most important step requires understanding your specific needs; so it is strongly recommended that you organize the requirements for your applicaiton and put it in writing. Decide what frequency range is involved, the LO drive available, the level of harmonic and two-tone, third-order intermodulation (IM) distortion you can tolerate and other factors. Fill-out the Specifications Checklist.

I. DETERMINE THE LO LEVEL REQUIRED.

In many mixer applications there are specifications involving distortion at a particular level of the RF input signal. In most cases this specification will be the governing factor in determining the level mixer required; i.e. Level 7, Level 10, Level 17, etc. As a first order approximation, the LO power should be 10dB greater than the highest input signal level anticipated. Keep in mind that it is desirable to select the lowest level mixer that will meet the application because it would be more economical and it would result in the least amount of LO leakage within the system. This 10dB criteria is a first degree approximation.

In many cases this number may be modified. The trade-off is generally between performance versus cost. Mini-Circuits offers a wide range of different level mixers, from 7 to 27. Referring to Fig. 2, and the discussion on 1dB compression point to follow, select the level mixer for your requirement.

II. DETERMINE THE TYPE OF CONNECTIONS: PC BOARD MOUNTING OR COAXIAL CONNECTORS

Generally, the designer has evaluated his system requirements and will know beforehand whether the mixer is to be mounted on a pc board or is to have coaxial connectors.

Mini-Circuits has both types available. All pc board mounting units have at least 4 pins to ensure a mechanically rugged connection to the pc board. Many of these units easily comply with standard miliary requirements. The connector version mixers are available in five standard types: BNC, TNC, SMB, SMA and N. These units are available with or without a mounting bracket (please specify connector and bracket requirement).

III. DETERMINE THE FREQUENCY RANGE REQUIRED AND SELECT A MODEL.

Mini-Circuits offers extremely wideband mixers with a considerable amount of frequency overlap between models. Determine the required frequency range of operation. Then select the mixer whose frequency range specifications best "straddles" the range of frequency operation. It is good practice to try to select a mixer whose midband frequency range covers the frequency range of intended operation. Mini-Circuits has taken this design philosophy in specifying the frequency range of its models. All MCL mixers perform well at the edges of their frequency specification. In fact, many users operate outside of the band edge specified by MCL and expect and receive repeatable (unit to unit), high performing mixers.

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FIG. 1

Mini-Circuits

application

Space _____ Military _____ Industrial _____ Commercial _____

Description: _____

_____

Parameters important for application: _____

_____

electrical

FREQUENCY RANGE

LO _____ RF _____ IF _____

LEVEL MIXER: Dynamic range parameters (choose the most critical for your application)

1. Maximum RF input level anticipated _____
2. Percent distortion acceptable _____
3. Intercept point _____
4. Two-tone, 3rd order IM _____ dB at _____ dBm, RF input each tone
5. RF input at 1 dB compression level _____
6. LO power available _____
7. none of the above specified _____

CONVERSION LOSS, maximum

a) _____ dB over _____ MHz
b) Flatness over frequency _____ dB
c) Changes over temperature _____ dB over _____ °C
d) Unit-to-unit variation _____ dB

NOISE FIGURE, maximum _____ dB over _____ MHz

ISOLATION, minimum

LO-RF _____ dB over _____ MHz
LO-IF _____ dB over _____ MHz
RF-IF _____ dB over _____ MHz

VSWR OR RETURN LOSS

Impedance _____
LO port _____ RF port _____ IF port _____

HARMONIC INTERMODULATION REQUIREMENTS

_____ X LO by _____ X RF _____ dB below IF

REPLACEMENT FOR EXISTING MODEL

Manufacturer _____ Model _____

SPECIAL REQUIREMENTS: _____

_____

package

PINS

Hermetic seal required Yes ____ No ____
Small size important Yes ____ No ____
Max. size Requirement:
L _____" W _____" H _____"

Configuration

Plug-in _____ Flat pack _____
Surface Mount _____

CONNECTORS

BNC _____ SMA _____ N _____TNC _____
Connector Orientation
all in one Face _____ T configuration _____
Other _____
Mounting requirements
thru hole _____ tapped hole _____ flange _____

environmental & reliability

TEMPERATURE RANGE

Operating _____ Storage _____

MIL SPEC _____ Group A _____, B _____, C _____

SCREENING REQUIRED

Test	Conditions	MIL-STD
Vibration		
Shock		
Temperature Shock		
Burn-in		
Other _____		

DATA REQUIREMENTS

Lot data _____
Unit data _____
Other _____

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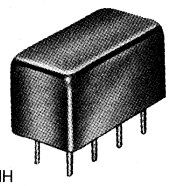
FREQUENCY MIXERS

Plug-In

ACTIVE, LOAD INSENSITIVE 10 to 500 MHz



UNCL-X
UNCL-X1MH

UNCL-X1 (+7 dBm LO, up to +1 dBm RF)
UNCL-X1MH (+13 dBm LO, up to +7 dBm RF)

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION GAIN, dB Mid-Band m $\bar{x}$	CONVERSION GAIN, dB Mid-Band m σ	CONVERSION GAIN, dB Mid-Band m Min.	CONVERSION GAIN, dB Total Range Min.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-X1	1-500	10-500	1.57	.05	-1.0	-1.0	60	40	30	25	25	20	50	30	30	20	26	18	1	12	36	1-177	A01	a	23.95
UNCL-X1MH	1-500	10-500	2.41	.015	0.5	0	60	40	35	25	30	20	50	30	25	18	18	14	7	12	60	1-181	A01	a	27.95

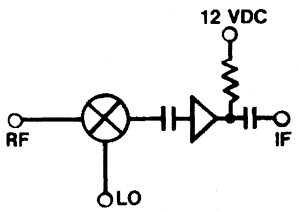
L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

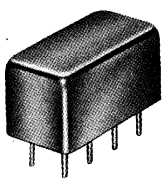
U = upper range (f_U/2 to f_U)

features

- 2-tone 3rd-order IM
- insensitive to IF load
- VSWR 1.2:1, IF/RF ports



ACTIVE, LOW NOISE (4.3 dB typ.) 10 to 500 MHz



UNCL-R1
UNCL-R1H

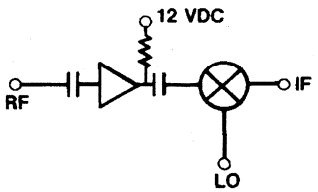
UNCL-R1 (+7 dBm LO, up to -10 dBm RF)
UNCL-R1H (+17 dBm LO, up to +1 dBm RF)

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION GAIN, dB Mid-Band m $\bar{x}$	CONVERSION GAIN, dB Mid-Band m σ	CONVERSION GAIN, dB Mid-Band m Min.	CONVERSION GAIN, dB Total Range Typ.	CONVERSION GAIN, dB Total Range Min.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-R1	10-500	DC-500	5.53	.11	2	5	2	65	45	55	40	47	35	40	30	30	20	25	17	-10	12	35	1-185	A01	b	23.95
UNCL-R1H	10-500	DC-500	6.32	.23	3	6	2	65	45	55	40	47	35	40	30	35	25	28	19	1	12	60	1-183	A01	b	27.95

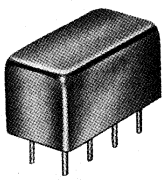
L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)



ACTIVE, LOW LO DRIVE 10 to 500 MHz



UNCL - L1
UNCL-L1H

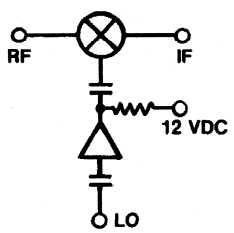
UNCL-L1 (-4 dBm LO, up to 1 dBm RF)
UNCL-L1H (+6 dBm LO, up to 14 dBm RF)

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS, dB Mid-Band m $\bar{X}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-L1	10-500	DC-500	5.73	.08	8.0	8.5	45	30	35	20	25	17	32	20	23	15	18	12	1	12	35	1-179	A01	c	23.95
UNCL-L1H	10-500	DC-500	5.73	.07	8.0	8.5	45	25	36	20	24	17	32	18	25	15	18	10	14	12	60	1-187	A01	c	27.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)



NSN GUIDE

MCL NO.	NSN
UNCL-X1MH	5895-01-391-0040

NOTES:

$\bar{X}$ Average of conversion loss at center of mid-band frequency(f_L + f_U/4)
σ Standard deviation
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.

pin connections

PORT	a	b	c
LO	7	7	1
RF	8	1	7
IF	1	8	8
DC	4	4	4
GND EXT.	3,5,6	3,5,6	3,5,6
CASE GND	3,5,6	3,5,6	3,5,6
NOT USED	2	2	2

CAPD now available! computer-automated performance data

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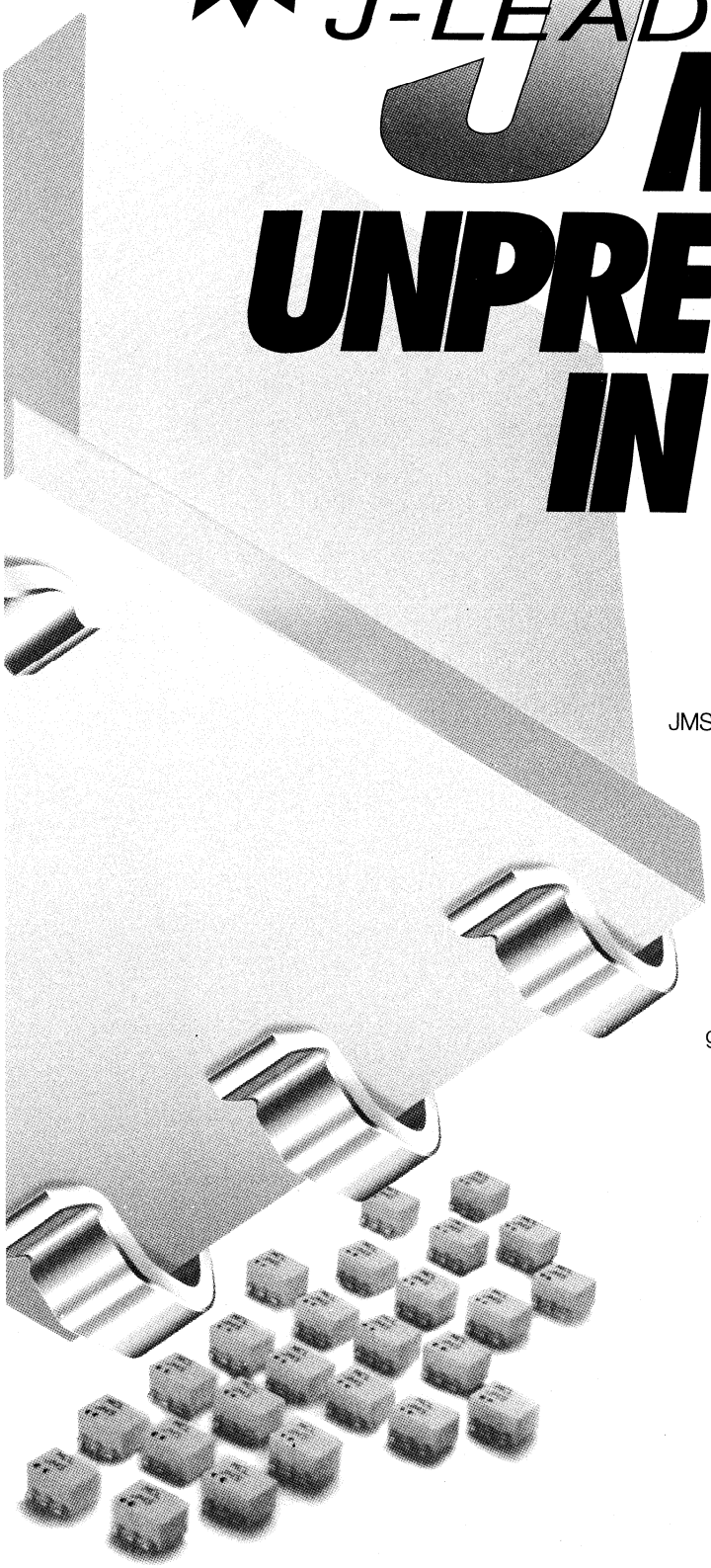
NEW!

J-LEAD MIXERS UNPRECEDENTED IN VALUE.



All Ceramic 2 to 1900MHz

$4.25 from (qty. 10-49)

JMS mixers mean unparalleled performance and reliability. Solder plated J leads provide improved reliability of the solder connection while significantly reducing thermal stress and leaching. All-welded internal construction withstands reflow temperatures up to 240°C for 5 minutes, and rugged construction enables JMS mixers to pass tough MIL-M-28837 shock and vibration tests. Additionally, the all-ceramic surface mount package has a cover pull strength of 20 pounds! Other quality features include 4.5 sigma repeatability unit-to unit, automated assembly for low-cost and fast, guaranteed 1 week shipment, tape and reel availability plus a 5 year Ultra-Rel™ guarantee. If value is a must...specify JMS mixers from Mini-Circuits.

Mini-Circuits...we're redefining what VALUE is all about!

SPECIFICATIONS

MODEL	LO (dBm)	FREQUENCY (MHz) LO/RF	FREQUENCY (MHz) I F	MIDBAND (dB, typ.) Conv. Loss	Isolation L-R	Isolation L-I	$ea. (qty. 1-9)
JMS-1	+7	2-500	DC-500	5.75	45	45	4.95
JMS-1LH	+10	2-500	DC-500	5.75	55	45	8.45
JMS-1MH	+13	2-500	DC-500	5.75	60	45	9.45
JMS-1H	+17	2-500	DC-500	5.90	50	50	11.45
JMS-2L	+3	800-1000	DC-200	7.0	24	20	7.45
JMS-2	+7	20-1000	DC-1000	7.0	50	47	7.45
JMS-2LH	+10	20-1000	DC-1000	6.5	48	35	9.45
JMS-2MH	+13	20-1000	DC-1000	7.0	50	47	10.45
JMS-2H	+17	20-1000	DC-1000	7.0	50	47	12.45
JMS-2W	+7	5-1200	DC-500	6.8	60	48	7.95
JMS-11X	+7	5-1900	5-1000	6.7	35	37	4.25*

Note: *10-49 qty.

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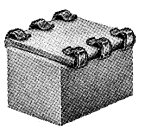
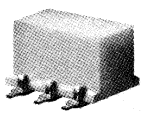
For detailed specs on all Mini-Circuits products refer to • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM • MINI-CIRCUITS' 740- pg. HANDBOOK.

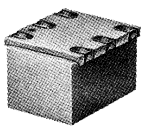
FREQUENCY MIXERS

Surface Mount

LEVEL 3 400 to 1400 MHz


JMS


LRMS


RMS

+3 dBm LO, up to -3 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	ISOLATION LO-RF (dB) Typ.	Min.	ISOLATION LO-IF (dB) Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
JMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	17	20	14	1-210	BH292	ht	7.45
LRMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	16	20	12	1-210	QQQ130	w	6.95
LRMS-5L	400-1400	DC-800	7.0	0.2	9.8	22	14	18	6	1-210	QQQ130	w	13.95
RMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	16	20	12	1-210	TT100	w	6.95
RMS-5L	400-1400	DC-800	7.0	0.2	9.8	22	14	18	6	1-210	TT100	w	13.95

features

- low LO power: 3 dBm.
- JMS-2L, RMS-2L and LRMS-2L are usable at 0 dBm LO.
- wide band coverage: 400-1400 MHz.
- 1 dB compression, -3 dBm typical.
- miniature surface mount (0.25" x 0.31" x 0.2").
- conversion loss spec limit 4.5 s typical from mean.
- ideal for cellular applications.

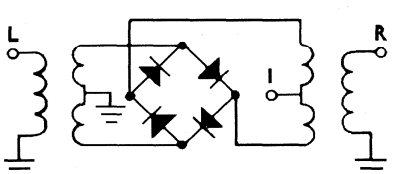
pin connections

PORT	w	ht[1]
LO	1	6
RF	4	3
IF	5	2
GND EXT.	2,3,6	1,4,5
CASE GND	—	—
NOT USED	—	—

[1] pin connection physically same as w.

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency $(f_L+f_U/4)$
σ Standard deviation
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. RF power, 50mW
   1b. Peak IF current, 40mA



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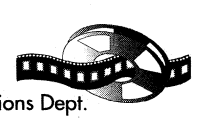
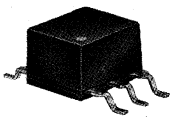
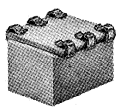


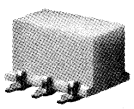
FREQUENCY MIXERS

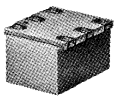
Surface Mount

LEVEL 7 150 kHz to 3 GHz


ASK-KK81


†JMS


† LRMS


†RMS

+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band m Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	ASK-1-KK81	1-600	DC-600	5.58	.06	7.0	8.5	50	30	35	25	30	20	45	35	30	20	25	15	1-76	KK81	w	6.95
	ASK-2-KK81	1-1000	DC-1000	6.79	.10	8.0	9.8	60	40	35	18	26	16	50	30	25	17	15	10	1-209	KK81	w	8.25
	JMS-1	2-500	DC-500	5.75	.10	7.0	8.0	55	50	45	30	40	25	55	45	45	25	32	20	1-218	BH292	ht	4.95
	JMS-2	20-1000	DC-1000	7.0	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	1-244	BH292	ht	7.45
	JMS-2W	5-1200	DC-500	6.8	.10	8.0	9.0	60	40	60	30	37	20	60	40	48	20	31	15	1-47	BH292	ht	7.95
NEW	JMS-5	5-1500	DC-1000	6.0	.10	8.0	9.5	63	40	50	25	35	20	60	40	30	18	15	8	1-225	BH292	ht	9.95
	JMS-11X	5-1900	5-1000	6.7	.15	8.2	9.8	58	45	35	20	27	18	56	45	37	20	27	20	1-49	BH292	hu	4.25***
	LRMS-1	0.5-500	DC-500	5.94	.05	7.0	8.5	55	50	33	25	27	20	55	45	30	23	24	19	1-218	QQQ130	w	6.25
	LRMS-1W	2-750	DC-750	5.83	.21	7.5	8.5	70	45	45	28	38	22	60	45	40	25	30	20	1-175	QQQ130	w	6.75
	LRMS-2	5-1000	DC-1000	6.67	.26	8.0	9.5	60	40	40	20	25	18	55	30	30	20	20	12	1-224	QQQ130	w	6.95
	LRMS-2D	5-1000	DC-1000	6.81	.06	8.0	10.0	59	40	40	30	33	22	55	30	40	22	30	20	1-173	QQQ130	w	7.25
	LRMS-2U	10-1000	10-750	6.79	.16	8.0	9.5	55	40	40	30	30	25	55	30	35	25	30	22	1-227	QQQ130	w	11.45
	LRMS-5	5-1500	DC-1000	5.92	.34	7.5	9.5	60	40	40	20	30	18	55	30	30	18	15	8	1-225	QQQ130	w	13.95
	LRMS-11A	1500-1900	40-400	7.44	.36	—	9.0			25 (typ.)		17 (min.)				23 (typ.)		15 (min.)		1-212	QQQ130	w	16.95
	LRMS-860	800-1050	DC-250	5.5	.23	7.5	7.5			36 (typ.)		25 (min.)				24 (typ.)		18 (min.)		1-171	QQQ130	w	11.45
	RMS-1	0.5-500	DC-500	5.94	.05	7.0	8.5	55	50	33	25	27	20	55	45	30	23	24	19	1-218	TT240	w	6.25
	RMS-1W	2-750	DC-750	5.83	.21	7.5	8.5	70	45	45	28	38	22	60	45	40	25	30	20	1-175	TT100	w	6.75
	RMS-1BM	5-600	DC-600	6.0	.05	7.0	7.5	65	45	50	32	35	23	55	40	40	25	35	22	1-175	TT100	w	6.25
	RMS-2	5-1000	DC-1000	6.67	.26	8.0	9.5	60	40	40	20	25	18	55	30	30	20	20	12	1-224	TT100	w	6.95
	RMS-2D	5-1000	DC-1000	6.81	.06	8.0	10.0	59	40	40	30	33	22	55	30	40	22	30	20	1-173	TT100	w	7.25
	RMS-2U	10-1000	10-750	6.79	.16	8.0	9.5	55	40	40	30	30	25	55	30	35	25	30	22	1-227	TT100	w	11.45
	RMS-5	5-1500	DC-1000	5.92	.34	7.5	9.5	60	40	40	20	30	18	55	30	30	18	15	8	1-225	TT100	w	13.95
	RMS-11A	1500-1900	40-400	7.44	.36	—	9.0			25 (typ.)		17 (min.)				23 (typ.)		15 (min.)		1-212	TT100	w	16.95
✪	RMS-11F	350-2000	DC-400	5.5	.20	7.0	9.2	37	26	36	20	32	20	22	14	29	20	28	20	1-51	TT240	w	4.95***
	RMS-11X	5-1900	5-1000	7.1	.10	8.2	9.8	58	45	35	20	27	18	56	45	37	20	27	20	1-49	TT240	gk	3.95***
	RMS-30	200-3000	DC-1000	6.5	.20	9.0	9.8			27 (typ.)		17 (min.)				20 (typ.)		7 (min.)		1-53	TT240	w	6.95***
	RMS-860	800-1050	DC-250	5.5	.23	7.5	7.5			36 (typ.)		25 (min.)				24 (typ.)		18 (min.)		1-171	TT100	w	11.45

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)

m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

pin connections see case style outline drawings for pin locations

PORT	d	k	r	w	x	z	gk	gm	ht[1]	hu[2]	hp	je
LO	8	8	1	1	2	4	1	4	6	6	5	1
RF	1	1	8	4	1	1	5	2	3	2	1	5
IF	3,4^	3	3	5	3	2	4	1	2	3	7	7
GND EXT.	2,5,6,7	2,5,6,7	2,4,5,6,7	2,3,6	4,5,6	3	2,3,6	3	1,4,5	1,4,5	2,3,4,6,8	2,3,4,6,8
CASE GND	—	—	—	—	—	3	—	3	—	—	—	—
NOT USED	—	4	—	—	—	—	—	—	—	—	—	—

^ pins must be connected together externally

[1] pin connection physically same as w

[2] pin connection physically same as gk

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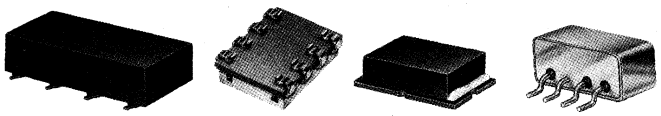


SCM SKY SYM TUF-SM

+7 dBm LO, up to +1 dBm RF

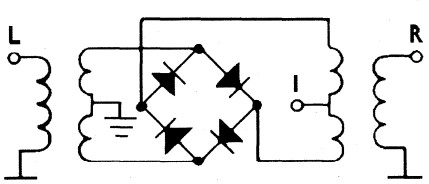
	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band m Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	SCM-1	1-500	DC-500	5.72	.10	7.0	8.0	60	40	45	35	40	30	50	40	45	35	40	25	1-221	YY101	d	4.25
	SCM-2	5-1000	DC-500	5.76	.03	8.3	9.8	50	40	40	25	35	20	55	30	40	25	30	18	1-219	YY101	k	5.45
	SCM-5	1250-1800	DC-500	5.82	.19	—	8.0	28 (typ.)		17 (min.)				18 (typ.)		8 (min.)				1-196	YY101	r	11.95
	SCM-2500	500-2500	DC-500	5.88	.08	6.9	10.0	35	22	35	22	35	22	18	12	18	12	18	12	1-191	YY101	r	11.95
NEW	SKY-5G	2000-5000	DC-1000	6.6	.10	—	9.5	28 (typ.)		20 (min.)				13 (typ.)		7 (min.)				1-59	BJ398	je	14.95
NEW	SKY-7G	2000-7000	DC-1000	7.0	.10	—	9.8	28 (typ.)		15 (min.)				20 (typ.)		7 (min.)				1-61	BJ398	je	16.95
NEW	SKY-53R	2800-5300	DC-500	5.7	.20	—	9.5	28 (typ.)		15 (min.)				12 (typ.)		8 (min.)				1-63	BJ398	hp	14.95
NEW	SKY-60	2500-6000	DC-1500	6.2	.20	—	9.7	28 (typ.)		17 (min.)				14 (typ.)		8 (min.)				1-65	BJ398	je	14.95
	SYM-2	2-1000	DC-1000	5.4	.10	7.2	9.5	70	45	50	30	40	25	63	40	48	24	37	20	1-66	TTT166	x	11.95
	SYM-860	800-1050	DC-250	5.6	.10	7.0	7.0	39 (typ.)		25 (min.)				37 (typ.)		20 (min.)				1-165	TTT166	x	8.95
	SYM-11	1-2500	10-600	7.0	.30	9.0	10.5	63	40	40	24	34	20	61	40	35	20	28	15	1-169	TTT167	x	9.95
	SYM-12	5-1200	DC-1000	6.5	.30	8.0	9.0	68	45	50	30	37	25	56	40	46	25	29	18	1-55	TTT167	x	9.45
	SYM-2500	1-2500	DC-500	6.5	.10	8.5	9.8	70	50	50	25	36	20	60	45	30	10	16	8	1-57	TTT167	x	11.95
	TUF-1SM	2-600	DC-600	5.85	.04	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	NNN150	z	4.25
	TUF-2SM	50-1000	DC-1000	5.85	.07	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	NNN150	z	5.20
†	TUF-3SM	0.15-400	DC-400	4.7	.02	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	NNN150	z	6.10
	TUF-5SM	20-1500	DC-1000	5.7	.04	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	NNN150	z	9.45
	TUF-5XSM	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	NNN150	gm	11.95
	TUF-11ASM	1400-1900	40-500	6.8	.30	8.6	8.6	33 (typ.)		20 (min.)				29 (typ.)		15 (min.)				1-167	NNN150	z	16.95
	TUF-860SM	800-1050	DC-250	5.6	.24	7.75	7.75	35 (typ.)		25 (min.)				27 (typ.)		20 (min.)				1-165	NNN150	z	9.45

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NOTES:
- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- † Phase detection, positive polarity except RMS-860 and LRMS-860
- ✪ Frequency ranges specified: m = 350-1000 MHz, L = 350-750 MHz, M = 750-1000 MHz, U = 1000-2000 MHz
- *** Price for quantities 10-49
- A. Environmental specifications and re-flow soldering information available in General Information Section.
- B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. RF power, 50mW
  - 1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
RMS-1	5895-01-415-6798
RMS-2TR	5895-01-382-2092
SCM-1NL	5895-01-374-9561



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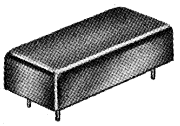
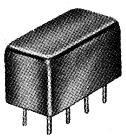
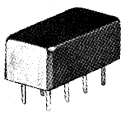
FREQUENCY MIXERS

Plug-In

LEVEL 7 500 Hz to 3.5 GHz


GRA


SRA


SBL
SIMA

+7 dBm LO, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
GRA-1	5-500	DC-500	5.96	.09	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	D09	y	14.95
GRA-3	.025-200	DC-200	4.78	.07	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	D09	y	18.45
GRA-6	.003-100	DC-100	4.70	.14	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-48	D09	y	28.95
GRA-8	.0005-10	DC-10	6.03	.08	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	D09	y	31.95
SRA-1	.5-500	DC-500	5.11	.09	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	A01	e	13.45
SRA-1TX	.5-500	DC-500	5.68	.04	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	A01	e	59.95
SRA-1W	1-750	DC-750	5.80	.04	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	A01	f	15.95
SRA-1-1	.1-500	DC-500	4.81	.11	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	A01	e	14.95
SRA-2	1-1000	.5-500	5.66	.07	7.5	8.5	45	30	35	20	30	20	45	30	30	20	30	20	1-56	A01	j	15.95
SRA-2CM	5-1000	DC-1000	5.27	.04	7.0	8.5	60	50	35	30	30	25	50	45	30	25	25	20	1-96	A01	f	14.95
SRA-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	A01	e	15.95
SRA-4	5-1250	.5-500	5.71	.08	7.5	8.5	50	40	40	20	30	20	50	40	40	20	30	20	1-122	A01	j	17.95
SRA-5	5-1500	10-600	6.69	.07	8.0	8.5	50	45	35	30	30	20	45	40	30	25	25	15	1-20	A06	m	24.95
SRA-6	.003-100	DC-100	4.58	.05	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-48	A01	d	24.95
SRA-8	.0005-10	DC-10	5.69	.11	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	A01	d	29.95
SRA-11	5-2000	10-600	6.72	.07	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	A06	m	20.95
SRA-12	800-1250	50-90	6.21	.13	7.5	7.5	32	25	35	25	35	25	30	20	30	20	30	20	1-74	A06	m	29.95
SRA-149***	5-500	DC-500	5.61	.07	6.5	8.0	60	50	55	45	53	40	50	40	35	25	30	24	1-217	A06	p	9.95
SRA-2000	100-2000	DC-600	8.60	.15	9.5	9.5	37 (Typ.) 20 (Min.)						30 (Typ.) 20 (Min.)						1-60	A06	m	21.95
SRA-2400	750-2400	DC-400	5.95	.26	9.0	9.0	30	20	30	20	30	20	30	8	30	8	30	8	1-191	A06	s	22.95
SRA-3500**	500-3500	DC-1000	7.28	.31	9.5	9.5	30	17	30	17	30	17	20	8	20	8	20	8	1-213	A06	s	28.95
❑ SBL-1	1-500	DC-500	5.60	.09	7.0	8.0	60	45	45	35	40	25	45	35	40	25	30	20	1-62	A06	d	4.75
❑ SBL-1X	10-1000	5-500	5.88	.10	7.5	8.0	50	40	40	30	30	20	50	45	40	35	35	25	1-64	A06	j	6.45
❑ SBL-1Z	10-1000	DC-500	6.27	.09	7.5	9.0	50	40	35	25	25	20	40	25	25	18	19	15	1-114	A06	s	7.45
❑ SBL-1-1	0.1-400	DC-400	4.84	.04	7.0	8.0	50	45	45	30	35	25	45	30	40	25	30	20	1-116	A06	d	7.45
❑ SBL-3	.025-200	DC-200	4.81	.05	7.5	8.5	55	50	45	30	35	25	45	35	40	30	30	20	1-118	A06	e	7.45
❑ SBL-11	5-2000	10-600	7.08	.11	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	A06	m	19.95
SIMA-5	2-1500	DC-1000	7.01	.08	8.0	9.0	65	44	44	23	31	22	54	38	30	18	25	11	1-198	A06	m	24.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ❑ Non-hermetic
- † Phase detection, positive polarity
- * Conversion loss 9.5 dB maximum from 0.01 to 0.015 MHz
- ** Conversion loss 10dB maximum at IF=1000 MHz
- *** Blue bead pin 4
- ✻ Conversion Loss max is 3 dB higher for IF freq. range 0.5 to 5 MHz
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. RF power, 50 mW
  - 1b. Peak IF current, 40 mA

NSN GUIDE

MCL NO.	NSN MIL-M-28837/1*
GRA-1	5895-00-480-2849
GRA-3	5895-01-169-1815
GRA-8	5895-01-217-5627
SAM-1	5895-01-117-2926
SAM-2	5895-01-165-6621
SAM-3	5895-01-062-9973
SAM-5	5895-01-036-9507
SBL-1	5895-01-126-4913
SBL-1X	5895-01-179-8084
SRA-1	5895-00-008-8272 03
SRA-1-1	5962-01-113-5431
SRA-1-TX	5895-01-163-9247
SRA-1-1-TX	5895-01-151-6753
SRA-11-TX	5895-01-163-9248
SRA-1W	5895-01-163-0433 09
SRA-3	5895-01-021-5914
SRA-4	5826-01-155-6545
SRA-6	5895-01-124-0117
SRA-8	5985-01-081-0977
SRA-11	5895-01-273-0883
SBL-3	5895-01-326-6030
TAK-5	5895-01-271-0842
TAK-6	5895-01-231-2372
TSM-1	5895-01-121-7958
TSM-3	5895-01-373-2444

*units are not QPL listed

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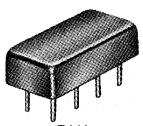
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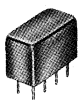
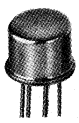

TSM

SAM


ROSE

+7 dBm LO, up to +1 dBm RF

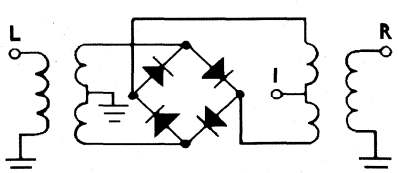
MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
TAK-5*	.01-250	DC-250	4.65	.02	7.0	8.5	60	50	50	35	40	35	55	45	45	30	35	25	1-86	A04	e	20.95
TAK-5R	.05-200	DC-200	4.70	.05	6.5	8.0	55	50	45	35	45	35	50	45	40	30	40	30	1-88	A04	d	20.95
TAK-6	.5-600	DC-600	5.58	.04	7.5	8.5	60	50	50	30	40	25	55	45	45	30	30	20	1-90	A04	e	20.95
TAK-6R	.5-600	DC-600	5.40	.11	7.0	8.0	55	50	45	30	35	30	45	40	40	25	30	25	1-90	A04	t	20.95
TAK-7	2-1000	5-500	5.86	.08	7.5	8.5	45	30	35	20	30	20	45	30	35	20	30	20	1-56	A04	j	20.95
TSM-1	1-600	DC-600	5.71	.04	7.5	8.5	60	45	45	35	35	25	55	45	40	30	35	25	1-102	A11	e	19.95
TSM-2	1-1000	DC-1000	5.55	.08	7.5	10.0	55	45	40	20	35	18	50	40	40	20	25	18	1-66	A11	f	20.95
TSM-3	.1-500	DC-500	4.75	.04	7.5	8.5	60	50	50	35	35	25	55	45	45	30	35	25	1-106	A11	e	21.95
† TSM-5	5-1500	DC-1000	6.16	.04	8.5	9.5	60	45	35	25	30	25	60	45	35	25	25	16	1-189	A11	e	27.95
SAM-1	1-600	DC-600	5.67	.05	7.0	8.5	55	45	45	30	35	20	50	40	40	25	30	20	1-102	A03	e	16.95
SAM-2	1-1000	DC-1000	5.68	.08	7.5	9.5	55	45	40	25	35	20	50	40	40	25	30	25	1-66	A03	f	20.45
SAM-3	0.1-500	DC-500	5.04	.07	7.0	8.5	60	50	50	35	35	30	50	40	45	30	30	20	1-106	A03	e	19.95
SAM-4	5-1250	0.5-1000	5.98	.18	8.5	8.5	55	40	35	25	30	20	50	40	35	25	30	20	1-108	A03	j	23.95
SAM-5	5-1500	0.5-1000	5.81	.08	7.5	✻8.5	55	40	35	25	30	20	50	40	35	25	30	20	1-110	A03	j	29.95
ROSE-1	1-600	DC-600	5.08	.03	6.5	7.5	40	30	35	25	30	20	55	40	40	20	25	18	1-100	PP94	ab	11.95
ROSE-2	1-1000	DC-1000	5.60	.23	7.0	8.0	61	45	37	22	25	18	55	40	26	17	16	12	—	PP94	ab	16.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

pin connections see case style outline drawings

PORT	d	e	f	j	m	p	s	t	y	ab
LO	8	8	8	8	8	8	1	1	1	1
RF	1	1	1	3,4^	1	2	8	8	6	3
IF	3,4^	3,4^	3,4^	1	3	5,6^	3	5,6^	4	2
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	1,3,4,7	2,5,6,7	2,3,4,7	2,3,5	4
CASE GND	—	2	2,5,6,7	2,5,6,7	2,5,6,7	3,4,7	2,5,6,7	3,4,7	—	4
NOT USED	—	—	—	—	4	—	4	—	—	—

^ pins must be connected together externally



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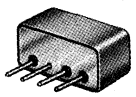
FREQUENCY MIXERS

Plug-In & Flatpack

LEVEL 7 *40 kHz to 4.3 GHz*

ASK-X65

ASK-W38



TFM

+7 dBm Lo, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	m σ	m Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
❑	ASK-1*	1-600	DC-600	5.58	.06	7.0	8.5	50	30	35	25	30	20	45	35	30	20	25	15	1-76	W38	w	6.95
❑	ASK-2*	1-1000	DC-1000	6.79	.10	8.0	9.8	60	40	35	18	26	16	50	30	25	17	15	10	1-209	W38	w	8.25
	TFM-2	1-1000	DC-1000	5.74	.07	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	18	1-66	B02	z	13.95
†	TFM-2P	1-1000	DC-1000	5.74	.07	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	18	1-66	B02	z	13.95
†	TFM-3**	0.04-400	DC-400	4.70	.06	7.0	8.0	60	50	50	35	35	25	55	40	45	30	35	25	1-68	B02	z	21.45
†	TFM-4	5-1250	DC-1250	6.47	.05	7.5	8.5	50	45	40	30	30	25	45	40	35	25	25	20	1-70	B02	z	23.45
	TFM-5	5-1500	DC-1000	6.33	.06	8.5	9.5	60	45	35	25	30	25	60	40	35	15	25	14	1-189	B02	aa	25.45
	TFM-11	1-2000	5-600	7.16	.07	8.5	9.0	50	45	35	25	25	20	45	40	27	20	25	20	1-72	B13	z	47.45
	TFM-12	800-1250	50-90	5.71	.14	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	B13	z	47.45
	TFM-2400	750-2400	DC-400	6.65	.20	—	9.0	30	20	30	20	30	20	30	10	30	10	30	10	1-191	B13	aa	28.95
	TFM-4300	300-4300	DC-800	5.87	.13	—	10.5	30	20	—	—	30	17	15	7	—	—	10	7	1-211	B13	aa	38.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)

m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
❑ Non-hermetic
† Phase detection, positive polarity.
* ASK plug-in mounting case X65
** Below 10°C, f_L is 0.2 MHz.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0)
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power, 50mW
1b. Peak IF current, 40mA

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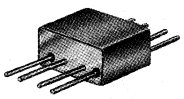
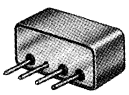

LMX


TUF

+7 dBm Lo, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
LMX-3	0.04-400	DC-400	4.84	.05	7.0	8.0	60	50	50	35	35	25	45	40	35	25	25	20	1-68	BB48	q	25.95
LMX-113	5-1000	DC-1000	5.72	.05	7.0	8.0	50	40	40	25	35	25	45	35	35	30	30	20	1-78	BB48	q	16.95
LMX-124	0.5-500	DC-500	5.18	.06	6.5	7.0	50	40	45	25	45	22	45	40	40	30	30	20	1-80	BB48	q	27.95
LMX-149	10-1500	DC-1500	6.58	.09	7.5	9.0	55	40	45	35	30	20	50	40	40	25	20	12	1-82	BB48	q	29.95
LMX-156	800-2500	DC-1500	7.09	.37	9.0	9.0	35	25	35	25	35	25	22	17	22	17	22	17	1-214	BB48	q	44.95
❑ TUF-1	2-600	DC-600	5.85	.04	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	B02	z	4.25
❑ TUF-2	50-1000	DC-1000	5.85	.07	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	B02	z	5.20
❑ TUF-3	0.15-400	DC-400	4.7	.02	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	B02	z	6.10
❑ TUF-5	20-1500	DC-1000	5.7	.04	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	B02	z	9.45
❑ TUF-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	B02	gm	11.95
❑ TUF-11A	1400-1900	40-500	6.8	.30	8.6	8.6			33 (typ.)	20 (min.)					29 (typ.)	15 (min.)			1-167	B02	z	16.95
❑ TUF-860	800-1050	DC-250	5.6	.24	7.75	7.75			35 (typ.)	25 (min.)					27 (typ.)	20 (min.)			1-165	B02	z	9.45

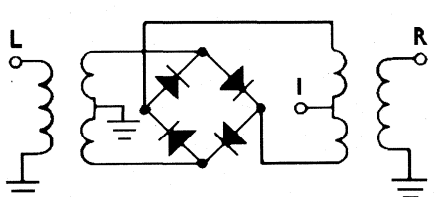
L = low range (f_L to 10 f_L)
M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)
U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN
ASK-1	5895-01-320-0366
TFM-2	5895-01-135-1852
TFM-3	5895-01-112-0031
TFM-4	5895-01-317-9388
TFM-11	5895-01-409-1158
TFM-12	5895-01-179-5686

pin connections see case style outline drawings

PORT	q	w	z	aa	gm
LO	8	1	4	1	4
RF	5	4	1	4	2
IF	4	5	2	2	1
GND EXT.	1,2,3,6,7	2,3,6	3	3	3
CASE GND	1,2,3,6,7	—	3	3	3
NOT USED	—	—	—	—	—



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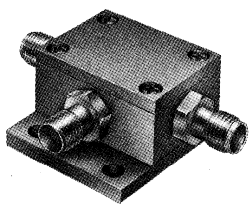
FREQUENCY MIXERS

Coaxial

LEVEL 7 *500 Hz to 10 GHz*



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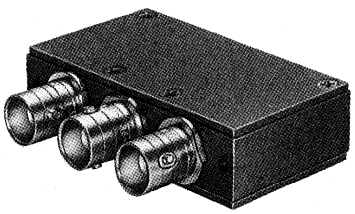

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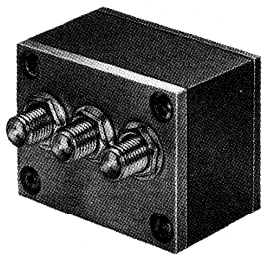

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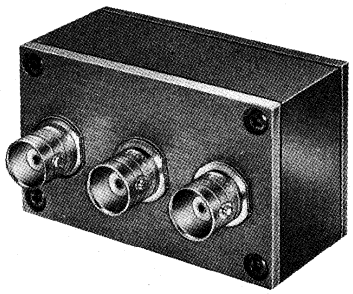

ZAD

+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
NEW	ZMX-7GR	3700-7000	DC-1000	5.0	.30	—	8.2			30 (typ.)		20 (min.)				36 (typ.)		20 (min.)		1-67	BU413	af	71.95
NEW	ZMX-10G	3700-10000	DC-2000	5.0	.10	—	8.5			37 (typ.)		20 (min.)*				17 (typ.)		8 (min.)		1-69	BU413	ad	81.95
	ZP-1	2-600	DC-600	5.85	.10	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	GG60	ag	39.95
	ZP-2	50-1000	DC-1000	5.85	.10	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	GG60	ag	39.95
†	ZP-3	0.15-400	DC-400	4.7	.10	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	GG60	ag	39.95
	ZP-5	20-1500	DC-1000	5.7	.10	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	GG60	ag	47.95
	ZP-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	GG60	hg	47.95
	ZP-11A	1400-1900	40-500	6.8	.30	8.6	8.6			33 (typ.)		20 (min.)				29 (typ.)		15 (min.)		1-167	GG60	ag	47.95
	ZP-860	800-1050	DC-250	5.6	.24	7.75	7.75			35 (typ.)		25 (min.)				27 (typ.)		20 (min.)		1-165	GG60	ag	47.95
	ZP10514	.2-500	DC-500	5.18	.10	7.0	8.5	55	45	50	35	35	30	50	40	36	30	30	20	1-124	GG60	ag	62.95
△	ZLW-1	.5-500	DC-500	5.81	.08	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	M21	ae	51.95
△	ZLW-1W	1-750	DC-750	5.74	.05	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	M21	ae	56.95
△	ZLW-1-1	.1-500	DC-500	4.82	.07	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	M21	ae	53.95
△	ZLW-2	1-1000	DC-1000	5.68	.08	7.5	9.5	55	45	40	25	35	20	50	40	40	25	30	20	1-66	M21	ae	56.95
△	ZLW-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	M21	ae	53.95
△	ZLW-5	5-1500	10-600	5.81	.08	7.5	8.5	55	40	35	25	30	20	50	40	35	25	30	20	1-120	M21	ae	61.95
△	ZLW-6	.003-100	DC-100	4.58	.05	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	25	1-48	M21	ae	64.95
△	ZLW-8	.0005-10	DC-10	5.66	.08	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	M21	ae	69.95
△	ZLW-11	5-2000	10-600	6.85	.10	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	M21	ae	71.95
△	ZLW-12	800-1250	50-90	6.21	.13	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	M21	ae	71.95
	ZAD-1	.5-500	DC-500	5.24	.10	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	M22	ae	43.95
	ZAD-1W	1-750	DC-750	5.56	.05	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	M22	ae	45.95
	ZAD-1-1	.1-500	DC-500	4.83	.04	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	M22	ae	44.95
	ZAD-2	1-1000	.5-500	5.66	.07	7.5	8.5	45	30	35	20	30	20	45	30	35	20	30	20	1-56	M22	ad	49.95
	ZAD-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	M22	ae	45.95
	ZAD-4	5-1250	.5-500	5.71	.08	7.5	8.5	50	40	40	20	30	20	50	40	40	20	30	20	1-122	M22	ad	51.95
	ZAD-6	.003-100	DC-100	4.65	.08	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-48	M22	ae	51.95
	ZAD-8	.0005-10	DC-10	5.79	.05	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	M22	ae	54.95
	ZAD-11	5-2000	10-600	7.12	.12	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	M22	ae	61.95
	ZAD-12	800-1250	50-90	6.21	.13	7.5	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	M22	ae	61.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
△ Available only with SMA connectors
† Phase detection, positive polarity
* 15 dB min. 8.5 to 10 GHz
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power, 50mW
1b. Peak IF current, 40mA

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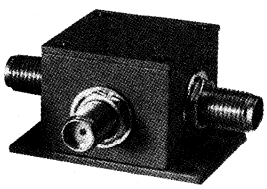
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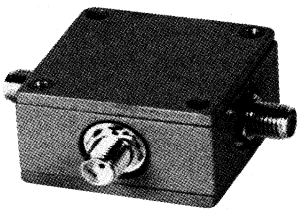
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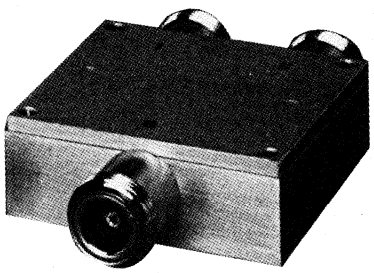

ZAM

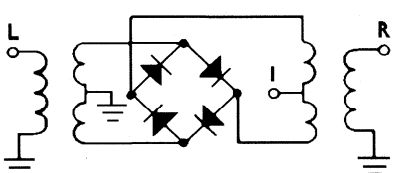
+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band m Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
∧	ZEM-2B	10-1000	DC-1000	5.74	.07	7.0	8.5	55	50	30	25	25	20	55	45	30	20	25	20	1-66	V37	ad	59.95
△	ZEM-4300	300-4300	DC-1000	6.65	.06	—	9.5	40	20	—	—	30	17	15	8	—	—	15	8	1-211	V37	af	79.95
	ZFM-1W	10-750	DC-750	5.42	.14	7.0	8.0	50	45	45	30	35	25	45	40	40	25	27	20	1-54	K18	ad	51.95
	ZFM-2	1-1000	DC-1000	5.72	.06	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	20	1-66	K18	ad	53.95
	ZFM-3	0.04-400	DC-400	4.78	.03	7.0	8.0	60	50	50	35	35	25	55	40	45	30	35	25	1-68	K18	ad	61.95
†	ZFM-4	5-1250	DC-1250	5.70	.34	7.5	8.5	50	45	40	30	30	25	45	40	35	25	25	20	1-70	K18	ad	61.95
	ZFM-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	K18	ad	59.95
	ZFM-11	1-2000	5-600	7.03	.17	8.5	9.0	50	45	35	25	25	20	45	40	27	20	25	20	1-72	K18	ad	89.95
	ZFM-12	800-1250	50-90	5.67	.12	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	K18	ad	79.95
△	ZFM-2000	100-2000	DC-600	7.49	.20	9.5	9.5	—	—	37	20	—	—	—	—	—	—	30	20	1-60	K18	ad	71.95
△	ZFM-4212	2000-4200	DC-1300	5.44	.088	—	8.5	—	—	25	17	—	—	—	—	18	10	—	—	—	K18	ad	54.95
△	ZAM-42	1500-4200	DC-500	5.67	.11	—	8.5	25	14	25	14	25	14	18	10	18	10	18	10	—	F14	af	54.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NSN GUIDE

MCL NO.	NSN
ZAD-1B(BNC)	5985-00-280-7750
ZAD-4B	5895-01-127-0376
ZAD-6B	5895-01-344-7843
ZEM-2	5895-01-235-7834
ZFM-1W	5895-01-412-3037
ZFM-2	4935-01-230-3782
ZFM-3	5895-01-257-9523
ZFM-3 (SMA)	5895-01-214-7362
ZFM-3B	5895-01-381-9289
ZFM-11(SMA)	6625-01-415-2182
ZLW-1W	5895-00-607-7010
ZLW-2	6920-01-037-1974
ZLW-2B	5840-01-186-8398
ZP-10514	6625-01-108-6156
ZP-10514(BNC)	5895-01-384-7453



coaxial connections

see case style outline drawings

PORT	ad	ae	af	ag	hg
LO	1	1	2	L	L
RF	2	3	1	R	X
IF	3	2	3	X	R
GND EXT.	—	—	—	—	—
CASE GND	—	—	—	—	—
NOT USED	—	—	—	—	—

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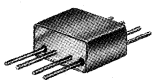
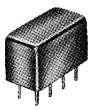
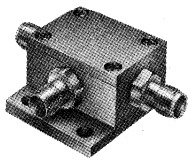
LEVEL 10 *50 kHz to 8 GHz*

TFM / TUF


LMX

ROK


SBL / SRA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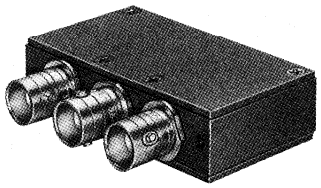
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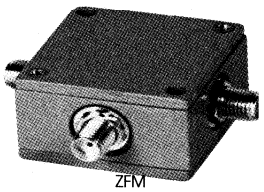
ZFM

+10 dBm LO, up to +5 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9
TFM-15	10-3000	10-800	6.75	.08	8.0	8.5	35	25	35	25	35	25	30	20	30	20	30	20	1-126	B13	aa	49.95
TFM-150**	10-2000	DC-1000	6.19	.11	8.0	8.0	32	25	35	25	35	25	33	20	30	20	30	20	1-128	B13	aa	45.45
TFM-2LH	2-1000	DC-1000	5.70	.177	7.5	9.2	62	45	44	25	37	25	58	40	45	25	31	18	1-195	B02	z	16.95
❑ TUF-1LH	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	B02	z	6.25
❑ TUF-2LH*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	B02	z	7.20
❑ TUF-3LH	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	B02	z	8.10
❑ TUF-5LH	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	B02	z	11.45
❑ TUF-11ALH	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	B02	z	18.95
❑ TUF-860LH	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	B02	z	11.45
LMX-123	10-3000	10-1000	5.94	.08	8.0	8.5	35	25	35	20	30	15	35	25	30	25	30	20	1-130	BB48	q	69.95
† LMX-148	10-1500	DC-1500	6.48	.08	7.0	10.0	45	40	35	30	25	20	40	35	35	25	20	12	1-132	BB48	q	29.95
LMX-1481	3-1100	DC-1100	6.70	.12	8.5	9.8	65	45	40	25	30	18	57	38	30	20	20	14	1-208	BB48	q	23.95
ROK-2500LH	1-2500	DC-500	6.4	.20	8.4	9.0	55	40	48	20	30	20	55	38	27	15	22	15	1-77	PP230	ah	32.95
❑ SBL-1LH	2-500	DC-500	5.8	.03	7.0	8.0	75	45	68	35	56	25	61	35	45	25	36	20	1-205	A06	d	5.75
❑ SBL-1-1LH	.2-400	DC-400	5.2	.06	7.0	9.0	67	45	64	30	51	25	62	30	52	25	34	20	1-201	A06	d	8.45
❑ SBL-1XLH	10-1000	5-500	6.0	.12	7.5	8.5	50	40	40	25	30	20	70	45	55	40	45	30	1-199	A06	j	7.45
❑ SBL-2LH	5-1000	DC-1000	5.9	.09	7.5	9.5	67	45	61	30	57	30	68	40	54	30	43	20	1-195	A06	h	8.45
❑ SBL-3LH	.07-250	DC-250	4.9	.22	7.0	8.5	60	45	60	35	45	30	57	35	53	30	42	25	1-193	A06	d	8.45
❑ SBL-11LH	5-2000	10-600	7.0	.11	8.5	9.5	60	45	45	30	30	20	50	35	30	20	25	16	1-203	A06	m	20.95
SRA-2CR	10-1000	5-500	5.68	.12	7.5	8.0	50	40	40	30	30	20	40	25	30	18	25	15	1-215	A01	s	17.95
SRA-215	.05-1500	.05-500	5.20	.08	7.5	9.0	25	20	35	25	30	20	25	20	35	25	25	15	1-134	A01	m	28.95
SRA-220	.05-2000	.05-500	5.59	.11	8.0	9.0	25	20	40	30	30	20	25	20	40	30	25	15	1-136	A01	m	31.95
NEW ZMX-7GLHR	3700-7000	DC-1500	5.4	.30	—	8.5	33 (Typ.)		20 (Min.)				35 (Typ.)		20 (Min.)				1-84	BU413	af	71.95
NEW ZMX-8GLH	3700-8000	DC-2000	5.5	.20	—	8.5	40 (Typ.)		20 (Min.)				18 (Typ.)		8 (Min.)				1-85	BU413	ad	74.95
ZP-1LH	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	GG60	ag	41.95
ZP-2LH*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	GG60	ag	41.95
ZP-3LH	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	GG60	ag	41.95
ZP-5LH	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	GG60	ag	45.95
ZP-11ALH	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	GG60	ag	45.95
ZP-860LH	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	GG60	ag	45.95
ZFM-15	10-3000	10-800	6.13	.14	8.0	8.5	35	25	35	25	35	25	30	20	30	20	30	20	1-126	K18	ad	89.95
ZFM-150**	10-2000	DC-1000	6.05	.12	8.0	8.0	32	25	35	25	35	20	33	20	30	20	25	20	1-128	K18	ad	69.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ❑ Non-hermetic
- † Phase detection, positive polarity
- * L=50-100 MHz; M=100-500 MHz
- ** Below 10 MHz IF, conversion loss increase up to 6 dB higher as frequency decreases to DC.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings: 1a. RF power 50mW; 1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
LMX-123	5895-01-367-9005
LMX-148	5962-01-357-4432
TFM-15	5895-01-292-2759
ZFM-15	5895-01-412-3035
ZFM-150	5895-01-217-6878

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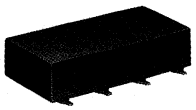
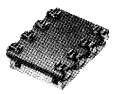
LEVEL 10 150 kHz to 6 GHz

tJMS

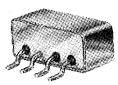
tLRMS

tRMS


SCM


SKY

SYM


TUF-SM

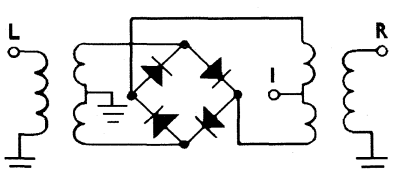
+10 dBm LO, up to +5 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	CONVERSION LOSS dB Mid-Band σ	CONVERSION LOSS dB Mid-Band Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	JMS-1LH	2-500	DC-500	5.75	.10	7.0	8.0	67	50	55	30	42	25	50	40	45	25	32	20	1-220	BH292	ht	8.45
	JMS-2LH	20-1000	DC-1000	6.5	.10	7.5	9.0	60	40	48	25	37	20	45	30	35	20	27	11	1-226	BH292	ht	9.45
NEW	JMS-5LH	5-1500	DC-1000	6.0	.20	8.0	9.5	60	40	50	25	35	20	55	40	35	14	15	6	1-163	BH292	ht	10.95
	LRMS-1LH	2-500	DC-500	5.36	.08	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	1-220	QQQ130	w	7.95
	LRMS-2LH	5-1000	DC-1000	6.44	.10	8.0	9.5	58	40	39	20	22	16	52	30	30	17	18	11	1-226	QQQ130	w	8.95
	LRMS-5LH	10-1500	DC-900	5.27	.09	8.0	9.8	58	35	38	20	25	18	56	30	38	14	17	6	1-163	QQQ130	w	14.95
	RMS-1LH	2-500	DC-500	5.36	.08	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	1-220	TT100	w	7.95
	RMS-2LH	5-1000	DC-1000	6.44	.10	8.0	9.5	58	40	39	20	22	16	52	30	30	17	18	11	1-226	TT100	w	8.95
	RMS-5LH	10-1500	DC-900	5.27	.09	8.0	9.8	58	35	38	20	25	18	56	30	38	14	17	6	1-163	TT100	w	14.95
	SCM-1LH	1-500	DC-500	5.75	.20	7.0	8.0	60	40	50	35	40	30	50	40	45	35	40	25	1-71	YY101	d	6.25
	SCM-2LH	5-1000	DC-500	7.15	.20	8.4	9.7	65	40	50	25	44	20	58	40	50	25	28	15	1-73	YY101	d	7.45
	SCM-5LH	1250-1800	DC-500	6.0	.46	—	8.8	26 (Typ.)		17 (Min.)				18 (Typ.)		8 (Min.)				—	YY101	d	13.95
	SCM-2500LH	500-2500	DC-500	5.6	.20	6.8	10.0	35 (Typ.)		20 (Min.)				18 (Typ.)		10 (Min.)				1-75	YY101	r	13.95
NEW	SKY-53LHR	2800-5300	DC-500	5.7	.20	—	9.5	28 (typ.)		15 (min.)				12 (typ.)		8 (min.)				—	BJ398	hp	16.95
NEW	SKY-60LH	2500-6000	DC-1500	6.2	.20	—	9.7	28 (typ.)		17 (min.)				14 (typ.)		8 (min.)				—	BJ398	je	16.95
	SYM-11LH	1-2000	10-600	7.0	.10	8.3	9.85	60	40	45	25	37	25	59	40	33	20	25	20	1-161	TTT167	x	11.95
	TUF-1LHSM	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	NNN150	z	6.25
	TUF-2LHSM*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	NNN150	z	7.20
	TUF-3LHSM	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	NNN150	z	8.10
	TUF-5LHSM	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	NNN150	z	11.45
	TUF-11ALHSM	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	NNN150	z	18.95
	TUF-860LHSM	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	NNN150	z	11.45

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)



pin and coaxial connections see case style outline drawings for pin locations

PORT	d	h	j	m	q	r	w	x	z	aa	ad	af	ag	ah	ht[1]	hp	je
LO	8	8	8	8	8	1	1	2	4	1	1	2	L	4	6	5	1
RF	1	1	3,4^	1	5	8	4	1	1	4	2	1	R	2	3	1	5
IF	3,4^	3,4^	1	3	4	3	5	3	2	2	3	3	X	1	2	7	7
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	1,2,3,6,7	2,5,6,7	2,3,6	4,5,6	3	3	—	—	—	3	1,4,5	2,3,4,6,8	2,3,4,6,8
CASE GND	—	2,5,6	2,5,6,7	2,5,6,7	1,2,3,6,7	—	—	—	3	3	—	—	—	3	—	—	—
NOT USED	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—

^ pins must be connected together externally
[1] pin connection physically same as w

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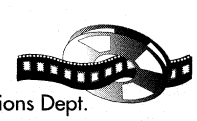
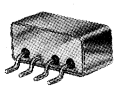
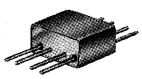


FREQUENCY MIXERS

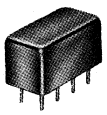
Plug-In & Coaxial

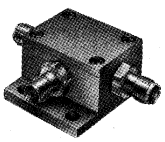
LEVEL 13 *25 kHz to 7 GHz*


TFM / TUF


LMX

ROK


SBL / SIMA/ SRA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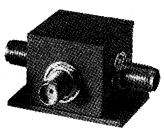
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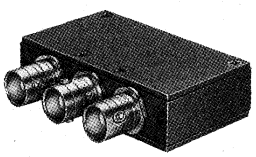
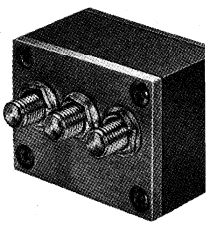

ZP


ZLW

+13 dBm LO, up to +9 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
TFM-1MH	2-500	DC-500	5.80	.05	7.5	8.5	50	45	40	30	30	20	45	40	35	25	25	20	1-138	B02	z	24.95
TFM-3MH	1-250	DC-250	4.79	.23	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20	1-140	B02	z	24.95
TFM-12MH	0.5-2000	0.2-600	6.99	.16	8.0	9.5	60	45	35	30	30	25	55	40	30	25	25	20	1-104	B13	z	48.95
TFM-42MH	10-4200	10-1000	7.46	.12	8.5	11	35	25	40	25	35	25	35	20	35	25	27	20	1-94	B13	aa	69.95
❑ TUF-1MH	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	B02	z	7.25
❑ TUF-2MH*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	B02	z	8.20
❑ TUF-3MH	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	B02	z	9.10
❑ TUF-5MH	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	B02	z	12.45
❑ TUF-11AMH	1400-1900	40-500	7.4	.20	8.6	8.6			33 (Typ.)		20 (Min.)				24 (Typ.)		15 (Min.)		1-127	B02	z	19.95
❑ TUF-860MH	800-1050	DC-250	6.8	.32	8.3	8.3			35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)		1-125	B02	z	12.45
❑ TUF-2500MH	400-2500	30-800	7.3	.15	8.5	10.0			32 (Typ.)		24 (Min.)				27 (Typ.)		17 (Min.)		1-87	B02	z	24.95
LMX-123MH	10-2500	10-500	6.80	.074	8.5	9.6	42	22	35	20	28	20	33	20	36	20	36	15	1-159	BB48	q	70.95
LMX-125MH	0.5-500	DC-500	5.80	.07	7.0	9.0	45	40	45	40	40	30	45	40	40	35	35	25	1-142	BB48	q	62.95
ROK-186MH	5-2500	10-1000	6.57	.11	8.5	9.5	33	25	35	25	25	20	33	20	31	25	27	20	1-112	QQ96	v	47.95
❑ SBL-1MH	1-500	DC-500	5.73	.08	7.5	8.5	50	35	45	30	35	25	45	30	40	25	30	20	1-144	A06	d	10.45
❑ SBL-1ZMH	2-1100	DC-500	6.63	.10	8.0	9.0	50	40	40	30	30	20	40	30	25	20	25	15	1-197	A06	s	12.45
SIMA-5MH	2-1500	DC-1000	7.11	.11	8.6	9.0	70	44	44	23	31	22	57	38	30	20	25	15	1-204	A06	m	28.95
SRA-1MH	.5-500	DC-500	5.65	.04	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-146	A01	e	14.95
SRA-3MH	.025-200	DC-200	4.77	.07	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-148	A01	e	16.95
SRA-2010MH	10-2000	DC-600	7.50	.20	8.5	9.8	50	45	45	30	40	25	45	45	35	30	35	20	1-98	A06	m	38.95
NEW ZMX-7GMH	3700-7000	DC-2000	4.7	.20	—	8.0			37 (Typ.)		20 (Min.)				17 (Typ.)		8 (Min.)		1-97	BU413	ad	74.95
NEW ZMX-7GMHR	3700-7000	DC-1000	6.0	.20	—	8.6			30 (Typ.)		20 (Min.)				35 (Typ.)		20 (Min.)		1-99	BU413	af	75.95
ZEM-4300MH	300-4300	DC-1000	6.42	.15	—	8.5	40	20	—	—	40	20	14	7	—	—	12	7	1-155	V37	af	89.95
ZEM-M2TMH	10-2400	10-1000	6.9	.10	9.0	9.5	49	40	43	35	42	35	49	40	44	30	40	30	—	V37	hq	114.95
ZP-1MH	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	GG60	ag	43.95
ZP-2MH*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	GG60	ag	43.95
ZP-3MH	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	GG60	ag	43.95
ZP-5MH	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	GG60	ag	47.95
ZP-11AMH	1400-1900	40-500	7.4	.20	8.6	8.6			33 (Typ.)		20 (Min.)				24 (Typ.)		15 (Min.)		1-127	GG60	ag	47.95
ZP-860MH	800-1050	DC-250	6.8	.32	8.3	8.3			35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)		1-125	GG60	ag	47.95
ZLW-186MH	2-2500	2-1000	6.9	.11	8.5	9.5	33	25	35	25	30	20	42	25	49	25	32	20	—	M21	ae	69.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ❑ Non-hermetic
- † Phase detection, positive polarity
- * L=50-100 MHz; M=100-500 MHz
- ✪ Frequency Specified m=1000 - 2000 MHz, L=800 - 2100 MHz, U=2100 - 4200 MHz
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  1a. RF power 200mW; 1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
ROK-186MH	5895-01-392-2276
SRA-1MH	5895-01-391-0113
TFM-3MH	5895-01-302-7047
TFM-42MH	5895-01-408-6093

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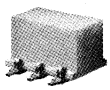
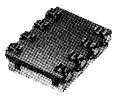
LEVEL 13 150 kHz to 6 GHz

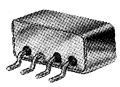
† JMS


† LRMS

† RMS


SKY

SYM


TUF-SM

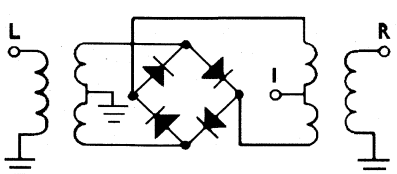
+13 dBm LO, up to +9 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	JMS-1MH	2-500	DC-500	5.75	.10	7.0	8.0	70	55	60	40	44	25	55	42	45	25	35	20	1-222	BH292	ht	9.45
	JMS-2MH	20-1000	DC-1000	7.0	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	1-228	BH292	ht	10.45
NEW	JMS-5MH	5-1500	DC-1000	5.7	.10	8.0	9.5	67	40	57	25	35	20	60	40	35	18	15	8	1-223	BH292	ht	11.95
	LRMS-1MH	2-500	DC-500	5.65	.08	7.0	8.0	58	45	44	25	30	20	55	40	36	25	28	17	1-222	QQQ130	w	8.95
	LRMS-2MH	5-1000	DC-1000	6.72	.08	8.5	9.5	55	40	39	20	22	16	52	35	30	17	18	12	1-228	QQQ130	w	9.95
	LRMS-2UMH	10-1000	20-500	7.0	.10	8.5	9.5	52	40	43	30	33	25	53	30	44	25	39	22	1-89	QQQ130	w	14.45
	LRMS-5MH	10-1500	DC-900	5.67	.09	9.0	9.5	58	40	40	20	26	18	50	30	38	18	17	8	1-229	QQQ130	w	15.95
	RMS-1MH	2-500	DC-500	5.65	.08	7.0	8.0	58	45	44	25	30	20	55	40	36	25	28	17	1-222	TT100	w	8.95
	RMS-2MH	5-1000	DC-1000	6.72	.08	8.5	9.5	55	40	39	20	22	16	52	35	30	17	18	12	1-228	TT100	w	9.95
	RMS-2UMH	10-1000	20-500	7.0	.10	8.5	9.5	52	40	43	30	33	25	53	30	44	25	39	22	1-89	TT100	w	14.45
	RMS-5MH	10-1500	DC-900	5.67	.09	9.0	9.5	58	40	40	20	26	18	50	30	38	18	17	8	1-223	TT100	w	15.95
	RMS-25MH	5-2500	5-1500	7.0	.20	8.5	9.8	54	28	32	23	32	20	34	23	32	25	28	17	1-91	TT240	w	7.95***
✪	RMS-42MH	800-4200	DC-800	5.3	.20	9.0	10.8	35	25	—	—	28	17	18	10	—	—	15	7	1-94	TT240	w	24.95
NEW	SKY-53MHR	2800-5300	DC-500	5.7	.20	—	9.5	28 (Typ.)		15 (Min.)				12 (Typ.)		8 (Min.)				1-93	BJ398	hp	17.95
NEW	SKY-60MH	2500-6000	DC-1500	6.2	.20	—	9.5	28 (Typ.)		17 (Min.)				14 (Typ.)		8 (Min.)				1-95	BJ398	je	17.95
	SYM-11MH	50-2000	50-1000	6.6	.10	8.0	9.9	55	35	44	25	30	20	40	25	36	20	29	20	1-157	TTT167	x	15.95
	TUF-1MHSM	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	NNN150	z	7.25
	TUF-2MHSM*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	NNN150	z	8.20
	TUF-3MHSM	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	NNN150	z	9.10
	TUF-5MHSM	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	NNN150	z	12.45
	TUF-11AMHSM	1400-1900	40-500	7.4	.20	8.6	8.6	33 (Typ.)		20 (Min.)				24 (Typ.)		15 (Min.)				1-127	NNN150	z	19.95
	TUF-860MHSM	800-1050	DC-250	6.8	.32	8.3	8.3	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-125	NNN150	z	12.45
	TUF-2500MHSM	400-2500	30-800	7.3	.15	8.5	10.0	32 (Typ.)		24 (Min.)				27 (Typ.)		17 (Min.)				1-87	NNN150	z	24.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)



pin and coaxial connections see case style outline drawings

PORT	d	e	m	q	s	v	w	x	z	aa	ad	ae	af	ag	hq	ht[1]	hp	je
LO	8	8	8	8	1	5	1	2	4	1	1	1	2	L	3	6	5	1
RF	1	1	1	5	8	11	4	1	1	4	2	3	1	R	2	3	1	5
IF	3,4^	3,4^	3	4	3	2	5	3	2	2	3	2	3	X	1	2	7	7
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	1,2,3,6,7	2,5,6,7	1,3,4,6,7,8,9,10,12	2,3,6	4,5,6	3	3	—	—	—	—	—	1,4,5	2,3,4,6,8	2,3,4,6,8
CASE GND	—	2	2,5,6,7	1,2,3,6,7	2,5,6,7	1,3,4,6,7,8,9,10,12	—	—	3	3	—	—	—	—	—	—	—	—
NOT USED	—	—	4		4	—	—	—	—	—	—	—	—	—	—	—	—	—

^ pins must be connected together externally
[1] pin connection physically same as w

In Stock... Immediate Delivery
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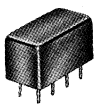
FREQUENCY MIXERS

Plug-In

LEVEL 17 10 kHz to 3 GHz

GRA

SBL/SIMA


SRA

TFM/TUF

TAK

+17 dBm LO, up to +10 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	Mid-Band σ	Mid-Band Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9
GRA-1H	.5-500	DC-500	5.87	.09	7.5	8.5	55	45	45	30	35	25	45	35	40	30	30	20	1-150	D08	y	21.95
GRA-3H	.05-200	DC-200	4.85	.07	7.0	7.5	55	45	45	30	35	25	45	35	40	30	30	20	1-156	D08	y	24.95
GRA-6H	.01-50	DC-50	5.04	.05	6.0	7.0	50	45	45	30	35	25	50	40	47	35	32	25	1-162	D08	y	34.95
❑ SBL-173H	5-1200	1-1200	5.70	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-113	A06	u,f	15.95
❑ SBL-2500H	5-2500	1-1000	5.50	.10	7.5	10.5	46	35	44	30	35	25	50	35	44	27	32	19	1-117	A06	f	33.95
SRA-1H	.5-500	DC-500	6.01	.08	7.5	8.5	55	45	45	30	35	25	45	35	40	30	30	20	1-150	A01	e	20.95
SRA-1WH	1-750	DC-750	5.85	.11	7.5	8.5	50	40	45	25	35	25	45	35	40	30	30	20	1-152	A01	f	24.95
SRA-2H	2-1000	DC-1000	6.34	.14	7.5	10.0	50	40	35	25	35	25	45	30	30	20	25	20	1-154	A01	f	38.95
SRA-3H	.05-200	DC-200	5.18	.05	7.0	7.5	50	45	40	30	35	25	45	35	40	30	30	20	1-156	A01	e	22.95
SRA-6H	.01-50	DC-50	4.97	.06	6.0	7.0	50	45	45	30	35	25	50	40	47	35	32	25	1-162	A01	e	38.95
SRA-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	A01	m	47.95
SRA-173H	5-1200	DC-1200	5.38	.05	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-160	A01	u,f	31.95
SIMA-5H	2-1500	DC-1000	6.94	.07	8.5	8.5	65	35	44	23	40	22	54	25	30	23	25	13	1-202	A06	m	32.95

+17 dBm LO, up to +14 dBm RF

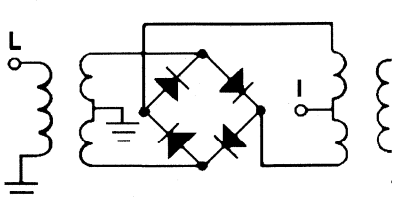
TFM-1H	2-500	DC-500	6.14	.11	7.5	8.5	50	45	40	30	30	20	45	40	35	25	25	20	1-164	B02	z	25.95
TFM-2H	5-1000	DC-1000	6.12	.12	7.0	10.0	50	45	40	30	30	20	45	40	35	25	25	17	1-166	B02	z	36.95
TFM-3H	.1-250	DC-250	4.58	.11	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20	1-170	B02	z	25.95
† TFM-4H	5-1200	DC-1200	5.24	.05	8.0	9.0	50	40	35	25	30	20	50	40	35	20	30	20	1-174	B13	z	39.45
❑ TUF-1H	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	1-164	B02	z	9.25
❑ TUF-2H	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	1-166	B02	z	10.20
❑ TUF-3H	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	1-170	B02	z	11.10
❑ TUF-5H	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	1-123	B02	z	14.45
❑ TUF-11AH	1400-1900	40-500	7.30	.28	9.0	9.0		35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)			1-121	B02	z	21.95
❑ TUF-860H	800-1050	DC-250	6.80	.31	8.3	8.3		38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)			1-119	B02	z	14.45
TAK-1H	2-500	DC-500	5.93	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	A05	e	21.45
TAK-1WH	5-750	DC-750	5.71	.08	7.5	9.0	50	40	40	30	30	25	45	35	35	25	30	20	1-168	A05	f	25.95
TAK-3H	.05-300	DC-300	4.82	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	A05	e	23.45
❑ SBL-173SH	5-1200	1-1200	5.7	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-115	A06	u,f	21.95
SRA-173SH	5-1200	1-1200	5.7	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-115	A06	u,f	33.95
SRA-2500SH	5-2500	1-1000	5.8	.10	7.5	10.5	40	25	37	28	30	18	50	35	42	25	25	17	1-115	A06	f	35.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
❑ Non-hermetic
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power 200mW 1b. Peak IF current, 40mA
2. Two-Tone 3rd order IM below IF, each tone at 0dBm (200 and 202 MHz), LO at +17dBm (180 MHz). All models 60dB typ., 55dB min. , except 55 dB typ., 45 dBm min. for TFM-3H, TAK-3H, ZFM-3H, ZLW-3SH, ZAD-3SH.



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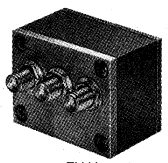
LEVEL 17 50 kHz to 8 GHz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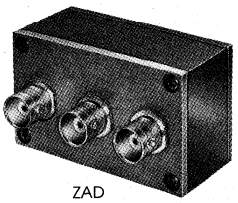
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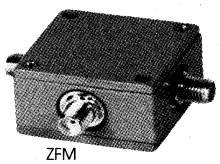
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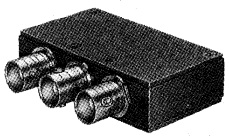
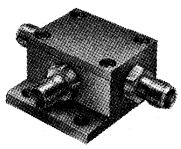

ZP


ZMX

+17 dBm LO, up to +10 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
ZLW-1H	.5-500	DC-500	6.13	.08	7.5	8.5	55	45	45	30	35	25	45	35	40	30	30	20	1-150	M21	ae	56.95
ZLW-1WH	1-750	DC-750	6.07	.13	7.5	8.5	50	45	45	25	35	25	45	35	40	25	30	20	1-152	M21	ae	59.95
ZLW-2H	2-1000	DC-1000	6.34	.14	7.5	10.0	50	40	35	25	35	25	45	35	30	20	25	20	1-154	M21	ae	64.95
ZLW-3H	.05-200	DC-200	5.18	.05	7.0	7.5	55	45	45	30	35	25	45	35	40	30	30	20	1-156	M21	ae	58.95
ZLW-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	M21	ae	99.95
ZAD-1H	.5-500	DC-500	6.16	.08	7.5	8.5	50	45	45	30	35	25	45	35	40	30	30	20	1-150	M22	ae	48.95
ZAD-1WH	1-750	DC-750	6.16	.09	7.5	8.5	50	45	45	25	35	25	45	35	40	25	30	20	1-152	M22	ae	52.95
ZAD-2H	2-1000	DC-1000	6.22	.15	7.5	10.0	50	40	35	25	35	25	45	35	30	20	25	20	1-154	M22	ae	59.95
ZAD-3H	.05-200	DC-200	4.89	.09	7.0	7.5	55	45	45	30	35	25	45	35	40	30	30	20	1-156	M22	ae	50.95
ZAD-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	M22	ae	89.95

+17 dBm LO, up to +14 dBm RF

ZFM-1H	2-500	DC-500	6.14	.11	7.5	8.5	50	45	40	30	30	25	45	35	35	25	25	20	1-164	K18	ad	64.95
ZFM-2H	5-1000	DC-1000	6.12	.12	7.0	10.0	50	40	40	30	30	20	45	40	35	25	25	17	1-166	K18	ad	71.95
ZFM-3H	.05-300	DC-300	5.18	.11	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	K18	ad	64.95
† ZFM-4H	5-1200	DC-1200	4.97	.11	8.0	9.0	50	40	35	25	30	20	50	40	35	20	30	20	1-174	K18	ad	73.95
ZP-1H	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	1-164	GG60	ag	45.95
ZP-2H	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	1-166	GG60	ag	45.95
ZP-3H	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	1-170	GG60	ag	45.95
ZP-5H	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	1-123	GG60	ag	49.95
ZP-11AH	1400-1900	40-500	7.30	.28	9.0	9.0	35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)				1-121	GG60	ag	49.95
ZP-860H	800-1050	DC-250	6.80	.31	8.3	8.3	38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)				1-119	GG60	ag	49.95
NEW ZMX-7GHR	3700-7000	DC-1000	5.3	.30	—	8.5	33 (Typ.)		20 (Min.)				34 (Typ.)		20 (Min.)				1-109	BU413	af	84.95
NEW ZMX-8GH	3700-8000	DC-2000	5.8	.30	—	8.5	40 (Typ.)		20 (Min.)				18 (Typ.)		8 (Min.)				1-111	BU413	ad	89.95
ZLW-1SH	2-500	DC-500	5.93	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	M21	ae	62.95
ZLW-1WSH	5-750	DC-750	5.83	.07	7.5	9.0	50	45	40	30	30	20	45	40	35	25	30	20	1-168	M21	ae	66.95
ZLW-3SH	.05-300	DC-300	4.65	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	M21	ae	64.95
ZAD-1SH	2-500	DC-500	5.98	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	M22	ae	54.95
ZAD-1WSH	5-750	DC-750	5.64	.08	7.5	9.0	50	45	40	30	30	20	45	40	35	25	30	20	1-168	M22	ae	56.95
ZAD-3SH	.05-300	DC-300	5.08	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	M22	ae	55.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NSN GUIDE

MCL NO.	NSN	MIL-M-28837/1*
GRA-1H	5895-01-284-6870	
GRA-3H	5895-01-171-0974	
SRA-1H	6625-00-594-0223	08
SRA-1WH	5895-00-576-0716	
SRA-2H	5895-01-063-1078	
SRA-3H	5895-01-117-4537	
SRA-11H	5895-01-192-0173	
SRA-11H-TX	5895-01-137-9278	
ZAD-1WH	5895-01-045-4647	
ZAD-3H	5895-01-149-0771	
ZLW-1H	5985-01-080-7637	
ZLW-1HB	5962-01-045-7500	
ZLW-1HB(SMA)	5895-01-141-4646	

* units are not QPL listed

pin and coaxial connections

see case style outline drawings

PORT	e	f	m	u	x	y	z	ad	ae	af	ag
LO	8	8	8	3,4 ^	2	1	4	1	1	2	L
RF	1	1	1	1	1	6	1	2	3	1	R
IF	3,4 ^	3,4 ^	3	8	3	4	2	3	2	3	X
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	4,5,6	2,3,5	3	—	—	—	—
CASE GND	2	2,5,6,7	2,5,6,7	2,5,6,7	—	—	3	—	—	—	—
NOT USED	—	—	4	—	—	—	—	—	—	—	—

^ pins must be connected together externally

CAPD now available! computer-automated performance data

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FREQUENCY MIXERS

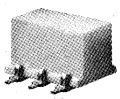
Surface Mount

LEVEL 17 150 kHz to 6 GHz

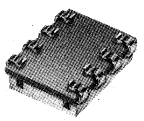
SYM

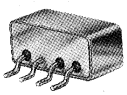
JYM

†JMS


†LRMS

†RMS


SKY


TUF-SM

+17 dBm LO, up to +10 dBm RF

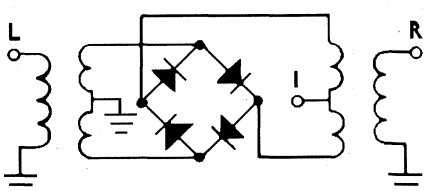
MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
SYM-11H	50-2000	50-1950	6.3	.10	7.5	9.0	45	35	40	25	37	25	40	25	32	20	30	20	1-153	TTT167	x	17.95
JYM-20H	2-2000	4-700	5.7	.20	8.5	9.0	40	30	44	28	40	25	40	35	40	22	29	15	1-101	BJ293	hp	17.95
JYM-28H	400-2800	4-700	6.3	.20	8.0	9.0	40 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)				1-103	BJ293	hp	21.95
JYM-30H	2-3000	4-1400	6.0	.20	8.9	10.6	40	30	40	25	30	25	40	35	30	20	22	15	1-101	BJ293	hp	23.95

+17 dBm LO, up to +14 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	JMS-1H	2-500	DC-500	5.90	.10	7.0	8.5	60	45	50	25	37	22	55	45	50	25	37	22	1-151	BH292	ht	11.45
	JMS-2H	20-1000	DC-1000	7.00	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	1-147	BH292	ht	12.45
NEW	JMS-5H	5-1500	DC-1000	5.90	.10	8.0	9.5	70	50	50	25	35	20	60	40	35	18	20	8	1-207	BH292	ht	12.95
	LRMS-1H	2-500	DC-500	6.25	.034	7.0	8.5	55	44	44	25	33	20	50	34	45	25	37	22	1-151	QQQ130	w	10.95
	LRMS-1WH	10-750	DC-750	7.00	.11	8.5	8.8	55	40	43	22	28	20	52	30	38	22	29	20	1-149	QQQ130	w	11.95
	LRMS-2H	5-1000	DC-900	6.98	.054	8.5	9.3	55	40	39	22	33	20	52	30	45	22	30	17	1-147	QQQ130	w	11.95
	LRMS-2UH	10-1000	10-750	7.10	.083	9.2	9.9	50	40	38	30	30	23	50	30	40	25	34	22	1-145	QQQ130	w	14.45
	LRMS-5H	10-1500	DC-900	6.36	.05	8.0	9.8	65	40	36	20	22	15	50	30	30	18	17	7	1-207	QQQ130	w	17.95
	RMS-1H	2-500	DC-500	6.25	.034	7.0	8.5	55	44	44	25	33	20	50	34	45	25	37	22	1-151	TT100	w	10.95
	RMS-1WH	10-750	DC-750	7.00	.11	8.5	8.8	55	40	43	22	28	20	52	30	38	22	29	20	1-149	TT100	w	11.95
	RMS-2H	5-1000	DC-900	6.98	.054	8.5	9.3	55	40	39	22	33	20	52	30	45	22	30	17	1-147	TT100	w	11.95
	RMS-2UH	10-1000	10-750	7.10	.083	9.2	9.9	50	40	38	30	30	23	50	30	40	25	34	22	1-145	TT100	w	14.45
	RMS-5H	10-1500	DC-900	6.36	.05	8.0	9.8	65	40	36	20	22	15	50	30	30	18	17	7	1-207	TT100	w	17.95
NEW	SKY-53HR	2800-5300	DC-500	5.70	.20	—	9.5	28 (Typ.)		15 (Min.)				12 (Typ.)		8 (Min.)				1-105	BJ398	hp	18.95
NEW	SKY-60H	2500-6000	DC-1500	6.20	.20	—	9.7	28 (Typ.)		17 (Min.)				14 (Typ.)		8 (Min.)				1-107	BJ398	je	18.95
	TUF-1HSM	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	1-164	NNN150	z	9.25
	TUF-2HSM	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	1-166	NNN150	z	10.20
	TUF-3HSM	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	1-170	NNN150	z	11.10
	TUF-5HSM	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	1-123	NNN150	z	14.45
	TUF-11AHSM	1400-1900	40-500	7.30	.28	9.0	9.0	35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)				1-121	NNN150	z	21.95
	TUF-860HSM	800-1050	DC-250	6.80	.31	8.3	8.3	38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)				1-119	NNN150	z	14.45

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)



NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ❑ Non-hermetic
- † Phase detection, positive polarity
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Level 17 mixers, RF power 200mW
  - 1b. Level 23 mixers, RF power 350mW
  - 1c. Peak IF current, 40mA
- 2. Level 17 mixers, Two-Tone 3rd order IM below IF, each tone at 0dBm (200 and 202 MHz), LO at +17dBm (180 MHz). All models 60dB typ., 55dB min.

pin connections see case style outline drawings

PORT	w	x	z	hp	ht[1]	je
LO	1	2	4	5	6	1
RF	4	1	1	1	3	5
IF	5	3	2	7	2	7
GND EXT.	2,3,6	4,5,6	3	2,3,4,6,8	1,4,5	2,3,4,6,
CASE GND	—	—	3	—	—	—
NOT USED	—	—	—	—	—	—

[1] pin connection physically same as w

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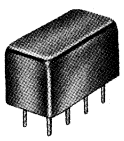
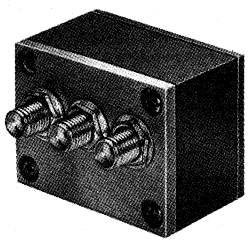
LEVEL 23 10 kHz to 2.5 GHz


RAY

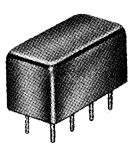

ZMY

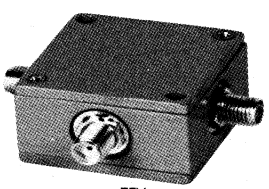
ZAY

+23 dBm LO, up to +15 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
RAY-1	5-500	DC-500	6.57	.09	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	A01	e	40.95
RAY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	A01	f	64.45
RAY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	A01	e	40.95
RAY-6	0.03-50	DC-50	5.36	.15	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-182	A01	d	52.45
RAY-6U	0.01-100	DC-100	5.09	.15	7.0	8.0	60	50	50	40	40	30	50	45	40	30	35	25	1-216	A01	e	46.95
RAY-11	100-2500	DC-500	6.23	.21	9.0	9.0	35	25	32	25	32	25	14	10	20	10	20	10	1-143	A01	s	74.95
ZMY-1	5-500	DC-500	6.62	.10	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	M21	ae	67.95
ZMY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	M21	ae	84.95
ZMY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	M21	ae	69.95
ZAY-1	5-500	DC-500	6.57	.09	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	M22	ae	64.95
ZAY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	M22	ae	84.95
ZAY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	M22	ae	64.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)


SAY


ZFY

+23 dBm LO, up to +20 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
SAY-1	0.1-500	.01-500	4.85	.18	6.0	7.5	40	20	46	35	40	30	37	23	46	35	40	30	1-184	A01	m	62.95
SAY-2	0.1-1000	.01-500	5.40	.24	7.5	9.5	40	20	40	30	30	25	37	23	40	25	25	15	1-186	A01	m	67.95
SAY-11	10-2400	5-1000	7.40	.09	8.5	10	28	20	26	20	25	20	28	20	26	20	25	20	1-188	A01	m	72.95
ZFY-1	0.1-500	.01-500	4.85	.18	6.0	7.5	40	20	46	35	40	30	37	23	46	35	40	30	1-184	K18	ad	74.95
ZFY-2	0.1-1000	.01-500	5.40	.24	7.5	9.5	40	20	40	30	30	25	37	23	40	25	25	15	1-186	K18	ad	79.95
ZFY-11	10-2400	5-1000	7.40	.09	8.5	10	28	20	25	20	25	20	28	20	26	20	25	20	1-188	K18	ad	84.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

pin and coaxial connections

see case style outline drawings

PORT	d	e	f	m	s	ad	ae
LO	8	8	8	8	1	1	1
RF	1	1	1	1	8	2	3
IF	3,4^	3,4^	3,4^	3	3	3	2
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7		
CASE GND	—	2	2,5,6,7	2,5,6,7	2,5,6,7		
NOT USED	—	—	—	4	4		

^ pins must be connected together externally

NSN GUIDE

MCL NO.	NSN
RAY-1	5895-01-105-6188
RAY-2	5895-01-111-7368
RAY-3	5895-01-064-5082
RAY-6	5895-01-317-5882
SAY-11	5895-01-199-3893
VAY-1	5895-01-232-5890
ZMY-1B	5895-01-213-3888
ZMY-2	4935-01-080-7636

*units are not QPL listed

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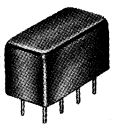
FREQUENCY MIXERS

Plug-In

LEVEL 27 0.5 to 500 MHz



VAY

+27 dBm LO, up to +24 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band m Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
VAY-1	0.5-500	.02-500	5.79	.15	7.5	8.5	47	40	46	35	35	25	35	28	46	35	35	25	1-190	A01	m	84.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

NOTES:

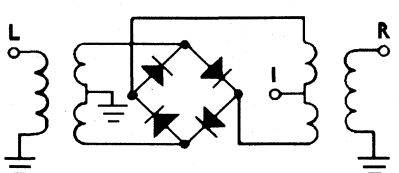
$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. Level 27 mixers, RF power 500mW
   1b. Peak IF current, 40mA

pin and coaxial connections

see case style outline drawings

PORT	m
LO	8
RF	1
IF	3
GND EXT.	2,5,6,7
CASE GND	2,5,6,7
NOT USED	4

^ pins must be connected together externally



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return loss Vs. VSWR

table of return loss vs. voltage standing wave ratio

RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR
46.064	1.01	13.842	1.51	9.485	2.01	7.327	2.51	5.999	3.01
40.086	1.02	13.708	1.52	9.428	2.02	7.294	2.52	5.970	3.02
36.607	1.03	13.577	1.53	9.372	2.03	7.262	2.53	5.956	3.03
34.151	1.04	13.449	1.54	9.317	2.04	7.230	2.54	5.935	3.04
32.256	1.05	13.324	1.55	9.262	2.05	7.198	2.55	5.914	3.05
30.714	1.06	13.201	1.56	9.208	2.06	7.167	2.56	5.893	3.06
29.417	1.07	13.081	1.57	9.155	2.07	7.135	2.57	5.872	3.07
28.299	1.08	12.964	1.58	9.103	2.08	7.105	2.58	5.852	3.08
27.318	1.09	12.849	1.59	9.051	2.09	7.074	2.59	5.832	3.09
26.444	1.10	12.736	1.60	8.999	2.10	7.044	2.60	5.811	3.10
25.658	1.11	12.625	1.61	8.949	2.11	7.014	2.61	5.791	3.11
24.943	1.12	12.518	1.62	8.899	2.12	6.984	2.62	5.771	3.12
24.289	1.13	12.412	1.63	8.849	2.13	6.954	2.63	5.751	3.13
23.686	1.14	12.308	1.64	8.800	2.14	6.925	2.64	5.732	3.14
23.127	1.15	12.207	1.65	8.752	2.15	6.896	2.65	5.712	3.15
22.607	1.16	12.107	1.66	8.705	2.16	6.867	2.66	5.693	3.16
22.120	1.17	12.009	1.67	8.657	2.17	6.839	2.67	5.674	3.17
21.664	1.18	11.913	1.68	8.611	2.18	6.811	2.68	5.654	3.18
21.234	1.19	11.818	1.69	8.565	2.19	6.783	2.69	5.635	3.19
20.828	1.20	11.725	1.70	8.519	2.20	6.755	2.70	5.617	3.20
20.443	1.21	11.634	1.71	8.474	2.21	6.728	2.71	5.598	3.21
20.079	1.22	11.545	1.72	8.430	2.22	6.700	2.72	5.579	3.22
19.732	1.23	11.457	1.73	8.386	2.23	6.673	2.73	5.561	3.23
19.401	1.24	11.370	1.74	8.342	2.24	6.646	2.74	5.542	3.24
19.085	1.25	11.285	1.75	8.299	2.25	6.620	2.75	5.524	3.25
18.783	1.26	11.202	1.76	8.257	2.26	6.594	2.76	5.506	3.26
18.493	1.27	11.120	1.77	8.215	2.27	6.567	2.77	5.488	3.27
18.216	1.28	11.039	1.78	8.173	2.28	6.541	2.78	5.470	3.28
17.949	1.29	10.960	1.79	8.138	2.29	6.516	2.79	5.452	3.29
17.690	1.30	10.881	1.80	8.091	2.30	6.490	2.80	5.435	3.30
17.445	1.31	10.804	1.81	8.051	2.31	6.465	2.81	5.417	3.31
17.207	1.32	10.729	1.82	8.011	2.32	6.440	2.82	5.400	3.32
16.977	1.33	10.654	1.83	7.972	2.33	6.415	2.83	5.383	3.33
16.755	1.34	10.581	1.84	7.933	2.34	6.390	2.84	5.365	3.34
16.540	1.35	10.509	1.85	7.894	2.35	6.366	2.85	5.348	3.35
16.332	1.36	10.437	1.86	7.856	2.36	6.341	2.86	5.331	3.36
16.131	1.37	10.367	1.87	7.818	2.37	6.317	2.87	5.315	3.37
15.936	1.38	10.298	1.88	7.781	2.38	6.293	2.88	5.298	3.38
15.747	1.39	10.230	1.89	7.744	2.39	6.270	2.89	5.281	3.39
15.563	1.40	10.163	1.90	7.707	2.40	6.246	2.90	5.265	3.40
15.385	1.41	10.097	1.91	7.671	2.41	6.223	2.91	5.248	3.41
15.211	1.42	10.032	1.92	7.635	2.42	6.200	2.92	5.232	3.42
15.043	1.43	9.968	1.93	7.599	2.43	6.177	2.93	5.216	3.43
14.879	1.44	9.904	1.94	7.564	2.44	6.154	2.94	5.200	3.44
14.719	1.45	9.842	1.95	7.529	2.45	6.131	2.95	5.184	3.45
14.564	1.46	9.780	1.96	7.494	2.46	6.109	2.96	5.168	3.46
14.412	1.47	9.720	1.97	7.460	2.47	6.086	2.97	5.152	3.47
14.264	1.48	9.660	1.98	7.426	2.48	6.064	2.98	5.137	3.48
14.120	1.49	9.601	1.99	7.393	2.49	6.042	2.99	5.121	3.49
13.979	1.50	9.542	2.00	7.360	2.50	6.021	3.00	5.105	3.50

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Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-3
GRA-3
ZLW-3
ZAD-3

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.025	30.025	7.21	6.94	6.77	.025	61.68	58.72	56.56	57.08	53.27	51.07
.040	30.040	6.05	5.80	5.65	.040	57.71	55.35	53.96	54.31	51.43	49.68
.050	30.050	5.74	5.52	5.37	.050	56.72	54.61	53.34	53.56	51.09	49.47
.100	30.100	5.32	5.16	4.95	.100	55.43	53.51	52.62	52.38	50.41	49.13
.200	30.200	5.21	4.98	4.86	.200	55.00	53.27	52.45	51.97	50.18	49.00
.500	30.500	5.14	4.92	4.82	.500	54.58	53.12	52.30	51.86	50.13	48.94
1.000	31.000	5.00	4.82	4.72	1.000	53.86	53.18	52.24	51.81	50.48	49.14
2.000	32.000	4.95	4.77	4.67	2.000	53.82	53.13	52.17	51.42	50.55	49.22
5.000	35.000	4.94	4.76	4.66	5.000	54.18	53.42	52.39	52.01	50.99	49.53
10.000	40.000	5.00	4.81	4.69	10.000	54.39	53.68	52.71	52.35	51.27	49.73
20.000	50.000	5.11	4.87	4.75	20.000	54.46	53.67	52.78	51.61	50.52	49.12
38.482	68.482	5.19	4.96	4.84	38.482	54.62	53.25	52.25	51.07	48.52	46.85
50.000	80.000	5.16	4.94	4.84	50.000	54.76	53.49	52.53	49.96	47.54	45.77
69.247	99.247	5.10	4.90	4.78	69.247	54.38	53.53	52.77	47.69	45.77	44.16
84.630	54.630	5.07	4.86	4.78	84.630	54.10	53.31	52.51	45.33	44.13	42.88
100.000	70.000	4.95	4.81	4.73	100.000	53.91	53.55	52.96	43.50	42.70	41.62
123.087	93.087	5.02	4.87	4.81	123.087	55.23	55.31	55.03	40.89	40.58	39.80
153.852	123.852	5.11	4.96	4.89	153.852	52.25	52.97	52.92	38.71	38.04	37.79
176.926	146.926	5.30	5.19	5.10	176.926	47.72	49.53	51.11	37.78	38.76	38.46
200.000	170.000	5.37	5.28	5.21	200.000	43.90	45.61	47.46	36.16	38.31	40.01

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.28	1.16	1.09	1.39	2.06	2.93	5.000	1.53	1.42	1.33	.025	−227.82	+.96
10.000	1.29	1.17	1.09	1.38	2.04	2.90	10.000	1.54	1.43	1.33	.030	−237.32	+1.02
16.143	1.29	1.17	1.09	1.36	2.01	2.83	16.143	1.55	1.44	1.34	.050	−248.89	+1.03
20.000	1.29	1.16	1.09	1.34	1.99	2.80	20.000	1.55	1.44	1.34	.100	−255.16	+1.01
27.286	1.28	1.16	1.08	1.39	2.05	2.85	27.286	1.55	1.45	1.35	.500	−258.65	+1.02
38.429	1.27	1.15	1.08	1.43	2.08	2.86	38.429	1.57	1.46	1.36	2.000	−256.76	+1.02
44.000	1.27	1.15	1.07	1.42	2.07	2.86	44.000	1.58	1.47	1.37	5.000	−253.42	+1.00
50.000	1.26	1.14	1.07	1.42	2.07	2.84	50.000	1.59	1.49	1.39	10.000	−256.79	+.99
60.714	1.25	1.13	1.06	1.41	2.05	2.80	60.714	1.62	1.52	1.42	20.000	−252.96	+.98
77.429	1.23	1.11	1.06	1.41	2.02	2.77	77.429	1.67	1.57	1.47	38.482	−249.19	+.98
94.143	1.21	1.10	1.06	1.42	2.02	2.76	94.143	1.73	1.63	1.53	53.864	−257.10	+1.07
100.000	1.20	1.09	1.06	1.42	2.02	2.75	100.000	1.76	1.65	1.55	69.247	−254.46	+1.11
110.857	1.18	1.09	1.08	1.44	2.03	2.75	110.857	1.81	1.70	1.61	84.630	−256.99	+1.21
122.000	1.17	1.08	1.09	1.45	2.03	2.76	122.000	1.87	1.75	1.64	100.000	−257.87	+1.33
138.714	1.16	1.09	1.12	1.47	2.05	2.74	138.714	1.99	1.85	1.76	115.395	−255.22	+1.28
149.857	1.15	1.11	1.14	1.51	2.07	2.72	149.857	2.05	1.92	1.81	130.778	−249.16	+1.29
166.571	1.15	1.13	1.17	1.53	2.11	2.76	166.571	2.16	2.01	1.91	153.852	−254.87	+1.35
177.714	1.16	1.15	1.20	1.56	2.13	2.79	177.714	2.24	2.08	1.98	169.235	−255.80	+1.58
188.857	1.17	1.18	1.23	1.59	2.14	2.82	188.857	2.31	2.16	2.05	184.617	−255.26	+1.77
200.000	1.19	1.21	1.25	1.61	2.15	2.80	200.000	2.39	2.24	2.11	200.000	−253.61	+1.72

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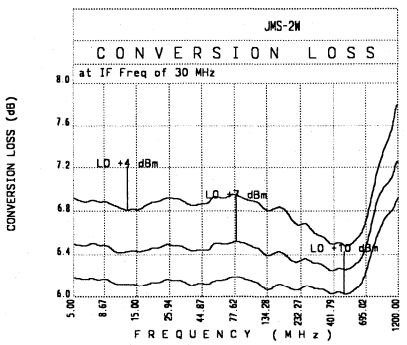
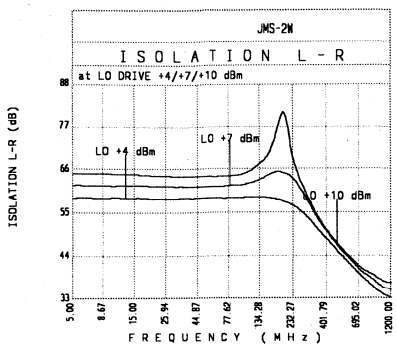
surface mount

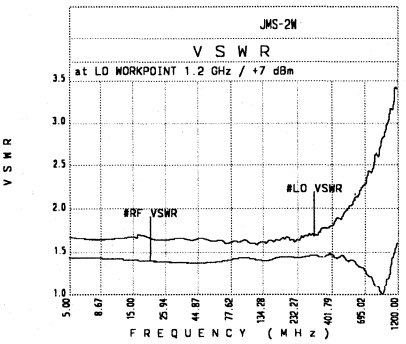
Frequency Mixers

Model JMS-2W

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
5.00	35.00	6.93	6.50	6.19	5.00	59.28	62.55	65.54	57.98	59.95	61.74
10.00	40.00	6.86	6.43	6.14	10.00	59.42	62.08	65.34	57.62	59.28	60.34
15.30	45.30	6.81	6.43	6.11	15.30	59.44	62.44	65.27	57.14	58.34	58.69
29.94	59.94	6.92	6.49	6.17	29.94	59.00	62.14	64.68	55.90	56.11	55.55
50.00	80.00	6.89	6.45	6.13	50.00	59.14	62.11	64.77	54.74	53.65	52.52
81.92	111.92	6.95	6.52	6.20	81.92	59.36	62.44	64.93	52.78	50.79	49.22
102.45	132.45	6.90	6.47	6.16	102.45	59.43	62.71	65.55	51.74	49.36	47.75
160.26	130.26	6.85	6.44	6.14	160.26	59.13	65.46	71.42	49.84	46.82	44.74
200.43	170.43	6.72	6.34	6.08	200.43	58.36	65.54	84.70	49.20	45.89	43.75
350.63	320.63	6.57	6.30	6.08	350.63	51.38	53.86	54.50	45.20	42.07	40.07
438.53	408.53	6.54	6.29	6.07	438.53	47.54	49.13	49.56	41.99	40.13	38.61
548.47	518.47	6.50	6.28	6.05	548.47	43.71	44.85	45.32	38.25	37.77	37.02
600.00	570.00	6.56	6.34	6.10	600.00	42.28	43.57	44.06	36.66	36.59	36.09
613.38	583.38	6.56	6.32	6.09	613.38	41.91	43.25	43.82	36.36	36.40	35.94
685.97	655.97	6.68	6.45	6.21	685.97	40.17	41.28	41.99	34.37	34.97	35.02
767.15	737.15	6.91	6.66	6.42	767.15	38.71	40.04	40.83	32.63	33.20	33.62
959.47	929.47	7.39	7.03	6.75	959.47	35.46	37.35	38.89	29.95	31.24	32.14
1073.01	1043.01	7.53	7.10	6.80	1073.01	34.45	36.16	37.74	29.11	30.62	31.94
1120.00	1090.00	7.65	7.17	6.84	1120.00	34.16	36.10	37.74	28.97	30.60	32.13
1200.00	1170.00	7.79	7.25	6.93	1200.00	33.74	35.69	37.57	29.12	30.56	32.27

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
5.00	1.60	1.46	1.33	1.16	1.69	2.51	1.01	2.12	1.80	1.54
10.00	1.59	1.44	1.32	1.15	1.67	2.48	3.30	2.13	1.80	1.54
15.30	1.57	1.43	1.30	1.14	1.69	2.50	5.50	2.12	1.80	1.54
29.94	1.55	1.40	1.28	1.14	1.68	2.46	7.80	2.12	1.80	1.54
50.00	1.54	1.39	1.27	1.13	1.67	2.46	10.00	2.12	1.80	1.54
81.92	1.58	1.44	1.32	1.14	1.64	2.39	12.00	2.12	1.80	1.54
102.45	1.59	1.45	1.33	1.15	1.63	2.39	34.00	2.08	1.76	1.50
160.26	1.58	1.44	1.33	1.20	1.64	2.36	56.00	2.06	1.74	1.48
200.43	1.60	1.46	1.35	1.21	1.69	2.43	78.00	2.09	1.77	1.51
350.63	1.58	1.46	1.36	1.28	1.79	2.50	100.00	2.16	1.83	1.57
438.53	1.56	1.45	1.36	1.37	1.90	2.58	150.00	2.10	1.79	1.55
548.47	1.51	1.42	1.35	1.51	2.05	2.72	188.90	2.19	1.87	1.62
600.00	1.49	1.40	1.32	1.60	2.15	2.82	227.80	2.19	1.89	1.67
613.38	1.47	1.38	1.31	1.62	2.16	2.81	266.70	2.18	1.87	1.64
685.97	1.42	1.33	1.27	1.74	2.29	2.94	305.60	2.28	1.99	1.77
767.15	1.32	1.24	1.19	1.89	2.44	3.08	344.40	2.23	1.94	1.74
959.47	1.11	1.04	1.09	2.30	2.85	3.50	383.30	2.28	1.99	1.79
1073.01	1.33	1.32	1.35	2.63	3.17	3.80	422.20	2.32	2.05	1.86
1120.00	1.47	1.47	1.51	2.68	3.18	3.77	461.10	2.26	2.00	1.83
1200.00	1.56	1.62	1.71	2.91	3.41	3.97	500.00	2.33	2.06	1.88

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
5.00	227.53	-1.19
8.00	224.92	-1.24
10.00	224.54	-1.27
15.00	225.00	-1.36
20.00	226.59	-1.46
30.00	230.91	-1.65
50.00	229.32	-2.02
80.00	227.03	-2.48
100.00	229.58	-2.76
200.00	227.09	-3.43
300.00	239.89	-3.68
400.00	220.17	-4.15
500.00	206.48	-4.02
600.00	206.22	-3.96
700.00	205.80	-3.66
800.00	211.26	-3.92
900.00	196.22	-5.29
1000.00	189.75	-5.89
1100.00	180.78	-6.24
1200.00	176.71	-6.74

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Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

GRA-6
SRA-6
ZLW-6
ZAD-6

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.003	30.00	6.43	6.08	5.85	>64.00	61.88	59.98	>64.00	63.93	62.81
.100	30.10	6.22	5.90	5.63	>64.00	62.42	60.32	>64.00	63.98	63.03
.200	30.20	6.22	5.92	5.52	>64.00	62.44	60.51	>64.00	64.17	63.17
.500	30.50	6.22	5.87	5.59	>64.00	62.74	60.50	>64.00	64.06	63.48
.800	30.80	6.19	5.87	5.54	>64.00	62.70	60.52	>64.00	64.22	63.19
1.000	31.00	6.12	5.82	5.46	>64.00	62.48	60.50	>64.00	64.07	63.36
2.000	32.00	6.20	5.85	5.42	>64.00	62.34	60.33	>64.00	63.72	63.16
5.000	35.00	6.23	5.93	5.58	>64.00	61.61	59.62	>64.00	63.44	61.59
10.000	40.00	6.28	5.96	5.62	58.73	56.55	55.24	59.27	56.72	55.57
20.000	50.00	6.43	6.13	5.67	50.42	49.50	49.52	50.36	49.60	49.77
22.225	52.23	6.43	6.08	5.56	48.95	48.53	48.63	48.74	48.53	48.79
29.632	59.63	6.45	6.15	5.62	44.51	44.72	45.32	43.64	43.96	44.58
37.039	7.04	6.43	6.11	6.04	41.84	42.63	43.62	42.26	43.10	44.11
44.446	14.45	6.52	6.17	6.09	40.48	41.27	42.13	40.30	41.40	42.53
50.000	20.00	6.55	6.25	6.26	38.93	39.99	41.13	39.16	40.43	41.73
62.964	32.96	6.77	6.42	6.46	34.58	35.83	37.01	36.69	37.97	39.05
70.371	40.37	6.81	6.51	6.18	33.01	34.72	36.60	34.40	35.50	36.14
77.779	47.78	7.13	6.81	6.43	32.20	34.07	35.62	32.19	32.41	32.56
85.186	55.19	7.43	7.08	6.83	32.50	33.63	34.68	31.56	31.31	30.96
92.593	62.59	7.43	7.13	6.78	34.01	34.08	34.08	32.70	31.97	30.63
100.000	70.00	7.56	7.24	6.87	36.49	36.43	34.99	33.82	32.88	30.92

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.35	1.25	1.15	1.85	2.77	4.14	1.73	1.60	1.44
7.795	1.36	1.25	1.15	1.80	2.73	3.93	1.74	1.61	1.45
10.000	1.35	1.25	1.15	1.79	2.68	3.84	1.75	1.61	1.46
13.382	1.35	1.25	1.15	1.74	2.59	3.67	1.76	1.63	1.48
18.971	1.33	1.24	1.15	1.82	2.60	3.72	1.79	1.66	1.51
20.000	1.33	1.23	1.14	1.81	2.58	3.75	1.79	1.67	1.51
27.353	1.30	1.21	1.12	1.78	2.63	3.66	1.85	1.72	1.57
32.941	1.27	1.18	1.10	1.79	2.61	3.53	1.92	1.77	1.63
38.529	1.23	1.15	1.08	1.81	2.55	3.51	1.99	1.84	1.70
41.323	1.21	1.13	1.07	1.81	2.55	3.48	2.02	1.88	1.74
46.912	1.17	1.10	1.06	1.79	2.56	3.47	2.10	1.97	1.81
50.000	1.15	1.08	1.06	1.80	2.56	3.45	2.17	2.02	1.86
52.500	1.13	1.07	1.07	1.81	2.56	3.44	2.20	2.07	1.90
60.882	1.08	1.06	1.11	1.83	2.56	3.42	2.32	2.18	2.03
66.470	1.06	1.08	1.14	1.84	2.55	3.36	2.40	2.28	2.13
72.058	1.05	1.10	1.17	1.86	2.53	3.30	2.47	2.35	2.22
80.441	1.06	1.13	1.19	1.93	2.57	3.33	2.52	2.42	2.30
88.823	1.08	1.15	1.21	2.05	2.71	3.45	2.52	2.43	2.33
94.411	1.08	1.15	1.20	2.09	2.79	3.60	2.51	2.40	2.32
100.000	1.07	1.14	1.18	2.16	2.86	3.68	2.49	2.39	2.30

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
.003	−241.92	+0.00
.007	−236.39	+.02
.010	−235.94	+.02
.040	−235.42	+.02
.070	−235.38	+.02
.100	−231.29	+.01
.300	−226.88	+.01
.700	−227.59	+.01
1.000	−227.36	+.01
5.000	−226.73	+.01
14.329	−227.40	+.03
23.848	−228.70	+.07
33.367	−225.12	+.09
42.886	−220.78	+.12
50.000	−219.72	+.08
61.924	−212.18	+.46
70.000	−209.35	+.60
80.962	−204.70	+1.05
90.481	−188.36	+1.33
100.000	−170.55	+2.08

Measurements at RF & LO Power +7 dBm

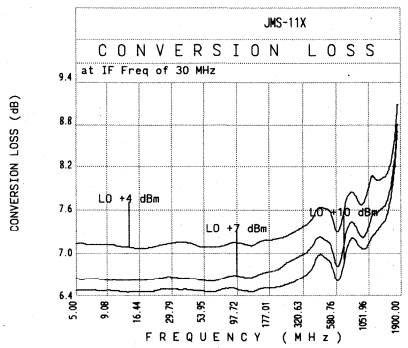
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

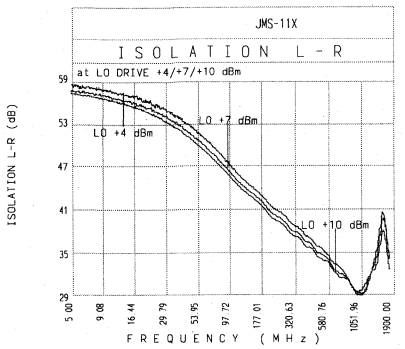
surface mount

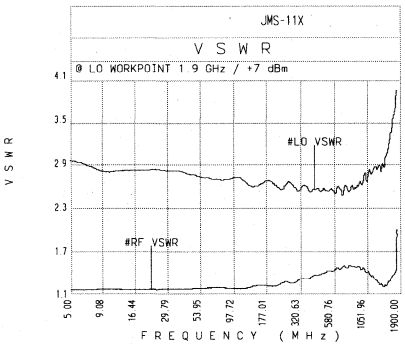
Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
JMS-11X
RMS-11X







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
5.00	35.00	7.17	6.69	6.52	5.00	58.78	57.72	57.53	66.40	66.80	67.41
10.01	40.01	7.17	6.67	6.52	10.01	58.07	57.22	56.74	65.60	64.98	65.00
50.04	80.04	7.12	6.66	6.52	50.04	52.84	51.74	50.96	53.57	53.60	53.47
103.56	73.56	7.18	6.72	6.52	103.56	47.60	46.56	45.99	47.60	47.68	47.77
189.86	159.86	7.22	6.79	6.56	189.86	43.11	42.32	41.78	43.18	43.39	43.29
241.95	211.95	7.26	6.90	6.60	241.95	41.48	40.60	40.02	41.57	41.62	41.46
308.34	278.34	7.37	7.00	6.68	308.34	39.78	38.96	38.35	39.99	39.89	39.64
392.94	362.94	7.47	7.11	6.79	392.94	38.46	37.54	36.96	38.64	38.49	38.16
500.75	470.75	7.64	7.20	6.96	500.75	36.56	35.72	35.25	37.24	37.03	36.78
638.14	608.14	7.15	6.65	6.48	638.14	34.95	34.40	34.06	36.29	36.08	35.72
720.38	690.38	7.76	7.33	7.04	720.38	34.09	33.17	32.77	35.55	35.36	35.21
918.04	888.04	7.77	7.35	7.15	918.04	31.49	31.46	31.50	34.69	34.64	34.55
950.00	920.00	7.68	7.26	7.12	950.00	30.98	30.90	30.98	34.41	34.39	34.26
1036.36	1006.36	7.73	7.24	7.06	1036.36	30.32	30.00	30.22	34.36	34.46	34.50
1200.00	1170.00	8.10	7.58	7.27	1200.00	31.15	30.35	30.16	34.44	34.77	35.15
1320.71	1290.71	8.01	7.59	7.36	1320.71	32.36	32.03	31.81	33.72	34.21	34.76
1500.00	1470.00	8.07	7.67	7.47	1500.00	34.08	35.10	35.99	32.84	33.40	33.97
1800.00	1770.00	8.63	8.36	8.26	1800.00	36.91	38.63	38.80	31.23	32.68	34.01
1850.00	1820.00	8.83	8.56	8.50	1850.00	34.97	36.54	36.77	30.75	32.31	33.82
1900.00	1870.00	9.07	8.80	8.70	1900.00	33.40	34.84	35.15	31.13	32.78	34.33

mixer VSWR

FREQ. MHz	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. MHz	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
5.00	1.35	1.21	1.11	2.14	2.98	4.12	5.00	1.27	1.29	1.32
10.01	1.36	1.22	1.12	1.99	2.83	3.95	66.30	1.05	1.10	1.15
50.04	1.37	1.23	1.13	1.96	2.78	3.85	127.50	1.06	1.11	1.17
103.56	1.36	1.23	1.14	1.93	2.75	3.81	188.80	1.10	1.14	1.19
189.86	1.38	1.26	1.19	1.91	2.72	3.74	250.00	1.10	1.14	1.19
241.95	1.43	1.31	1.24	1.85	2.59	3.55	300.00	1.16	1.20	1.24
308.34	1.43	1.32	1.26	1.85	2.59	3.53	350.00	1.13	1.17	1.21
392.94	1.47	1.37	1.32	1.83	2.56	3.47	400.00	1.21	1.25	1.29
500.75	1.53	1.44	1.40	1.88	2.60	3.50	450.00	1.20	1.22	1.26
638.14	1.60	1.52	1.49	1.87	2.53	3.36	500.00	1.27	1.30	1.33
720.38	1.62	1.54	1.51	1.88	2.52	3.30	550.00	1.27	1.29	1.31
918.04	1.59	1.53	1.51	2.01	2.61	3.35	600.00	1.35	1.37	1.40
950.00	1.60	1.54	1.53	2.04	2.63	3.35	650.00	1.35	1.36	1.38
1036.36	1.56	1.52	1.51	2.10	2.68	3.38	700.00	1.45	1.47	1.48
1200.00	1.42	1.40	1.42	2.23	2.79	3.47	750.00	1.44	1.45	1.47
1320.71	1.32	1.34	1.39	2.34	2.90	3.57	800.00	1.57	1.59	1.59
1500.00	1.16	1.26	1.36	2.41	2.89	3.53	850.00	1.58	1.60	1.60
1800.00	1.23	1.42	1.57	3.33	3.62	4.23	900.00	1.69	1.71	1.73
1850.00	1.27	1.47	1.61	3.53	3.73	4.26	950.00	1.73	1.75	1.76
1900.00	1.70	2.04	2.29	3.73	3.94	4.42	1000.00	1.85	1.88	1.89

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

GRA-8
SRA-8
ZLW-8
ZAD-8

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.001	3.00	5.43	5.26	4.97	63.49	67.32	68.05	>64.00	>67.00	>70.00
.002	3.00	5.18	4.96	4.76	63.34	67.15	67.96	>64.00	>67.00	>70.00
.005	3.01	4.98	4.92	4.61	63.46	67.23	67.72	>64.00	>67.00	>70.00
.010	3.01	4.96	4.88	4.59	63.99	67.03	67.90	>64.00	>67.00	>70.00
.020	3.02	5.04	4.84	4.64	>64.00	66.98	68.02	>64.00	>67.00	>70.00
.050	3.05	5.04	4.84	4.61	>64.00	66.86	68.43	>64.00	>67.00	>70.00
.100	3.10	5.00	4.79	4.59	>64.00	>67.00	68.45	>64.00	>67.00	>70.00
.200	3.20	5.06	4.88	4.63	>64.00	>67.00	68.61	>64.00	>67.00	>70.00
.500	3.50	5.07	4.86	4.64	>64.00	66.98	68.77	>64.00	>67.00	>70.00
.700	3.70	5.11	4.83	4.66	>64.00	>67.00	68.83	>64.00	>67.00	>70.00
1.000	4.00	5.13	4.88	4.66	>64.00	66.64	67.78	>64.00	>67.00	>70.00
1.430	4.43	5.12	4.91	4.71	>64.00	65.85	65.86	>64.00	>67.00	>70.00
2.000	5.00	5.16	4.91	4.72	63.68	64.48	63.99	>64.00	>67.00	>70.00
2.858	5.86	5.15	4.97	4.78	59.08	57.58	56.32	>64.00	>67.00	>70.00
4.287	7.29	5.22	5.16	4.88	54.41	53.00	52.31	>64.00	>67.00	>70.00
5.001	8.00	5.24	5.17	4.89	51.08	50.13	50.21	>64.00	>67.00	>70.00
6.429	9.43	5.36	5.18	4.97	48.83	48.56	48.77	>64.00	>67.00	>70.00
7.143	4.14	5.24	5.21	4.95	45.65	45.59	45.96	>64.00	>67.00	>70.00
8.572	5.57	5.34	5.23	5.11	43.01	43.14	43.64	>64.00	>67.00	>70.00
10.000	7.00	5.54	5.22	5.22						

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
.101	1.58	1.41	1.30	1.78	3.30	7.11	1.62	1.47	1.38
.201	1.54	1.37	1.27	1.64	2.70	4.36	1.58	1.44	1.35
.420	1.54	1.38	1.28	1.57	2.54	3.76	1.58	1.43	1.35
.740	1.53	1.37	1.28	1.55	2.46	3.67	1.59	1.44	1.36
1.001	1.54	1.37	1.28	1.56	2.41	3.56	1.58	1.44	1.36
1.698	1.54	1.38	1.29	1.51	2.32	3.35	1.59	1.44	1.37
2.001	1.53	1.38	1.28	1.50	2.29	3.30	1.59	1.44	1.36
2.656	1.54	1.38	1.29	1.46	2.21	3.16	1.60	1.45	1.37
3.294	1.54	1.37	1.28	1.39	2.10	2.93	1.60	1.45	1.37
4.253	1.53	1.37	1.28	1.31	1.98	2.76	1.62	1.47	1.39
5.001	1.53	1.37	1.29	1.29	1.95	2.67	1.64	1.50	1.42
5.530	1.52	1.37	1.28	1.29	1.94	2.63	1.64	1.50	1.42
6.169	1.52	1.36	1.28	1.31	1.96	2.64	1.65	1.52	1.43
7.001	1.50	1.37	1.28	1.35	2.01	2.74	1.68	1.55	1.46
7.446	1.50	1.36	1.28	1.38	2.03	2.75	1.69	1.56	1.47
8.085	1.49	1.36	1.28	1.39	2.02	2.71	1.71	1.58	1.49
8.404	1.49	1.36	1.27	1.39	1.98	2.67	1.72	1.58	1.51
9.043	1.48	1.36	1.28	1.35	1.94	2.58	1.74	1.62	1.54
9.362	1.48	1.36	1.28	1.34	1.92	2.55	1.75	1.61	1.54
10.000	1.48	1.35	1.27	1.34	1.90	2.51	1.78	1.65	1.57

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
.001	−275.22	−.11
.005	−271.22	−.13
.010	−264.26	−.13
.020	−261.87	−.13
.050	−262.01	−.12
.100	−259.74	−.12
.200	−260.96	−.12
.500	−262.44	−.13
.700	−264.77	−.13
1.000	−265.78	−.13
2.000	−266.07	−.13
3.334	−259.84	−.13
4.167	−258.11	−.12
5.000	−255.19	−.12
5.834	−250.59	−.12
6.667	−246.55	−.09
7.000	−247.09	−.10
7.500	−246.77	−.13
8.333	−247.65	−.09
10.000	−247.81	−.11

Measurements at RF & LO Power +7 dBm

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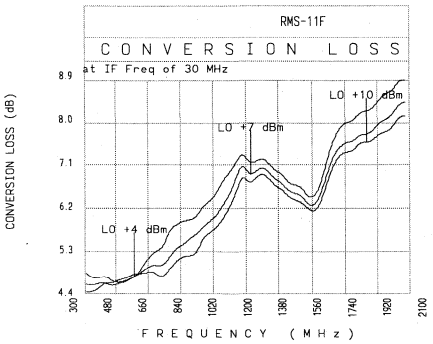
800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

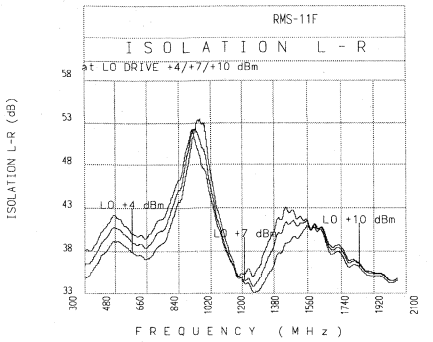
surface mount

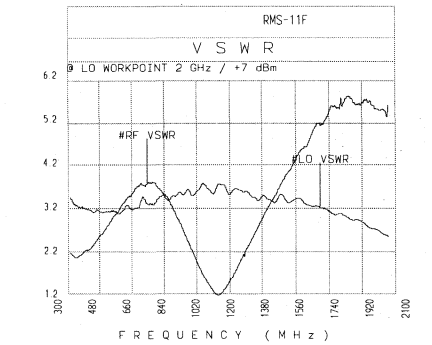
Frequency Mixers

Model RMS-11F

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
350.00	380.00	4.89	4.65	4.48	350.00	34.82	36.37	38.04	17.79	19.43	20.93
383.67	413.67	4.77	4.63	4.49	383.54	35.52	36.83	38.09	17.90	19.55	21.05
417.35	447.35	4.78	4.67	4.56	417.55	36.68	38.11	39.24	18.71	20.39	21.86
451.02	481.02	4.83	4.68	4.70	450.64	37.75	39.27	40.51	18.84	20.76	22.33
484.69	514.69	4.72	4.61	4.66	484.23	38.67	40.31	41.58	19.62	21.53	23.11
552.04	582.04	4.72	4.69	4.76	551.85	38.75	40.08	41.15	21.54	23.23	24.47
619.39	649.39	4.87	4.86	4.88	619.40	37.65	38.80	39.83	23.75	25.64	26.83
700.00	730.00	5.33	5.08	4.93	699.78	37.40	38.87	40.11	26.59	28.43	29.91
720.41	750.41	5.34	5.03	4.83	719.88	37.99	39.51	40.81	27.59	29.35	30.79
754.08	784.08	5.46	5.06	4.80	753.58	38.84	40.27	41.66	28.94	30.58	31.92
855.10	885.10	5.98	5.48	5.24	855.09	43.67	45.01	46.24	37.95	42.88	48.69
1000.00	1030.00	6.41	6.00	5.75	1000.32	49.53	47.36	45.88	33.32	33.91	34.14
1124.49	1154.49	7.16	6.85	6.52	1125.21	37.52	36.96	36.86	29.35	29.41	29.50
1292.86	1262.86	7.17	6.99	6.86	1293.57	33.92	35.46	37.14	29.09	29.97	30.05
1427.55	1397.55	6.72	6.54	6.41	1426.82	38.95	41.21	42.78	27.25	27.91	28.08
1562.24	1532.24	6.72	6.52	6.34	1563.54	40.94	41.00	40.82	26.24	27.02	27.43
1696.94	1666.94	8.01	7.61	7.40	1698.50	38.66	38.30	37.88	25.07	26.09	26.85
1797.96	1767.96	8.23	7.75	7.58	1797.49	36.69	36.56	36.18	24.47	25.61	26.59
1898.98	1868.98	8.61	8.07	7.81	1898.11	35.41	35.37	35.14	24.38	25.71	26.87
2000.00	1970.00	8.87	8.43	8.13	2000.00	34.72	34.77	34.59	24.72	26.20	27.56

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
350.00	2.54	2.22	1.98	3.75	3.48	4.01	1.00	1.12	1.35	1.60
383.67	2.41	2.12	1.93	3.45	3.31	3.86	25.80	1.13	1.34	1.59
417.35	2.47	2.23	2.07	3.09	3.24	3.94	50.50	1.19	1.39	1.63
451.02	2.52	2.31	2.20	2.93	3.21	3.97	75.30	1.27	1.47	1.71
484.69	2.68	2.49	2.39	2.80	3.20	4.02	100.00	1.37	1.57	1.82
552.04	3.03	2.89	2.82	2.58	3.16	4.09	110.00	1.40	1.60	1.86
619.39	3.40	3.33	3.30	2.50	3.17	4.15	132.50	1.49	1.71	1.97
700.00	3.68	3.73	3.76	2.48	3.25	4.29	155.00	1.59	1.82	2.10
720.41	3.68	3.81	3.87	2.57	3.43	4.55	177.50	1.68	1.93	2.23
754.08	3.67	3.83	3.92	2.49	3.34	4.43	200.00	1.78	2.05	2.37
855.10	3.21	3.50	3.75	2.50	3.43	4.58	210.00	1.83	2.12	2.45
1000.00	1.96	2.12	2.30	2.62	3.56	4.71	232.50	1.96	2.28	2.64
1124.49	1.39	1.26	1.22	2.86	3.79	4.95	255.00	2.07	2.41	2.78
1292.86	2.75	2.50	2.30	2.70	3.51	4.53	277.50	2.17	2.53	2.92
1427.55	3.90	3.59	3.37	2.77	3.42	4.33	300.00	2.31	2.72	3.13
1562.24	4.90	4.61	4.30	2.92	3.39	4.14	310.00	2.39	2.81	3.24
1696.94	5.74	5.43	5.11	2.94	3.16	3.74	332.50	2.56	3.02	3.48
1797.96	6.08	5.81	5.51	2.89	3.01	3.46	355.00	2.66	3.12	3.60
1898.98	5.92	5.65	5.45	2.72	2.81	3.18	377.50	2.80	3.28	3.78
2000.00	5.47	5.59	5.85	2.46	2.59	2.96	400.00	3.00	3.52	4.04

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
350.00	-203.63	2.17
436.84	-210.58	1.44
523.68	-221.61	0.58
610.53	-164.71	-0.28
697.37	-131.36	-0.54
784.21	-148.13	-1.05
871.05	-129.46	-1.50
1000.00	-87.07	-1.89
1044.74	-65.59	-2.31
1131.58	-61.36	-3.22
1218.42	-79.26	-3.57
1305.26	-103.12	-5.71
1392.11	-106.96	-8.31
1478.95	-110.48	-7.15
1565.79	-58.94	-7.31
1652.63	-30.01	-7.40
1739.47	-37.62	-8.67
1826.32	-59.83	-9.21
1913.16	-61.22	-9.27
2000.00	-36.66	-11.20

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

SRA-1-1
ZLW-1-1
ZAD-1-1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.100	30.10	6.29	5.97	5.79	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
.500	30.50	5.39	5.10	4.97	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
1.000	31.00	5.26	5.03	4.88	> 64.00	> 67.00	> 70.00	> 64.00	60.45	58.45
2.000	32.00	5.17	4.95	4.83	> 64.00	> 67.00	> 70.00	> 64.00	60.33	58.40
5.000	35.00	5.09	4.94	4.79	> 64.00	> 67.00	> 70.00	> 64.00	60.77	58.85
10.000	40.00	5.11	4.92	4.82	> 64.00	> 67.00	> 70.00	> 64.00	61.39	59.31
20.000	50.00	5.23	5.01	4.91	> 64.00	> 67.00	> 70.00	> 64.00	61.65	59.31
50.000	80.00	5.11	4.95	4.85	> 64.00	> 67.00	60.40	> 64.00	61.63	57.18
69.828	99.83	5.07	4.92	4.82	> 64.00	57.89	55.46	> 64.00	55.93	53.10
100.000	70.00	4.98	4.82	4.77	53.52	51.38	50.35	51.19	49.30	48.15
173.070	143.07	5.09	4.99	4.92	42.69	42.54	43.78	40.65	40.81	42.06
200.000	170.00	5.19	5.08	4.99	43.25	43.50	43.78	40.60	41.01	41.28
224.690	194.69	5.33	5.23	5.09	40.97	41.57	42.12	38.49	39.41	40.10
259.110	229.11	5.35	5.21	5.12	38.29	38.74	39.32	36.72	36.85	37.59
293.520	263.52	5.41	5.32	5.28	36.69	37.88	39.26	35.47	36.40	37.52
345.140	315.14	5.80	5.71	5.62	35.04	36.54	37.94	32.97	33.55	34.49
396.760	366.76	6.04	5.68	5.37	36.38	37.59	38.39	34.55	34.68	33.66
431.180	401.18	6.70	5.98	5.36	37.85	37.76	38.44	36.93	36.68	35.35
465.590	435.59	7.52	7.01	6.30	37.33	37.18	37.12	35.95	36.08	35.13
500.000	470.00	8.25	7.80	7.14	37.02	38.33	40.41	33.62	34.17	32.40

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.38	1.27	1.20	1.50	2.30	3.45	2.13	1.92	1.78
10.000	1.38	1.27	1.20	1.42	2.24	3.20	2.12	1.91	1.77
20.000	1.37	1.27	1.20	1.51	2.26	3.25	2.12	1.90	1.76
34.118	1.35	1.25	1.18	1.47	2.20	3.09	2.13	1.91	1.77
50.000	1.33	1.23	1.16	1.43	2.16	3.02	2.15	1.92	1.78
77.795	1.28	1.18	1.12	1.41	2.11	2.89	2.16	1.93	1.80
100.000	1.25	1.15	1.09	1.40	2.08	2.88	2.21	1.96	1.85
121.470	1.21	1.12	1.07	1.47	2.09	2.94	2.24	2.00	1.87
150.590	1.16	1.09	1.07	1.50	2.12	2.86	2.34	2.05	1.93
179.710	1.13	1.10	1.10	1.51	2.18	2.87	2.42	2.13	1.99
200.000	1.12	1.11	1.14	1.53	2.22	2.96	2.44	2.19	2.04
223.390	1.12	1.15	1.19	1.58	2.23	2.93	2.51	2.24	2.08
267.060	1.16	1.22	1.27	1.69	2.38	3.05	2.60	2.32	2.17
296.180	1.20	1.27	1.33	1.71	2.43	3.15	2.66	2.37	2.24
325.300	1.24	1.31	1.38	1.80	2.44	3.20	2.68	2.41	2.25
354.420	1.27	1.34	1.41	1.93	2.56	3.26	2.66	2.37	2.25
383.530	1.29	1.36	1.41	2.09	2.75	3.42	2.65	2.37	2.23
412.650	1.29	1.35	1.40	2.17	2.85	3.56	2.69	2.37	2.24
441.770	1.26	1.31	1.36	2.22	2.95	3.69	2.65	2.34	2.19
470.890	1.19	1.23	1.28	2.29	3.00	3.82	2.63	2.31	2.16
500.000	1.13	1.16	1.21	2.32	3.10	3.77	2.70	2.32	2.18

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
.100	−252.07	+.02
.200	−255.06	+.03
.500	−256.56	+.02
1.000	−257.44	+.02
2.000	−256.78	+.02
5.000	−258.91	+.02
10.000	−257.73	+.02
20.000	−259.14	+.03
50.000	−256.04	+.02
73.912	−260.65	+.03
100.000	−261.64	+.05
159.130	−256.39	+.09
200.000	−257.48	+.15
223.040	−261.16	+.20
265.650	−248.60	+.26
300.000	−236.58	+.14
372.170	−208.88	−.07
400.000	−197.61	−.18
457.380	−180.61	−.37
500.000	−182.97	+.07

Measurements at RF & LO Power +7 dBm

Mini-Circuits™
Distribution Centers NORTH AMERICA P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
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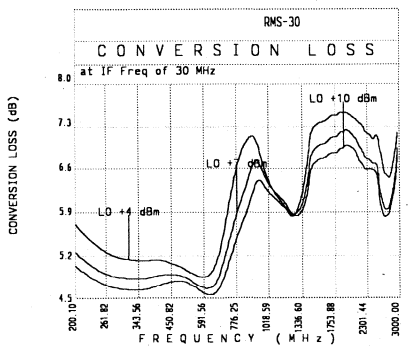
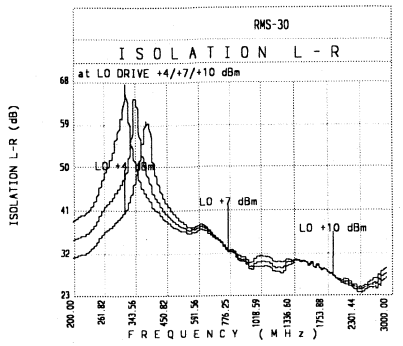
surface mount

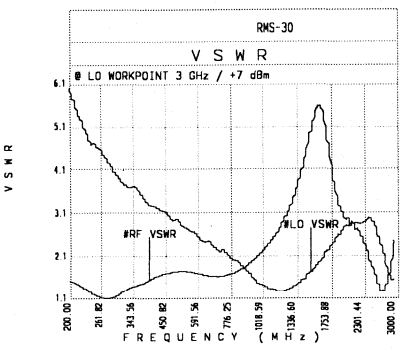
Frequency Mixers

Model RMS-30

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

		Conversion Loss (dB)				Isolation L-R (dB)			Isolation L-I (dB)		
RF MHz	LO MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
200.10	230.10	5.75	5.30	5.08	200.10	31.72	35.34	39.34	21.68	22.95	24.74
400.10	430.10	5.21	4.94	4.77	400.10	52.36	45.55	42.37	20.99	22.74	24.31
600.09	630.09	4.86	4.68	4.59	600.09	38.50	38.09	37.53	22.99	24.23	25.03
828.65	858.65	7.04	6.27	5.85	828.65	32.94	32.57	32.33	30.74	30.75	30.45
1000.07	1030.07	6.50	6.43	6.29	1000.07	31.68	30.53	29.76	31.70	30.13	28.40
1114.35	1144.35	6.11	6.16	6.06	1114.35	31.77	30.64	29.78	25.70	23.50	21.92
1228.63	1258.63	5.82	5.88	5.90	1228.63	30.85	29.50	28.42	22.69	21.69	20.82
1342.92	1372.92	6.21	6.03	5.94	1342.92	31.02	30.63	30.05	22.88	23.23	23.36
1457.20	1487.20	7.23	6.87	6.66	1457.20	30.73	30.80	30.76	24.30	25.21	26.01
1500.00	1530.00	7.30	6.95	6.73	1500.00	30.85	31.01	31.02	24.93	25.49	25.85
1685.76	1655.76	7.43	7.08	6.86	1685.76	30.02	30.14	30.21	21.45	20.62	19.98
1857.18	1827.18	7.53	7.22	6.96	1857.18	28.39	28.52	28.53	17.05	16.49	16.02
1971.47	1941.47	7.52	7.26	7.01	1971.47	27.08	27.20	27.30	15.18	14.81	14.47
2085.75	2055.75	7.42	7.12	6.93	2085.75	27.07	26.56	26.17	13.78	13.64	13.42
2200.03	2170.03	7.32	6.95	6.72	2200.03	26.57	26.14	25.63	12.28	12.33	12.23
2371.45	2341.45	7.16	6.77	6.63	2371.45	24.97	24.57	23.99	11.02	11.40	11.55
2542.87	2512.87	7.12	6.62	6.44	2542.87	25.78	25.24	24.71	12.23	13.33	14.22
2714.30	2684.30	6.52	5.98	5.84	2714.30	27.09	26.06	25.03	14.04	14.42	14.64
2885.72	2855.72	6.63	6.24	6.16	2885.72	28.03	26.86	25.57	14.30	14.79	15.11
3000.00	2970.00	7.19	6.95	6.87	3000.00	29.49	28.42	27.38	15.80	16.91	17.65

mixer VSWR

	VSWR RF port			VSWR LO port			VSWR IF port					
FREQ. MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	max. DC output mV	DC offset mV
200.00	1.81	1.59	1.44	6.93	6.06	6.63	1.00	2.14	1.82	1.49	200.10	-179.32	-0.59
400.10	1.62	1.63	1.68	2.49	3.34	4.45	63.30	2.16	1.84	1.54	347.46	-200.78	3.13
600.09	1.76	1.75	1.80	1.88	2.59	3.47	125.50	2.07	1.79	1.54	494.83	-210.77	2.32
828.65	1.95	1.81	1.74	1.68	2.05	2.64	187.80	1.98	1.75	1.53	642.19	-184.66	2.26
1000.07	2.39	2.20	2.08	1.26	1.49	1.99	250.00	1.81	1.61	1.47	789.55	-133.83	-0.58
1114.35	2.79	2.56	2.39	1.21	1.38	1.87	260.00	1.82	1.62	1.48	1000.00	-120.84	-4.12
1228.63	3.29	3.00	2.77	1.11	1.34	1.81	320.00	1.69	1.58	1.52	1084.28	-110.94	-5.48
1342.92	4.00	3.60	3.28	1.03	1.47	1.99	380.00	1.68	1.61	1.60	1231.64	-61.34	-9.68
1457.20	4.96	4.40	3.95	1.17	1.62	2.15	440.00	1.59	1.57	1.62	1379.01	-32.75	-9.87
1500.00	5.41	4.81	4.26	1.26	1.75	2.33	500.00	1.61	1.65	1.73	1526.37	10.98	-14.63
1685.76	5.95	5.49	4.98	1.58	2.12	2.73	550.00	1.58	1.64	1.75	1673.73	21.76	-17.91
1857.18	4.13	3.82	3.58	1.96	2.51	3.11	600.00	1.64	1.74	1.87	1821.09	72.77	-20.34
1971.47	3.55	3.19	2.94	2.21	2.75	3.34	650.00	1.62	1.71	1.85	1968.46	88.04	-23.14
2085.75	3.35	2.97	2.69	2.42	2.86	3.40	700.00	1.68	1.79	1.94	2115.82	107.95	-24.56
2200.03	3.14	2.76	2.47	2.65	2.94	3.40	750.00	1.67	1.77	1.91	2263.18	111.72	-21.68
2371.45	2.81	2.44	2.16	2.95	2.95	3.19	760.00	1.67	1.77	1.90	2410.55	123.90	-1.93
2542.87	2.14	1.85	1.65	3.27	2.94	2.97	820.00	1.68	1.76	1.89	2557.91	105.86	-1.06
2714.30	1.48	1.35	1.31	3.32	2.45	2.13	880.00	1.65	1.69	1.79	2705.27	120.63	0.70
2885.72	1.40	1.60	1.79	2.67	1.83	1.37	940.00	1.61	1.60	1.66	2852.64	156.08	9.20
3000.00	2.24	2.52	2.90	2.07	1.60	1.47	1000.00	1.56	1.48	1.49	3000.00	179.69	10.34

ϕ detection

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

SRA-1W
ZAD-1W
ZFM-1W
ZLW-1W

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	6.40	6.42	6.47	>64.00	>67.00	>70.00	>64.00	>67.00	64.91
2.000	32.00	6.15	5.97	6.07	>64.00	>67.00	>70.00	>64.00	>67.00	64.71
5.000	35.00	5.80	5.50	5.73	>64.00	>67.00	>70.00	>64.00	>67.00	64.82
10.000	40.00	5.92	5.66	5.47	>64.00	>67.00	>70.00	>64.00	>67.00	65.02
20.000	50.00	5.93	5.60	5.41	>64.00	>67.00	>70.00	>64.00	>67.00	64.65
50.000	80.00	5.85	5.60	5.50	>64.00	>67.00	>70.00	>64.00	62.28	61.08
100.000	70.00	5.75	5.47	5.47	>64.00	>67.00	59.87	54.37	55.09	54.33
130.140	100.14	5.74	5.52	5.42	>64.00	57.96	55.48	51.69	51.55	51.11
200.000	170.00	5.81	5.62	5.55	51.92	50.48	49.20	46.26	45.84	44.92
285.110	255.11	5.64	5.47	5.44	46.41	45.61	44.78	41.42	40.64	40.18
362.590	332.59	5.90	5.71	5.53	43.45	42.62	42.43	38.16	37.34	37.26
414.250	384.25	6.10	5.97	5.63	40.29	40.09	40.38	35.59	36.21	36.95
500.000	470.00	6.39	6.14	5.93	40.14	39.49	39.46	33.46	33.17	33.44
543.390	513.39	6.45	6.24	5.97	38.53	37.59	37.08	32.09	31.35	31.13
595.040	565.04	6.61	6.21	6.28	37.16	37.44	37.78	32.18	31.39	31.01
646.700	616.70	6.61	6.16	5.91	35.85	36.31	37.13	33.13	33.58	33.33
672.530	642.53	6.88	6.27	5.93	36.55	36.63	37.42	30.97	31.60	31.99
698.360	668.36	7.13	6.43	5.95	36.25	36.64	37.41	29.19	29.86	30.40
724.180	694.18	7.46	6.68	6.13	36.48	36.68	37.16	28.44	28.78	29.14
750.000	720.00	7.84	6.98	6.25	35.61	35.77	36.24	27.28	27.45	27.86

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.15	1.20	1.23	2.15	3.31	4.93	1.64	1.46	1.35
10.000	1.07	1.12	1.16	2.07	3.09	4.57	1.64	1.46	1.35
20.000	1.05	1.10	1.15	2.12	3.15	4.56	1.64	1.46	1.36
50.000	1.08	1.12	1.17	2.04	2.99	4.21	1.65	1.47	1.37
78.484	1.10	1.14	1.19	2.00	2.99	4.06	1.67	1.50	1.40
100.000	1.11	1.16	1.21	2.00	2.84	3.86	1.68	1.51	1.42
155.970	1.15	1.20	1.25	1.99	2.88	3.83	1.77	1.60	1.51
200.000	1.18	1.23	1.28	1.96	2.75	3.59	1.86	1.68	1.59
259.280	1.24	1.30	1.35	1.96	2.74	3.56	1.99	1.81	1.71
310.940	1.29	1.35	1.41	2.00	2.74	3.58	2.12	1.93	1.81
362.590	1.34	1.40	1.46	2.08	2.78	3.61	2.26	2.05	1.94
414.250	1.39	1.45	1.50	2.07	2.78	3.56	2.35	2.13	2.01
465.900	1.43	1.48	1.53	2.10	2.80	3.48	2.43	2.22	2.09
517.560	1.45	1.50	1.54	2.15	2.82	3.52	2.45	2.24	2.11
569.220	1.47	1.49	1.53	2.18	2.85	3.52	2.45	2.23	2.11
620.870	1.49	1.51	1.54	2.30	2.93	3.47	2.38	2.20	2.09
672.530	1.55	1.58	1.60	2.39	2.94	3.57	2.27	2.10	2.00
698.360	1.62	1.64	1.68	2.41	3.03	3.52	2.24	2.05	1.97
724.180	1.69	1.72	1.75	2.43	3.01	3.55	2.16	1.99	1.91
750.000	1.80	1.83	1.86	2.45	3.01	3.56	2.11	1.93	1.84

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
1.000	−225.12	−.06
2.000	−228.82	−.06
5.000	−229.29	−.06
10.000	−231.45	−.05
20.000	−226.19	−.04
49.322	−222.81	−.04
73.483	−223.49	−.05
100.000	−228.62	−.05
145.970	−229.46	−.04
200.000	−226.10	+0.00
266.770	−229.57	+0.00
387.580	−193.60	+.08
460.060	−199.61	−.23
500.000	−207.29	−.12
556.700	−187.14	+.32
605.030	−160.57	+.22
677.510	−144.43	+.16
701.670	−137.65	−.18
725.830	−124.38	−.31
750.000	−115.97	−.53

Measurements at RF & LO Power +7 dBm

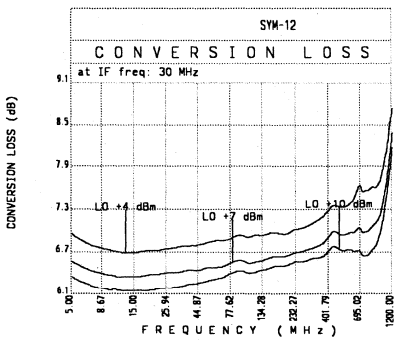
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

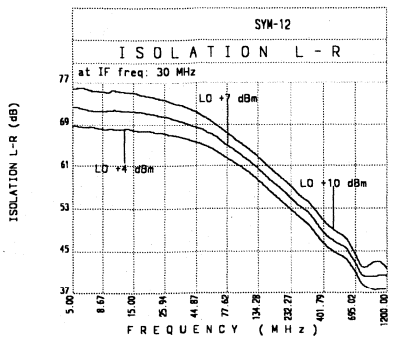
surface mount

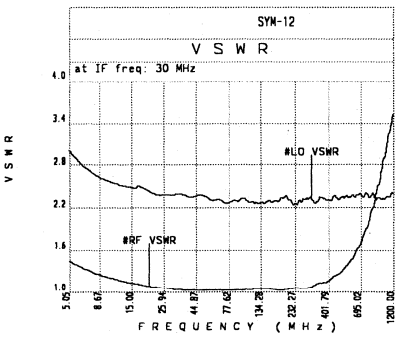
Frequency Mixers

Model SYM-12

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
5.00	35.00	6.97	6.57	6.35	5.00	68.78	72.28	75.69	69.78	69.79	69.15
10.10	40.10	6.72	6.37	6.17	10.10	68.20	71.75	75.55	68.54	68.24	68.23
50.00	80.00	6.84	6.49	6.29	50.00	65.20	68.06	70.43	61.54	64.89	68.28
102.45	72.45	6.90	6.54	6.40	102.45	60.84	63.00	65.32	55.83	60.09	67.03
143.30	113.30	6.98	6.62	6.46	143.30	57.79	59.96	62.10	52.00	55.79	62.38
224.15	194.15	7.04	6.70	6.58	224.15	53.45	55.72	57.97	46.89	50.78	54.89
280.35	250.35	7.08	6.74	6.59	280.35	51.11	53.25	55.27	44.87	48.69	51.16
350.63	320.63	7.18	6.80	6.62	350.63	48.81	51.05	53.11	43.55	46.92	47.59
438.53	408.53	7.41	7.05	6.83	438.53	45.75	47.81	50.06	41.88	45.14	44.29
548.47	518.47	7.35	6.96	6.73	548.47	44.33	46.31	48.39	42.77	42.00	39.07
600.00	570.00	7.44	7.01	6.75	600.00	43.64	45.68	47.51	41.40	39.34	37.01
685.97	655.97	7.74	7.10	6.75	685.97	41.36	43.02	44.69	41.48	37.59	34.86
767.15	737.15	7.60	7.00	6.66	767.15	39.28	40.88	42.42	42.07	35.91	32.94
857.93	827.93	7.65	7.07	6.74	857.93	38.18	40.26	42.09	41.67	34.32	31.39
900.00	870.00	7.61	7.11	6.77	900.00	38.01	40.45	42.61	39.62	33.02	30.13
1000.00	970.00	7.77	7.29	7.04	1000.00	37.66	40.41	43.20	36.17	30.95	28.54
1100.00	1070.00	8.11	7.71	7.53	1100.00	37.72	40.52	42.85	34.02	29.45	27.21
1150.00	1120.00	8.53	8.07	7.85	1150.00	37.84	40.56	42.48	32.68	28.53	26.21
1170.00	1140.00	8.60	8.18	7.98	1170.00	37.81	40.56	42.14	32.75	28.47	26.26
1200.00	1170.00	8.73	8.39	8.18	1200.00	37.92	40.43	41.75	32.33	28.40	26.09

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
5.00	1.46	1.43	1.42	2.78	3.00	3.79	0.03	1.99	1.72	1.52
10.00	1.23	1.19	1.17	2.02	2.56	3.49	1.00	2.03	1.73	1.52
20.00	1.12	1.07	1.04	1.71	2.42	3.40	3.00	2.02	1.73	1.52
50.00	1.05	1.01	1.06	1.60	2.36	3.36	5.00	2.02	1.73	1.52
100.00	1.06	1.01	1.05	1.56	2.32	3.30	10.00	2.02	1.73	1.51
125.00	1.04	1.03	1.07	1.54	2.25	3.18	20.00	2.00	1.71	1.50
200.00	1.05	1.02	1.07	1.62	2.36	3.31	30.00	1.98	1.70	1.49
280.00	1.04	1.04	1.09	1.64	2.32	3.21	50.00	1.95	1.67	1.46
360.00	1.09	1.11	1.16	1.69	2.33	3.17	70.00	1.97	1.69	1.48
440.00	1.17	1.20	1.24	1.77	2.34	3.12	100.00	2.01	1.73	1.51
500.00	1.24	1.27	1.31	1.80	2.33	3.08	200.00	1.98	1.71	1.51
600.00	1.40	1.45	1.49	1.89	2.37	3.05	300.00	1.92	1.67	1.49
680.00	1.59	1.64	1.68	1.95	2.38	3.00	400.00	1.84	1.63	1.48
760.00	1.81	1.87	1.91	2.00	2.41	3.01	450.00	1.78	1.60	1.48
840.00	2.09	2.16	2.19	2.01	2.37	2.95	500.00	1.76	1.58	1.47
920.00	2.41	2.48	2.52	2.04	2.34	2.88	600.00	1.66	1.53	1.45
1000.00	2.70	2.78	2.82	2.06	2.31	2.83	700.00	1.58	1.50	1.45
1080.00	2.99	3.06	3.09	2.15	2.35	2.83	800.00	1.53	1.49	1.47
1160.00	3.29	3.35	3.37	2.28	2.38	2.79	900.00	1.49	1.51	1.53
1200.00	3.44	3.50	3.52	2.34	2.39	2.75	1000.00	1.48	1.57	1.63

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
5.00	-217.58	0.19
10.00	-228.19	0.18
20.00	-232.98	0.18
50.00	-236.59	0.19
100.00	-231.59	0.17
125.00	-233.57	0.17
200.00	-224.34	0.16
280.00	-247.83	0.11
360.00	-230.33	0.22
440.00	-218.02	0.22
500.00	-202.26	0.29
600.00	-206.20	0.41
680.00	-224.36	0.95
760.00	-208.88	0.84
840.00	-187.15	0.57
920.00	-185.96	1.16
1000.00	-194.18	1.98
1080.00	-197.58	2.53
1160.00	-191.67	3.06
1200.00	-199.20	3.64

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-2
TAK-7
ZAD-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	6.07	5.81	5.46	62.60	62.40	>66.00	>64.00	66.60	>70.00
10.000	40.00	6.08	5.74	5.59	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
20.000	50.00	6.30	5.87	5.69	>64.00	63.37	61.98	>64.00	>67.00	65.75
50.000	80.00	6.12	5.77	5.63	55.60	55.36	54.47	59.32	58.05	57.23
100.000	70.00	6.19	5.79	5.61	49.88	49.04	48.78	53.06	52.36	51.54
160.320	130.32	6.26	5.85	5.67	45.01	45.18	45.58	49.33	48.76	47.95
200.000	170.00	6.37	5.92	5.76	42.87	43.67	44.12	47.83	47.23	46.11
284.570	254.57	6.33	5.95	5.78	39.78	41.08	41.57	45.98	44.56	43.24
346.690	316.69	6.46	6.00	5.80	37.76	39.04	39.72	46.26	43.59	42.36
408.820	378.82	6.63	6.15	6.03	36.41	36.94	37.09	45.83	43.85	42.15
500.000	470.00	6.65	6.25	6.02	34.76	35.65	36.13	42.46	41.57	41.15
533.070	503.07	6.60	6.19	5.99	33.76	34.41	34.81	41.86	42.87	40.89
595.200	565.20	6.36	5.96	5.83	31.57	33.15	32.76	38.80	37.76	37.80
688.390	658.39	5.98	5.57	5.36	30.43	31.77	33.15	38.78	38.59	39.85
750.510	720.51	6.09	5.59	5.38	29.69	30.90	32.19	40.24	40.39	41.51
800.000	770.00	6.10	5.60	5.40	29.15	30.50	31.72	41.59	41.73	42.48
843.700	813.70	6.02	5.64	5.42	28.90	30.24	31.53	41.01	41.84	41.85
905.830	875.83	5.98	5.62	5.46	28.01	28.94	30.05	37.68	47.26	38.04
967.950	937.95	6.15	5.81	5.66	27.16	28.12	28.44	36.14	35.84	35.75
1000.000	970.00	6.36	6.10	5.89	26.28	27.73	27.35	33.59	32.72	33.16

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.94	1.73	1.58	2.14	3.13	4.78	1.32	1.39	1.45
10.000	1.94	1.73	1.59	2.01	2.99	4.46	1.23	1.31	1.37
20.000	1.93	1.73	1.59	2.14	3.08	4.50	1.19	1.28	1.35
50.000	1.95	1.74	1.61	2.02	2.94	4.34	1.19	1.29	1.35
100.000	1.99	1.80	1.67	1.98	2.86	3.95	1.23	1.31	1.38
137.670	2.05	1.86	1.73	1.96	2.78	3.79	1.26	1.34	1.40
200.000	2.17	1.97	1.88	1.93	2.72	3.68	1.31	1.38	1.44
237.170	2.25	2.06	1.95	1.91	2.74	3.68	1.33	1.40	1.46
303.500	2.35	2.17	2.05	1.94	2.74	3.60	1.34	1.41	1.47
369.840	2.42	2.23	2.12	2.04	2.85	3.76	1.31	1.37	1.43
436.170	2.40	2.21	2.11	2.10	2.86	3.68	1.24	1.30	1.35
500.000	2.31	2.11	2.01	2.14	2.92	3.68	1.15	1.20	1.24
568.840	2.17	1.98	1.86	2.25	2.94	3.76	1.12	1.17	1.21
635.170	2.01	1.78	1.66	2.34	3.02	3.79	1.32	1.35	1.39
701.510	1.90	1.66	1.49	2.47	3.13	3.97	1.65	1.68	1.73
767.840	1.81	1.56	1.39	2.61	3.33	4.10	2.10	2.12	2.17
800.000	1.77	1.55	1.37	2.68	3.40	4.14	2.37	2.37	2.44
867.340	1.76	1.57	1.46	2.74	3.45	4.19	2.99	3.00	3.00
933.680	1.66	1.56	1.52	2.75	3.47	4.14	3.62	3.57	3.55
1000.000	1.43	1.41	1.41	2.72	3.30	4.04	4.13	4.05	3.96

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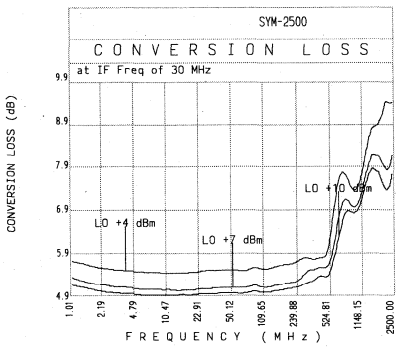
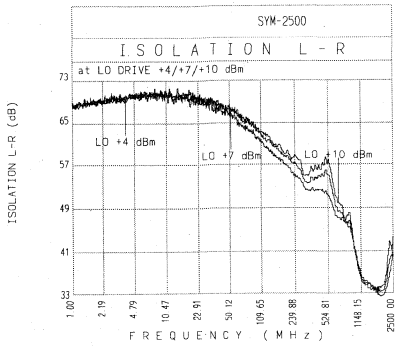
surface mount

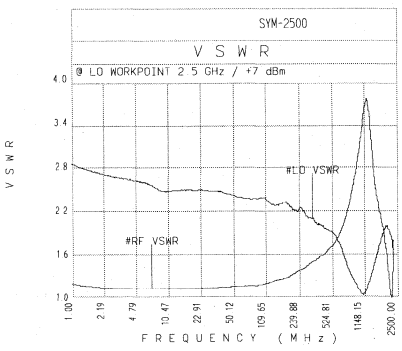
Frequency Mixers

Model
SYM-2500

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
1.01	31.01	5.79	5.40	5.23	1.00	68.86	68.55	68.96	70.80	78.07	74.95
2.01	32.01	5.63	5.24	5.09	2.01	69.52	68.93	69.10	77.60	76.05	72.73
5.84	35.84	5.54	5.13	4.99	5.84	69.84	70.25	69.89	79.08	70.86	67.07
9.42	39.42	5.51	5.12	5.00	9.42	70.13	70.04	70.28	77.34	68.23	63.94
20.90	50.90	5.53	5.12	5.02	20.90	69.19	68.86	69.14	75.63	62.17	57.50
54.42	84.42	5.58	5.17	5.04	54.42	66.16	67.37	67.18	67.24	57.12	51.24
102.99	72.99	5.59	5.17	5.06	102.99	61.85	63.40	63.46	50.59	53.83	47.44
194.90	164.90	5.71	5.28	5.15	194.90	57.35	58.63	59.78	40.88	46.88	41.54
507.42	477.42	5.84	5.59	5.33	507.42	52.80	56.42	58.29	30.03	36.76	35.04
960.27	930.27	7.32	6.94	6.83	960.27	43.62	43.41	43.29	18.05	19.21	20.32
1126.30	1096.30	7.46	7.08	6.95	1126.30	37.26	37.71	38.09	16.80	17.79	18.87
1250.00	1220.00	8.01	7.57	7.39	1250.00	35.38	35.73	36.16	17.34	18.03	18.77
1400.00	1370.00	8.57	7.99	7.75	1400.00	34.79	35.56	35.80	18.66	18.61	18.70
1549.41	1519.41	8.82	8.23	7.92	1549.41	34.36	34.63	34.53	18.08	17.85	17.79
1600.00	1570.00	8.82	8.20	7.87	1600.00	34.72	34.82	34.68	17.73	17.62	17.64
1800.00	1770.00	8.89	8.17	7.81	1800.00	34.93	34.21	33.44	15.56	16.19	16.84
2000.00	1970.00	9.10	7.97	7.54	2000.00	35.64	34.66	33.70	15.68	16.53	17.51
2200.00	2170.00	9.42	7.83	7.39	2200.00	40.42	38.26	36.08	17.59	17.68	17.94
2400.00	2370.00	9.36	7.93	7.47	2400.00	42.13	40.77	39.43	17.49	17.10	16.94
2500.00	2470.00	9.39	8.18	7.75	2500.00	40.67	43.10	44.14	17.41	16.95	16.56

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
1.00	1.47	1.24	1.21	2.13	2.88	3.96	1.00	1.95	1.44	1.18
2.01	1.47	1.18	1.12	1.94	2.74	3.84	3.30	1.95	1.44	1.19
5.84	1.49	1.17	1.04	1.82	2.63	3.69	5.50	1.96	1.44	1.18
9.42	1.50	1.17	1.02	1.71	2.50	3.55	7.80	1.96	1.44	1.18
20.90	1.50	1.17	1.01	1.73	2.52	3.56	10.00	1.96	1.44	1.18
54.42	1.52	1.20	1.07	1.70	2.44	3.41	50.00	1.94	1.42	1.17
102.99	1.53	1.22	1.13	1.71	2.41	3.33	62.50	1.96	1.44	1.18
194.90	1.61	1.33	1.27	1.77	2.33	3.11	75.00	1.96	1.44	1.18
507.42	2.01	1.69	1.56	2.08	1.97	2.24	87.50	1.93	1.42	1.18
960.27	2.95	2.59	2.37	1.81	1.30	1.21	100.00	1.90	1.39	1.15
1126.30	3.53	3.14	2.86	1.54	1.12	1.19	150.00	1.88	1.39	1.14
1250.00	3.97	3.60	3.29	1.33	1.10	1.31	188.90	1.77	1.30	1.10
1400.00	3.87	3.63	3.41	1.25	1.27	1.51	227.80	1.73	1.28	1.08
1549.41	3.12	2.87	2.71	1.45	1.45	1.64	266.70	1.64	1.23	1.12
1600.00	2.97	2.69	2.52	1.54	1.52	1.69	305.60	1.58	1.19	1.12
1800.00	2.57	2.25	2.04	1.94	1.77	1.83	344.40	1.51	1.19	1.20
2000.00	2.20	1.93	1.75	2.29	1.96	1.86	383.30	1.46	1.18	1.23
2200.00	1.68	1.46	1.32	2.42	2.01	1.78	422.20	1.43	1.22	1.31
2400.00	1.09	1.10	1.20	2.27	1.86	1.59	461.10	1.41	1.24	1.34
2500.00	1.50	1.83	2.12	2.06	1.71	1.51	500.00	1.42	1.32	1.42

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
1.01	-225.51	-0.17
3.00	-230.03	-0.17
5.00	-229.47	-0.17
10.00	-223.83	-0.16
20.00	-226.75	-0.16
50.00	-230.44	-0.13
100.00	-221.40	-0.17
200.00	-215.83	-0.16
300.00	-201.45	-0.25
400.00	-187.64	-0.15
500.00	-157.69	-0.06
800.00	-85.64	-3.00
1000.00	-58.38	-4.88
1200.00	10.23	-4.38
1350.00	44.06	-3.53
1500.00	81.59	-3.09
1800.00	122.52	-2.88
2000.00	133.45	-1.46
2300.00	134.38	-0.71
2500.00	149.03	-2.95

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-11
ZLW-11
ZAD-11
SBL-11

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	5.92	5.85	5.80	46.33	46.19	48.51	>64.00	>67.00	>70.00
10.000	40.00	6.02	5.88	5.81	46.80	46.23	48.89	>64.00	>67.00	>70.00
20.000	50.00	6.35	6.11	5.99	46.84	46.26	48.68	>64.00	>67.00	>70.00
50.000	80.00	6.61	6.37	6.24	46.25	45.89	47.69	>64.00	>67.00	69.02
100.000	70.00	6.49	6.25	6.14	44.81	44.70	45.68	>64.00	64.66	64.72
200.000	170.00	6.94	6.62	6.39	41.62	41.17	41.39	57.90	55.90	54.53
311.920	281.92	7.16	6.71	6.44	39.17	38.72	38.07	50.53	50.11	51.19
465.390	435.39	7.66	7.06	6.64	36.28	37.94	35.08	44.95	46.15	47.44
618.850	588.85	7.95	7.40	7.00	33.62	38.38	32.75	43.83	45.38	47.50
772.310	742.31	7.79	7.53	7.35	33.55	38.07	32.37	44.19	45.67	46.26
849.040	819.04	7.49	7.22	7.09	32.38	37.13	31.82	42.69	43.78	44.40
1000.000	970.00	7.28	7.05	6.96	30.89	36.28	29.71	37.21	38.27	39.01
1156.000	1126.00	7.04	6.76	6.66	31.61	35.18	29.94	44.42	43.23	41.99
1386.200	1356.20	8.05	7.53	7.24	38.48	41.65	36.24	41.70	38.52	36.21
1462.900	1432.90	8.10	7.62	7.34	41.17	41.43	33.31	43.90	41.57	39.61
1500.000	1470.00	7.94	7.48	7.24	39.84	41.94	35.06	44.76	42.71	40.60
1616.400	1586.40	7.34	6.96	6.78	38.73	43.41	40.48	46.03	43.97	43.05
1800.000	1770.00	7.07	6.79	6.60	40.00	41.03	41.30	40.95	38.23	35.95
1923.300	1893.30	6.90	6.64	6.51	39.95	38.49	40.75	32.70	30.27	28.57
2000.000	1970.00	6.99	6.69	6.52	39.23	39.35	39.94	29.79	27.98	26.39

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	3.06	3.19	3.19	2.29	3.03	4.59	3.11	3.21	3.24
10.000	2.54	2.54	2.51	1.90	2.69	4.03	1.90	2.08	2.20
50.000	2.48	2.45	2.43	1.81	2.70	4.02	1.55	1.79	1.93
100.000	2.64	2.62	2.58	1.81	2.61	3.85	1.48	1.68	1.81
200.000	3.00	2.96	2.92	1.83	2.46	3.45	1.38	1.55	1.67
300.560	3.25	3.21	3.17	1.83	2.31	3.19	1.34	1.49	1.59
374.450	3.42	3.31	3.28	1.86	2.27	3.05	1.38	1.52	1.62
500.000	3.40	3.42	3.37	1.76	2.13	2.75	1.53	1.67	1.76
670.000	3.25	3.19	3.18	1.70	2.08	2.48	1.90	2.08	2.17
817.780	3.00	2.96	2.93	1.81	1.93	2.27	2.30	2.56	2.66
1000.000	2.50	2.41	2.35	1.83	1.73	1.98	3.00	3.20	3.35
1100.000	2.24	2.10	2.01	1.79	1.58	1.78	3.90	4.07	4.20
1200.000	2.05	1.86	1.73	1.63	1.45	1.64	4.72	4.75	4.91
1408.900	2.28	2.12	2.02	1.41	1.17	1.47	4.12	4.12	4.14
1500.000	2.44	2.27	2.12	1.25	1.17	1.52	9.74	9.63	9.79
1630.600	2.32	2.19	2.06	1.15	1.32	1.68	13.39	13.09	13.29
1704.400	2.22	2.08	2.00	1.11	1.39	1.83	12.71	12.26	12.44
1852.200	1.97	1.87	1.81	1.18	1.59	1.99	10.96	11.10	10.89
1926.100	1.85	1.79	1.72	1.26	1.70	2.16	10.31	9.90	9.79
2000.000	1.77	1.67	1.62	1.33	1.74	2.14	9.23	8.72	8.72

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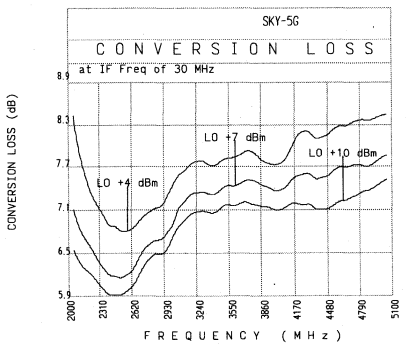
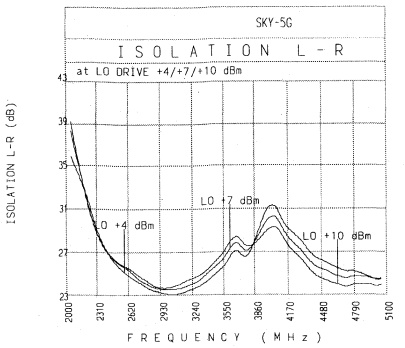
urface mount

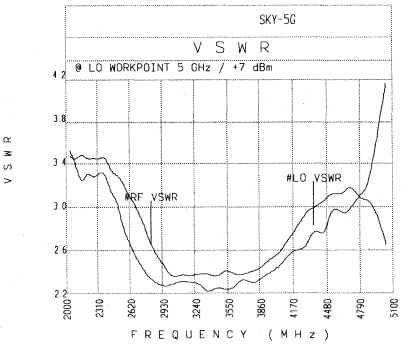
Frequency Mixers

Model SKY-5G

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
2000.00	2030.00	8.40	7.12	6.56	2000.00	39.33	38.50	36.12	11.11	14.25	16.68
2169.81	2199.81	7.32	6.60	6.24	2169.81	31.46	31.59	32.15	11.95	13.96	14.93
2396.23	2426.23	6.91	6.21	5.96	2396.23	26.74	26.84	26.93	11.70	12.26	12.32
2622.64	2652.64	6.94	6.44	6.20	2622.64	24.79	25.14	25.48	11.39	11.84	11.70
2735.85	2765.85	7.09	6.65	6.46	2735.85	24.14	24.45	24.76	11.59	11.90	11.63
3000.00	3030.00	7.59	7.14	6.87	3000.00	23.51	24.02	24.26	12.51	12.53	12.17
3188.68	3218.68	7.77	7.34	7.08	3188.68	24.04	24.50	25.00	13.46	13.38	12.95
3245.28	3275.28	7.79	7.37	7.10	3245.28	24.26	24.75	25.24	13.82	13.67	13.25
3358.49	3388.49	7.71	7.32	7.06	3358.49	25.01	25.75	26.11	14.56	14.21	13.81
3528.30	3498.30	7.82	7.43	7.15	3528.30	26.50	27.28	27.95	16.13	15.61	15.24
3584.91	3554.91	7.85	7.46	7.19	3584.91	27.51	28.20	28.72	16.81	16.21	15.79
3754.72	3724.72	7.87	7.50	7.18	3754.72	27.31	27.58	27.84	19.36	18.86	18.27
4000.00	3970.00	7.75	7.39	7.11	4000.00	31.72	30.76	29.80	23.09	22.51	22.01
4207.55	4177.55	8.19	7.60	7.17	4207.55	28.74	27.85	27.05	25.03	24.77	24.42
4264.15	4234.15	8.19	7.62	7.20	4264.15	28.18	27.29	26.53	25.43	25.14	24.83
4490.57	4460.57	8.22	7.65	7.17	4490.57	26.38	25.66	24.74	26.13	26.39	26.24
4716.98	4686.98	8.33	7.74	7.31	4716.98	25.68	25.13	24.36	27.10	27.44	27.37
4830.19	4800.19	8.32	7.69	7.37	4830.19	25.32	25.10	24.40	27.72	28.06	28.14
4943.40	4913.40	8.40	7.82	7.48	4943.40	24.78	24.78	24.20	28.43	28.81	28.71
5000.00	4970.00	8.42	7.86	7.53	5000.00	24.89	24.98	24.40	28.89	29.27	29.18

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	max. DC output mV	DC offset mV
2000.00	4.28	3.49	2.91	4.57	3.54	3.40	1.55	1.49	2.00	2.36	2000.00	217.25	3.43
2169.81	4.32	3.45	2.87	3.95	3.36	3.41	3.30	1.49	2.00	2.35	2157.89	213.93	8.31
2396.23	4.21	3.33	2.79	3.56	3.13	3.38	5.50	1.49	2.00	2.36	2315.79	224.67	19.86
2622.64	3.65	3.05	2.64	2.80	2.57	2.91	7.80	1.49	2.00	2.35	2473.68	208.45	31.76
2735.85	3.26	2.80	2.46	2.42	2.40	2.82	10.00	1.50	2.00	2.36	2631.58	197.81	21.71
3000.00	2.93	2.45	2.13	1.97	2.30	2.90	20.00	1.49	2.00	2.35	2789.47	158.89	13.56
3188.68	2.93	2.49	2.19	1.84	2.32	2.98	40.00	1.49	2.00	2.34	2947.37	152.55	16.32
3245.28	2.86	2.41	2.13	1.83	2.33	3.00	60.00	1.48	1.99	2.33	3105.26	127.59	24.83
3358.49	2.87	2.42	2.12	1.78	2.31	2.95	80.00	1.48	1.97	2.33	3263.16	127.11	17.41
3528.30	2.72	2.32	2.06	1.79	2.38	3.11	100.00	1.47	1.96	2.30	3421.05	97.24	11.24
3584.91	2.84	2.40	2.17	1.75	2.29	2.96	150.00	1.45	1.92	2.25	3578.95	109.07	16.08
3754.72	2.89	2.44	2.17	1.77	2.31	2.98	244.40	1.38	1.81	2.13	3736.84	73.21	16.81
4000.00	3.05	2.58	2.31	1.95	2.47	3.17	338.90	1.29	1.68	1.97	3894.74	72.32	13.57
4207.55	3.40	2.84	2.61	2.33	2.79	3.47	433.30	1.19	1.53	1.80	4052.63	39.93	14.93
4264.15	3.50	2.99	2.67	2.28	2.63	3.07	527.80	1.12	1.37	1.61	4210.53	40.41	16.34
4490.57	3.64	3.16	2.80	2.78	3.06	3.71	622.20	1.12	1.23	1.44	4368.42	14.58	18.19
4716.98	3.76	3.13	2.70	2.85	2.91	3.33	716.70	1.19	1.10	1.28	4526.32	10.26	19.45
4830.19	3.77	3.11	2.70	3.30	3.18	3.54	811.10	1.30	1.03	1.14	4684.21	0.58	20.56
4943.40	3.57	2.90	2.53	4.16	3.79	4.06	905.60	1.42	1.14	1.05	4842.11	-8.76	20.91
5000.00	3.55	2.67	2.43	4.67	4.15	4.29	1000.00	1.54	1.26	1.12	5000.00	-19.75	20.97

ϕ detection

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-2000
ZFM-2000

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
100.000	130.000	8.09	7.88	7.75	100.000	64.43	63.45	62.54	48.08	46.41	45.11
200.000	230.000	7.62	7.16	6.86	200.000	60.82	60.41	59.67	43.64	40.82	38.84
267.650	237.647	7.90	7.37	7.03	267.650	58.02	58.33	57.88	41.46	38.59	36.54
435.290	405.294	8.54	7.73	7.27	435.290	52.16	51.41	51.14	36.86	34.21	32.30
500.000	470.000	8.54	7.83	7.35	500.000	53.94	52.88	52.24	36.19	33.31	31.53
602.940	572.941	8.44	7.78	7.34	602.940	52.69	52.63	52.35	34.91	32.54	30.83
714.710	684.706	8.40	7.91	7.61	714.710	53.94	54.29	53.52	32.49	30.27	28.90
770.590	740.588	8.42	8.02	7.75	770.590	54.82	54.64	53.30	32.22	30.10	28.76
938.240	908.235	8.01	7.66	7.50	938.240	72.62	60.17	56.80	31.93	29.50	27.72
994.120	964.118	7.85	7.51	7.34	994.120	72.58	59.11	54.41	31.68	29.33	27.52
1000.000	970.000	7.90	7.53	7.38	1000.000	70.20	59.12	54.02	31.65	29.29	27.40
1161.760	1131.765	7.91	7.40	7.25	1161.760	51.32	49.13	45.90	30.38	27.43	25.04
1273.530	1243.529	7.93	7.46	7.23	1273.530	47.56	43.70	40.67	29.58	26.26	23.74
1385.290	1355.294	8.11	7.55	7.33	1385.290	41.94	36.51	33.53	27.61	24.00	21.64
1441.180	1411.177	8.21	7.71	7.44	1441.180	37.98	34.04	31.73	29.52	26.34	24.11
1552.940	1522.941	8.34	7.73	7.39	1552.940	38.61	36.54	35.20	40.54	38.03	36.22
1720.590	1690.588	7.90	7.45	7.18	1720.590	41.45	42.35	42.11	38.58	34.48	32.05
1888.240	1858.235	7.87	7.47	7.22	1888.240	42.68	44.03	44.93	35.35	33.01	31.27
1944.120	1914.118	7.92	7.51	7.26	1944.120	42.70	43.94	44.77	34.30	32.64	31.00
2000.000	1970.000	7.92	7.54	7.30	2000.000	42.43	43.18	43.84	33.28	32.15	30.88

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
100.000	5.52	5.22	4.95	1.66	2.43	3.37	5.000	1.28	1.38	1.51	100.000	179.72	−0.20
199.750	5.59	5.25	4.80	1.66	2.36	3.22	10.000	1.77	1.85	1.99	200.000	215.16	−0.12
294.750	5.36	5.06	4.78	1.71	2.39	3.24	20.000	1.74	1.86	2.02	211.760	225.25	−0.17
442.000	4.78	4.59	4.36	1.79	2.43	3.24	50.000	1.48	1.60	1.75	379.410	235.89	0.14
537.000	4.47	4.34	4.17	1.81	2.42	3.20	60.780	1.45	1.57	1.72	500.000	243.13	−0.30
589.250	4.29	4.17	4.03	1.83	2.42	3.19	100.000	1.39	1.51	1.66	547.060	240.39	0.19
750.750	3.61	3.55	3.47	1.95	2.34	2.97	116.560	1.37	1.49	1.63	658.820	243.58	−0.43
879.000	3.21	3.13	3.03	2.10	2.34	2.87	172.340	1.31	1.43	1.56	714.710	251.26	0.30
997.750	2.72	2.55	2.46	2.18	2.24	2.66	200.000	1.27	1.39	1.52	882.350	250.69	−0.06
1026.250	2.69	2.52	2.41	2.18	2.22	2.61	228.130	1.24	1.36	1.49	994.120	259.69	0.26
1073.750	2.63	2.46	2.30	2.18	2.17	2.52	283.910	1.20	1.32	1.43	1050.000	250.35	0.49
1121.250	2.56	2.35	2.26	2.16	2.08	2.37	300.000	1.20	1.31	1.42	1161.760	267.63	1.44
1249.500	2.42	2.23	2.12	2.07	1.83	2.01	339.690	1.19	1.30	1.41	1273.530	266.21	1.25
1415.750	2.26	2.11	2.01	1.83	1.44	1.51	395.470	1.24	1.33	1.44	1385.290	270.37	−3.01
1501.250	2.13	1.99	1.89	1.71	1.29	1.39	451.250	1.35	1.43	1.54	1441.180	248.20	−0.77
1563.000	2.17	2.03	1.93	1.55	1.16	1.36	500.000	1.47	1.56	1.68	1552.940	260.26	4.92
1705.500	2.25	2.12	2.10	1.32	1.12	1.51	507.030	1.49	1.58	1.71	1720.590	235.06	2.01
1852.750	2.40	2.23	2.09	1.10	1.41	1.84	562.810	1.68	1.79	1.95	1888.240	226.68	0.92
1952.500	2.44	2.28	2.16	1.24	1.68	2.18	581.410	1.75	1.88	2.05	1944.120	249.76	0.51
2000.000	2.43	2.26	2.14	1.33	1.79	2.30	600.000	1.83	1.96	2.15	2000.000	225.49	−0.12

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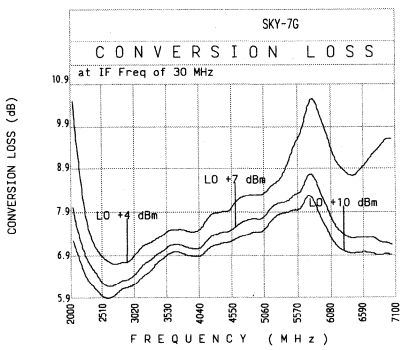
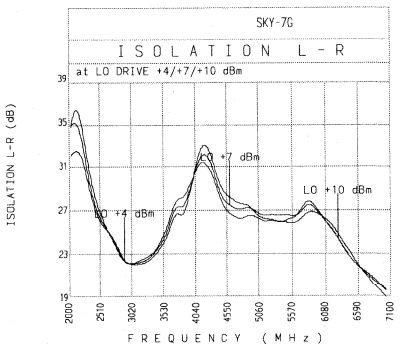
surface mount

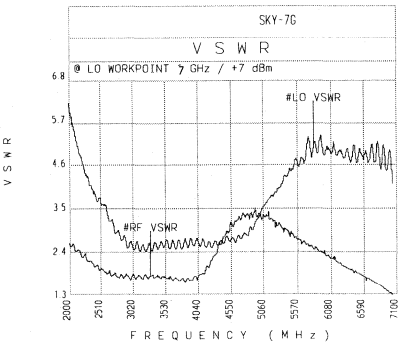
Frequency Mixers

Model SKY-7G

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
2000.00	2030.00	10.48	8.06	7.31	2000.00	34.86	34.92	32.24	10.67	14.09	17.85
2566.04	2596.04	6.82	6.24	5.96	2566.04	25.69	25.63	25.57	13.61	14.30	14.19
2849.06	2879.06	6.79	6.39	6.22	2849.06	22.61	22.59	22.68	12.60	12.59	12.22
3000.00	3030.00	7.04	6.57	6.34	3000.00	22.34	22.41	22.46	12.69	12.50	12.02
3320.75	3350.75	7.37	7.01	6.82	3320.75	23.02	23.29	23.36	13.46	12.87	12.31
3509.43	3539.43	7.56	7.20	7.02	3509.43	24.43	24.83	25.30	13.91	13.12	12.45
4000.00	4030.00	7.53	7.11	6.92	4000.00	31.31	30.95	30.84	19.08	17.74	16.92
4358.49	4388.49	7.97	7.50	7.25	4358.49	30.09	29.44	29.01	22.31	20.61	19.54
4452.83	4482.83	7.93	7.49	7.26	4452.83	28.95	28.13	27.58	23.04	21.25	20.13
4547.17	4517.17	8.17	7.60	7.32	4547.17	28.50	27.76	27.00	23.77	21.90	20.71
5000.00	4970.00	8.34	7.81	7.52	5000.00	26.75	27.00	26.59	28.19	26.15	24.89
5301.89	5271.89	8.78	8.17	7.93	5301.89	26.28	26.79	26.20	30.37	27.76	26.26
5584.91	5554.91	9.68	8.34	7.96	5584.91	26.11	26.68	26.59	31.43	28.42	26.35
5679.25	5649.25	10.32	8.80	8.38	5679.25	26.52	27.15	27.39	31.42	28.49	26.41
5773.59	5743.59	10.65	8.85	8.29	5773.59	27.12	27.89	28.24	31.42	28.51	26.42
6000.00	5970.00	9.68	8.03	7.54	6000.00	26.68	26.63	26.71	30.65	28.32	26.17
6245.28	6215.28	8.92	7.45	7.07	6245.28	25.19	24.75	24.71	30.34	28.56	26.66
6622.64	6592.64	9.07	7.37	7.04	6622.64	21.89	21.88	21.94	29.94	28.81	27.17
6811.32	6781.32	9.40	7.26	6.95	6811.32	20.39	20.79	21.01	30.49	29.46	27.82
7000.00	6970.00	9.62	7.21	6.97	7000.00	19.29	19.91	19.98	31.29	30.33	28.56

mixer VSWR

FREQ. MHz	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. MHz	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
2000.00	3.24	2.69	2.43	7.95	6.20	6.13	1.55	1.38	1.09	1.33
2566.04	2.32	1.98	1.85	3.28	3.67	4.18	3.30	1.38	1.09	1.33
2849.06	2.01	1.85	1.70	2.23	2.81	3.46	5.50	1.38	1.09	1.33
3000.00	1.99	1.89	1.81	1.97	2.56	3.18	7.80	1.39	1.09	1.33
3320.75	2.01	1.87	1.70	1.92	2.58	3.21	10.00	1.39	1.09	1.33
3509.43	2.01	1.84	1.66	2.01	2.69	3.34	12.00	1.39	1.09	1.33
4000.00	2.05	1.80	1.63	2.32	2.80	3.39	34.00	1.38	1.10	1.34
4358.49	3.10	2.69	2.42	2.38	2.70	3.14	56.00	1.39	1.10	1.34
4452.83	3.35	2.91	2.63	2.44	2.80	3.25	78.00	1.40	1.10	1.33
4547.17	3.62	3.18	2.89	2.48	2.80	3.27	100.00	1.41	1.12	1.33
5000.00	3.85	3.36	3.07	3.56	3.38	3.50	200.00	1.48	1.18	1.35
5301.89	3.62	3.16	2.86	4.43	4.09	4.01	288.90	1.57	1.25	1.37
5584.91	3.28	2.78	2.49	5.81	4.59	4.26	377.80	1.66	1.33	1.41
5679.25	3.18	2.71	2.42	6.02	4.65	4.33	466.70	1.75	1.41	1.45
5773.58	3.09	2.62	2.32	7.16	5.02	4.30	555.60	1.81	1.46	1.48
6000.00	2.85	2.42	2.10	7.39	4.94	4.16	644.40	1.85	1.48	1.49
6245.28	2.59	2.16	1.90	8.05	5.04	3.84	733.30	1.85	1.49	1.50
6622.64	2.19	1.83	1.62	7.42	4.95	3.46	822.20	1.84	1.48	1.49
6811.32	1.94	1.64	1.47	7.64	5.24	3.31	911.10	1.79	1.44	1.47
7002.20	1.63	1.43	1.28	7.97	5.06	2.96	1000.00	1.74	1.39	1.45

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
2000.00	193.22	-3.87
2263.16	208.20	9.32
2526.32	227.08	29.81
2789.47	182.42	18.90
3052.63	169.33	23.63
3315.79	152.59	22.04
3578.95	154.23	18.21
3842.11	107.93	16.69
4105.26	106.28	15.70
4368.42	50.35	17.82
4631.58	51.06	19.66
4894.74	15.88	21.43
5157.89	2.53	21.75
5421.05	-1.75	20.64
5684.21	-21.94	21.88
5947.37	-21.80	26.23
6210.53	-36.06	27.44
6473.68	4.84	27.70
6736.84	-33.80	24.34
7000.00	-12.73	17.81

most economical

Frequency Mixers

Models
SBL-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	6.99	6.67	6.45	62.73	>67.00	68.01	61.88	65.61	>70.00
2.000	32.00	6.50	6.24	6.05	61.86	>67.00	67.46	61.93	>67.00	>70.00
5.000	35.00	5.96	5.74	5.60	61.73	64.84	66.12	62.43	>67.00	>70.00
10.000	40.00	5.85	5.58	5.46	61.35	64.19	65.15	61.72	64.81	66.04
20.000	50.00	5.96	5.67	5.51	60.14	62.22	62.01	60.33	61.69	61.30
32.188	62.19	5.86	5.60	5.51	58.85	59.04	58.99	58.27	57.74	57.09
50.000	80.00	5.84	5.60	5.49	56.98	56.71	55.75	54.84	54.39	53.61
78.970	48.97	5.83	5.56	5.44	54.05	52.21	50.75	51.16	49.67	48.53
100.000	70.00	5.74	5.52	5.43	51.39	49.41	48.33	48.54	46.90	46.10
156.940	126.94	5.69	5.53	5.47	45.18	44.20	43.99	42.22	41.66	41.56
200.000	170.00	5.85	5.68	5.60	41.88	41.56	41.75	39.00	38.98	39.65
203.720	173.72	5.83	5.67	5.56	41.46	41.05	41.34	38.60	38.52	39.23
250.500	220.50	5.80	5.63	5.47	40.14	40.04	40.21	37.21	37.29	37.77
297.290	267.29	5.77	5.61	5.48	36.89	36.90	37.90	33.86	33.97	34.98
344.070	314.07	5.93	5.81	5.72	36.80	37.11	37.44	33.43	33.88	34.36
375.260	345.26	6.28	6.13	5.97	34.83	36.02	37.25	31.69	32.79	34.20
406.440	376.44	6.27	6.15	6.07	33.09	34.80	36.66	29.68	31.05	32.79
437.630	407.63	6.38	6.08	5.88	32.48	33.79	35.38	29.38	30.39	31.81
468.820	438.82	6.48	6.00	5.73	32.24	32.80	34.05	29.76	30.12	30.96
500.000	470.00	6.90	6.31	5.99	32.48	32.36	33.04	30.19	30.37	30.65

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
1.001	1.83	1.80	1.86	2.45	3.75	5.47	1.67	1.44	1.30
16.121	1.07	1.14	1.20	1.92	2.81	3.95	1.68	1.45	1.31
20.000	1.06	1.14	1.20	1.94	2.89	3.95	1.68	1.44	1.31
31.242	1.06	1.14	1.20	1.93	2.83	3.88	1.68	1.44	1.32
50.000	1.07	1.15	1.20	1.83	2.69	3.54	1.69	1.46	1.33
76.605	1.08	1.16	1.21	1.84	2.72	3.70	1.71	1.48	1.36
100.000	1.09	1.17	1.22	1.82	2.62	3.38	1.74	1.52	1.39
121.970	1.11	1.18	1.24	1.82	2.62	3.53	1.79	1.55	1.42
152.210	1.13	1.20	1.25	1.88	2.66	3.42	1.85	1.62	1.50
182.450	1.15	1.22	1.27	1.83	2.62	3.21	1.93	1.69	1.57
200.000	1.12	1.26	1.27	1.87	2.58	3.22	1.98	1.77	1.62
242.940	1.19	1.26	1.32	1.89	2.56	3.19	2.11	1.88	1.74
273.180	1.21	1.28	1.34	1.90	2.59	3.17	2.21	1.99	1.86
318.540	1.23	1.30	1.35	1.99	2.64	3.25	2.35	2.11	1.95
348.780	1.24	1.31	1.36	2.01	2.59	3.18	2.38	2.15	2.03
379.030	1.24	1.30	1.34	2.03	2.60	3.15	2.45	2.24	2.09
409.270	1.23	1.28	1.32	2.12	2.72	3.19	2.46	2.24	2.11
424.390	1.21	1.27	1.31	2.20	2.77	3.27	2.50	2.30	2.16
454.630	1.19	1.24	1.28	2.30	2.82	3.34	2.46	2.32	2.14
500.000	1.16	1.21	1.25	2.40	3.01	3.54	2.43	2.23	2.12

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
10.000	−233.19	+0.00
20.000	−230.80	−.01
38.000	−225.55	+0.00
50.000	−225.92	+0.00
66.000	−226.43	+0.00
80.000	−230.22	+.01
100.000	−231.28	+.03
136.000	−229.89	+.08
178.000	−223.93	+.17
200.000	−223.43	+.15
234.000	−223.86	+.23
262.000	−229.61	+.25
304.000	−218.66	+.32
360.000	−194.91	+.72
402.000	−179.58	+.97
444.000	−163.75	+.88
458.000	−160.12	+.78
472.000	−155.46	+.60
486.000	−150.45	+.39
500.000	−142.53	+.23

Measurements at RF & LO Power +7 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
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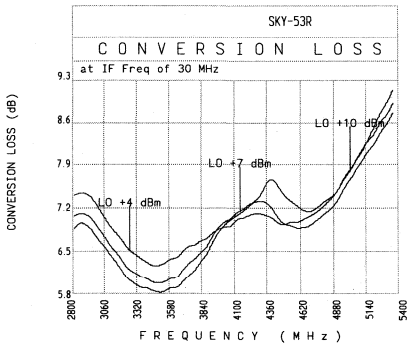
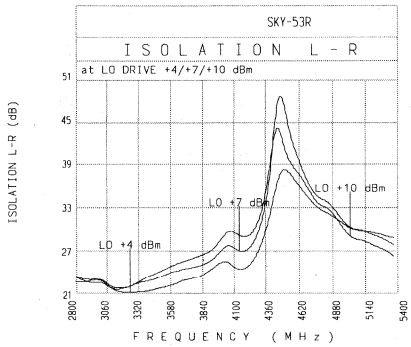
surface mount

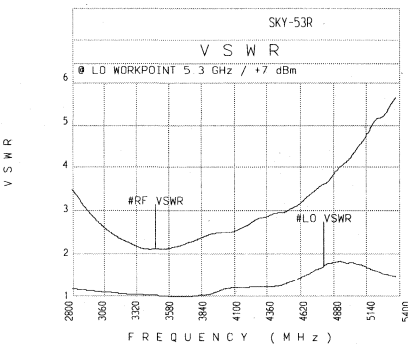
Frequency Mixers

Model SKY-53R

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
2800.00	2830.00	7.45	7.12	6.92	2800.00	24.06	24.10	23.41	15.08	13.93	12.38
3000.00	3030.00	7.22	6.88	6.69	3000.00	23.28	23.72	23.60	13.03	12.62	11.57
3224.53	3254.53	6.57	6.25	6.09	3224.53	21.86	22.60	22.60	11.91	12.04	11.39
3413.21	3443.21	6.32	6.05	5.92	3413.21	22.22	23.59	24.32	11.18	11.70	11.40
3601.89	3631.89	6.44	6.11	5.95	3601.89	23.09	24.83	25.86	10.46	11.20	11.26
3649.06	3679.06	6.54	6.24	6.06	3649.06	23.55	25.07	26.15	10.43	11.15	11.25
3837.74	3867.74	6.75	6.61	6.49	3837.74	24.62	25.95	27.28	10.85	11.67	11.73
4000.00	4030.00	6.96	7.06	7.03	4000.00	26.27	28.37	30.17	11.57	12.70	13.03
4120.75	4090.75	7.08	7.21	7.18	4120.75	24.93	27.42	29.57	12.42	13.45	14.11
4215.09	4185.09	7.16	7.34	7.35	4215.09	26.21	28.53	30.12	12.89	14.01	14.80
4356.60	4326.60	7.09	7.24	7.74	4356.60	33.23	38.78	40.58	13.37	14.50	15.46
4498.11	4468.11	7.04	6.98	7.36	4498.11	38.32	43.80	39.79	13.81	14.97	16.01
4639.62	4609.62	7.11	6.95	7.18	4639.62	34.98	37.01	36.22	14.85	16.09	17.24
4781.13	4751.13	7.33	7.19	7.38	4781.13	32.89	34.53	33.69	16.42	17.74	18.92
4828.30	4798.30	7.41	7.25	7.42	4828.30	32.44	33.70	32.88	16.91	18.20	19.48
5000.00	4970.00	7.97	7.82	7.97	5000.00	30.51	30.61	29.29	19.16	20.43	21.83
5111.32	5081.32	8.36	8.17	8.34	5111.32	30.26	30.10	28.70	20.31	21.61	22.98
5158.49	5128.49	8.55	8.26	8.42	5158.49	30.09	29.73	28.30	20.78	22.08	23.47
5252.83	5222.83	8.92	8.57	8.71	5252.83	29.60	28.98	27.56	21.57	22.89	24.21
5300.00	5270.00	9.13	8.76	8.92	5300.00	29.48	28.50	26.95	22.00	23.26	24.50

mixer VSWR

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	max. DC output mV	DC offset mV
2800.00	3.77	3.53	3.39	1.63	1.24	1.42	1.55	1.46	1.26	1.10	2800.00	214.26	-4.49
3000.00	2.83	2.79	2.83	1.50	1.18	1.39	3.30	1.46	1.26	1.10	2931.58	185.68	-1.78
3224.53	2.15	2.34	2.45	1.44	1.12	1.37	5.50	1.46	1.26	1.10	3063.16	183.12	-6.74
3413.21	1.93	2.15	2.39	1.39	1.09	1.36	7.80	1.47	1.26	1.10	3194.74	165.08	-15.27
3601.89	1.91	2.21	2.47	1.29	1.06	1.39	10.00	1.47	1.26	1.10	3326.32	164.04	-17.99
3649.06	1.93	2.24	2.50	1.26	1.06	1.42	12.00	1.47	1.26	1.10	3457.89	157.60	1.03
3837.74	2.14	2.46	2.74	1.22	1.10	1.43	34.00	1.46	1.26	1.11	3589.47	157.73	-5.33
4000.00	2.26	2.55	2.81	1.39	1.25	1.45	56.00	1.47	1.27	1.11	3721.05	144.67	-8.70
4120.75	2.36	2.66	2.91	1.45	1.28	1.44	78.00	1.48	1.28	1.12	3852.63	140.10	-7.82
4215.09	2.50	2.82	3.06	1.50	1.29	1.44	100.00	1.49	1.29	1.14	3984.21	149.53	-0.54
4356.60	2.68	2.97	3.24	1.51	1.28	1.45	150.00	1.51	1.31	1.18	4115.79	127.72	-7.20
4498.11	2.83	3.09	3.27	1.64	1.41	1.60	188.90	1.52	1.34	1.22	4247.37	85.26	-13.62
4639.62	3.13	3.40	3.62	1.81	1.58	1.72	227.80	1.55	1.37	1.24	4378.95	66.03	-5.33
4781.13	3.60	3.65	3.89	2.34	1.86	1.87	266.70	1.58	1.40	1.28	4510.53	94.73	-1.82
4828.30	3.61	3.87	4.08	2.34	1.83	1.81	305.60	1.61	1.44	1.32	4642.11	72.30	-6.98
5000.00	4.21	4.43	4.62	2.47	1.82	1.61	344.40	1.63	1.46	1.34	4773.68	34.07	-9.93
5111.32	4.72	4.90	5.07	2.28	1.69	1.48	383.30	1.66	1.50	1.39	4905.26	37.09	-10.08
5158.49	4.97	5.18	5.30	2.30	1.67	1.46	422.20	1.69	1.53	1.42	5036.84	56.26	-10.09
5252.83	5.28	5.41	5.51	2.17	1.57	1.42	461.10	1.73	1.57	1.45	5168.42	16.46	-10.65
5300.00	5.68	5.62	5.70	2.06	1.53	1.42	500.00	1.75	1.59	1.48	5300.00	-12.50	-10.49

ϕdetection

most economical

Frequency Mixers

Models
SBL-1X

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
10.000	40.00	6.29	5.91	5.70	50.68	52.58	54.27	55.71	57.65	58.94
20.000	50.00	6.55	6.07	5.85	50.33	51.57	52.78	55.05	56.10	56.31
50.000	80.00	6.34	5.97	5.76	48.45	48.88	48.88	51.91	51.40	50.84
100.000	70.00	6.32	6.02	5.79	45.57	44.82	44.29	47.39	46.42	45.36
160.320	130.32	6.46	6.05	5.84	42.61	42.05	41.40	43.63	42.49	41.59
200.000	170.00	6.59	6.14	5.89	41.43	40.99	39.98	41.84	40.75	39.77
253.500	223.50	6.71	6.19	5.95	40.54	40.18	38.99	40.75	39.56	38.54
315.630	285.63	6.66	6.25	6.01	39.31	38.29	37.09	39.48	37.94	37.02
377.760	347.76	6.83	6.34	6.11	36.67	35.80	35.11	38.56	36.81	35.91
439.880	409.88	6.97	6.56	6.34	34.91	33.93	33.09	37.98	35.80	34.50
500.000	470.00	6.99	6.55	6.31	32.30	31.47	30.75	37.04	35.23	34.36
564.130	534.13	6.57	6.24	6.01	30.82	30.58	30.10	34.75	33.53	33.09
626.260	596.26	6.26	5.86	5.67	29.12	29.34	29.13	35.60	34.86	33.59
657.320	627.32	6.35	5.95	5.71	29.01	29.13	29.15	36.32	35.78	34.99
719.450	689.45	6.31	5.84	5.60	28.83	28.51	28.62	35.42	35.11	35.80
781.580	751.58	6.26	5.77	5.51	28.12	28.01	27.67	35.25	34.75	34.77
812.640	782.64	6.43	5.92	5.59	27.51	27.68	27.45	34.28	33.85	33.92
874.760	844.76	6.30	5.87	5.58	26.96	27.52	27.88	32.62	32.09	32.28
936.890	906.89	6.25	5.87	5.63	26.56	27.40	28.21	30.70	30.31	30.84
1000.000	970.00	6.33	6.04	5.90	26.20	27.28	28.39	30.15	30.12	30.53

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
10.000	1.11	1.11	1.16	1.68	2.50	3.70	2.06	1.70	1.49
20.000	1.06	1.07	1.14	1.76	2.58	3.78	2.04	1.68	1.48
38.167	1.03	1.07	1.15	1.64	2.46	3.62	2.03	1.73	1.49
50.000	1.03	1.08	1.16	1.64	2.54	3.63	2.06	1.74	1.50
100.000	1.02	1.10	1.18	1.64	2.40	3.40	2.11	1.77	1.54
137.670	1.02	1.12	1.20	1.61	2.34	3.24	2.12	1.82	1.60
200.000	1.06	1.16	1.25	1.57	2.31	3.11	2.24	1.96	1.73
270.340	1.11	1.23	1.31	1.65	2.35	3.18	2.44	2.14	1.92
336.670	1.17	1.29	1.37	1.73	2.38	3.22	2.55	2.31	2.09
403.000	1.22	1.34	1.42	1.78	2.48	3.24	2.71	2.41	2.20
469.340	1.26	1.37	1.44	1.88	2.51	3.16	2.77	2.49	2.29
500.000	1.26	1.36	1.44	1.97	2.60	3.24	2.80	2.52	2.31
568.840	1.25	1.33	1.39	2.01	2.65	3.29	2.78	2.48	2.25
635.170	1.21	1.27	1.35	2.08	2.64	3.23	2.68	2.37	2.18
701.510	1.23	1.27	1.36	2.25	2.84	3.35	2.57	2.31	2.08
767.840	1.38	1.40	1.47	2.39	3.02	3.53	2.52	2.22	1.98
800.000	1.51	1.51	1.56	2.51	3.03	3.56	2.46	2.17	1.94
867.340	1.91	1.88	1.90	2.57	3.15	3.62	2.42	2.09	1.84
900.510	2.14	2.10	2.11	2.61	3.11	3.60	2.36	2.02	1.77
1000.000	2.99	2.89	2.87	2.68	3.07	3.50	2.24	1.95	1.71

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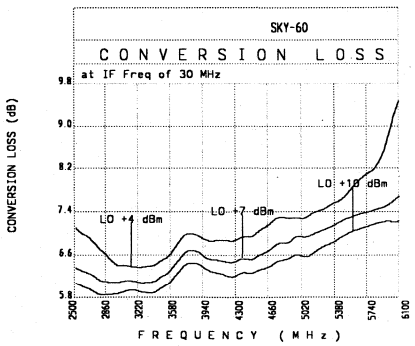
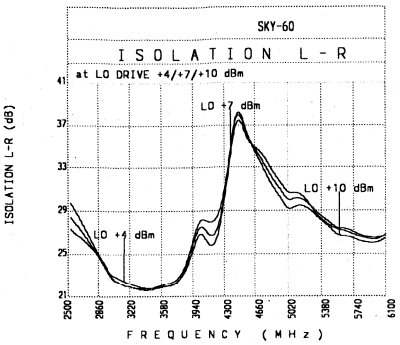
urface mount

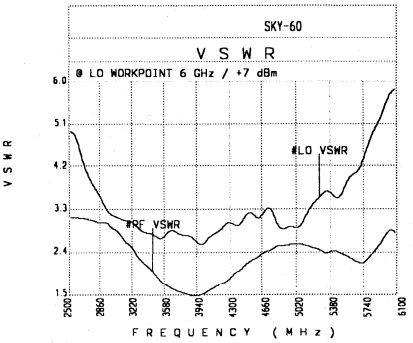
Frequency Mixers

Model SKY-60

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

		Conversion Loss (dB)				Isolation L-R (dB)			Isolation L-I (dB)		
RF MHz	LO MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
2500.00	2530.00	7.13	6.39	6.10	2500.00	29.94	28.60	27.51	14.43	17.65	19.20
2698.11	2728.11	6.85	6.24	5.94	2698.11	27.04	26.41	26.02	15.20	16.56	16.57
2896.23	2926.23	6.50	6.11	5.88	2896.23	23.83	23.87	24.18	14.45	14.61	14.46
3000.00	3030.00	6.44	6.13	5.92	3000.00	23.01	22.62	22.68	14.00	13.96	13.55
3292.45	3322.45	6.42	6.12	5.91	3292.45	21.99	21.77	21.86	13.22	12.75	12.16
3490.57	3520.57	6.56	6.26	6.05	3490.57	21.94	22.01	22.14	12.75	12.06	11.37
3688.68	3718.68	7.03	6.70	6.46	3688.68	22.37	22.43	22.66	12.54	11.80	11.05
3886.79	3916.79	6.91	6.59	6.39	3886.79	26.01	26.67	27.02	12.81	12.03	11.33
3952.83	3982.83	6.88	6.54	6.32	3952.83	27.40	27.93	28.51	13.41	12.54	11.77
4000.00	4030.00	6.89	6.54	6.30	4000.00	26.64	27.51	28.32	14.16	13.08	12.23
4283.02	4253.02	6.95	6.56	6.30	4283.02	32.98	33.35	33.47	16.85	15.58	14.76
4547.17	4517.17	7.14	6.66	6.37	4547.17	35.28	35.36	35.18	18.99	17.59	16.42
4811.32	4781.32	7.29	6.83	6.55	4811.32	32.32	31.67	30.97	21.56	19.88	18.78
4943.40	4913.40	7.29	6.96	6.61	4943.40	30.72	30.01	29.17	22.97	21.24	20.06
5000.00	4970.00	7.32	6.95	6.57	5000.00	30.88	30.27	29.47	23.61	21.94	20.83
5273.58	5243.58	7.58	7.16	6.84	5273.58	28.60	28.84	28.44	26.74	24.64	23.40
5537.74	5507.74	7.97	7.37	7.09	5537.74	27.34	27.52	26.83	30.27	27.13	25.33
5801.89	5771.89	8.43	7.51	7.27	5801.89	26.58	26.80	26.16	33.56	29.17	26.76
5867.92	5837.92	8.64	7.52	7.26	5867.92	26.44	26.60	26.10	34.65	29.78	27.11
6000.00	5970.00	9.49	7.71	7.25	6000.00	26.94	26.91	26.62	35.62	30.39	27.75

mixer VSWR

ϕ detection

	VSWR RF port			VSWR LO port			VSWR IF port						
FREQ. MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	max. DC output mV	DC offset mV
2500.00	4.18	3.17	2.69	5.51	4.99	6.07	2.17	1.54	1.03	1.28	2500.00	215.74	17.43
2698.11	4.22	3.12	2.60	3.76	4.03	4.67	13.30	1.56	1.02	1.28	2684.21	218.08	26.74
2896.23	4.15	3.10	2.56	2.95	3.30	4.06	25.50	1.56	1.03	1.27	2868.42	202.91	21.94
3000.00	3.85	2.94	2.47	2.63	3.18	3.93	37.80	1.56	1.04	1.27	3052.63	186.56	20.91
3292.45	2.82	2.22	1.94	2.22	2.85	3.67	50.00	1.57	1.04	1.27	3236.84	164.66	37.44
3490.57	2.26	1.80	1.59	2.09	2.67	3.33	70.00	1.57	1.05	1.28	3421.05	170.21	32.01
3688.68	1.98	1.59	1.41	2.22	2.80	3.48	177.50	1.58	1.12	1.29	3605.26	162.11	25.81
3886.79	1.87	1.50	1.41	2.08	2.61	3.20	285.00	1.60	1.19	1.32	3789.47	161.74	30.91
3952.83	1.90	1.54	1.41	2.06	2.57	3.15	392.50	1.64	1.23	1.35	3973.68	144.10	16.17
4000.00	1.95	1.61	1.49	2.20	2.74	3.35	500.00	1.70	1.23	1.34	4157.89	118.98	16.60
4283.02	2.39	2.00	1.88	2.58	3.01	3.56	600.00	1.73	1.21	1.30	4342.11	114.22	18.41
4547.17	2.86	2.32	2.13	2.86	3.07	3.42	700.00	1.71	1.17	1.25	4526.32	118.45	12.94
4811.32	3.22	2.56	2.29	2.77	2.88	3.28	800.00	1.72	1.13	1.19	4710.53	104.52	16.15
4943.40	3.33	2.59	2.30	2.80	2.94	3.45	900.00	1.77	1.11	1.13	4894.74	52.34	19.19
5000.00	3.36	2.60	2.32	2.84	2.95	3.43	1000.00	1.79	1.11	1.09	5078.95	34.47	18.67
5273.58	3.06	2.37	2.10	4.15	3.75	4.01	1100.00	1.78	1.13	1.09	5263.16	44.64	21.67
5537.74	3.03	2.29	2.05	4.88	4.09	4.21	1200.00	1.76	1.16	1.11	5447.37	36.61	22.63
5801.89	3.29	2.45	2.16	6.83	5.12	4.88	1300.00	1.74	1.19	1.13	5631.58	19.84	24.36
5867.92	3.57	2.66	2.34	7.05	5.33	4.87	1400.00	1.74	1.22	1.14	5815.79	-3.36	25.33
6000.00	3.84	2.85	2.39	8.39	5.87	5.20	1500.00	1.72	1.22	1.13	6000.00	-3.13	26.10

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

SAM-2
SYM-2
TFM-2P*
TSM-2
TFM-2
ZEM-2B
ZFM-2
ZLW-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	7.65	7.23	7.05	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
2.000	32.00	6.99	6.50	6.38	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
5.000	35.00	6.14	5.80	5.68	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
10.000	40.00	6.01	5.62	5.47	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
20.000	50.00	6.10	5.68	5.51	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
50.000	80.00	5.94	5.58	5.44	>64.00	61.94	60.30	>64.00	63.74	61.51
100.000	70.00	5.88	5.53	5.39	56.03	54.33	53.23	55.98	54.76	53.55
167.340	137.34	5.89	5.57	5.44	50.05	48.65	48.08	48.75	47.61	47.01
233.870	203.87	6.02	5.72	5.54	46.08	45.10	44.88	43.82	43.03	43.10
300.400	270.40	5.74	5.45	5.37	43.14	42.56	42.56	40.29	40.00	40.23
366.940	336.94	6.01	5.73	5.58	40.77	40.45	40.57	37.73	37.57	38.18
466.740	436.74	6.15	5.82	5.66	38.41	38.33	38.72	33.78	34.32	35.36
500.000	470.00	6.05	5.72	5.56	38.98	38.80	39.09	33.83	34.10	34.86
599.810	569.81	6.34	6.02	5.78	38.50	37.43	36.87	32.71	32.81	32.88
666.340	636.34	6.54	6.11	5.88	38.54	37.94	37.43	31.60	31.57	31.51
799.410	769.41	7.07	6.27	5.92	35.96	36.06	36.24	29.94	29.67	29.67
832.680	802.68	7.29	6.46	6.03	35.29	35.22	35.39	28.80	28.79	28.42
899.210	869.21	7.77	7.00	6.39	34.14	33.77	33.77	26.59	26.14	25.92
932.480	902.48	8.11	7.37	6.84	33.72	33.17	33.14	25.85	25.03	24.52
1000.000	969.00	8.20	7.63	7.18	33.25	32.49	32.14	24.75	23.59	22.58

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.26	1.30	1.34	1.77	2.70	4.33	1.43	1.24	1.09
10.000	1.12	1.15	1.20	1.71	2.63	3.91	1.44	1.25	1.10
20.000	1.04	1.07	1.15	1.76	2.77	3.95	1.43	1.25	1.10
50.000	1.02	1.06	1.15	1.69	2.55	3.74	1.44	1.25	1.11
100.000	1.06	1.07	1.14	1.63	2.41	3.37	1.45	1.27	1.13
155.760	1.09	1.09	1.14	1.61	2.37	3.24	1.49	1.31	1.18
200.000	1.12	1.11	1.14	1.54	2.29	3.18	1.54	1.36	1.23
306.520	1.18	1.16	1.16	1.53	2.20	2.95	1.66	1.48	1.35
366.820	1.21	1.18	1.17	1.52	2.16	2.89	1.75	1.57	1.44
427.130	1.23	1.20	1.18	1.52	2.13	2.83	1.84	1.66	1.53
500.000	1.26	1.22	1.21	1.55	2.06	2.74	1.97	1.77	1.66
547.740	1.28	1.23	1.22	1.53	2.13	2.70	2.04	1.88	1.78
608.040	1.30	1.26	1.24	1.50	2.09	2.65	2.02	1.87	1.77
668.340	1.34	1.29	1.27	1.51	2.09	2.65	2.07	1.90	1.81
728.650	1.38	1.34	1.32	1.56	2.04	2.69	2.08	1.91	1.83
788.950	1.44	1.40	1.38	1.61	2.13	2.69	2.07	1.91	1.82
849.260	1.51	1.47	1.46	1.63	2.19	2.70	2.02	1.86	1.77
909.560	1.58	1.55	1.54	1.67	2.24	2.78	1.93	1.77	1.68
969.860	1.68	1.66	1.66	1.74	2.28	2.85	1.81	1.66	1.57
1000.000	1.75	1.72	1.72	1.77	2.30	2.89	1.74	1.60	1.51

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
1.000	−230.07	+.09
2.000	−234.86	+.09
5.000	−240.18	+.08
20.000	−240.24	+.09
50.000	−236.50	+.09
100.000	−238.59	+.08
161.970	−242.90	+.06
200.000	−243.36	+.02
290.750	−246.83	+.11
322.940	−237.61	+.11
387.330	−224.03	+.01
451.720	−223.29	+.22
500.000	−229.56	+.23
580.490	−229.04	+.37
644.880	−207.44	+.48
709.270	−196.52	+1.06
773.660	−188.54	+.83
838.040	−187.28	+.49
902.430	−173.88	+.72
934.630	−171.49	+.76
1000.000	−178.52	+.64

Measurements at RF & LO Power +7 dBm
*PHASE POSITIVE

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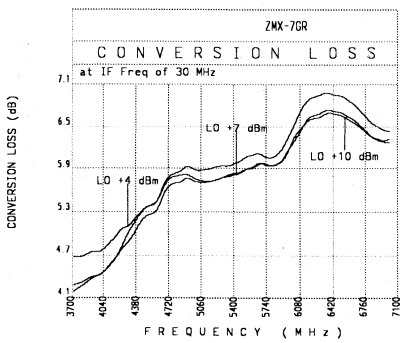
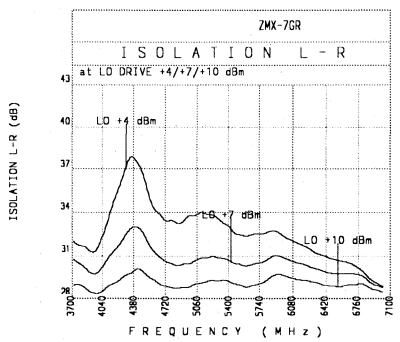
coaxial

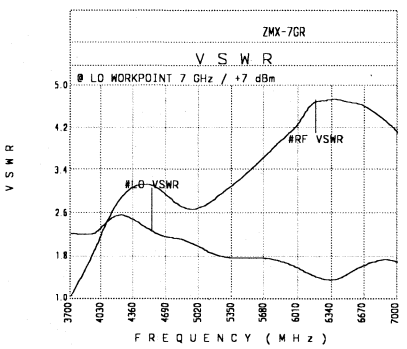
Frequency Mixers

Model
ZMX-7GR

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
3700.00	3730.00	4.64	4.25	4.16	3700.00	31.78	30.50	28.69	27.04	25.89	24.95
3949.06	3979.06	4.71	4.38	4.38	3949.06	31.01	29.45	28.07	28.09	27.95	27.52
4000.00	4030.00	4.72	4.40	4.41	4000.00	31.89	29.82	28.13	28.34	28.13	27.76
4198.11	4228.11	5.05	4.74	4.75	4198.11	35.56	31.47	29.00	29.45	29.71	29.84
4447.17	4477.17	5.33	5.21	5.33	4447.17	36.78	32.54	29.72	30.04	31.21	32.03
4633.96	4663.96	5.66	5.53	5.62	4633.96	33.75	30.64	28.70	30.55	31.84	32.99
4820.75	4850.75	5.84	5.68	5.79	4820.75	32.95	30.03	28.43	31.35	32.73	34.03
5000.00	4970.00	5.85	5.69	5.72	5000.00	33.42	30.38	28.82	32.49	33.91	35.00
5194.34	5164.34	5.91	5.73	5.72	5194.34	33.68	30.78	29.10	33.79	34.92	35.78
5443.40	5413.40	5.98	5.81	5.82	5443.40	32.26	30.19	28.76	34.57	35.19	35.87
5692.45	5662.45	6.06	5.95	5.98	5692.45	32.38	30.25	28.77	35.34	35.33	35.55
5879.25	5849.25	6.15	5.99	5.98	5879.25	32.58	30.83	29.49	35.60	35.33	35.09
6000.00	5970.00	6.49	6.26	6.33	6000.00	32.00	30.52	29.31	35.74	35.10	34.76
6128.30	6098.30	6.83	6.57	6.55	6128.30	31.60	30.24	29.08	35.62	34.77	34.22
6252.83	6222.83	6.91	6.64	6.59	6252.83	31.16	29.94	28.95	35.20	34.14	33.51
6377.36	6347.36	6.95	6.72	6.68	6377.36	30.82	29.71	28.71	34.71	33.58	32.75
6501.89	6471.89	6.92	6.68	6.64	6501.89	30.51	29.55	28.64	34.04	32.81	32.01
6626.42	6596.42	6.80	6.58	6.54	6626.42	30.34	29.56	28.76	33.05	32.09	31.34
6875.47	6845.47	6.48	6.29	6.31	6875.47	29.08	28.82	28.40	31.31	30.49	29.80
7000.00	6970.00	6.41	6.26	6.30	7000.00	28.62	28.55	28.22	30.57	29.90	29.49

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	VSWR LO port LO + 4 dBm	LO +7 dBm	LO + 10 dBm	FREQ. MHz	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO + 10 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	1.18	1.09	1.26	2.28	1.23	1.31	0.03	1.56	1.87	2.16	3700.00	178.58	-3.39
3949.06	2.00	1.94	1.96	2.24	1.29	1.17	2.50	1.55	1.86	2.14	3873.68	159.45	-4.99
4000.00	2.26	2.21	2.20	2.37	1.34	1.18	5.00	1.55	1.86	2.14	4047.37	148.17	-5.11
4198.11	2.92	3.01	3.06	2.73	1.41	1.20	7.50	1.55	1.86	2.14	4221.05	168.27	-4.99
4447.17	3.05	3.28	3.45	2.41	1.35	1.26	10.00	1.55	1.86	2.14	4394.74	147.65	-7.67
4633.96	2.90	3.09	3.29	2.20	1.27	1.31	20.00	1.55	1.85	2.13	4568.42	149.47	-7.08
4820.75	2.67	2.74	2.91	2.20	1.28	1.37	40.00	1.54	1.85	2.13	4742.11	152.17	-6.18
5000.00	2.78	2.70	2.69	2.04	1.20	1.42	60.00	1.54	1.84	2.12	4915.79	123.07	-5.78
5194.34	3.19	2.98	2.87	1.83	1.15	1.44	80.00	1.54	1.84	2.11	5089.47	122.65	-6.42
5443.40	3.61	3.32	3.16	1.81	1.09	1.49	100.00	1.53	1.83	2.10	5263.16	131.46	-8.11
5692.45	4.05	3.76	3.55	1.83	1.13	1.50	200.00	1.52	1.80	2.06	5436.84	84.25	-8.04
5879.25	4.44	4.12	3.88	1.74	1.16	1.56	288.90	1.50	1.79	2.03	5610.53	98.24	-8.58
6000.00	4.68	4.29	4.06	1.64	1.16	1.62	377.80	1.50	1.78	2.02	5784.21	90.55	-7.98
6128.30	4.91	4.77	4.33	1.51	1.12	1.69	466.70	1.49	1.77	2.00	5957.89	65.88	-8.99
6252.83	5.18	4.76	4.47	1.42	1.13	1.67	555.60	1.48	1.75	1.99	6131.58	64.45	-11.05
6377.36	5.22	4.82	4.48	1.40	1.18	1.65	644.40	1.46	1.73	1.97	6305.26	46.45	-12.06
6501.89	5.18	4.73	4.42	1.52	1.20	1.61	733.30	1.44	1.70	1.94	6478.95	50.23	-12.57
6626.42	5.12	4.74	4.38	1.67	1.19	1.51	822.20	1.40	1.66	1.89	6652.63	39.85	-13.71
6875.47	4.88	4.41	4.09	1.83	1.07	1.41	911.10	1.35	1.60	1.83	6826.32	1.89	-15.31
7000.00	4.59	4.17	3.85	1.74	1.13	1.56	1000.00	1.29	1.53	1.75	7000.00	16.83	-15.49

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

TFM-3
ZFM-3
LMX-3

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.040	30.04	6.45	6.15	6.01	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.050	30.05	5.82	5.52	5.36	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.070	30.07	5.44	5.12	4.99	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.100	30.10	5.30	4.92	4.76	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.500	30.50	5.10	4.77	4.60	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
1.000	31.00	5.07	4.76	4.59	>64.00	>67.00	>70.00	62.64	63.53	>70.00
5.000	35.00	4.91	4.75	4.56	>64.00	>67.00	>70.00	59.16	60.91	64.41
10.000	40.00	4.87	4.75	4.56	>64.00	>67.00	>70.00	58.46	60.97	63.86
20.000	50.00	4.98	4.74	4.60	>64.00	>67.00	63.79	57.26	58.52	60.41
60.871	90.87	4.87	4.73	4.60	51.05	50.40	50.16	49.67	49.37	49.56
100.000	70.00	4.76	4.63	4.51	44.79	44.80	44.88	43.57	44.05	44.87
162.610	132.61	4.94	4.79	4.70	38.73	39.22	39.57	38.80	39.87	40.79
200.000	170.00	5.13	4.95	4.84	36.77	37.18	37.12	36.43	37.86	38.79
230.440	200.44	5.11	4.89	4.78	35.18	35.78	35.97	36.79	37.67	38.36
281.310	251.31	5.16	5.05	4.93	33.40	33.68	33.93	34.86	35.71	35.77
315.230	285.23	5.38	5.25	5.22	34.35	34.22	34.07	33.94	33.98	33.69
349.140	319.14	5.60	5.32	5.18	36.71	35.64	34.41	36.04	34.07	32.17
366.100	336.10	5.72	5.37	5.15	36.71	35.56	34.41	37.45	34.58	31.91
383.050	353.05	5.85	5.44	5.19	36.26	35.25	34.16	36.77	34.26	31.46
400.000	370.00	6.20	5.56	5.18	35.85	34.72	33.54	34.74	32.46	29.98

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.36	1.24	1.18	1.71	2.69	4.09	1.73	1.59	1.46
10.000	1.36	1.25	1.18	1.64	2.55	3.82	1.74	1.59	1.47
20.000	1.36	1.25	1.18	1.70	2.67	3.89	1.73	1.59	1.47
29.688	1.35	1.24	1.17	1.70	2.63	3.95	1.72	1.59	1.47
50.000	1.33	1.23	1.16	1.64	2.55	3.75	1.73	1.60	1.48
66.720	1.33	1.23	1.16	1.59	2.45	3.58	1.74	1.62	1.49
100.000	1.31	1.21	1.14	1.63	2.48	3.51	1.77	1.67	1.53
116.100	1.30	1.21	1.14	1.64	2.42	3.47	1.80	1.69	1.56
153.130	1.28	1.19	1.12	1.66	2.42	3.35	1.87	1.76	1.64
177.820	1.26	1.18	1.11	1.68	2.36	3.34	1.93	1.82	1.69
200.000	1.24	1.16	1.10	1.69	2.38	3.21	1.97	1.87	1.74
227.190	1.22	1.15	1.09	1.73	2.46	3.35	2.03	1.94	1.80
251.880	1.20	1.13	1.09	1.74	2.40	3.29	2.06	1.97	1.83
264.220	1.19	1.13	1.09	1.75	2.42	3.39	2.12	2.03	1.90
288.910	1.18	1.13	1.10	1.76	2.41	3.33	2.17	2.10	1.97
325.940	1.17	1.14	1.13	1.89	2.56	3.43	2.26	2.19	2.06
350.630	1.16	1.14	1.14	1.97	2.63	3.54	2.29	2.23	2.11
375.320	1.16	1.14	1.15	2.00	2.68	3.74	2.32	2.26	2.15
387.660	1.16	1.15	1.16	2.00	2.69	3.75	2.33	2.28	2.17
400.000	1.15	1.15	1.16	1.99	2.76	3.83	2.33	2.29	2.17

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
.040	+239.68	+.03
.050	+241.65	+.02
.100	+246.04	+.02
.500	+247.27	+.01
1.000	+249.11	+.01
5.000	+239.67	+0.00
10.000	+239.13	+0.00
20.000	+238.04	+0.00
50.000	+236.98	+.02
76.820	+238.73	+.07
100.000	+239.43	+.13
150.000	+235.41	+.21
200.000	+239.94	+.20
256.370	+229.27	+.12
300.000	+224.42	+.63
328.190	+216.15	+.53
346.150	+208.91	+.60
364.100	+198.11	+.88
382.060	+190.39	+.64
400.000	+182.44	−.09

Measurements at RF & LO Power +7 dBm

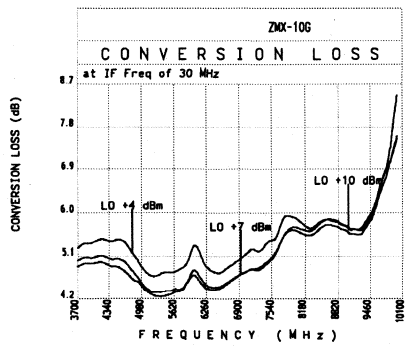
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

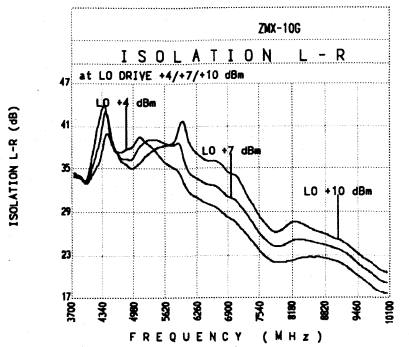
coaxial

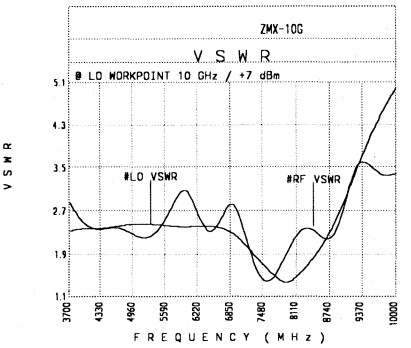
Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Model
ZMX-10G







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
3700.00	3730.00	5.25	4.99	4.86	3700.00	34.84	34.57	34.17	12.74	12.28	11.72
4000.00	4030.00	5.37	5.05	4.93	4000.00	34.32	33.76	33.32	14.04	12.98	12.31
4337.97	4367.97	5.39	5.02	4.88	4337.97	45.22	44.41	40.39	15.23	13.90	12.92
4656.96	4686.96	5.35	4.95	4.75	4656.96	37.50	36.62	36.25	15.80	14.49	13.46
5000.00	4970.00	4.79	4.44	4.38	5000.00	39.72	38.22	35.95	17.11	15.80	14.83
5374.68	5344.68	4.75	4.33	4.23	5374.68	37.67	39.47	38.26	18.19	16.96	16.16
5773.42	5743.42	4.84	4.40	4.37	5773.42	35.36	38.75	39.26	18.25	17.25	16.37
6000.00	5970.00	5.38	4.84	4.72	6000.00	32.40	35.07	39.47	17.86	17.16	16.38
6411.39	6381.39	4.75	4.43	4.38	6411.39	30.41	33.08	36.39	16.62	16.34	15.85
6810.13	6780.13	4.96	4.65	4.64	6810.13	28.66	31.52	35.02	16.39	16.66	16.63
7000.00	6970.00	5.12	4.76	4.75	7000.00	28.00	31.02	34.50	16.74	17.09	17.19
7448.10	7418.10	5.42	4.94	4.99	7448.10	24.13	26.55	28.94	16.52	17.02	17.22
7846.84	7816.84	5.94	5.62	5.64	7846.84	22.31	24.43	26.53	17.44	17.82	18.10
8000.00	7970.00	5.89	5.63	5.70	8000.00	22.35	24.81	27.28	18.75	19.24	19.70
8325.32	8295.32	5.68	5.54	5.63	8325.32	22.94	25.45	27.61	22.29	23.21	23.88
8724.05	8694.05	5.81	5.72	5.85	8724.05	22.89	24.75	26.35	24.35	26.18	27.88
9000.00	8970.00	5.72	5.63	5.74	9000.00	22.41	24.10	25.43	25.24	27.42	29.43
9282.28	9252.28	5.65	5.53	5.62	9282.28	21.19	22.97	24.28	25.80	27.93	30.04
9681.01	9651.01	6.66	6.49	6.64	9681.01	18.96	20.82	22.23	27.05	28.97	30.59
10000.00	9970.00	8.46	7.60	7.55	10000.00	17.83	19.42	20.91	29.97	31.29	32.49

mixer VSWR

FREQ. MHz	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. MHz	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
3700.00	3.24	2.40	2.09	1.88	2.93	3.69	0.03	1.54	1.08	1.10
4000.00	3.24	2.46	2.15	1.98	2.46	3.09	2.50	1.71	1.10	1.06
4337.97	3.16	2.44	2.17	2.10	2.41	2.94	5.00	1.70	1.10	1.07
4656.96	3.19	2.49	2.13	2.13	2.51	3.01	7.50	1.70	1.10	1.07
5000.00	3.21	2.54	2.11	2.41	2.28	2.67	10.00	1.70	1.10	1.07
5374.68	3.18	2.52	2.11	2.32	2.24	2.67	20.00	1.69	1.10	1.07
5773.42	3.15	2.48	2.08	3.26	3.01	3.09	65.00	1.71	1.10	1.06
6000.00	3.14	2.47	2.07	4.42	3.36	3.17	110.00	1.72	1.10	1.06
6411.39	3.32	2.51	1.97	2.93	1.98	1.81	155.00	1.71	1.11	1.07
6810.13	3.36	2.42	1.94	3.81	3.09	2.93	200.00	1.71	1.11	1.07
7000.00	2.89	2.26	1.93	5.56	2.73	2.24	300.00	1.71	1.11	1.09
7448.10	1.91	1.77	1.82	2.01	1.14	1.26	488.90	1.70	1.14	1.15
7846.84	1.49	1.41	1.53	1.85	1.83	1.88	677.80	1.68	1.19	1.21
8000.00	1.61	1.46	1.46	2.36	2.20	1.61	866.70	1.75	1.31	1.33
8325.32	2.01	1.74	1.76	2.04	2.61	1.98	1055.60	1.87	1.44	1.46
8724.05	2.71	2.32	2.29	1.45	2.04	2.61	1244.40	1.93	1.55	1.55
9000.00	3.37	2.90	2.84	1.81	2.73	3.95	1433.30	2.19	1.73	1.67
9282.28	4.16	3.61	3.50	3.09	3.95	5.54	1622.20	2.53	1.94	1.81
9681.01	5.26	4.53	4.35	2.86	3.36	3.57	1811.10	2.55	2.01	1.82
10000.00	6.04	5.06	4.91	3.09	3.46	3.81	2000.00	2.66	2.03	1.96

ϕdetection

FREQ. MHz	max. DC output mV	DC offset mV
3700.00	124.70	12.11
4031.58	101.48	13.75
4363.16	86.46	11.42
4694.74	56.83	11.80
5026.32	31.54	12.17
5357.89	13.29	12.03
5689.47	9.77	10.84
6021.05	11.27	11.58
6352.63	15.69	11.96
6684.21	2.33	11.86
7015.79	-9.39	10.93
7347.37	-10.99	7.46
7678.95	-62.74	-1.94
8010.53	-98.36	-19.00
8342.11	-123.98	-8.33
8673.68	-156.19	1.09
9005.26	-194.67	5.26
9336.84	-216.94	7.10
9668.42	-202.18	6.57
10000.00	-164.86	6.42

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
TFM-4
ZFM-4

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	7.39	7.08	6.85	>64.00	>67.00	66.97	>64.00	62.10	59.80
20.000	50.00	7.19	6.84	6.61	>64.00	>67.00	62.16	>64.00	59.11	57.53
50.000	80.00	6.97	6.64	6.45	52.06	50.64	50.62	51.15	49.95	48.63
100.000	70.00	6.76	6.48	6.32	45.63	44.54	44.61	45.08	43.90	42.67
138.390	108.39	6.81	6.51	6.38	39.91	38.97	39.28	39.15	38.26	37.49
227.320	197.32	6.85	6.59	6.41	38.18	37.28	37.71	37.26	36.56	36.05
271.780	241.78	6.66	6.44	6.26	35.39	34.49	34.87	34.59	34.10	33.61
360.710	330.71	6.68	6.47	6.34	33.51	32.40	32.45	33.15	32.75	31.86
449.640	419.64	6.84	6.57	6.40	33.30	31.70	31.37	31.47	31.16	30.26
538.570	508.57	6.69	6.45	6.29	33.34	31.48	30.96	31.22	30.87	29.94
583.030	553.03	6.76	6.54	6.40	31.94	30.37	29.93	31.03	30.53	29.24
671.960	641.96	7.12	6.82	6.56	30.92	29.62	29.36	29.85	29.00	27.48
760.890	730.89	7.16	6.83	6.56	30.46	29.45	29.56	28.21	27.36	25.98
849.820	819.82	7.34	6.86	6.54	30.45	29.60	29.84	27.33	26.76	25.43
894.280	864.28	7.67	7.01	6.57	30.77	30.37	30.69	24.95	25.36	24.55
983.210	953.21	7.85	7.24	6.72	30.24	29.78	30.11	23.37	23.67	22.94
1027.700	997.70	8.00	7.43	6.95	29.82	29.36	30.17	22.38	22.34	21.66
1116.600	1086.60	8.05	7.58	7.27	28.97	28.75	29.77	21.30	21.27	20.25
1200.000	1170.00	8.01	7.70	7.49	28.49	28.39	29.34	20.82	20.82	19.72
1250.000	1220.00	8.06	7.80	7.68	27.96	28.05	29.00	20.23	20.19	19.35

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	1.46	1.54	1.62	2.01	3.00	4.40	1.35	1.12	1.01
10.000	1.34	1.42	1.51	1.93	2.83	4.06	1.35	1.12	1.01
50.000	1.25	1.34	1.44	1.90	2.85	4.06	1.37	1.13	1.03
100.000	1.21	1.31	1.40	1.84	2.72	3.77	1.38	1.15	1.05
200.000	1.18	1.26	1.34	1.76	2.49	3.46	1.44	1.22	1.12
212.500	1.17	1.25	1.33	1.76	2.44	3.41	1.44	1.22	1.12
337.000	1.14	1.20	1.27	1.70	2.33	3.21	1.59	1.36	1.26
420.000	1.13	1.17	1.22	1.68	2.23	3.14	1.71	1.47	1.37
500.000	1.12	1.13	1.17	1.66	2.19	2.98	1.82	1.56	1.46
544.500	1.13	1.12	1.15	1.67	2.17	2.87	1.87	1.61	1.52
627.500	1.14	1.12	1.12	1.64	2.14	2.75	1.93	1.66	1.61
710.500	1.17	1.13	1.12	1.61	2.05	2.68	1.89	1.64	1.59
793.500	1.20	1.16	1.15	1.64	2.02	2.69	1.93	1.69	1.66
835.000	1.22	1.18	1.17	1.67	2.05	2.72	1.95	1.69	1.66
959.500	1.27	1.22	1.23	1.75	2.12	2.71	1.82	1.60	1.55
1000.000	1.30	1.24	1.26	1.79	2.11	2.76	1.75	1.54	1.49
1084.000	1.38	1.31	1.36	1.82	2.17	2.78	1.58	1.39	1.33
1167.000	1.53	1.43	1.52	1.96	2.24	2.92	1.39	1.23	1.17
1208.500	1.65	1.52	1.63	2.01	2.32	2.83	1.29	1.15	1.10
1250.000	1.79	1.62	1.75	2.14	2.36	2.99	1.20	1.07	1.08

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
5.000	+218.12	+0.00
10.000	+219.36	+0.00
50.000	+216.50	+0.00
100.000	+219.70	+.02
120.000	+223.77	+.06
185.730	+226.90	+.24
230.910	+226.80	+.41
321.270	+233.26	+.34
411.640	+207.81	+.06
500.000	+211.13	+.34
547.180	+219.10	+.10
637.550	+216.95	−.76
727.910	+198.44	−.04
818.280	+191.82	+.63
863.460	+189.28	+.69
953.820	+174.32	+.44
1000.000	+169.06	+.67
1100.000	+167.29	+.89
1200.000	+156.90	−2.15
1250.000	+152.76	−4.81

Measurements at RF & LO Power +7 dBm

Mini-Circuits™
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945
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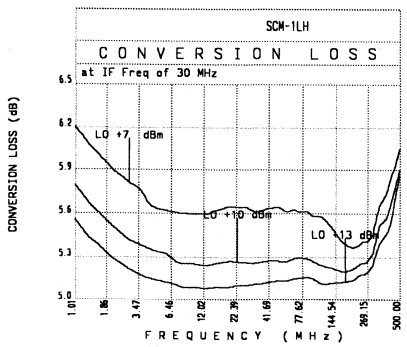
EUROPE 44-252-835094 Fax 44-252-837010

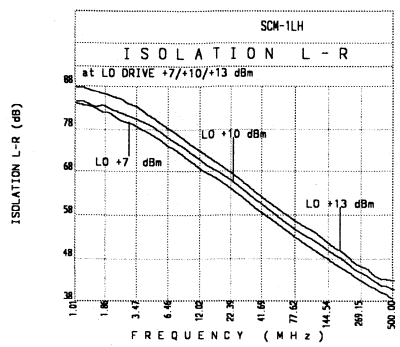
surface mount

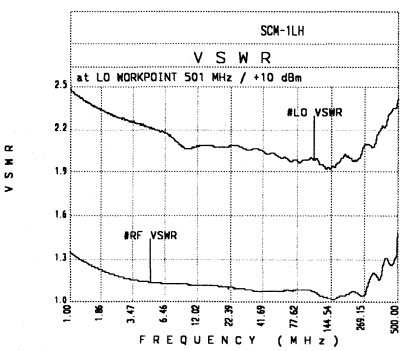
Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model SCM-1LH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	Isolation L-I (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm
1.01	31.01	6.20	5.80	5.56	1.01	83.37	83.76	87.11	51.05	53.19	55.41
2.16	32.16	5.89	5.50	5.28	2.16	80.29	81.75	84.73	50.88	52.98	55.24
4.07	34.07	5.67	5.36	5.15	4.07	76.80	78.65	80.73	50.71	52.80	55.05
5.95	35.95	5.62	5.32	5.12	5.95	73.73	75.79	77.97	50.65	52.76	55.04
9.87	39.87	5.60	5.25	5.09	9.87	69.98	71.74	73.71	50.41	52.50	54.80
12.71	42.71	5.59	5.24	5.08	12.71	67.61	69.47	71.67	50.36	52.52	54.73
18.58	48.58	5.65	5.27	5.09	18.58	64.96	66.73	68.63	50.70	52.69	54.64
27.17	57.17	5.65	5.26	5.10	27.17	61.79	63.66	65.40	50.70	52.40	53.90
39.73	69.73	5.64	5.27	5.12	39.73	58.16	60.22	61.84	50.16	51.59	52.33
51.18	81.18	5.65	5.27	5.13	51.18	56.08	57.85	59.64	49.87	50.69	51.08
84.93	114.93	5.63	5.29	5.16	84.93	51.56	53.33	55.39	49.25	49.07	48.65
124.18	94.18	5.55	5.23	5.11	124.18	48.35	50.69	52.52	49.56	48.38	47.35
140.94	110.94	5.49	5.22	5.12	140.94	47.43	49.47	51.22	49.71	47.52	46.07
206.07	176.07	5.36	5.21	5.13	206.07	44.54	46.47	48.10	50.21	47.09	45.15
250.00	220.00	5.42	5.26	5.18	250.00	42.67	44.49	45.98	47.99	45.62	43.78
300.00	270.00	5.45	5.32	5.24	300.00	41.39	43.40	45.09	47.71	43.37	41.41
350.00	320.00	5.67	5.53	5.40	350.00	40.65	42.27	43.49	44.26	43.86	43.19
400.00	370.00	5.77	5.59	5.47	400.00	39.57	41.21	42.65	42.62	40.37	40.00
450.00	420.00	5.89	5.74	5.66	450.00	38.60	40.76	42.50	41.27	42.33	41.23
500.00	470.00	6.05	5.90	5.86	500.00	38.03	40.35	42.41	37.67	40.69	43.02

mixer VSWR

FREQ. MHz	VSWR RF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	VSWR LO port LO + 7 dBm	LO +10 dBm	LO + 13 dBm	FREQ. MHz	VSWR IF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm
1.00	1.38	1.36	1.35	1.86	2.49	3.42	0.30	2.24	2.02	1.82
2.16	1.25	1.21	1.19	1.62	2.32	3.27	0.70	2.24	2.02	1.82
4.07	1.21	1.16	1.13	1.53	2.24	3.18	1.20	2.24	2.03	1.82
5.95	1.20	1.14	1.10	1.48	2.20	3.13	1.60	2.24	2.02	1.82
9.87	1.19	1.13	1.09	1.38	2.08	3.01	2.00	2.25	2.03	1.83
12.71	1.19	1.13	1.08	1.39	2.10	3.02	3.00	2.25	2.03	1.83
18.58	1.18	1.12	1.07	1.39	2.09	3.01	4.80	2.25	2.03	1.83
27.17	1.17	1.11	1.06	1.38	2.09	3.00	6.50	2.25	2.03	1.83
39.73	1.15	1.09	1.04	1.37	2.07	2.98	8.30	2.26	2.04	1.84
51.18	1.15	1.09	1.04	1.36	2.04	2.95	10.00	2.25	2.04	1.84
84.93	1.16	1.10	1.05	1.34	2.00	2.94	30.00	2.21	2.00	1.80
124.18	1.11	1.06	1.03	1.34	1.97	2.88	60.00	2.19	1.99	1.79
140.94	1.10	1.04	1.02	1.34	1.94	2.86	90.00	2.29	2.08	1.88
206.07	1.09	1.08	1.10	1.42	2.01	2.96	120.00	2.25	2.05	1.87
250.00	1.02	1.06	1.11	1.47	2.03	3.01	150.00	2.21	2.01	1.83
300.00	1.12	1.18	1.23	1.57	2.10	3.07	200.00	2.33	2.15	1.99
350.00	1.10	1.18	1.23	1.68	2.19	3.18	275.00	2.36	2.19	2.05
400.00	1.23	1.31	1.37	1.76	2.23	3.20	350.00	2.26	2.12	2.00
450.00	1.20	1.27	1.32	1.89	2.35	3.37	425.00	2.20	2.07	1.97
500.00	1.27	1.50	1.20	2.02	2.42	3.42	500.00	2.55	2.10	2.27

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
1.00	-379.00	0.05
2.00	-380.90	0.05
5.00	-360.60	0.04
10.10	-370.40	0.05
15.00	-368.80	0.04
20.00	-341.70	0.04
30.00	-360.40	0.04
40.00	-377.50	0.04
50.00	-361.00	0.03
80.00	-375.80	0.04
100.00	-354.30	0.06
125.00	-369.80	0.25
150.00	-373.30	0.26
200.00	-366.80	0.32
250.00	-385.00	0.24
300.00	-381.90	0.63
350.00	-317.60	0.88
400.00	-335.30	0.77
450.00	-311.20	0.84
500.00	-307.70	1.15

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
TFM-11
ZFM-11

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	6.34	6.05	5.92	58.56	60.95	64.12	54.78	56.30	58.16
5.000	35.00	6.04	5.78	5.64	58.80	61.86	65.69	53.80	55.70	58.00
20.000	50.00	6.10	5.81	5.64	58.87	61.93	65.38	53.47	55.12	57.37
50.000	80.00	6.28	5.94	5.79	58.00	60.22	63.38	52.47	54.24	55.98
100.000	70.00	6.24	5.92	5.80	54.71	56.59	57.37	50.08	50.92	51.84
200.000	170.00	6.94	6.50	6.18	48.17	48.94	49.72	43.91	44.33	45.26
267.530	237.53	7.11	6.52	6.15	45.01	45.81	46.78	40.82	41.60	43.04
400.800	370.80	7.59	6.74	6.33	41.09	42.38	43.83	37.40	38.67	39.67
500.000	470.00	7.58	6.83	6.44	40.01	41.61	43.58	36.21	36.88	37.46
600.700	570.70	7.64	7.03	6.64	38.46	40.10	41.61	36.37	36.28	35.49
733.960	704.29	7.78	7.24	6.86	37.95	39.39	39.90	35.43	34.20	32.72
867.230	837.52	7.64	7.09	6.79	37.34	39.07	40.00	33.52	31.66	30.22
1000.000	969.69	7.59	7.12	6.92	35.09	36.76	37.95	31.13	29.17	28.00
1067.100	1037.50	7.40	6.97	6.77	34.50	35.43	35.88	30.67	28.56	26.91
1200.400	1170.40	7.28	6.77	6.60	33.34	33.71	33.57	29.25	27.07	25.52
1333.700	1303.60	7.28	6.72	6.55	32.41	32.82	33.19	27.15	25.51	24.37
1466.900	1436.90	7.41	6.80	6.55	32.53	33.13	33.05	25.46	24.22	23.31
1600.200	1570.50	7.50	6.93	6.63	31.70	32.34	32.69	24.25	23.42	22.89
1733.500	1703.70	7.43	6.92	6.65	28.65	29.41	30.12	27.71	27.19	26.79
2000.000	1970.30	7.36	6.99	6.77	29.71	30.47	31.15	25.40	25.17	24.98

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	2.56	2.34	2.10	1.58	2.51	4.05	1.30	1.46	1.62
20.000	2.75	2.49	2.24	1.51	2.42	3.84	1.15	1.35	1.51
50.000	2.76	2.44	2.24	1.61	2.46	4.04	1.16	1.35	1.51
100.000	2.80	2.54	2.29	1.51	2.19	3.41	1.17	1.35	1.49
200.000	3.13	2.88	2.63	1.59	2.23	3.42	1.20	1.38	1.52
254.380	3.32	3.21	2.84	1.58	2.18	3.16	1.23	1.41	1.54
379.060	3.92	3.60	3.43	1.67	1.98	2.87	1.32	1.50	1.63
500.000	3.98	3.74	3.67	1.70	1.88	2.56	1.43	1.61	1.75
628.440	3.84	3.84	3.65	1.86	1.82	2.34	1.58	1.81	1.93
753.130	3.51	3.52	3.33	1.96	1.69	2.09	1.75	1.98	2.09
877.810	3.36	3.24	3.21	1.87	1.51	1.83	1.95	2.20	2.27
1000.000	2.99	3.00	2.85	1.78	1.37	1.59	2.25	2.46	2.52
1064.800	2.82	2.77	2.71	1.78	1.24	1.48	2.49	2.89	2.75
1189.500	2.56	2.54	2.41	1.55	1.14	1.41	2.92	3.06	3.18
1376.600	2.27	2.23	2.10	1.25	1.13	1.63	3.78	4.11	3.98
1501.300	2.19	2.13	2.07	1.10	1.39	1.91	4.47	4.50	4.59
1625.900	2.27	2.16	2.12	1.18	1.67	2.03	4.89	4.89	5.09
1750.600	2.02	2.27	2.26	1.26	2.36	2.10	6.71	6.28	6.76
1875.300	1.70	2.54	2.44	1.54	2.01	2.32	8.95	8.81	8.20
2000.000	2.65	2.89	2.71	1.55	1.93	2.35	8.47	8.64	8.35

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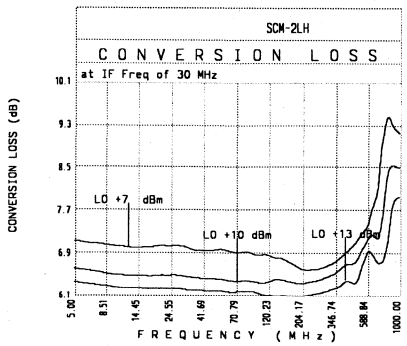
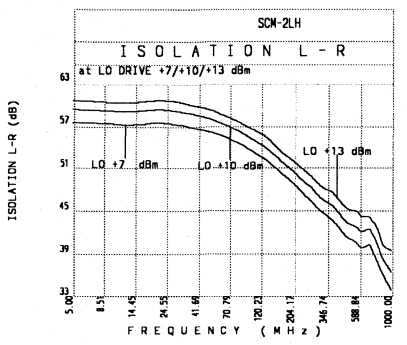
surface mount

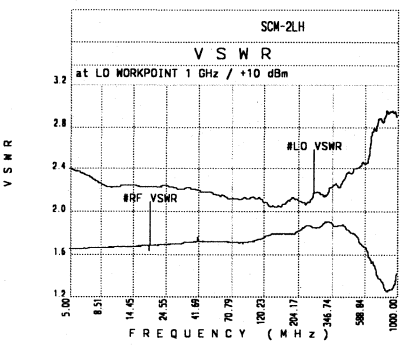
Frequency Mixers

Model
SCM-2LH

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
5.00	35.00	7.20	6.68	6.43	5.00	57.10	59.04	60.17	53.66	53.78	53.78
10.10	40.10	7.10	6.56	6.32	10.10	56.99	58.76	59.95	53.41	53.60	53.62
20.39	50.39	7.12	6.56	6.31	20.39	57.16	58.97	60.22	53.89	54.13	54.17
35.01	65.01	7.02	6.51	6.27	35.01	56.60	58.51	59.70	53.91	54.13	54.27
53.96	83.96	7.05	6.48	6.26	53.96	55.65	57.42	58.67	53.88	54.08	54.10
60.12	90.12	7.02	6.46	6.24	60.12	55.38	57.03	58.31	53.96	54.09	54.12
83.16	113.16	7.01	6.46	6.25	83.16	54.28	55.93	57.19	54.38	54.56	54.60
115.03	85.03	6.96	6.41	6.18	115.03	52.60	54.32	55.74	55.31	56.14	55.84
159.10	129.10	6.83	6.45	6.17	159.10	50.48	52.19	53.44	58.37	57.66	56.33
220.07	190.07	6.66	6.42	6.18	220.07	47.99	49.59	51.20	65.83	61.13	58.51
273.20	243.20	6.68	6.47	6.23	273.20	46.08	48.01	49.49	77.54	63.62	59.72
339.16	309.16	6.78	6.57	6.31	339.16	44.34	46.11	47.71	57.60	57.82	58.53
421.04	391.04	6.98	6.78	6.48	421.04	42.76	44.69	46.49	55.59	61.36	58.58
500.00	470.00	7.21	6.83	6.40	500.00	40.89	42.91	44.83	50.24	49.55	50.12
600.00	570.00	7.52	7.28	7.05	600.00	39.68	41.94	43.99	48.49	46.87	45.27
700.00	670.00	8.08	7.19	6.76	700.00	40.30	42.46	44.10	44.71	44.95	41.31
760.00	730.00	9.09	7.62	6.79	760.00	38.64	41.19	43.20	41.32	41.51	40.20
850.00	820.00	9.50	8.58	7.48	850.00	36.30	38.44	40.46	35.52	35.76	35.57
897.51	867.51	9.32	8.64	7.98	897.51	35.56	37.74	39.75	33.32	33.69	34.02
1000.00	970.00	9.21	8.57	8.03	1000.00	33.72	36.31	39.26	29.09	30.05	30.66

mixer VSWR

FREQ. MHz	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
5.00	1.75	1.66	1.57	1.71	2.41	3.39	0.30	2.83	2.44	2.08
10.10	1.77	1.68	1.58	1.52	2.23	3.21	0.70	2.84	2.45	2.09
20.39	1.79	1.70	1.60	1.51	2.24	3.22	1.20	2.85	2.45	2.09
35.01	1.81	1.72	1.62	1.50	2.23	3.18	1.60	2.85	2.45	2.09
53.96	1.82	1.73	1.64	1.48	2.17	3.12	2.00	2.85	2.45	2.09
60.12	1.82	1.73	1.64	1.47	2.16	3.11	3.00	2.86	2.45	2.09
83.16	1.81	1.72	1.62	1.46	2.12	3.10	4.80	2.86	2.46	2.09
115.03	1.85	1.76	1.66	1.47	2.13	3.08	6.50	2.87	2.45	2.09
159.10	1.89	1.80	1.71	1.45	2.06	3.03	8.30	2.90	2.47	2.10
220.07	1.93	1.85	1.76	1.51	2.09	3.04	10.00	2.89	2.47	2.10
273.20	1.94	1.86	1.76	1.61	2.18	3.14	30.00	2.80	2.39	2.03
339.16	2.00	1.91	1.82	1.71	2.21	3.14	60.00	2.78	2.37	2.00
421.04	1.96	1.89	1.79	1.88	2.29	3.16	90.00	2.91	2.49	2.10
500.00	1.89	1.81	1.71	2.02	2.40	3.29	120.00	2.90	2.48	2.10
600.00	1.76	1.68	1.58	2.21	2.45	3.17	150.00	2.80	2.38	2.01
700.00	1.59	1.51	1.41	2.53	2.78	3.44	200.00	2.98	2.55	2.15
760.00	1.47	1.38	1.29	2.63	2.88	3.62	275.00	2.92	2.49	2.10
850.00	1.34	1.26	1.18	2.75	2.94	3.69	350.00	2.88	2.47	2.08
897.51	1.34	1.27	1.22	2.80	2.94	3.64	425.00	2.88	2.47	2.09
1000.00	1.46	1.43	1.36	2.82	2.89	3.48	500.00	2.82	2.40	2.06

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
5.00	-342.10	1.24
10.10	-346.80	1.25
20.00	-345.50	1.24
50.00	-335.20	1.18
100.00	-345.50	1.15
150.00	-355.00	1.04
200.00	-351.40	0.95
250.00	-370.10	0.91
300.00	-369.30	0.53
350.00	-306.70	0.48
400.00	-321.70	0.69
450.00	-318.00	0.70
500.00	-308.60	0.33
550.00	-312.70	-0.04
600.00	-310.40	-0.30
650.00	-307.90	0.54
700.00	-268.82	1.09
800.00	-263.69	-0.37
900.00	-257.88	-1.44
1000.00	-254.25	-0.93

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

SRA-12
TFM-12
ZAD-12
ZFM-12
ZLW-12

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
800.000	730.00	7.00	6.67	6.54	33.86	33.42	32.78	35.19	34.21	32.91
835.530	765.53	6.87	6.56	6.47	33.38	32.78	32.12	34.77	33.92	32.60
871.050	801.05	6.86	6.57	6.48	33.06	32.33	31.77	34.08	33.41	32.37
894.740	824.74	6.73	6.41	6.33	32.93	32.16	31.52	33.69	33.06	32.03
918.420	848.42	6.63	6.31	6.20	32.90	32.06	31.50	33.40	32.78	31.86
942.100	872.10	6.64	6.33	6.23	33.02	32.10	31.51	33.26	32.59	31.62
965.790	895.79	6.62	6.29	6.22	33.15	32.20	31.53	33.01	32.33	31.40
989.470	919.47	6.51	6.18	6.11	33.32	32.44	31.64	32.80	32.15	31.06
1013.200	943.20	6.51	6.19	6.12	33.52	32.61	32.04	32.58	31.91	30.99
1036.800	966.80	6.59	6.24	6.13	33.87	33.00	32.37	32.40	31.84	30.75
1060.500	990.50	6.57	6.23	6.10	34.27	33.47	32.71	32.30	31.84	30.46
1072.400	1002.40	6.68	6.34	6.22	34.43	33.61	33.03	32.19	31.77	30.53
1096.100	1026.10	6.75	6.39	6.27	34.69	33.93	33.41	32.10	31.75	30.39
1119.700	1049.70	6.89	6.52	6.39	34.86	34.25	33.71	32.02	31.80	30.08
1143.400	1073.40	7.10	6.67	6.53	34.89	34.50	34.06	31.93	31.82	29.81
1167.100	1097.10	7.25	6.77	6.57	34.80	34.75	34.64	31.93	31.82	29.61
1190.800	1120.80	7.44	6.90	6.67	34.94	35.42	35.69	32.16	32.00	29.32
1214.500	1144.50	7.56	6.95	6.71	35.41	36.69	37.55	32.80	32.55	29.22
1238.200	1168.20	7.68	7.04	6.78	36.16	38.41	40.23	33.82	33.59	30.30
1250.000	1180.00	7.63	7.00	6.72	36.66	39.24	41.58	34.50	34.65	31.14

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
800.000	2.71	2.64	2.60	1.99	1.93	2.25	2.92	3.19	3.42
823.680	2.67	2.58	2.53	2.03	1.88	2.23	3.07	3.38	3.59
847.370	2.64	2.53	2.47	2.03	1.87	2.19	3.42	3.70	3.90
871.050	2.56	2.46	2.39	2.02	1.84	2.16	3.57	3.87	4.06
894.740	2.57	2.43	2.36	2.04	1.82	2.12	3.93	4.15	4.38
918.420	2.44	2.29	2.22	2.10	1.81	2.07	4.34	4.64	4.72
942.110	2.36	2.20	2.13	2.09	1.79	2.03	4.59	4.69	4.86
965.790	2.33	2.13	2.06	2.13	1.77	2.01	4.92	4.98	5.16
989.470	2.27	2.07	1.99	2.18	1.77	1.96	5.47	5.65	5.79
1001.300	2.23	2.04	1.95	2.17	1.77	1.95	5.54	5.74	5.83
1025.000	2.15	1.94	1.86	2.21	1.74	1.90	5.66	5.72	5.79
1048.700	2.11	1.89	1.78	2.26	1.74	1.86	6.17	6.15	6.26
1072.400	2.06	1.84	1.72	2.24	1.73	1.83	6.17	6.11	6.17
1096.100	1.99	1.78	1.66	2.19	1.69	1.77	5.85	5.83	5.85
1119.700	1.99	1.76	1.62	2.20	1.69	1.75	5.81	5.85	5.85
1143.400	1.94	1.73	1.58	2.21	1.65	1.71	4.80	4.83	4.80
1167.100	1.93	1.71	1.56	2.18	1.62	1.67	4.08	4.09	4.04
1190.800	1.93	1.73	1.58	2.15	1.59	1.66	3.31	3.30	3.28
1214.500	1.93	1.73	1.59	2.10	1.57	1.62	2.78	2.79	2.80
1250.000	1.93	1.75	1.63	2.05	1.51	1.57	3.56	3.64	3.71

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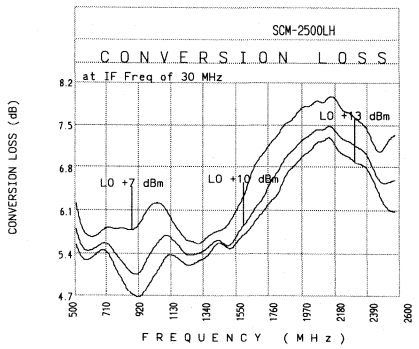
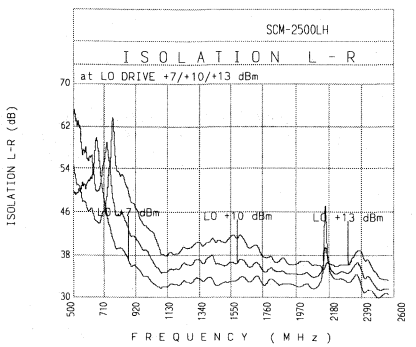
surface mount

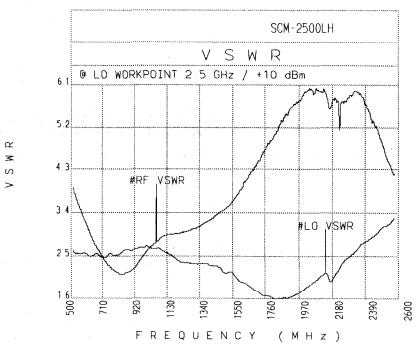
Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
SCM-2500LH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	Isolation L-I (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm
500.00	530.00	6.31	5.89	5.64	500.00	50.32	65.85	55.19	31.90	31.29	30.70
622.45	652.45	5.75	5.56	5.46	622.45	53.94	55.50	46.66	30.48	29.50	28.62
744.90	774.90	5.86	5.48	5.24	744.90	42.25	50.54	62.54	27.79	27.28	26.98
867.35	897.35	5.87	5.13	4.78	867.35	36.62	42.15	48.57	26.00	25.72	25.43
1000.00	1030.00	6.33	5.61	5.16	1000.00	33.64	37.79	43.07	23.22	23.23	23.29
1112.24	1142.24	5.97	5.70	5.46	1112.24	33.03	35.91	39.05	20.89	20.77	20.60
1250.00	1280.00	5.68	5.48	5.33	1250.00	33.41	36.78	40.00	19.21	19.31	19.27
1357.14	1387.14	5.82	5.65	5.55	1357.14	34.51	38.10	41.00	19.45	20.17	20.60
1479.59	1509.59	6.05	5.62	5.53	1479.59	33.57	36.72	40.94	20.68	22.37	24.06
1520.41	1490.41	6.26	5.85	5.73	1520.41	33.77	37.24	42.27	21.08	23.28	25.69
1642.86	1612.86	7.03	6.30	6.09	1642.86	33.84	36.49	40.00	22.66	25.51	28.47
1765.31	1735.31	7.39	6.79	6.41	1765.31	34.23	36.28	38.37	23.26	24.69	24.70
1887.76	1857.76	7.79	7.25	6.96	1887.76	33.22	35.20	36.85	21.96	21.72	21.07
2010.20	1980.20	8.02	7.54	7.33	2010.20	32.71	34.85	37.04	20.38	19.66	19.04
2051.02	2021.02	7.91	7.48	7.30	2051.02	32.61	34.66	36.76	20.18	19.44	18.85
2173.47	2143.47	7.79	7.34	7.10	2173.47	34.23	35.19	36.49	18.91	18.10	17.51
2295.92	2265.92	7.63	7.20	6.95	2295.92	35.01	37.02	38.88	18.17	17.55	17.08
2377.55	2347.55	7.19	6.78	6.61	2377.55	32.07	34.65	37.61	17.50	17.01	16.62
2459.18	2429.18	7.36	6.65	6.19	2459.18	30.88	32.10	34.23	16.49	16.12	15.82
2500.00	2470.00	7.42	6.69	6.18	2500.00	31.16	32.24	33.95	15.78	15.44	15.24

mixer VSWR

FREQ. MHz	VSWR RF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	VSWR LO port LO + 7 dBm	LO +10 dBm	LO + 13 dBm	FREQ. MHz	VSWR IF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm
500.00	4.43	3.95	3.64	2.02	2.63	3.32	1.00	1.08	1.17	1.40
622.45	3.25	2.87	2.58	1.96	2.52	3.15	25.80	1.06	1.23	1.48
744.90	2.59	2.24	1.98	2.09	2.54	3.10	50.50	1.16	1.32	1.57
867.35	2.48	2.22	1.99	2.34	2.62	3.07	75.30	1.27	1.38	1.58
1000.00	2.74	2.74	2.66	2.50	2.67	2.99	100.00	1.33	1.41	1.59
1112.24	2.81	2.97	3.04	2.52	2.54	2.79	120.00	1.41	1.48	1.65
1250.00	2.94	3.08	3.13	2.62	2.36	2.40	145.00	1.45	1.53	1.69
1357.14	3.21	3.27	3.26	2.80	2.32	2.17	170.00	1.55	1.64	1.80
1479.59	3.60	3.56	3.51	2.94	2.18	1.83	195.00	1.64	1.73	1.86
1520.41	3.84	3.76	3.69	2.83	2.07	1.69	220.00	1.68	1.76	1.87
1642.86	4.61	4.39	4.26	2.51	1.78	1.37	250.00	1.75	1.88	2.02
1765.31	5.43	5.09	4.90	2.09	1.61	1.42	282.50	1.96	2.08	2.19
1887.76	6.13	5.70	5.53	1.86	1.69	1.76	315.00	1.92	2.00	2.07
2010.20	6.59	5.94	5.72	1.85	1.99	2.24	347.50	2.01	2.13	2.21
2051.02	6.59	5.96	5.61	1.90	2.11	2.38	380.00	2.17	2.25	2.29
2173.47	6.64	5.72	5.23	1.97	2.33	2.71	400.00	2.09	2.13	2.16
2295.92	6.85	5.89	5.15	2.33	2.75	3.19	425.00	2.02	2.08	2.11
2377.55	6.01	5.28	4.64	2.55	2.94	3.35	450.00	2.07	2.15	2.17
2459.18	5.13	4.51	4.01	2.84	3.17	3.56	475.00	2.09	2.16	2.15
2500.00	4.74	4.25	3.73	3.02	3.32	3.68	500.00	2.03	2.07	2.05

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
500.00	-250.88	1.88
605.26	-264.34	-0.91
710.53	-226.19	0.56
815.79	-188.37	4.62
921.05	-171.68	4.07
1026.32	-188.38	3.27
1131.58	-202.54	-0.19
1236.84	-198.07	-1.51
1342.11	-194.43	-2.40
1447.37	-205.63	-2.02
1552.63	-191.48	-2.36
1657.89	-148.27	-2.01
1763.16	-121.70	-1.36
1868.42	-96.21	-0.68
1973.68	-68.16	-0.45
2078.95	-38.15	-4.52
2184.21	-10.19	3.48
2289.47	3.02	4.41
2394.74	4.05	6.89
2500.00	-31.21	7.09

most widely used

Frequency Mixers

Model ASK-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	5.61	5.34	5.16	39.10	41.73	44.04	39.04	40.78	42.48
5.000	35.00	5.28	5.14	4.90	41.35	43.83	46.14	45.93	48.03	49.94
10.000	40.00	5.24	5.10	4.87	42.10	44.31	46.27	47.06	49.23	50.33
20.000	50.00	5.33	5.10	4.89	41.21	43.27	44.87	46.03	47.31	47.18
50.000	80.00	5.21	5.07	4.86	40.33	41.89	42.46	43.68	43.53	41.68
100.000	70.00	5.09	4.98	4.82	39.93	41.22	41.75	41.82	41.32	40.36
124.930	94.93	5.18	5.07	4.90	39.54	40.40	40.49	39.25	38.91	38.11
166.240	136.24	5.29	5.14	4.98	39.26	40.04	40.44	36.95	37.11	37.23
207.550	177.55	5.31	5.19	4.98	39.26	39.72	39.36	35.80	36.06	35.67
228.210	198.21	5.20	5.11	4.90	38.88	39.43	37.92	34.36	34.77	34.32
269.520	239.52	5.24	5.17	4.97	38.87	39.11	39.52	32.97	33.40	34.08
310.830	280.83	5.50	5.34	5.16	38.11	38.68	38.01	31.41	32.44	32.86
352.140	322.14	5.48	5.31	5.09	35.92	36.90	36.78	29.97	31.38	31.89
372.790	342.79	5.49	5.36	5.21	33.94	34.94	33.83	29.59	31.09	31.65
414.100	384.10	5.53	5.33	5.15	33.25	33.57	33.66	30.29	31.83	33.34
455.410	425.41	5.79	5.57	5.35	32.21	32.53	32.17	29.66	31.14	32.51
496.720	466.72	6.07	5.67	5.35	31.01	30.97	30.86	28.78	29.46	29.39
538.030	508.03	6.18	5.75	5.39	30.80	30.78	30.29	28.51	28.57	27.79
558.690	528.69	6.15	5.72	5.45	30.06	29.47	29.81	28.45	27.11	26.81
600.000	570.00	6.27	5.82	5.52	29.46	28.98	28.82	27.11	25.59	24.20

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.23	1.15	1.13	1.89	3.01	4.50	1.49	1.35	1.27
20.000	1.19	1.12	1.06	1.91	2.92	4.12	1.49	1.36	1.27
43.388	1.17	1.10	1.04	1.91	2.87	4.04	1.48	1.36	1.26
50.000	1.16	1.09	1.04	1.91	2.86	4.01	1.48	1.36	1.26
81.776	1.15	1.08	1.03	1.82	2.67	3.67	1.48	1.36	1.26
100.970	1.14	1.08	1.03	1.83	2.75	3.72	1.50	1.36	1.27
139.360	1.12	1.06	1.03	1.82	2.68	3.43	1.49	1.37	1.27
177.750	1.10	1.04	1.03	1.88	2.68	3.41	1.51	1.38	1.28
200.000	1.08	1.03	1.03	1.83	2.64	3.36	1.53	1.39	1.30
235.330	1.06	1.01	1.04	1.86	2.61	3.40	1.55	1.42	1.32
273.720	1.03	1.03	1.07	1.91	2.72	3.52	1.58	1.45	1.34
312.100	1.04	1.06	1.10	1.98	2.70	3.47	1.61	1.47	1.38
350.490	1.08	1.10	1.13	2.05	2.84	3.48	1.65	1.51	1.41
388.880	1.13	1.15	1.18	2.12	3.08	3.67	1.69	1.55	1.44
427.270	1.18	1.20	1.23	2.17	3.20	3.67	1.71	1.59	1.49
465.660	1.24	1.26	1.27	2.25	3.16	3.72	1.75	1.63	1.54
500.000	1.29	1.31	1.32	2.30	3.29	3.80	1.78	1.67	1.58
523.240	1.33	1.34	1.35	2.40	3.28	3.94	1.80	1.69	1.61
561.630	1.39	1.40	1.40	2.49	3.48	4.10	1.84	1.73	1.65
600.000	1.46	1.47	1.46	2.65	3.57	4.30	1.85	1.73	1.66

ϕ detection

freq. (MHz)	max. output/DC offset vs. freq. max. DC output mV	DC offset mv
1.000	−228.02	+4.07
5.000	−228.76	+2.52
20.000	−227.06	+2.57
39.646	−225.37	+2.80
78.292	−226.95	+2.99
100.000	−226.11	+2.96
136.260	−227.74	+2.86
174.910	−225.41	+2.47
200.000	−228.13	+2.24
232.880	−226.65	+1.73
271.520	−218.89	+1.15
310.170	−210.92	+.58
348.810	−207.49	+.21
387.460	−206.24	−.11
426.110	−212.46	−1.04
464.750	−213.69	−1.82
500.000	−201.73	−1.83
522.720	−197.65	−2.55
561.370	−189.45	−2.83
600.000	−187.27	−3.58

Measurements at RF & LO Power +7 dBm

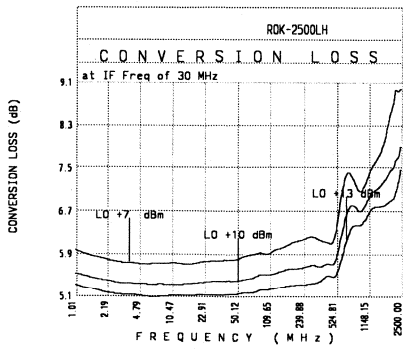
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

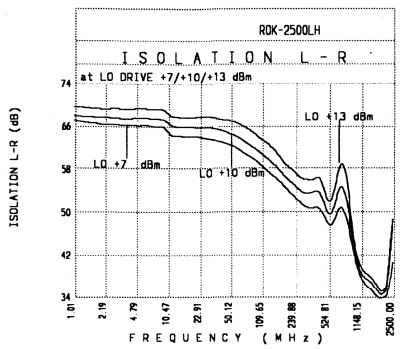
plug-in & coaxial

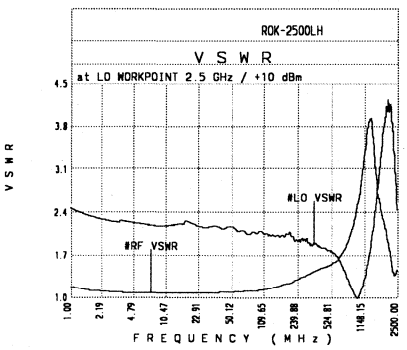
Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
ROK-2500LH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
1.01	31.01	6.05	5.61	5.40	1.01	67.86	68.77	70.36	82.02	73.78	66.96
2.01	32.01	5.89	5.48	5.25	2.01	67.02	68.41	70.01	79.85	70.42	65.45
5.84	35.84	5.79	5.40	5.17	5.84	66.98	68.24	69.99	69.67	65.66	62.43
9.42	39.42	5.80	5.39	5.18	9.42	66.76	68.14	69.91	65.63	62.46	60.07
20.90	50.90	5.83	5.44	5.21	20.90	64.87	66.39	68.48	53.58	51.68	50.59
54.42	84.42	5.92	5.48	5.24	54.42	62.90	65.02	67.54	46.16	44.64	43.62
102.99	72.99	5.94	5.57	5.30	102.99	59.64	61.83	64.39	41.69	39.78	38.46
194.90	164.90	6.21	5.70	5.39	194.90	54.93	56.90	59.17	36.48	34.82	33.25
507.42	477.42	6.11	5.71	5.48	507.42	48.52	50.06	52.22	26.47	27.73	27.98
960.27	930.27	7.04	6.69	6.47	960.27	43.43	44.10	44.99	19.15	19.89	20.45
1126.30	1096.30	7.38	6.96	6.67	1126.30	38.74	39.61	40.70	17.25	17.94	18.49
1250.00	1220.00	7.61	7.16	6.86	1250.00	37.27	38.37	39.45	17.27	18.19	18.87
1400.00	1370.00	7.71	7.16	6.85	1400.00	36.48	37.95	38.99	17.79	18.82	19.85
1549.41	1519.41	7.90	7.27	6.87	1549.41	35.45	36.84	38.19	18.16	19.50	20.71
1700.00	1670.00	8.02	7.35	6.88	1700.00	34.88	36.13	37.03	18.88	20.19	21.46
1900.00	1870.00	8.55	7.52	6.96	1900.00	34.54	35.11	35.61	20.03	21.00	21.88
2131.49	2101.49	8.78	7.58	7.01	2131.49	34.79	35.82	36.33	23.09	23.77	24.82
2300.00	2270.00	9.01	7.76	7.19	2300.00	36.69	40.02	41.75	28.34	30.98	32.32
2400.00	2370.00	9.01	7.77	7.33	2400.00	38.79	43.95	46.42	36.27	36.30	30.46
2500.00	2470.00	9.05	7.98	7.55	2500.00	41.22	49.03	49.41	39.98	32.03	26.94

mixer VSWR

FREQ. MHz	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
1.00	1.39	1.24	1.24	1.93	2.54	3.56	0.30	1.72	1.29	1.05
2.01	1.37	1.17	1.13	1.65	2.37	3.41	0.70	1.72	1.29	1.05
5.84	1.37	1.14	1.05	1.51	2.27	3.35	1.20	1.73	1.29	1.05
9.42	1.38	1.14	1.03	1.49	2.24	3.32	1.60	1.72	1.29	1.05
20.90	1.38	1.14	1.02	1.51	2.25	3.29	2.00	1.73	1.29	1.05
54.42	1.40	1.16	1.05	1.48	2.18	3.13	3.00	1.73	1.29	1.05
102.99	1.41	1.19	1.12	1.47	2.14	3.05	4.80	1.73	1.29	1.05
194.90	1.49	1.30	1.26	1.54	2.11	2.93	6.50	1.73	1.29	1.05
507.42	1.79	1.59	1.53	1.97	1.83	2.12	8.30	1.73	1.29	1.05
960.27	2.89	2.51	2.29	1.46	1.06	1.37	10.00	1.73	1.29	1.05
1126.30	3.76	3.25	2.91	1.11	1.31	1.76	30.00	1.72	1.29	1.05
1250.00	4.54	3.88	3.41	1.29	1.62	2.10	60.00	1.74	1.31	1.08
1400.00	4.27	3.75	3.38	1.85	2.14	2.60	90.00	1.69	1.27	1.04
1549.41	3.35	2.92	2.63	2.64	2.77	3.16	120.00	1.63	1.23	1.07
1700.00	2.92	2.49	2.21	3.74	3.40	3.52	150.00	1.67	1.27	1.09
1900.00	2.56	2.20	1.97	5.35	4.07	3.57	200.00	1.49	1.13	1.11
2131.49	1.95	1.71	1.56	5.90	4.15	3.21	275.00	1.39	1.06	1.16
2300.00	1.62	1.49	1.41	4.72	3.46	2.68	350.00	1.27	1.03	1.24
2400.00	1.52	1.46	1.45	3.91	2.98	2.37	425.00	1.13	1.16	1.39
2500.00	1.54	1.52	1.55	3.01	2.50	2.10	500.00	1.15	1.27	1.49

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
1.00	-335.00	-0.33
10.00	-345.60	-0.29
20.00	-351.40	-0.29
50.00	-360.70	-0.27
100.00	-346.30	-0.19
200.00	-338.80	-0.76
300.00	-332.10	-0.52
400.00	-293.00	-0.07
500.00	-287.20	-1.06
750.00	-182.44	-1.07
1000.00	-151.11	2.16
1200.00	-79.33	2.34
1400.00	-24.51	-0.32
1600.00	33.26	-1.28
1800.00	78.15	-1.34
2000.00	126.24	-1.21
2150.00	140.19	-3.18
2250.00	139.81	-4.93
2400.00	201.47	-6.22
2500.00	219.19	-6.44

Plug-In

Frequency Mixers

Model
LMX-113

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.000	5.75	5.42	5.22	5.000	74.81	75.21	74.91	72.01	68.71	67.31
10.000	40.000	5.86	5.49	5.28	10.000	71.87	71.27	71.37	65.97	63.27	62.07
20.000	50.000	5.90	5.54	5.31	20.000	67.04	66.34	66.34	60.24	57.44	56.40
35.151	65.151	5.86	5.50	5.28	35.151	62.47	61.67	61.57	55.37	52.65	51.26
50.000	80.000	5.80	5.46	5.25	50.000	59.55	58.85	58.36	52.31	49.49	47.86
65.303	95.303	5.75	5.43	5.22	65.303	57.52	56.88	56.70	50.26	47.63	46.27
100.000	70.000	5.71	5.39	5.21	100.000	54.39	53.73	53.17	47.26	44.42	42.86
155.758	125.758	5.69	5.37	5.20	155.758	51.31	50.55	49.78	43.90	41.24	39.78
200.000	170.000	5.87	5.53	5.37	200.000	49.32	48.42	47.85	41.92	39.45	38.09
246.212	216.212	5.82	5.53	5.36	246.212	48.03	47.03	46.35	40.60	38.15	36.55
336.667	306.667	5.61	5.32	5.20	336.667	45.24	44.19	43.43	37.04	35.51	33.72
427.121	397.121	5.87	5.56	5.31	427.121	42.88	41.93	41.56	33.25	32.03	31.03
500.000	470.000	5.89	5.48	5.27	500.000	41.77	40.77	40.17	31.10	30.73	30.28
547.727	517.727	5.81	5.44	5.27	547.727	40.48	39.56	39.14	29.50	29.33	29.06
608.030	578.030	5.91	5.58	5.35	608.030	39.90	38.47	38.09	28.77	28.45	28.05
668.333	638.333	6.28	5.92	5.49	668.333	38.20	37.37	36.49	27.02	27.21	26.61
758.788	728.788	6.40	5.97	5.52	758.788	36.41	36.26	35.82	24.82	25.46	25.54
819.091	789.091	6.71	6.06	5.63	819.091	36.02	36.04	35.39	24.08	24.67	24.56
909.546	879.546	7.45	6.45	5.76	909.546	35.64	35.77	35.37	22.98	23.44	23.58
1000.000	970.000	7.89	6.93	6.05	1000.000	36.25	36.36	36.00	22.68	23.06	23.24

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.13	1.12	1.15	1.43	2.13	3.03	5.000	1.48	1.29	1.14	5.000	−241.66	−.09
10.000	1.08	1.06	1.10	1.42	2.10	3.02	10.000	1.49	1.29	1.15	10.000	−240.98	−.09
20.000	1.06	1.02	1.08	1.38	2.06	2.99	20.000	1.49	1.29	1.15	20.000	−239.06	−.09
35.151	1.05	1.02	1.08	1.47	2.18	3.14	35.151	1.48	1.29	1.14	35.151	−242.83	−.08
50.000	1.05	1.03	1.09	1.49	2.15	3.11	50.000	1.48	1.29	1.15	50.000	−247.29	−.08
65.303	1.05	1.03	1.09	1.41	2.10	3.06	65.303	1.49	1.29	1.15	65.303	−244.73	−.08
100.000	1.06	1.05	1.09	1.41	2.09	3.00	100.000	1.50	1.30	1.16	100.000	−244.01	−.10
155.758	1.09	1.07	1.11	1.41	2.05	2.94	155.758	1.53	1.33	1.19	155.758	−243.97	−.13
200.000	1.11	1.09	1.12	1.40	2.04	2.88	200.000	1.55	1.35	1.21	200.000	−257.45	−.03
246.212	1.13	1.12	1.14	1.43	2.06	2.96	246.212	1.58	1.38	1.24	246.212	−260.20	−.04
336.667	1.17	1.16	1.18	1.47	2.03	2.80	336.667	1.64	1.43	1.29	336.667	−228.67	+.74
427.121	1.22	1.21	1.22	1.56	2.10	2.89	427.121	1.70	1.50	1.35	427.121	−232.21	+.38
500.000	1.27	1.26	1.27	1.65	2.19	3.00	500.000	1.75	1.55	1.40	500.000	−252.32	+.34
547.727	1.30	1.29	1.30	1.69	2.25	3.06	547.727	1.80	1.59	1.45	547.727	−242.11	+.70
608.030	1.35	1.33	1.34	1.74	2.20	2.93	608.030	1.81	1.61	1.47	608.030	−218.37	+1.19
668.333	1.41	1.39	1.39	1.82	2.32	3.05	668.333	1.84	1.66	1.52	668.333	−193.22	+1.30
758.788	1.52	1.49	1.48	1.93	2.42	3.14	758.788	1.85	1.68	1.55	758.788	−214.92	+2.01
819.091	1.62	1.58	1.57	2.01	2.54	3.24	819.091	1.84	1.69	1.57	819.091	−208.84	+2.92
909.546	1.80	1.75	1.73	2.09	2.63	3.40	909.546	1.81	1.65	1.55	909.546	−192.61	+3.72
1000.000	2.03	1.98	1.94	2.03	2.44	3.20	1000.000	1.75	1.59	1.50	1000.000	−198.10	+3.94

ϕ detection

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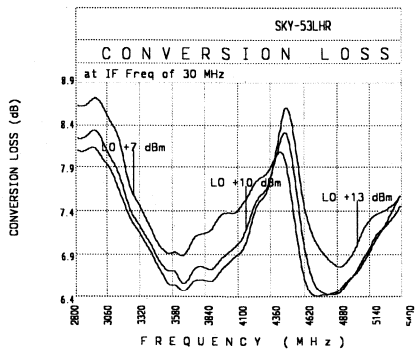
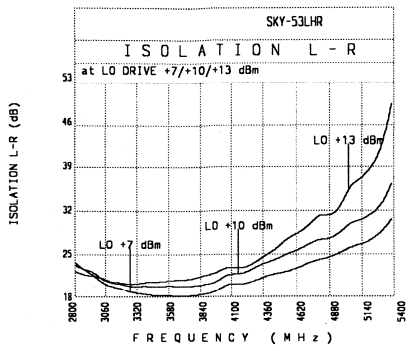
surface mount

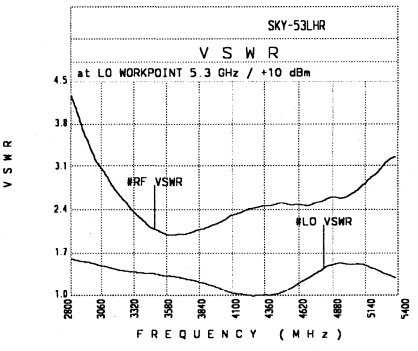
Frequency Mixers

Model
SKY-53LHR

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO + 10 dBm
2800.00	2830.00	8.66	8.29	8.15	2800.00	24.14	23.70	22.75	21.02	17.95	15.24
3000.00	3030.00	8.65	8.25	8.04	3000.00	21.11	21.68	21.82	16.62	15.70	14.07
3224.53	3254.53	7.65	7.40	7.32	3224.53	19.45	20.33	20.65	14.26	14.13	12.96
3413.21	3443.21	7.10	6.93	6.85	3413.21	18.81	20.24	20.96	12.92	13.49	12.59
3601.89	3631.89	6.93	6.61	6.53	3601.89	18.66	20.26	21.27	11.83	12.41	12.05
3649.06	3679.06	6.99	6.65	6.56	3649.06	18.72	20.25	21.31	11.72	12.26	11.90
3837.74	3867.74	7.24	6.78	6.64	3837.74	19.04	20.59	22.10	12.34	12.81	12.50
4000.00	4030.00	7.44	7.03	6.92	4000.00	20.34	22.00	23.21	13.14	13.98	13.85
4120.75	4090.75	7.63	7.32	7.17	4120.75	20.54	22.29	23.14	13.72	14.67	14.88
4215.09	4185.09	7.84	7.66	7.60	4215.09	21.03	23.01	23.81	14.30	15.30	15.70
4356.60	4326.60	8.16	8.19	8.28	4356.60	22.09	24.31	25.66	14.82	15.86	16.59
4498.11	4468.11	7.12	7.63	8.08	4498.11	22.71	25.54	28.03	15.09	16.04	16.94
4639.62	4609.62	6.48	6.58	7.10	4639.62	23.88	26.82	29.80	15.83	16.94	17.92
4781.13	4751.13	6.52	6.51	6.87	4781.13	24.68	27.73	31.60	17.23	18.42	19.56
4828.30	4798.30	6.55	6.51	6.80	4828.30	25.01	28.05	31.66	17.61	18.93	20.11
5000.00	4970.00	6.85	6.90	7.23	5000.00	26.63	30.48	36.67	19.75	20.92	22.12
5111.32	5081.32	7.16	7.21	7.43	5111.32	27.36	31.40	38.51	20.73	21.92	23.33
5158.49	5128.49	7.23	7.24	7.45	5158.49	27.96	31.98	39.68	21.28	22.36	23.75
5252.83	5222.83	7.51	7.40	7.53	5252.83	29.65	34.36	44.65	21.93	23.15	24.42
5300.00	5270.00	7.64	7.52	7.64	5300.00	30.96	36.61	49.31	22.25	23.42	24.63

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	VSWR LO port LO + 7 dBm	LO +10 dBm	LO + 13 dBm	FREQ. MHz	VSWR IF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. MHz	max. DC output mV	DC offset mV
2800.00	4.95	4.30	3.95	2.12	1.64	1.63	1.55	1.89	1.65	1.43	2800.00	321.10	42.10
3000.00	3.60	3.20	3.07	1.92	1.55	1.57	3.30	1.90	1.65	1.43	2931.58	298.72	44.35
3224.53	2.79	2.58	2.59	1.70	1.44	1.51	5.50	1.90	1.65	1.43	3063.16	288.60	38.80
3413.21	2.17	2.14	2.24	1.60	1.40	1.48	7.80	1.90	1.66	1.44	3194.74	263.32	25.10
3601.89	1.84	2.03	2.25	1.48	1.35	1.48	10.00	1.90	1.66	1.44	3326.32	260.51	18.30
3649.06	1.80	2.05	2.30	1.44	1.34	1.51	12.00	1.90	1.66	1.44	3457.89	260.51	42.00
3837.74	1.75	2.13	2.46	1.26	1.24	1.46	34.00	1.91	1.66	1.46	3589.47	246.77	35.39
4000.00	1.85	2.28	2.65	1.18	1.10	1.36	56.00	1.91	1.67	1.45	3721.05	223.82	26.14
4120.75	1.96	2.39	2.78	1.19	1.05	1.32	78.00	1.91	1.66	1.44	3852.63	210.14	27.11
4215.09	2.07	2.46	2.85	1.21	1.02	1.30	100.00	1.92	1.68	1.46	3984.21	236.24	29.94
4356.60	2.14	2.50	2.80	1.25	1.03	1.34	150.00	1.93	1.69	1.48	4115.79	226.99	29.17
4498.11	2.18	2.51	2.78	1.28	1.16	1.45	188.90	1.97	1.67	1.51	4247.37	188.11	18.09
4639.62	2.21	2.49	2.74	1.38	1.33	1.57	227.80	1.96	1.73	1.51	4378.95	152.93	25.89
4781.13	2.32	2.62	2.87	1.71	1.54	1.69	266.70	1.97	1.74	1.53	4510.53	179.06	20.74
4828.30	2.41	2.67	2.92	1.75	1.54	1.64	305.60	1.99	1.76	1.54	4642.11	161.17	15.21
5000.00	2.49	2.74	2.98	1.95	1.56	1.46	344.40	2.01	1.78	1.57	4773.68	114.03	8.96
5111.32	2.73	2.97	3.22	1.90	1.49	1.32	383.30	2.03	1.81	1.60	4905.26	105.78	4.41
5158.49	2.79	3.02	3.27	1.92	1.47	1.31	422.20	2.04	1.82	1.61	5036.84	122.75	5.07
5252.83	3.04	3.27	3.52	1.82	1.38	1.27	461.10	2.08	1.86	1.65	5168.42	74.27	-2.22
5300.00	3.05	3.30	3.54	1.73	1.33	1.27	500.00	2.09	1.88	1.67	5300.00	27.52	-5.97

most widely used

Frequency Mixers

Model LMX-124

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.500	30.50	6.54	6.23	5.94	>64.00	>67.00	>70.00	>64.00	62.90	63.65
2.000	32.00	5.76	5.49	5.26	42.99	41.87	40.94	41.12	40.14	39.23
10.000	40.00	5.58	5.34	5.23	39.95	38.99	38.01	37.90	36.96	36.04
20.000	50.00	5.58	5.34	5.22	39.78	38.83	37.85	37.72	36.80	35.86
32.726	62.73	5.49	5.27	5.17	37.92	36.90	36.00	35.69	34.76	33.91
48.839	78.84	5.40	5.21	5.12	36.21	35.12	34.31	33.75	32.93	32.15
50.000	80.00	5.42	5.22	5.12	34.88	33.77	32.87	32.33	31.58	30.93
97.178	67.18	5.24	5.11	4.98	34.59	33.51	32.71	31.97	31.32	30.63
129.400	99.40	5.26	5.14	5.02	34.10	33.22	32.34	32.08	31.14	30.52
145.520	115.52	5.32	5.16	5.05	33.31	32.33	31.47	30.97	30.11	29.57
161.630	131.63	5.34	5.21	5.09	32.49	31.51	30.65	29.88	29.16	28.69
193.860	163.86	5.46	5.34	5.18	31.89	30.87	29.96	28.98	28.35	27.87
209.970	179.97	5.46	5.30	5.15	31.35	30.33	29.35	28.18	27.72	27.21
226.080	196.08	5.46	5.30	5.11	30.90	29.76	28.77	27.36	26.99	26.46
242.200	212.20	5.41	5.26	5.07	30.57	29.41	28.44	26.66	26.35	25.92
290.530	260.53	5.38	5.25	5.13	29.37	28.19	27.19	25.01	25.01	24.68
322.760	292.76	5.46	5.25	5.15	29.02	27.39	26.01	22.59	22.67	22.38
354.990	324.99	5.70	5.45	5.30	28.98	26.98	25.54	21.01	21.17	20.79
435.550	405.55	5.74	5.46	5.25	26.20	25.58	24.77	20.61	21.09	20.62
500.000	470.00	5.90	5.61	5.39	25.41	25.00	24.33	19.87	20.64	20.39

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.19	1.13	1.12	1.69	2.58	4.03	1.49	1.34	1.20
19.559	1.18	1.09	1.04	1.62	2.43	3.75	1.50	1.34	1.20
34.118	1.18	1.09	1.02	1.67	2.54	3.83	1.49	1.34	1.20
48.676	1.18	1.09	1.02	1.70	2.55	3.78	1.49	1.34	1.20
50.000	1.18	1.09	1.02	1.70	2.52	3.78	1.49	1.34	1.20
63.235	1.18	1.09	1.02	1.64	2.41	3.62	1.49	1.34	1.20
92.353	1.17	1.08	1.01	1.61	2.37	3.42	1.50	1.35	1.21
100.000	1.17	1.08	1.01	1.61	2.30	3.30	1.50	1.35	1.21
106.910	1.17	1.08	1.01	1.59	2.29	3.32	1.50	1.35	1.22
136.030	1.16	1.07	1.02	1.63	2.34	3.35	1.52	1.37	1.23
150.590	1.15	1.07	1.03	1.60	2.27	3.28	1.52	1.37	1.24
165.150	1.15	1.07	1.03	1.61	2.27	3.21	1.52	1.38	1.25
179.710	1.14	1.07	1.04	1.63	2.33	3.26	1.53	1.39	1.26
194.260	1.14	1.07	1.05	1.62	2.32	3.24	1.55	1.40	1.27
208.820	1.14	1.07	1.06	1.62	2.31	3.16	1.56	1.40	1.28
252.500	1.13	1.08	1.08	1.62	2.30	3.12	1.58	1.43	1.31
325.290	1.14	1.13	1.14	1.71	2.37	3.17	1.64	1.48	1.36
398.090	1.21	1.21	1.23	1.77	2.45	3.30	1.72	1.55	1.44
470.880	1.31	1.32	1.33	1.89	2.58	3.38	1.77	1.61	1.51
500.000	1.36	1.37	1.37	1.95	2.62	3.42	1.78	1.63	1.53

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.500	−229.03	+.18
33.194	−234.57	+.25
49.291	−236.63	+.28
50.000	−236.67	+.28
65.388	−236.60	+.31
81.485	−238.53	+.36
97.582	−240.55	+.46
100.000	−239.82	+.48
113.680	−237.49	+.47
129.780	−238.21	+.63
145.870	−237.45	+.61
161.970	−237.09	+.86
178.070	−235.20	+.97
194.160	−235.50	+.84
210.260	−237.19	+.83
258.550	−237.60	+1.46
322.940	−219.78	+2.48
403.430	−212.29	+2.18
467.810	−219.35	+2.68
500.000	−217.66	+2.55

Measurements at RF & LO Power +7 dBm

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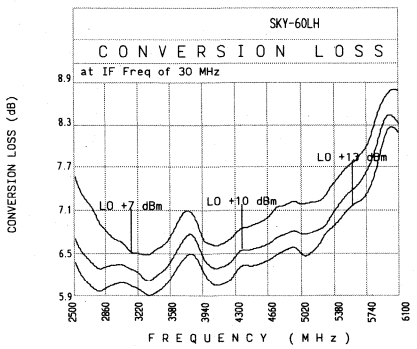
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

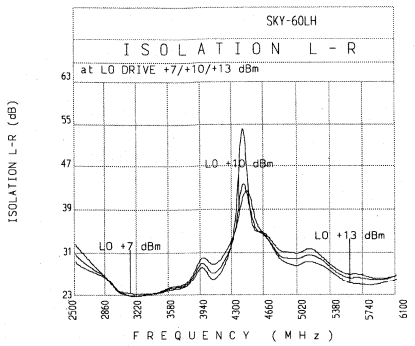
surface mount

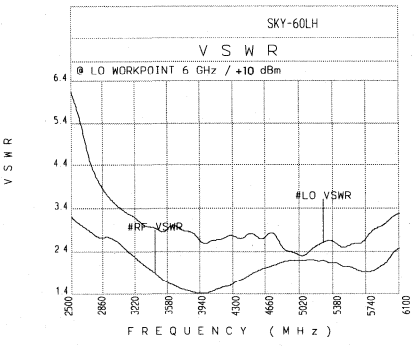
Frequency Mixers

Model
SKY-60LH

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
2500.00	2530.00	7.60	6.75	6.43	2500.00	32.94	31.14	29.80	12.64	15.39	16.85
2698.11	2728.11	7.16	6.40	6.06	2698.11	29.20	28.43	27.86	12.52	13.78	14.19
2896.23	2926.23	6.76	6.39	6.11	2896.23	25.57	25.62	25.98	11.48	12.30	12.55
3000.00	3030.00	6.72	6.41	6.16	3000.00	24.11	23.82	23.96	11.00	11.69	11.85
3292.45	3322.45	6.52	6.15	5.95	3292.45	23.71	23.74	23.63	10.70	11.01	10.99
3490.57	3520.57	6.70	6.36	6.13	3490.57	24.23	24.42	24.58	10.73	10.80	10.67
3688.68	3718.68	7.15	6.77	6.50	3688.68	24.80	24.98	25.24	11.04	10.92	10.68
3886.79	3916.79	6.70	6.47	6.29	3886.79	29.35	30.09	30.91	12.01	11.70	11.38
3952.83	3982.83	6.70	6.39	6.17	3952.83	27.47	28.51	29.98	12.81	12.36	11.94
4000.00	4030.00	6.65	6.34	6.10	4000.00	26.04	27.18	28.94	13.39	12.87	12.38
4283.02	4253.02	6.91	6.61	6.39	4283.02	37.49	36.12	35.90	16.05	15.17	14.49
4547.17	4517.17	7.01	6.66	6.44	4547.17	35.32	35.01	35.25	17.71	16.57	15.63
4811.32	4781.32	7.24	6.84	6.62	4811.32	31.47	30.37	29.55	19.78	18.35	17.37
4943.40	4913.40	7.21	6.81	6.54	4943.40	31.17	30.11	28.90	20.68	19.22	18.28
5000.00	4970.00	7.24	6.81	6.50	5000.00	31.62	30.68	29.64	21.18	19.73	18.78
5273.58	5243.58	7.49	7.08	6.90	5273.58	29.39	28.95	28.27	23.08	21.54	20.53
5537.74	5507.74	7.82	7.46	7.25	5537.74	27.45	26.73	25.59	24.44	22.47	21.23
5801.89	5771.89	8.57	8.23	7.93	5801.89	26.58	26.31	25.51	25.79	23.54	22.07
5867.92	5837.92	8.72	8.45	8.25	5867.92	26.60	26.43	25.82	26.32	23.92	22.39
6000.00	5970.00	8.78	8.33	8.20	6000.00	27.08	27.22	26.45	26.85	24.32	22.69

mixer VSWR

FREQ. MHz	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
2500.00	3.97	3.22	2.64	7.41	6.15	6.89	2.17	1.02	1.34	1.66
2698.11	3.67	2.90	2.35	4.63	4.50	4.86	13.30	1.01	1.33	1.65
2896.23	3.52	2.77	2.20	3.48	3.69	4.19	25.50	1.02	1.33	1.64
3000.00	3.34	2.65	2.12	3.03	3.46	4.01	37.80	1.02	1.33	1.65
3292.45	2.43	2.08	1.77	2.33	3.00	3.64	50.00	1.02	1.32	1.64
3490.57	1.98	1.72	1.49	2.17	2.81	3.35	70.00	1.03	1.32	1.63
3688.68	1.74	1.51	1.32	2.23	2.89	3.48	177.50	1.09	1.30	1.59
3886.79	1.63	1.42	1.25	2.02	2.63	3.23	285.00	1.15	1.28	1.52
3952.83	1.61	1.42	1.29	1.98	2.56	3.14	392.50	1.19	1.28	1.47
4000.00	1.62	1.45	1.35	2.04	2.68	3.34	500.00	1.20	1.26	1.42
4283.02	1.87	1.73	1.66	2.22	2.72	3.32	600.00	1.16	1.22	1.38
4547.17	2.18	2.00	1.89	2.32	2.64	3.05	700.00	1.12	1.18	1.33
4811.32	2.39	2.20	2.03	2.10	2.40	2.80	800.00	1.09	1.14	1.29
4943.40	2.50	2.21	1.99	1.94	2.32	2.80	900.00	1.07	1.12	1.26
5000.00	2.47	2.19	1.96	1.92	2.29	2.75	1000.00	1.11	1.14	1.25
5273.58	2.38	2.12	1.89	2.52	2.69	3.03	1100.00	1.18	1.18	1.27
5537.74	2.18	2.00	1.84	2.62	2.61	2.92	1200.00	1.23	1.21	1.28
5801.89	2.39	2.08	1.94	3.02	2.98	3.22	1300.00	1.28	1.25	1.28
5867.92	2.49	2.14	1.96	3.24	3.09	3.29	1400.00	1.33	1.28	1.29
6000.00	2.83	2.49	2.26	3.68	3.30	3.34	1500.00	1.36	1.30	1.28

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
2500.00	295.29	30.92
2684.21	303.60	43.79
2868.42	276.29	30.03
3052.63	271.88	31.76
3236.84	241.55	68.09
3421.05	238.19	26.44
3605.26	230.32	27.76
3789.47	235.54	27.47
3973.68	224.00	10.23
4157.89	189.42	17.31
4342.11	181.74	15.88
4526.32	197.68	19.22
4710.53	189.64	26.42
4894.74	120.43	26.83
5078.95	99.81	23.31
5263.16	110.69	29.49
5447.37	87.50	29.99
5631.58	56.98	30.58
5815.79	35.95	29.14
6000.00	33.25	31.56

most widely used

Frequency Mixers

Model LMX-149

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
10.000	40.00	5.89	5.55	5.41	>64.00	>67.00	65.32	>64.00	>67.00	63.75
20.000	50.00	5.95	5.61	5.44	>64.00	61.11	59.59	>64.00	60.03	57.97
145.460	115.46	5.91	5.65	5.54	46.30	45.23	44.11	43.97	43.22	42.55
190.610	160.61	5.96	5.73	5.59	44.52	43.11	42.04	41.83	41.33	40.63
235.760	205.76	6.02	5.77	5.60	43.17	41.70	40.64	40.40	39.99	39.28
326.060	296.06	5.90	5.68	5.53	40.97	39.51	38.56	38.24	37.88	37.22
416.370	386.37	6.16	5.87	5.68	39.24	38.05	37.23	36.16	35.93	35.42
500.000	470.00	6.08	5.77	5.56	38.09	37.27	36.67	34.53	34.64	34.58
551.820	521.82	6.07	5.79	5.59	37.37	36.73	36.21	33.54	33.59	33.31
642.130	612.13	6.19	5.89	5.65	36.82	36.47	36.12	31.91	32.22	32.16
732.430	702.80	6.45	6.08	5.81	36.84	36.95	36.72	30.54	31.31	31.41
822.740	792.70	6.68	6.26	5.93	36.79	37.11	37.31	29.09	30.08	31.12
913.040	883.29	7.15	6.56	6.16	36.95	37.23	37.48	28.48	29.21	29.70
1000.000	970.34	7.56	6.94	6.51	37.46	37.62	37.85	28.37	29.13	29.91
1048.500	1018.60	7.69	7.22	6.77	37.82	37.95	38.16	28.37	29.28	30.01
1138.800	1109.10	7.70	7.23	6.81	38.26	38.76	38.91	28.14	29.11	29.84
1229.100	1199.10	7.74	7.24	6.82	38.48	38.98	40.10	27.99	28.99	29.66
1319.400	1289.50	7.85	7.39	7.02	38.45	38.85	38.99	28.16	28.92	29.66
1409.700	1380.00	7.99	7.38	7.05	38.49	38.89	40.01	27.64	28.88	30.18
1500.000	1469.90	8.14	7.40	7.15	39.62	40.12	40.31	28.87	29.62	30.97

mixer VSWR

freq.	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
MHz									
10.000	1.25	1.16	1.11	1.83	2.77	3.83	1.81	1.54	1.38
50.000	1.20	1.10	1.03	1.89	2.94	4.19	1.78	1.53	1.38
100.000	1.20	1.10	1.04	1.75	2.68	3.70	1.76	1.52	1.37
145.450	1.20	1.11	1.06	1.77	2.62	3.52	1.73	1.52	1.37
200.000	1.21	1.13	1.09	1.76	2.59	3.54	1.72	1.53	1.38
280.910	1.23	1.17	1.14	1.83	2.54	3.50	1.69	1.52	1.40
371.210	1.27	1.22	1.20	1.88	2.63	3.45	1.67	1.54	1.45
461.520	1.31	1.30	1.28	2.00	2.83	3.56	1.65	1.55	1.50
506.670	1.33	1.34	1.32	2.05	2.74	3.58	1.66	1.58	1.54
596.970	1.39	1.41	1.40	2.21	2.80	3.67	1.65	1.62	1.60
687.270	1.49	1.53	1.52	2.36	3.19	3.98	1.71	1.69	1.70
777.580	1.62	1.66	1.66	2.55	3.30	4.11	1.76	1.76	1.75
867.880	1.77	1.83	1.79	2.76	3.65	4.32	1.82	1.84	1.80
958.180	1.97	2.03	2.00	3.03	3.80	4.46	1.88	1.92	1.87
1003.300	2.08	2.17	2.12	3.11	3.93	4.39	1.91	1.96	1.92
1093.600	2.36	2.41	2.38	3.42	4.20	4.79	1.92	1.98	1.94
1183.900	2.52	2.63	2.58	3.55	4.18	4.72	1.88	1.95	1.92
1274.200	2.68	2.95	2.81	3.65	4.32	4.73	1.82	1.90	1.86
1364.500	2.84	3.22	2.92	3.90	3.99	4.54	1.76	1.82	1.76
1500.000	3.05	3.43	3.09	4.28	3.48	4.32	1.69	1.72	1.64

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
10.000	+229.95	−.08
20.000	+229.43	−.08
48.038	+224.97	−.09
50.000	+224.87	−.09
100.000	+226.50	−.09
162.150	+228.65	−.12
200.190	+226.29	−.16
276.270	+233.99	−.27
390.380	+206.62	−.53
466.460	+210.33	−.51
504.490	+212.98	−.58
580.570	+217.20	−.89
656.650	+205.91	−1.08
770.760	+189.65	−1.47
808.800	+188.14	−1.63
884.870	+193.87	−2.09
960.950	+181.62	−2.31
1000.000	+177.67	−2.13
1250.000	+156.89	−2.29
1500.000	+152.38	−2.17

Measurements at RF & LO Power +7 dBm

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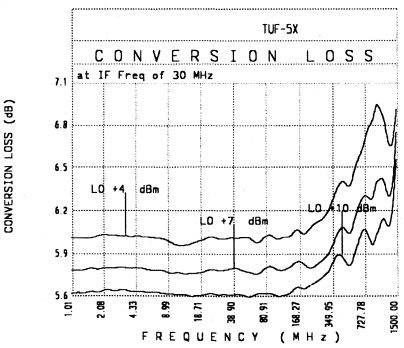
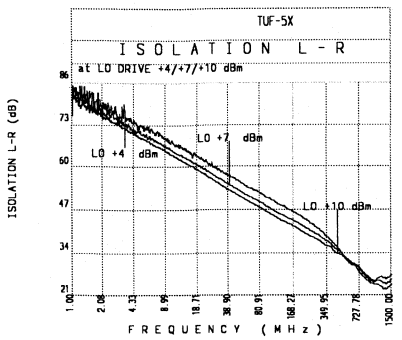
broadband high dynamic range

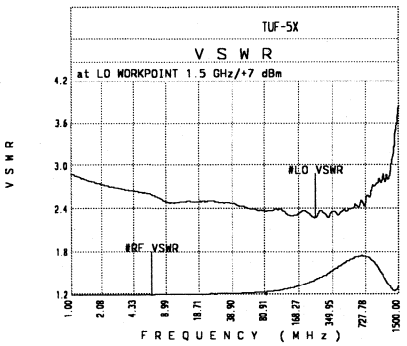
Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
ZFM-5X
ZP-5X
TUF-5X/SM







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1.01	31.01	6.03	5.81	5.64	1.00	74.57	76.49	78.05	69.41	72.03	75.32
2.13	32.13	6.06	5.83	5.67	2.13	78.01	74.70	74.05	70.36	73.03	73.50
10.96	40.96	5.98	5.80	5.63	10.96	65.44	63.50	62.16	68.35	69.26	69.76
56.50	86.50	6.04	5.80	5.61	56.50	53.65	50.82	49.20	60.42	61.44	61.68
160.38	130.38	6.12	5.88	5.70	160.38	45.87	43.16	41.46	54.23	54.92	55.36
216.07	186.07	6.10	5.81	5.70	216.07	43.24	40.68	38.94	52.60	53.11	53.54
250.80	220.80	6.15	5.85	5.73	250.80	41.87	39.60	37.95	52.13	53.11	53.38
337.90	307.90	6.24	5.93	5.81	337.90	38.48	36.86	35.29	51.11	51.90	52.61
455.25	425.25	6.47	6.15	5.91	455.25	34.17	33.77	32.74	49.67	50.56	51.40
528.42	498.42	6.34	6.01	5.80	528.42	31.74	31.68	31.38	48.91	49.21	49.45
613.35	583.35	6.58	6.23	5.97	613.35	30.06	30.05	29.51	50.28	50.49	50.14
750.00	720.00	6.75	6.34	6.10	750.00	26.78	27.83	28.16	50.90	48.82	47.76
826.36	796.36	6.83	6.30	6.02	826.36	25.33	26.21	26.74	51.34	49.29	47.60
900.00	870.00	6.85	6.30	5.96	900.00	24.45	25.22	25.84	50.34	49.14	47.75
1000.00	970.00	6.96	6.43	6.07	1000.00	23.68	24.31	24.65	50.30	49.77	49.10
1200.00	1170.00	6.79	6.37	6.13	1200.00	22.57	24.48	25.95	41.98	44.45	48.27
1292.29	1262.29	6.65	6.29	6.09	1292.29	22.17	24.10	25.65	39.70	42.55	46.01
1400.00	1370.00	6.70	6.43	6.27	1400.00	22.54	24.34	25.85	38.81	41.19	44.02
1450.00	1420.00	6.81	6.56	6.42	1450.00	22.58	24.29	25.74	37.96	40.04	42.31
1500.00	1470.00	6.93	6.77	6.58	1500.00	23.56	25.14	26.45	38.23	40.04	41.93

mixer VSWR

FREQ. MHz	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. MHz	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
1.00	1.36	1.25	1.16	2.17	2.94	4.03	1.00	1.67	1.69	1.71
2.13	1.36	1.25	1.16	1.97	2.78	3.89	63.30	1.06	1.05	1.11
10.96	1.37	1.26	1.17	1.74	2.54	3.60	125.50	1.11	1.08	1.11
56.50	1.39	1.28	1.20	1.69	2.46	3.46	187.80	1.13	1.09	1.12
160.38	1.45	1.37	1.31	1.63	2.37	3.32	250.00	1.17	1.14	1.17
216.07	1.50	1.43	1.40	1.65	2.38	3.31	300.00	1.24	1.21	1.21
250.80	1.54	1.48	1.45	1.65	2.36	3.27	350.00	1.26	1.22	1.22
337.90	1.62	1.58	1.56	1.67	2.37	3.27	400.00	1.34	1.30	1.28
455.25	1.73	1.70	1.69	1.76	2.44	3.33	450.00	1.39	1.34	1.32
528.42	1.78	1.75	1.75	1.79	2.45	3.29	500.00	1.46	1.40	1.37
613.35	1.81	1.78	1.78	1.86	2.49	3.32	550.00	1.53	1.48	1.44
750.00	1.80	1.78	1.78	2.02	2.64	3.48	600.00	1.63	1.57	1.53
826.36	1.77	1.75	1.75	2.09	2.69	3.48	650.00	1.68	1.62	1.58
900.00	1.72	1.69	1.70	2.18	2.79	3.58	700.00	1.82	1.77	1.72
1000.00	1.61	1.59	1.60	2.26	2.85	3.65	750.00	1.88	1.82	1.78
1200.00	1.39	1.40	1.45	2.35	2.84	3.60	800.00	2.00	1.96	1.92
1292.29	1.30	1.34	1.41	2.63	3.11	3.87	850.00	2.11	2.07	2.03
1400.00	1.21	1.31	1.42	3.19	3.52	4.20	900.00	2.20	2.18	2.16
1450.00	1.19	1.32	1.44	3.49	3.68	4.29	950.00	2.33	2.32	2.30
1500.00	1.22	1.38	1.50	3.81	3.90	4.45	1000.00	2.43	2.43	2.42

ϕ detection

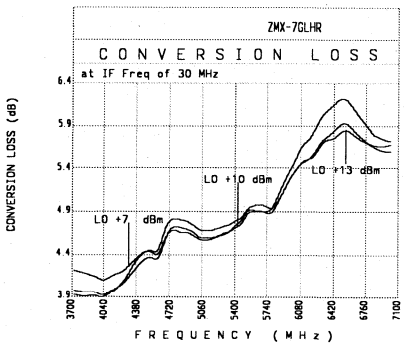
FREQ. MHz	max. DC output mV	DC offset mV
1200.00	-199.20	3.64
1160.00	-191.67	3.06
1080.00	-197.58	2.53
1000.00	-194.18	1.98
920.00	-185.96	1.16
840.00	-187.15	0.57
760.00	-208.88	0.84
680.00	-224.36	0.95
600.00	-206.20	0.41
500.00	-202.26	0.29
440.00	-218.02	0.22
360.00	-230.33	0.22
280.00	-247.83	0.11
200.00	-224.34	0.16
125.00	-233.57	0.17
100.00	-231.59	0.17
50.00	-236.59	0.19
20.00	-232.98	0.18
10.00	-228.19	0.18
5.00	-217.58	0.19

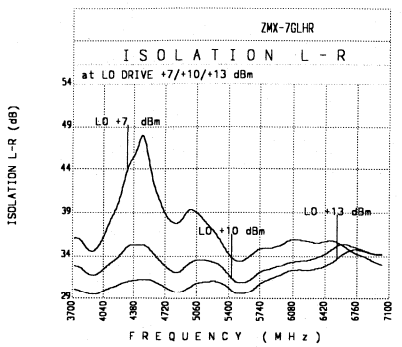
coaxial

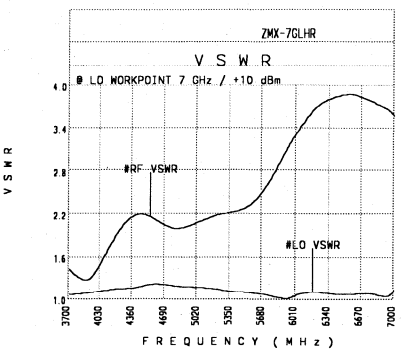
Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
ZMX-7GLHR







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	Isolation L-I (dB) LO + 7 dBm	LO + 10 dBm	LO + 13 dBm
3700.00	3730.00	4.23	3.99	3.94	3700.00	36.24	32.98	30.26	27.98	27.03	26.38
3886.79	3916.79	4.17	3.98	3.94	3886.79	34.45	31.80	29.61	28.49	28.45	28.17
4000.00	4030.00	4.10	3.92	3.90	4000.00	36.03	32.48	30.01	28.62	28.87	29.06
4198.11	4228.11	4.20	4.06	4.07	4198.11	41.01	34.29	30.89	29.76	30.39	30.94
4384.91	4414.91	4.41	4.31	4.40	4384.91	46.30	35.39	31.33	29.82	30.87	31.81
4571.70	4601.70	4.38	4.33	4.42	4571.70	41.94	34.22	31.12	30.10	31.36	32.54
4758.49	4788.49	4.70	4.75	4.83	4758.49	38.06	32.35	30.01	30.52	31.67	32.93
5000.00	4970.00	4.59	4.61	4.70	5000.00	39.39	33.65	30.85	32.28	33.33	34.15
5194.34	5164.34	4.63	4.63	4.72	5194.34	37.22	33.47	31.22	33.39	34.18	34.67
5381.13	5351.13	4.77	4.74	4.82	5381.13	34.12	31.77	30.32	33.82	34.40	34.64
5567.92	5537.92	4.93	4.92	4.99	5567.92	33.89	31.07	29.77	34.06	34.26	34.29
5754.72	5724.72	4.93	4.88	4.94	5754.72	35.10	32.53	31.18	34.60	34.46	34.21
5941.51	5911.51	5.39	5.30	5.29	5941.51	35.38	32.98	31.98	34.95	34.47	33.95
6000.00	5970.00	5.49	5.39	5.39	6000.00	35.94	33.39	32.39	35.07	34.42	33.93
6190.57	6160.57	5.82	5.57	5.54	6190.57	35.95	33.62	32.49	35.38	34.18	33.32
6377.36	6347.36	6.13	5.82	5.75	6377.36	35.74	34.18	32.78	35.37	33.86	32.83
6564.15	6534.15	6.20	5.93	5.86	6564.15	35.55	35.55	34.20	34.91	33.39	32.39
6750.94	6720.94	5.92	5.72	5.72	6750.94	34.30	35.04	34.91	34.36	32.76	31.76
6937.74	6907.74	5.75	5.62	5.68	6937.74	33.38	34.39	34.28	33.51	32.13	31.14
7000.00	6970.00	5.74	5.62	5.70	7000.00	33.13	34.32	34.37	33.32	32.02	31.09

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	VSWR IF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. MHz	VSWR IF port LO + 7 dBm	LO + 10 dBm	LO + 13 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	1.88	1.50	1.27	1.95	1.14	1.41	0.03	1.51	1.78	2.08	3700.00	214.45	-8.27
3886.79	1.59	1.27	1.13	1.90	1.16	1.27	2.50	1.49	1.77	2.07	3873.68	186.26	-10.99
4000.00	1.66	1.51	1.49	1.95	1.19	1.26	5.00	1.50	1.77	2.06	4047.37	166.80	-12.02
4198.11	1.93	2.05	2.17	2.07	1.23	1.26	7.50	1.50	1.77	2.06	4221.05	202.86	-10.64
4384.91	2.07	2.33	2.56	2.07	1.23	1.25	10.00	1.49	1.77	2.06	4394.74	172.78	-13.73
4571.70	1.93	2.22	2.50	2.24	1.31	1.30	20.00	1.49	1.77	2.06	4568.42	162.14	-15.03
4758.49	1.84	2.02	2.28	2.01	1.26	1.34	65.00	1.49	1.76	2.05	4742.11	166.82	-13.11
5000.00	2.12	2.15	2.25	1.98	1.25	1.36	110.00	1.48	1.74	2.03	4915.79	139.81	-11.91
5194.34	2.34	2.27	2.28	1.98	1.23	1.44	155.00	1.48	1.74	2.02	5089.47	115.20	-12.96
5381.13	2.43	2.30	2.24	1.83	1.18	1.48	200.00	1.46	1.72	2.00	5263.16	143.28	-14.32
5567.92	2.57	2.39	2.27	1.81	1.18	1.49	300.00	1.44	1.69	1.96	5436.84	73.18	-13.69
5754.72	2.98	2.75	2.59	1.62	1.13	1.50	433.30	1.43	1.67	1.93	5610.53	84.03	-13.84
5941.51	3.53	3.27	3.08	1.64	1.07	1.51	566.70	1.38	1.60	1.85	5784.21	68.34	-13.08
6000.00	3.65	3.38	3.19	1.64	1.15	1.56	700.00	1.32	1.53	1.77	5957.89	35.43	-14.49
6190.57	4.06	3.79	3.53	1.54	1.20	1.62	833.30	1.26	1.46	1.68	6131.58	35.75	-14.95
6377.36	4.20	3.91	3.68	1.36	1.15	1.65	966.70	1.18	1.35	1.56	6305.26	12.44	-15.78
6564.15	4.39	3.98	3.69	1.34	1.14	1.64	1100.00	1.11	1.22	1.41	6478.95	-5.18	-18.55
6750.94	4.26	3.86	3.57	1.45	1.18	1.55	1233.30	1.15	1.13	1.26	6652.63	-1.65	-21.02
6937.74	4.28	3.74	3.39	1.65	1.08	1.39	1366.70	1.30	1.15	1.13	6826.32	-53.64	-21.49
7000.00	4.06	3.64	3.21	1.51	1.21	1.69	1500.00	1.51	1.33	1.17	7000.00	-49.18	-20.36

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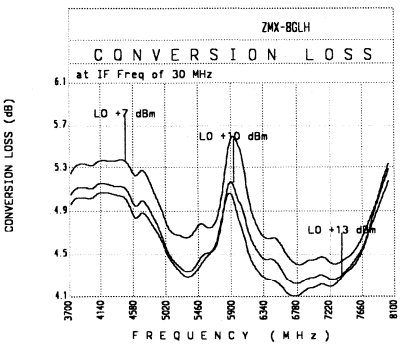
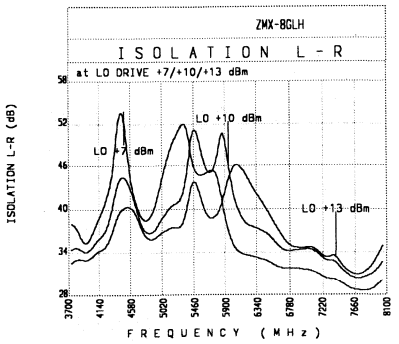
coaxial

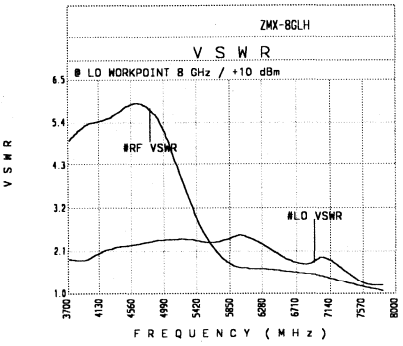
Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
ZMX-8GLH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
3700.00	3730.00	5.27	5.07	4.98	3700.00	38.23	34.59	32.72	11.05	10.57	10.15
3918.64	3948.64	5.36	5.14	5.04	3918.64	35.11	34.05	33.03	11.93	11.06	10.54
4000.00	4030.00	5.33	5.12	5.03	4000.00	36.93	34.96	33.61	12.33	11.46	10.85
4283.05	4313.05	5.38	5.15	5.07	4283.05	45.13	40.84	37.32	13.56	12.40	11.70
4574.58	4604.58	5.21	4.92	4.81	4574.58	41.81	41.61	40.17	14.50	13.36	12.56
4866.10	4896.10	5.02	4.80	4.72	4866.10	40.50	37.25	36.14	15.96	14.74	13.94
5000.00	4970.00	4.77	4.54	4.51	5000.00	46.03	39.42	37.13	16.54	15.24	14.37
5303.39	5273.39	4.67	4.35	4.30	5303.39	52.48	44.52	39.76	17.31	16.07	15.18
5594.92	5564.92	4.76	4.53	4.53	5594.92	45.38	45.25	39.11	17.85	16.55	15.69
5886.44	5856.44	5.67	5.22	5.08	5886.44	37.42	47.16	44.34	18.11	17.07	16.33
6000.00	5970.00	5.50	5.01	4.79	6000.00	34.55	40.82	46.73	18.15	17.08	16.36
6323.73	6293.73	4.66	4.46	4.29	6323.73	33.34	37.37	41.81	18.26	17.40	16.79
6615.25	6585.25	4.51	4.28	4.15	6615.25	32.02	34.74	36.78	18.14	17.53	17.04
6906.78	6876.78	4.47	4.30	4.20	6906.78	31.82	34.56	34.76	18.26	17.94	17.57
7000.00	6970.00	4.46	4.29	4.20	7000.00	31.74	34.69	34.93	18.47	18.21	17.88
7271.19	7241.19	4.42	4.28	4.23	7271.19	30.43	32.95	33.45	18.54	18.54	18.38
7562.71	7532.71	4.58	4.48	4.44	7562.71	29.03	30.79	31.34	18.52	18.69	18.83
7854.24	7824.24	5.03	4.94	5.02	7854.24	28.93	31.13	32.32	19.08	19.25	19.59
7927.12	7897.12	5.23	5.07	5.17	7927.12	29.52	31.80	33.47	19.41	19.44	19.87
8000.00	7970.00	5.36	5.20	5.31	8000.00	30.22	32.79	35.05	19.53	19.74	20.09

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	5.78	5.02	4.35	1.36	1.98	2.67	0.03	1.26	1.08	1.04	3700.00	201.50	15.74
3918.64	6.27	5.42	4.66	1.34	1.90	2.51	2.50	1.27	1.09	1.03	3926.32	168.68	18.38
4000.00	6.39	5.47	4.71	1.39	2.04	2.67	5.00	1.27	1.09	1.03	4152.63	144.60	18.89
4283.05	6.75	5.55	4.80	1.62	2.28	2.93	7.50	1.27	1.09	1.03	4378.95	123.28	14.47
4574.58	7.66	6.15	5.05	1.76	2.32	2.93	10.00	1.27	1.09	1.03	4605.26	110.67	15.85
4866.10	6.88	5.69	4.73	2.07	2.46	3.01	20.00	1.27	1.09	1.03	4831.58	98.31	15.50
5000.00	5.89	5.09	4.26	2.24	2.46	3.01	65.00	1.28	1.10	1.04	5057.89	95.51	15.63
5303.39	3.74	3.30	2.88	2.36	2.51	2.86	110.00	1.28	1.10	1.05	5284.21	79.27	14.91
5594.92	2.49	2.15	1.91	2.51	2.32	2.56	155.00	1.28	1.11	1.06	5510.53	47.87	16.20
5886.44	2.09	1.77	1.56	2.93	2.56	2.80	200.00	1.29	1.12	1.07	5736.84	25.58	13.40
6000.00	2.05	1.74	1.53	3.35	2.61	2.56	300.00	1.29	1.14	1.11	5963.16	-8.67	16.07
6323.73	2.02	1.73	1.53	2.93	2.28	2.01	488.90	1.35	1.22	1.19	6189.47	-21.63	16.56
6615.25	1.89	1.64	1.48	2.67	1.87	1.74	677.80	1.42	1.31	1.28	6415.79	-42.40	15.93
6906.78	1.81	1.59	1.45	2.41	1.81	1.88	866.70	1.53	1.44	1.41	6642.11	-53.90	15.95
7000.00	1.75	1.55	1.42	2.86	2.13	2.21	1055.60	1.67	1.58	1.54	6868.42	-67.50	16.45
7271.19	1.58	1.40	1.31	2.46	1.76	1.67	1244.40	1.78	1.70	1.66	7094.74	-85.44	16.25
7562.71	1.37	1.25	1.22	1.76	1.27	1.28	1433.30	1.94	1.83	1.77	7321.05	-95.10	12.36
7854.24	1.20	1.13	1.18	2.10	1.29	1.17	1622.20	2.05	1.90	1.82	7547.37	-125.81	15.92
7927.12	1.16	1.10	1.17	1.98	1.27	1.16	1811.10	2.19	2.01	1.89	7773.68	-165.12	10.46
8000.00	1.14	1.08	1.15	2.01	1.28	1.13	2000.00	2.31	2.06	1.89	8000.00	-197.39	-5.52

most widely used

Frequency Mixers

Model TAK-5

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.010	30.01	7.28	7.11	6.93	56.97	58.08	57.43	52.65	53.36	52.26
.200	30.20	4.89	4.71	4.57	58.23	59.34	59.43	51.70	52.17	51.68
1.000	31.00	4.71	4.56	4.42	58.08	59.46	59.35	51.73	51.84	51.63
5.000	35.00	4.87	4.60	4.47	57.90	59.26	59.05	51.61	51.76	51.55
19.240	49.24	4.85	4.71	4.59	56.84	56.47	56.67	51.69	52.25	51.97
28.855	58.86	4.79	4.65	4.53	55.16	54.43	53.81	51.50	52.12	51.71
48.085	78.09	4.76	4.63	4.51	50.43	50.19	50.28	49.40	50.36	50.77
67.315	97.32	4.72	4.60	4.53	47.21	47.74	47.74	46.37	48.07	48.94
86.545	56.55	4.65	4.59	4.50	43.70	44.68	45.60	43.38	45.40	46.91
100.000	70.00	4.72	4.63	4.56	42.85	43.92	44.75	41.42	43.20	44.52
115.390	85.39	4.82	4.75	4.75	41.68	43.05	44.47	40.17	42.22	44.18
134.620	104.62	4.96	4.85	4.75	37.26	38.26	39.58	38.65	40.16	41.69
144.240	114.24	5.10	5.02	4.88	36.69	37.90	39.26	37.73	39.27	40.59
163.470	133.47	5.25	5.14	5.10	36.21	38.05	39.74	36.23	37.81	39.07
182.700	152.70	5.35	5.30	5.26	36.79	38.71	39.42	34.35	34.70	34.66
200.000	170.00	5.52	5.38	5.30	38.74	39.71	39.63	33.89	33.53	33.11
221.160	191.16	5.65	5.36	5.16	41.33	40.42	39.12	33.81	32.38	31.11
230.770	200.77	5.73	5.32	5.04	42.79	40.93	38.79	33.73	31.70	29.71
240.390	210.39	5.96	5.38	5.07	42.40	40.98	38.11	33.46	31.63	28.69
250.000	220.00	6.33	5.61	5.19	41.37	40.47	38.66	32.96	31.55	28.79

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.19	1.07	1.02	1.89	2.97	4.39	1.64	1.43	1.31
10.000	1.20	1.07	1.01	1.86	2.78	4.21	1.65	1.43	1.32
19.412	1.20	1.07	1.00	1.76	2.59	3.92	1.67	1.46	1.34
26.618	1.19	1.07	1.01	1.82	2.67	3.95	1.69	1.48	1.36
48.235	1.17	1.05	1.03	1.87	2.72	3.99	1.78	1.57	1.46
55.441	1.16	1.04	1.04	1.83	2.71	3.88	1.83	1.61	1.50
77.059	1.13	1.03	1.07	1.79	2.56	3.60	2.00	1.78	1.64
84.265	1.12	1.04	1.09	1.78	2.55	3.58	2.05	1.82	1.70
98.676	1.09	1.06	1.12	1.81	2.50	3.47	2.20	1.95	1.80
105.880	1.08	1.07	1.14	1.79	2.51	3.48	2.27	2.01	1.87
113.090	1.08	1.09	1.16	1.81	2.56	3.58	2.37	2.08	1.94
134.710	1.09	1.15	1.22	1.89	2.60	3.51	2.61	2.33	2.16
156.320	1.13	1.21	1.29	1.91	2.62	3.49	2.83	2.55	2.39
177.940	1.18	1.27	1.34	1.94	2.64	3.54	3.04	2.79	2.62
192.350	1.21	1.29	1.35	2.03	2.67	3.51	3.19	2.93	2.74
200.000	1.22	1.30	1.35	2.06	2.72	3.54	3.18	2.96	2.79
213.970	1.22	1.29	1.33	2.16	2.78	3.57	3.22	2.99	2.83
228.380	1.21	1.27	1.29	2.23	2.90	3.72	3.24	2.99	2.82
242.790	1.18	1.22	1.23	2.26	3.00	3.83	3.26	3.00	2.81
250.000	1.17	1.20	1.21	2.26	3.02	3.80	3.27	2.99	2.81

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.010	−235.95	−.02
.050	−230.90	−.13
1.000	−234.34	−.24
9.625	−234.17	−.23
19.240	−234.76	−.23
28.855	−235.42	−.22
48.085	−236.45	−.19
57.700	−236.67	−.17
76.930	−235.16	−.10
96.160	−230.58	−.06
105.780	−231.51	−.09
115.390	−231.91	+.02
134.620	−234.05	+0.00
153.850	−227.02	+.40
173.080	−215.95	+.75
192.310	−209.85	+1.07
200.000	−205.42	+1.15
211.540	−196.29	+1.22
230.770	−181.60	+1.87
250.000	−167.99	+2.55

Measurements at RF & LO Power +7 dBm

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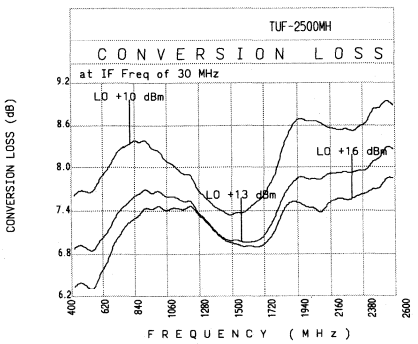
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

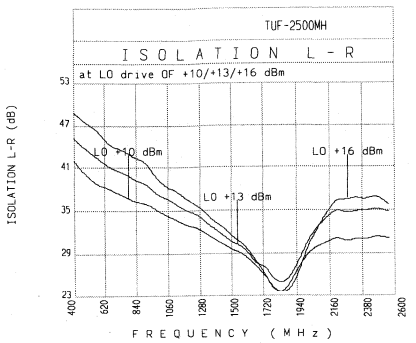
plug-in & coaxial

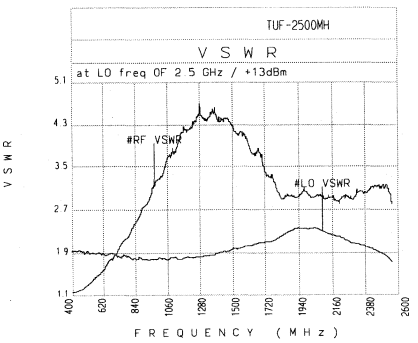
Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
TUF-2500MH
TUF-2500MHSM







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	Isolation L-I (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
400.000	430.000	7.64	6.90	6.36	400.000	42.26	45.45	48.99	34.1	36.3	36.91
528.571	558.571	7.67	6.84	6.28	528.571	39.43	43.07	46.94	33.05	34.63	34.86
657.143	687.143	8.15	7.29	6.97	657.143	38.12	41.16	44.22	31.93	33.33	33.43
800.000	830.000	8.44	7.65	7.32	800.000	36.68	39.76	42.81	32.82	34.11	32.86
914.286	944.286	8.26	7.64	7.41	914.286	36.03	38.53	41.13	33.85	34.94	32.27
1042.857	1072.857	8.09	7.63	7.47	1042.857	34.39	36.83	38.32	33.68	34.52	31.04
1171.429	1201.429	7.96	7.60	7.53	1171.429	33.10	35.08	36.72	34.81	34.99	29.75
1250.000	1280.000	7.66	7.35	7.33	1250.000	32.53	34.34	35.64	38.72	34.61	29.05
1300.000	1330.000	7.53	7.22	7.20	1300.000	31.77	33.23	34.40	43.05	33.62	27.97
1385.714	1415.714	7.42	7.04	7.02	1385.714	30.76	32.06	33.14	53.94	31.62	26.82
1514.286	1484.286	7.38	6.97	6.91	1514.286	29.39	30.38	30.97	36.61	28.74	25.13
1600.000	1570.000	7.55	7.00	6.91	1600.000	28.03	28.57	28.94	31.25	26.04	23.18
1642.857	1612.857	7.60	7.04	6.93	1642.857	27.10	27.48	27.69	28.73	24.2	21.67
1771.429	1741.429	8.30	7.60	7.41	1771.429	23.70	25.19	23.79	22.63	19.04	16.97
1900.000	1870.000	8.73	7.92	7.52	1900.000	26.96	27.83	26.16	24.29	19.83	17.34
2028.571	1998.571	8.65	7.84	7.35	2028.571	30.16	32.78	32.48	26.54	21.7	19.01
2157.143	2127.143	8.54	7.96	7.61	2157.143	31.44	35.26	36.75	28.34	22.69	19.93
2285.714	2255.714	8.63	8.00	7.65	2285.714	31.30	35.14	37.08	25.66	20.89	18.19
2414.286	2384.286	8.83	8.13	7.71	2414.286	31.58	35.51	37.30	22.55	19.32	17.18
2500.000	2470.000	8.90	8.28	7.88	2500.000	31.32	35.01	36.01	20.21	18.21	16.17

mixer VSWR

FREQ. MHz	VSWR RF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	VSWR LO port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. MHz	VSWR IF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
400.000	1.35	1.18	1.07	1.52	1.95	2.86	30.00	1.29	1.33	1.42
510.250	1.55	1.34	1.21	1.59	1.94	2.68	70.43	1.12	1.07	1.35
620.500	1.92	1.64	1.47	1.66	1.89	2.52	110.85	1.09	1.18	1.33
730.750	2.43	2.11	1.89	1.72	1.84	2.45	151.28	1.06	1.12	1.28
800.000	2.69	2.38	2.11	1.74	1.81	2.35	191.70	1.03	1.17	1.32
951.250	3.78	3.13	2.86	1.83	1.81	2.21	232.13	1.05	1.16	1.36
1061.500	4.29	3.78	3.34	1.87	1.84	2.35	272.55	1.04	1.26	1.10
1171.750	4.77	4.20	3.70	1.90	1.85	2.26	312.98	1.08	1.26	1.42
1250.000	5.00	4.74	3.91	1.96	1.86	2.25	353.40	1.05	1.20	1.35
1392.250	4.97	4.48	3.78	2.00	1.94	2.23	393.83	1.10	1.29	1.47
1502.500	4.57	4.12	3.72	2.10	2.00	2.25	434.25	1.13	1.32	1.52
1612.750	4.19	3.78	3.40	2.18	2.08	2.23	474.68	1.11	1.30	1.48
1723.000	3.78	3.42	2.87	2.31	2.14	2.17	515.10	1.20	1.41	1.61
1833.250	3.23	2.99	2.75	2.52	2.31	2.49	555.53	1.21	1.41	1.60
1943.500	3.30	3.06	2.83	2.54	2.37	2.82	595.95	1.29	1.62	2.05
2053.750	3.18	2.96	2.75	2.56	2.32	2.60	636.38	1.42	1.77	2.27
2164.000	3.15	2.93	2.70	2.57	2.22	2.47	676.80	1.31	1.53	1.72
2276.875	3.33	3.15	2.75	2.53	2.08	2.26	718.19	1.45	1.70	1.93
2387.125	3.37	3.17	2.99	2.41	1.98	1.99	758.61	1.44	1.67	1.90
2500.000	2.88	2.83	2.76	2.19	1.76	1.72	800.00	1.57	1.83	2.07

most widely used

Frequency Mixers

Model
TAK-5R

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.050	30.05	5.36	5.17	5.02	58.70	61.25	63.38	59.68	62.86	65.04
.200	30.20	5.02	4.82	4.70	58.78	61.25	63.53	60.25	63.20	65.17
1.000	31.00	4.79	4.62	4.50	58.78	60.99	63.56	60.35	63.40	65.24
5.000	35.00	4.80	4.59	4.52	58.77	61.03	63.40	60.14	63.18	65.16
10.000	40.00	4.95	4.76	4.66	58.84	61.08	63.32	60.27	63.47	65.68
20.000	50.00	5.02	4.82	4.71	58.07	59.80	60.71	58.79	61.27	61.90
27.629	57.63	4.96	4.76	4.65	56.95	57.89	57.17	57.07	58.07	57.51
41.419	71.42	4.97	4.79	4.68	52.50	52.84	53.11	51.56	52.06	52.58
50.000	80.00	4.89	4.74	4.66	50.55	50.73	51.45	49.05	49.96	50.80
62.103	92.10	4.89	4.71	4.61	47.72	48.51	49.45	46.37	47.55	48.71
68.998	99.00	4.94	4.76	4.66	46.00	46.81	47.85	45.15	46.48	47.53
82.788	52.79	4.77	4.66	4.59	44.69	45.80	46.63	43.07	44.56	45.85
96.577	66.58	4.78	4.68	4.61	41.67	42.83	44.07	41.64	43.18	44.30
110.370	80.37	4.90	4.79	4.75	40.55	41.57	42.63	40.40	42.03	43.34
131.050	101.05	4.91	4.80	4.79	39.36	40.59	41.64	38.78	40.54	42.00
144.840	114.84	5.07	4.98	4.90	37.05	38.10	39.29	38.07	39.51	40.84
158.630	128.63	5.20	5.12	5.01	35.56	36.70	37.46	37.78	39.14	39.89
172.420	142.42	5.23	5.14	5.03	34.51	35.89	37.04	36.68	37.99	38.76
186.210	156.21	5.32	5.18	5.10	34.21	35.65	36.61	35.69	36.72	37.03
200.000	170.00	5.46	5.35	5.28	34.69	36.03	36.90	34.87	35.11	34.83

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	1.32	1.21	1.15	1.73	2.61	3.67	1.66	1.53	1.43
10.571	1.33	1.22	1.15	1.69	2.49	3.52	1.67	1.54	1.44
20.000	1.33	1.21	1.15	1.63	2.39	3.36	1.68	1.55	1.45
27.286	1.31	1.20	1.14	1.69	2.46	3.45	1.68	1.56	1.45
38.429	1.30	1.19	1.12	1.76	2.53	3.55	1.70	1.57	1.47
49.571	1.28	1.17	1.10	1.72	2.46	3.45	1.72	1.60	1.50
55.143	1.27	1.16	1.09	1.69	2.43	3.42	1.74	1.62	1.52
71.857	1.22	1.12	1.06	1.70	2.38	3.29	1.80	1.68	1.57
83.000	1.20	1.09	1.04	1.69	2.35	3.19	1.84	1.72	1.61
94.143	1.17	1.07	1.04	1.66	2.33	3.15	1.89	1.77	1.66
99.714	1.15	1.06	1.04	1.70	2.34	3.15	1.93	1.79	1.69
100.000	1.15	1.06	1.05	1.70	2.33	3.14	1.93	1.79	1.69
105.290	1.14	1.05	1.07	1.70	2.36	3.18	1.96	1.82	1.71
116.430	1.11	1.05	1.11	1.71	2.37	3.25	2.02	1.88	1.76
133.140	1.07	1.06	1.13	1.76	2.40	3.19	2.14	2.00	1.88
144.290	1.05	1.08	1.17	1.78	2.41	3.25	2.22	2.08	1.94
161.000	1.03	1.11	1.19	1.83	2.44	3.30	2.35	2.18	2.04
172.140	1.04	1.13	1.22	1.86	2.50	3.31	2.42	2.26	2.10
183.290	1.07	1.16	1.29	1.89	2.51	3.33	2.54	2.36	2.20
200.000	1.14	1.22	3.30	1.92	2.54	3.30	2.67	2.48	2.34

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.050	−233.54	+.16
.200	−238.09	+.30
5.000	−238.75	+.31
10.000	−239.03	+.31
20.000	−238.34	+.31
27.629	−238.37	+.31
34.524	−238.06	+.32
48.314	−238.46	+.32
55.208	−239.95	+.32
68.998	−238.90	+.34
82.788	−237.63	+.32
89.682	−236.52	+.35
100.000	−233.80	+.35
117.260	−231.11	+.32
131.050	−232.02	+.34
144.840	−235.94	+.31
158.630	−234.40	+.21
172.420	−229.13	+.22
186.210	−224.76	+.16
200.000	−220.46	+.17

Measurements at RF & LO Power +7 dBm

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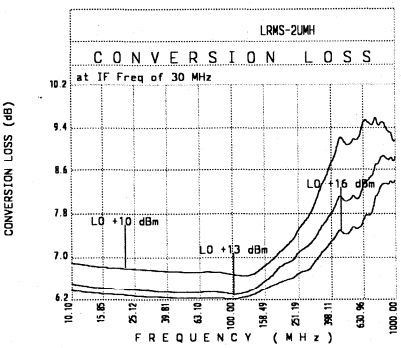
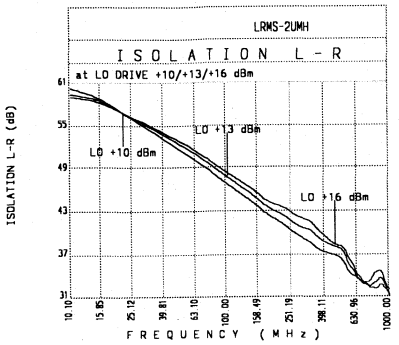
surface mount

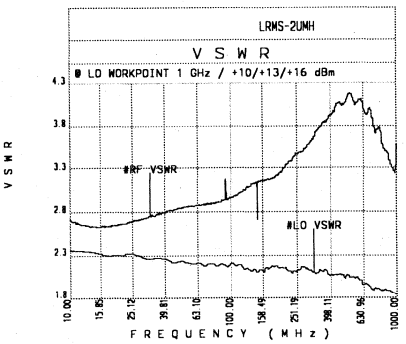
Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
RMS-2UMH
LRMS-2UMH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	Isolation L-I (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
10.10	40.10	6.93	6.53	6.40	10.10	60.45	59.61	59.23	57.00	57.12	57.67
20.10	50.10	6.83	6.44	6.32	20.10	57.49	57.46	57.41	55.70	55.69	55.93
50.00	80.00	6.73	6.33	6.23	50.00	51.90	52.77	53.20	54.03	53.31	52.92
80.00	110.00	6.77	6.40	6.27	80.00	48.62	49.49	50.04	53.39	52.10	51.02
100.00	70.00	6.69	6.29	6.21	100.00	47.03	47.97	48.55	53.67	51.86	49.96
171.72	141.72	6.94	6.65	6.48	171.72	43.04	44.05	44.87	54.77	49.03	45.81
212.12	182.12	7.25	6.93	6.61	212.12	41.61	42.83	43.87	51.03	47.10	44.34
252.52	222.52	7.55	7.13	6.73	252.52	40.34	41.64	42.89	47.77	45.36	42.94
272.73	242.73	7.69	7.19	6.77	272.73	39.79	41.07	42.34	45.98	43.97	41.98
292.93	262.93	7.80	7.25	6.78	292.93	39.34	40.73	42.09	44.84	42.96	41.34
353.53	323.53	8.40	7.63	7.14	353.53	38.01	39.75	40.79	42.22	41.63	40.39
414.14	384.14	8.86	7.90	7.36	414.14	37.28	38.58	39.30	39.92	39.56	39.15
500.00	470.00	9.11	8.06	7.46	500.00	36.58	37.89	38.29	38.73	38.90	38.38
555.56	525.56	9.25	8.21	7.61	555.56	34.89	35.96	36.78	37.42	37.88	37.76
616.16	586.16	9.38	8.22	7.59	616.16	34.03	34.36	34.85	36.84	37.37	37.47
717.17	687.17	9.45	8.54	7.87	717.17	33.24	32.87	32.97	38.11	37.48	36.62
818.18	788.18	9.53	8.88	8.35	818.18	34.59	33.14	32.32	39.08	35.95	33.75
878.79	848.79	9.44	8.88	8.41	878.79	34.81	33.85	32.83	34.66	32.77	31.01
919.19	889.19	9.34	8.83	8.37	919.19	34.11	33.36	32.66	32.41	30.75	29.12
1000.00	970.00	9.20	8.89	8.46	1000.00	32.00	31.25	31.07	29.38	27.75	26.38

mixer VSWR

FREQ. MHz	VSWR RF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	VSWR LO port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. MHz	VSWR IF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
10.00	2.89	2.71	2.53	1.66	2.35	3.53	20.00	1.37	1.36	1.40
20.10	2.84	2.66	2.46	1.54	2.30	3.37	40.00	1.23	1.22	1.29
50.00	3.09	2.86	2.62	1.45	2.23	3.48	60.00	1.21	1.20	1.27
80.00	3.16	2.92	2.66	1.40	2.17	3.28	80.00	1.21	1.18	1.25
100.00	3.22	2.98	2.71	1.43	2.20	3.24	100.00	1.20	1.15	1.21
171.72	3.44	3.18	2.92	1.43	2.14	3.19	120.00	1.17	1.12	1.19
212.12	3.58	3.34	3.06	1.50	2.15	3.27	147.10	1.15	1.14	1.25
252.52	3.73	3.47	3.21	1.50	2.12	3.09	174.30	1.20	1.18	1.27
272.73	3.76	3.51	3.24	1.54	2.15	3.02	201.40	1.19	1.15	1.22
292.93	3.82	3.58	3.30	1.56	2.13	3.10	228.60	1.15	1.15	1.26
353.53	4.04	3.81	3.55	1.60	2.11	2.93	255.70	1.18	1.21	1.33
414.14	4.15	3.96	3.71	1.64	2.06	2.82	282.90	1.21	1.21	1.31
500.00	4.25	4.08	3.86	1.73	2.06	2.76	310.00	1.18	1.20	1.32
555.56	4.22	4.09	3.89	1.78	2.03	2.71	337.10	1.19	1.25	1.38
616.16	4.24	4.11	3.94	1.77	1.97	2.52	364.30	1.22	1.29	1.42
717.17	3.98	3.89	3.76	1.82	1.88	2.43	391.40	1.22	1.30	1.43
818.18	3.69	3.61	3.50	1.94	1.88	2.32	418.60	1.23	1.33	1.48
878.79	3.57	3.49	3.38	1.98	1.87	2.23	445.70	1.27	1.39	1.55
919.19	3.45	3.36	3.26	2.03	1.86	2.20	472.90	1.30	1.43	1.59
1000.00	2.18	3.58	3.78	2.07	1.82	2.08	500.00	1.30	1.49	1.57

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
TAK-6
TAK-6R

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R* (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.500	30.50	7.80	7.38	7.11	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
1.000	31.00	7.13	6.75	6.47	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
2.000	32.00	6.54	6.13	5.93	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
5.000	35.00	5.88	5.55	5.38	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	> 70.00
10.000	40.00	5.87	5.53	5.32	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	64.95
20.000	50.00	5.94	5.57	5.35	> 64.00	61.27	58.83	> 64.00	58.72	56.92
40.466	70.47	5.89	5.59	5.39	55.07	53.48	52.39	53.40	51.73	50.74
60.449	90.45	5.77	5.51	5.39	51.05	49.77	48.80	49.58	48.51	47.29
100.000	70.00	5.71	5.45	5.32	46.67	45.73	44.75	45.85	44.74	43.77
140.380	110.38	5.66	5.45	5.33	44.05	42.94	42.16	43.49	42.35	41.44
200.000	170.00	5.83	5.64	5.55	41.47	40.43	39.65	40.97	39.87	38.88
240.300	210.30	5.86	5.67	5.55	39.57	38.69	37.99	38.96	38.10	37.46
280.260	250.26	5.78	5.58	5.48	39.59	38.77	37.90	38.36	37.77	36.85
360.190	330.19	6.25	5.95	5.80	36.88	36.13	35.65	35.82	35.08	34.54
400.160	370.16	6.12	5.94	5.87	36.06	36.07	35.61	34.62	34.75	34.34
480.090	450.09	6.72	6.48	6.32	34.66	35.09	35.31	30.47	31.56	32.60
500.080	470.08	6.83	6.59	6.37	34.63	34.94	35.60	29.91	30.74	32.08
540.040	510.04	6.80	6.43	6.19	35.64	35.12	35.58	30.37	30.07	31.01
580.010	550.01	6.93	6.37	6.03	37.16	36.24	35.75	32.15	31.22	30.63
600.000	570.00	7.13	6.51	6.16	37.47	36.75	35.81	33.00	32.22	31.07

*TAK 6R Selected for 40 dB min.

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.19	1.26	1.30	1.88	2.80	4.21	1.49	1.31	1.21
10.000	1.10	1.18	1.24	1.84	2.76	3.86	1.50	1.32	1.21
20.000	1.06	1.16	1.22	1.78	2.60	3.83	1.50	1.32	1.21
41.061	1.07	1.18	1.24	1.89	2.87	3.95	1.49	1.32	1.22
59.091	1.08	1.18	1.24	1.83	2.55	3.65	1.51	1.36	1.25
100.000	1.08	1.18	1.24	1.74	2.50	3.42	1.56	1.39	1.29
149.240	1.09	1.18	1.25	1.76	2.48	3.50	1.66	1.44	1.34
200.000	1.10	1.18	1.24	1.78	2.46	3.33	1.78	1.51	1.41
239.390	1.12	1.19	1.25	1.79	2.48	3.36	1.89	1.60	1.49
257.420	1.13	1.19	1.25	1.79	2.51	3.36	1.95	1.61	1.50
275.450	1.15	1.20	1.27	1.82	2.49	3.35	2.00	1.75	1.63
311.520	1.18	1.23	1.31	1.83	2.50	3.24	1.94	1.94	1.80
347.580	1.23	1.28	1.35	1.89	2.51	3.21	2.25	2.02	1.87
365.610	1.26	1.31	1.38	1.92	2.58	3.26	2.31	2.07	1.92
401.670	1.32	1.36	1.44	1.96	2.63	3.30	2.42	2.18	2.02
455.760	1.41	1.49	1.58	2.03	2.66	3.42	2.61	2.40	2.21
500.000	1.50	1.52	1.61	2.19	2.72	3.45	2.76	2.42	2.25
545.910	1.55	1.61	1.69	2.32	2.90	3.70	2.82	2.51	2.36
581.970	1.58	1.66	1.73	2.45	3.09	3.90	2.87	2.58	2.42
600.000	1.58	1.67	1.73	2.45	3.11	3.91	2.85	2.57	2.41

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
.500	−220.38	−.13
1.000	−221.24	−.14
2.000	−223.15	−.14
5.000	−226.12	−.14
10.000	−228.13	−.13
20.000	−226.19	−.13
40.466	−224.88	−.12
60.449	−225.86	−.11
100.000	−229.17	−.07
140.380	−233.40	+0.00
200.000	−229.89	+.10
240.300	−234.97	+.11
280.260	−236.33	+.34
360.190	−211.20	+.48
400.160	−197.76	+.52
480.090	−211.70	+.79
500.080	−209.44	+1.00
540.040	−192.55	+1.09
580.010	−170.60	+1.36
600.000	−164.18	+1.25

Measurements at RF & LO Power +7 dBm

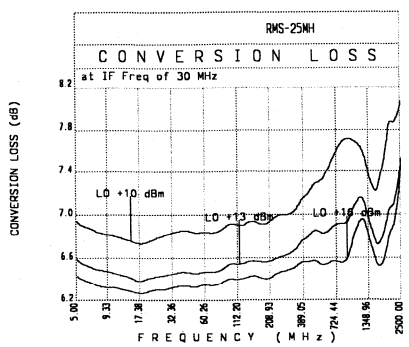
Mini-Circuits™
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
EUROPE 44-252-835094 Fax 44-252-837010

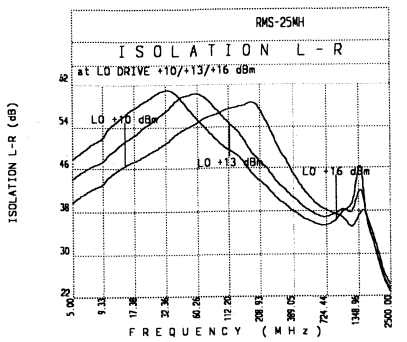
surface mount

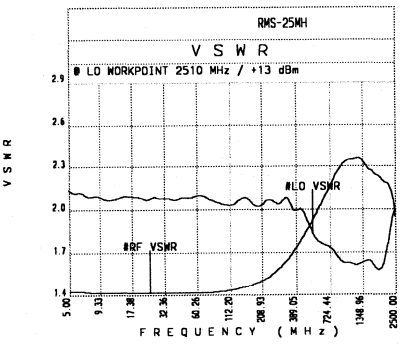
Frequency Mixers

Model RMS-25MH

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	Isolation L-I (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
5.00	35.00	6.95	6.60	6.44	5.00	39.24	43.66	47.26	28.54	31.16	33.31
10.10	40.10	6.82	6.47	6.33	10.10	43.96	48.02	53.10	30.47	33.66	36.35
20.18	50.18	6.76	6.42	6.29	20.18	47.73	53.20	57.88	31.37	34.80	37.59
33.51	63.51	6.85	6.47	6.34	33.51	50.73	56.82	60.33	31.28	34.60	37.47
49.03	79.03	6.83	6.46	6.33	49.03	53.26	59.20	56.92	31.31	34.63	37.53
81.42	111.42	6.87	6.50	6.38	81.42	55.64	57.10	51.42	31.24	34.59	37.27
135.23	165.23	6.95	6.58	6.43	135.23	57.25	52.43	47.92	31.51	34.78	37.31
224.60	194.60	6.99	6.60	6.46	224.60	54.78	46.08	42.68	32.48	35.72	37.79
373.01	343.01	7.15	6.77	6.58	373.01	45.32	40.43	37.83	34.85	37.11	36.49
480.71	450.71	7.31	6.88	6.60	480.71	41.44	38.16	36.15	37.23	36.46	34.18
545.72	515.72	7.31	6.82	6.52	545.72	39.87	37.54	35.84	38.50	35.91	33.47
798.38	768.38	7.69	6.92	6.55	798.38	37.49	36.87	35.34	37.40	32.89	30.69
906.34	876.34	7.72	6.92	6.59	906.34	36.96	37.27	36.26	34.87	31.38	29.53
1168.03	1138.03	7.63	7.19	6.98	1168.03	34.41	36.90	38.25	33.61	30.53	28.71
1250.00	1220.00	7.51	7.10	6.95	1250.00	35.16	38.52	40.43	33.99	31.35	29.63
1505.28	1475.28	7.23	6.78	6.62	1505.28	38.06	39.76	40.76	31.10	30.96	30.51
1800.00	1770.00	7.52	6.85	6.60	1800.00	33.09	31.84	31.80	26.52	27.67	28.88
2000.00	1970.00	7.89	7.07	6.83	2000.00	29.95	28.62	28.22	25.96	28.09	30.16
2200.00	2170.00	7.85	7.09	6.91	2200.00	26.62	25.62	25.28	26.07	28.13	30.21
2500.00	2470.00	8.05	7.52	7.45	2500.00	23.87	22.96	22.32	25.26	26.44	27.42

mixer VSWR

FREQ. MHz	VSWR RF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	VSWR LO port LO + 10 dBm	LO +13 dBm	LO + 16 dBm	FREQ. MHz	VSWR IF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
5.00	1.79	1.43	1.31	1.48	2.14	2.87	5.00	1.21	1.32	1.37
10.10	1.77	1.42	1.28	1.43	2.07	2.77	16.30	1.12	1.24	1.29
20.18	1.77	1.42	1.28	1.42	2.09	2.78	27.50	1.11	1.23	1.29
33.51	1.77	1.42	1.27	1.41	2.09	2.82	38.80	1.11	1.23	1.29
49.03	1.77	1.42	1.27	1.43	2.08	2.89	50.00	1.11	1.23	1.29
81.42	1.77	1.42	1.28	1.42	2.06	2.84	60.00	1.11	1.23	1.28
135.23	1.80	1.45	1.31	1.41	2.08	2.85	107.50	1.14	1.24	1.29
224.60	1.88	1.52	1.39	1.46	2.08	2.90	155.00	1.17	1.23	1.27
373.01	2.10	1.71	1.56	1.49	1.95	2.55	202.50	1.20	1.24	1.27
480.71	2.28	1.86	1.71	1.54	1.92	2.49	250.00	1.23	1.23	1.24
545.72	2.39	1.95	1.80	1.53	1.80	2.22	300.00	1.27	1.24	1.24
798.38	2.73	2.23	2.05	1.62	1.71	2.09	450.00	1.38	1.26	1.21
906.34	2.87	2.32	2.12	1.61	1.62	2.01	600.00	1.47	1.29	1.20
1168.03	2.95	2.35	2.14	1.91	1.61	1.80	750.00	1.55	1.34	1.22
1250.00	2.97	2.37	2.14	1.98	1.62	1.74	900.00	1.62	1.38	1.25
1505.28	2.89	2.27	2.04	2.31	1.65	1.57	1000.00	1.64	1.39	1.26
1800.00	2.90	2.24	1.98	2.30	1.57	1.42	1125.00	1.64	1.40	1.27
2000.00	2.88	2.19	1.91	2.47	1.62	1.33	1250.00	1.62	1.40	1.28
2200.00	2.87	2.18	1.89	2.86	1.77	1.30	1375.00	1.60	1.39	1.29
2500.00	2.62	1.95	1.75	3.21	1.99	1.41	1500.00	1.57	1.39	1.30

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models

GRA-1
SRA-1
SRA-1 TX
ZLW-1
ZAD-1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.500	30.50	7.78	7.29	7.01	>64.00	>67.00	64.94	>64.00	>67.00	56.93
1.000	31.00	7.34	6.89	6.61	>64.00	>67.00	63.22	>64.00	62.73	56.27
2.000	32.00	6.97	6.49	6.20	>64.00	>67.00	61.14	>64.00	61.28	55.71
5.000	35.00	6.39	6.01	5.80	>64.00	>67.00	60.28	>64.00	60.55	55.46
10.000	40.00	6.40	5.99	5.75	>64.00	>67.00	59.63	>64.00	59.37	55.25
20.000	50.00	6.46	6.02	5.75	>64.00	>67.00	58.89	>64.00	59.08	55.09
32.726	62.73	6.37	5.96	5.74	>64.00	59.27	56.91	>64.00	57.92	54.20
50.000	80.00	6.28	5.91	5.71	58.05	56.01	54.48	>64.00	56.08	53.11
64.952	94.95	6.22	5.87	5.64	54.46	53.83	52.86	57.32	54.11	51.72
100.000	70.00	6.13	5.81	5.66	50.35	49.90	48.91	51.33	49.45	47.96
161.630	131.63	6.13	5.84	5.70	45.29	44.60	44.03	44.16	43.60	43.25
200.000	170.00	6.27	5.99	5.82	42.19	41.47	41.29	41.32	40.82	40.93
226.080	196.08	6.26	5.95	5.75	41.04	40.62	40.68	39.98	39.96	40.20
258.310	228.31	6.19	5.89	5.72	39.93	39.44	39.63	38.30	37.84	38.74
306.650	276.65	6.26	5.99	5.84	36.83	37.26	37.70	35.84	36.42	36.87
354.990	324.99	6.57	6.23	6.05	34.24	34.94	35.71	33.81	34.34	35.10
403.330	373.33	6.74	6.32	6.07	33.60	33.70	34.26	33.74	33.77	34.23
451.660	421.66	7.29	6.68	6.25	33.90	33.66	34.10	34.38	33.23	33.15
483.890	453.89	7.77	7.17	6.69	33.99	34.17	34.71	34.99	34.46	34.37
500.000	470.00	7.86	7.25	6.77	34.23	34.51	35.08	34.62	34.41	34.36

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.22	1.21	1.25	1.36	1.98	2.99	1.47	1.28	1.16
17.692	1.12	1.03	1.09	1.29	1.93	2.84	1.48	1.29	1.17
30.384	1.10	1.02	1.09	1.30	1.96	2.82	1.48	1.30	1.18
55.768	1.11	1.06	1.12	1.27	1.86	2.69	1.50	1.32	1.21
81.152	1.12	1.10	1.14	1.25	1.83	2.61	1.53	1.35	1.25
106.540	1.14	1.13	1.17	1.28	1.87	2.68	1.58	1.40	1.30
119.230	1.16	1.15	1.19	1.29	1.88	2.67	1.60	1.43	1.33
144.610	1.19	1.19	1.23	1.31	1.91	2.63	1.69	1.52	1.42
170.000	1.22	1.23	1.26	1.32	1.91	2.59	1.73	1.54	1.43
208.070	1.28	1.29	1.33	1.35	1.92	2.62	1.86	1.66	1.54
233.460	1.33	1.35	1.38	1.39	1.91	2.59	1.96	1.74	1.62
271.530	1.41	1.42	1.46	1.43	1.99	2.65	2.10	1.88	1.73
296.920	1.47	1.49	1.52	1.48	1.99	2.63	2.18	1.97	1.80
322.300	1.53	1.56	1.58	1.52	1.99	2.66	2.29	2.07	1.90
360.380	1.62	1.65	1.68	1.62	2.03	2.64	2.45	2.19	2.03
398.450	1.73	1.74	1.77	1.73	2.16	2.72	2.59	2.33	2.13
423.840	1.80	1.81	1.83	1.77	2.20	2.83	2.65	2.40	2.20
461.910	1.92	1.93	1.94	1.80	2.27	2.90	2.76	2.49	2.29
487.300	1.99	2.00	2.00	1.82	2.25	2.87	2.81	2.53	2.32
500.000	2.03	2.03	2.02	1.83	2.26	2.86	2.79	2.55	2.33

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
10.000	−270.82	−.24
20.000	−267.82	−.23
24.000	−264.99	−.21
50.000	−261.17	−.19
80.000	−263.77	−.16
100.000	−264.35	−.15
122.000	−267.69	−.12
150.000	−263.45	−.11
178.000	−262.10	−.07
200.000	−261.22	−.13
248.000	−265.76	−.10
276.000	−270.40	−.18
304.000	−266.94	−.26
332.000	−249.96	−.23
360.000	−231.15	−.47
388.000	−211.89	−.18
430.000	−189.53	−.45
458.000	−184.41	−.03
486.000	−184.46	−.13
500.000	−181.27	−.33

Measurements at RF & LO Power +7 dBm

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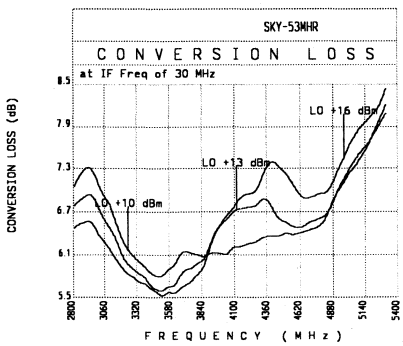
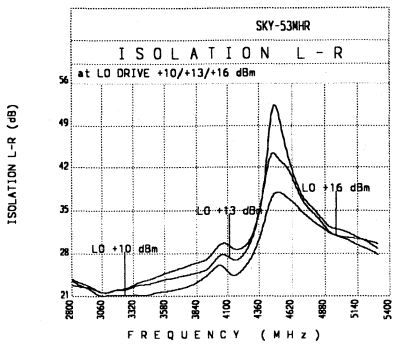
surface mount

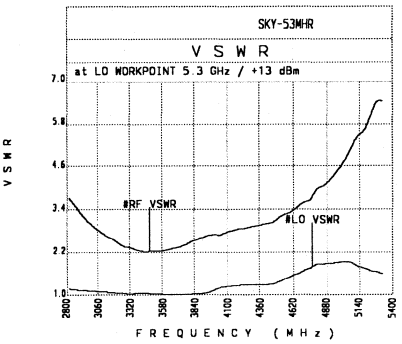
Frequency Mixers

Model SKY-53MHR

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	Isolation L-I (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
2800.00	2830.00	7.08	6.81	6.50	2800.00	23.82	24.05	23.11	15.16	13.89	12.15
3000.00	3030.00	7.08	6.76	6.38	3000.00	21.61	22.21	22.25	12.77	12.43	11.15
3224.53	3254.53	6.20	5.99	5.85	3224.53	21.36	22.25	22.42	11.38	11.65	10.74
3413.21	3443.21	5.86	5.67	5.64	3413.21	21.41	23.17	23.84	10.64	11.34	10.92
3601.89	3631.89	5.95	5.66	5.56	3601.89	22.11	24.09	25.23	9.93	10.82	10.75
3649.06	3679.06	6.14	5.84	5.65	3649.06	22.32	24.22	25.54	9.84	10.73	10.68
3837.74	3867.74	6.08	6.03	5.92	3837.74	23.66	25.15	26.78	10.44	11.25	11.28
4000.00	4030.00	6.13	6.59	6.62	4000.00	26.29	27.60	29.30	11.13	12.14	12.35
4120.75	4090.75	6.22	6.76	6.90	4120.75	24.52	27.24	29.09	11.91	12.80	13.27
4215.09	4185.09	6.28	6.79	6.98	4215.09	25.62	27.81	29.11	12.42	13.43	14.03
4356.60	4326.60	6.39	6.89	7.39	4356.60	30.97	35.40	35.62	12.79	13.95	14.81
4498.11	4468.11	6.44	6.59	7.27	4498.11	38.60	52.00	43.72	13.08	14.21	15.29
4639.62	4609.62	6.44	6.51	6.90	4639.62	36.36	40.26	39.40	13.81	15.15	16.40
4781.13	4751.13	6.54	6.64	6.99	4781.13	33.61	35.74	35.02	15.31	16.72	18.18
4828.30	4798.30	6.64	6.67	6.98	4828.30	32.90	34.61	33.96	15.72	17.36	18.75
5000.00	4970.00	7.25	7.29	7.62	5000.00	31.08	32.18	30.93	17.86	19.27	21.07
5111.32	5081.32	7.51	7.58	7.92	5111.32	30.77	31.21	29.90	18.92	20.41	22.21
5158.49	5128.49	7.62	7.66	7.99	5158.49	30.61	30.74	29.44	19.42	21.01	22.76
5252.83	5222.83	7.99	7.92	8.18	5252.83	30.25	29.76	28.73	20.24	21.69	23.44
5300.00	5270.00	8.21	8.09	8.43	5300.00	29.88	29.09	28.12	20.48	21.97	23.69

mixer VSWR

FREQ. MHz	VSWR RF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	VSWR LO port LO + 10 dBm	LO +13 dBm	LO + 16 dBm	FREQ. MHz	VSWR IF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
2800.00	4.17	3.76	3.44	1.79	1.21	1.42	1.55	1.61	1.39	1.23
3000.00	3.07	2.95	2.95	1.63	1.15	1.42	3.30	1.61	1.39	1.23
3224.53	2.32	2.41	2.75	1.53	1.09	1.39	5.50	1.61	1.39	1.23
3413.21	1.97	2.25	2.55	1.50	1.09	1.38	7.80	1.61	1.39	1.23
3601.89	1.89	2.32	2.67	1.40	1.06	1.42	10.00	1.61	1.39	1.23
3649.06	1.91	2.36	2.74	1.36	1.06	1.46	12.00	1.61	1.39	1.23
3837.74	2.17	2.60	2.98	1.26	1.07	1.46	34.00	1.62	1.38	1.24
4000.00	2.29	2.72	3.09	1.41	1.22	1.48	56.00	1.61	1.39	1.24
4120.75	2.47	2.84	3.22	1.47	1.30	1.50	78.00	1.60	1.41	1.25
4215.09	2.64	2.89	3.40	1.55	1.33	1.50	100.00	1.63	1.41	1.25
4356.60	2.67	3.01	3.38	1.58	1.31	1.52	150.00	1.66	1.42	1.29
4498.11	2.90	3.25	3.63	1.70	1.44	1.65	188.90	1.65	1.41	1.29
4639.62	3.19	3.53	3.87	1.90	1.62	1.83	227.80	1.68	1.48	1.32
4781.13	3.37	4.06	4.08	2.46	1.92	2.01	266.70	1.71	1.50	1.36
4828.30	3.67	4.06	4.36	2.44	1.88	1.90	305.60	1.74	1.54	1.40
5000.00	4.49	4.73	5.05	2.80	1.98	1.78	344.40	1.76	1.56	1.43
5111.32	5.21	5.52	5.83	2.61	1.81	1.57	383.30	1.79	1.60	1.47
5158.49	5.42	5.56	5.89	2.67	1.81	1.57	422.20	1.81	1.63	1.50
5252.83	6.22	6.50	6.79	2.52	1.70	1.52	461.10	1.85	1.67	1.54
5300.00	5.91	6.45	5.60	2.35	1.63	1.51	500.00	1.87	1.68	1.56

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
2800.00	418.30	-11.15
2931.58	355.50	-7.55
3063.16	376.70	-8.28
3194.74	326.40	-30.74
3326.32	321.00	-39.06
3457.89	293.16	-4.69
3589.47	297.87	-19.34
3721.05	265.34	-26.01
3852.63	260.06	-17.49
3984.21	293.69	-1.52
4115.79	248.57	-16.76
4247.37	161.65	-42.97
4378.95	99.56	-14.07
4510.53	172.70	-4.45
4642.11	149.01	-17.33
4773.68	60.48	-23.60
4905.26	70.46	-24.95
5036.84	112.88	-26.53
5168.42	29.42	-26.93
5300.00	-51.63	-26.21

broadband, low distortion

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Model
TFM-42MH
RMS-42MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
10.000	40.00	8.64	7.94	7.54	18.19	20.28	22.57	19.61	21.61	23.35
20.000	50.00	8.30	7.65	7.31	25.45	27.98	30.94	25.92	29.30	32.49
200.000	170.00	7.88	7.32	6.98	29.33	31.88	34.29	28.39	32.33	35.67
295.000	265.00	8.19	7.53	7.19	30.92	32.40	33.59	30.16	33.77	35.29
500.000	470.00	8.43	7.77	7.34	31.53	31.96	32.27	32.61	33.79	32.15
722.500	692.50	8.33	7.70	7.30	32.12	32.05	31.65	35.16	32.52	29.62
1000.000	970.00	8.38	7.67	7.30	33.21	32.59	32.12	33.86	29.95	27.43
1150.000	1120.00	8.23	7.63	7.22	34.18	32.84	31.97	32.53	29.21	27.20
1435.000	1405.00	7.47	6.82	6.74	36.72	35.06	33.31	29.77	28.00	26.61
1577.500	1547.50	8.16	7.65	7.33	36.83	34.54	33.27	28.80	27.23	26.18
1862.500	1832.50	8.40	7.75	7.26	36.46	36.03	34.57	27.76	27.46	27.11
2005.000	1975.00	9.29	8.44	7.82	33.40	34.15	33.90	28.29	27.88	27.48
2290.000	2260.00	9.55	8.70	8.09	30.39	30.53	29.93	30.46	30.66	30.60
2500.000	2470.00	9.46	8.40	7.70	30.63	31.06	31.31	30.79	30.74	30.57
2717.500	2687.50	9.39	8.50	8.04	28.65	29.50	30.35	31.68	31.68	31.79
3000.000	2970.00	8.82	8.07	7.70	31.97	33.65	35.18	33.28	32.53	30.30
3145.000	3115.00	8.32	7.62	7.29	33.92	33.58	32.04	31.80	31.08	28.62
3500.000	3470.00	8.17	7.57	7.22	30.85	32.49	33.79	25.95	26.48	26.09
3857.500	3827.50	8.39	7.73	7.28	27.55	28.41	29.15	23.47	24.34	24.47
4200.000	4170.00	9.47	8.84	8.30	26.82	29.31	31.59	23.38	25.00	26.18

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
10.000	2.38	2.29	2.17	2.27	2.30	2.86	1.42	1.62	1.69
50.000	1.53	1.39	1.34	1.27	1.76	2.55	1.20	1.21	1.27
152.500	1.57	1.38	1.32	1.08	1.54	2.26	1.21	1.11	1.18
295.000	1.68	1.48	1.41	1.07	1.47	2.10	1.18	1.11	1.20
500.000	1.86	1.65	1.57	1.14	1.42	1.97	1.09	1.17	1.27
722.500	2.09	1.88	1.79	1.23	1.42	1.91	1.01	1.26	1.35
1000.000	2.33	2.09	1.99	1.18	1.45	1.87	1.14	1.37	1.47
1150.000	2.42	2.18	2.13	1.24	1.37	1.81	1.22	1.43	1.55
1435.000	2.41	2.18	2.10	1.29	1.47	1.92	1.35	1.53	1.65
1577.500	2.31	2.08	2.05	1.30	1.58	2.02	1.38	1.53	1.65
1862.500	2.15	1.96	1.88	1.47	1.73	2.11	1.42	1.50	1.56
2005.000	2.17	2.05	2.03	1.59	1.95	2.30	1.61	1.78	1.89
2290.000	2.72	2.44	2.34	1.92	2.32	2.42	1.74	1.59	1.59
2500.000	3.07	2.78	2.75	2.17	2.05	2.17	2.13	1.84	1.84
2717.500	3.50	3.21	3.04	2.45	2.02	1.99	2.53	2.28	2.11
3000.000	3.60	3.16	3.18	2.21	1.58	1.53	2.44	2.20	2.20
3145.000	3.55	3.37	3.06	1.92	1.34	1.27	2.35	2.13	2.06
3500.000	3.90	3.33	2.98	1.34	1.23	1.36	2.33	2.37	2.37
3857.500	2.25	2.13	1.89	1.62	1.96	2.09	2.78	2.60	2.52
4200.000	1.27	1.19	1.11	1.99	2.35	2.96	3.26	3.86	4.12

ϕ detection

max. output/DC offset vs. freq. freq. (MHz)	max. DC output mV	DC offset mv
10.000	+255.94	−5.40
50.000	+278.74	−.68
148.000	+279.98	−.89
286.000	+294.67	−1.09
500.000	+215.17	+.07
700.000	+278.98	+1.05
1000.000	+229.74	+2.23
1187.500	+202.77	+3.42
1500.000	+257.06	+3.60
1675.000	+203.10	+6.74
1837.500	+210.00	+6.38
2000.000	+206.74	+7.15
2333.300	+214.80	+6.57
2500.000	+208.74	+5.99
2666.700	+233.75	+5.29
3000.000	+227.73	12.42
3166.700	+233.01	+7.84
3500.000	+216.25	+1.65
3833.300	+154.35	+2.91
4200.000	+123.50	+4.20

Measurements at RF & LO Power +13 dBm

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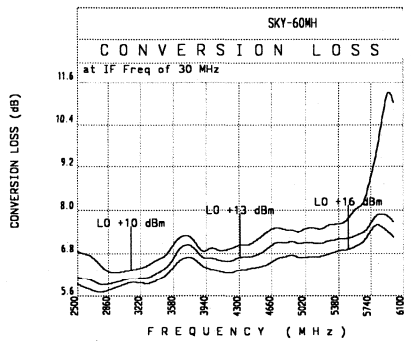
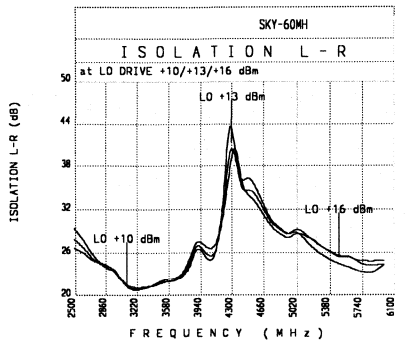
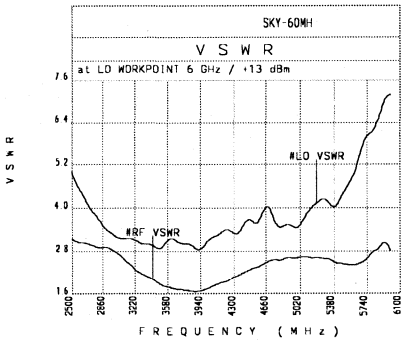
urface mount

Frequency Mixers Model SKY-60MH

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)







mixer conversion loss and isolation

		Conversion Loss (dB)				Isolation L-R (dB)			Isolation L-I (dB)		
RF MHz	LO MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
2500.00	2530.00	6.82	6.09	5.89	2500.00	29.54	28.06	26.82	14.73	18.01	19.08
2698.11	2728.11	6.60	5.96	5.69	2698.11	26.08	25.47	25.10	14.87	15.81	15.47
2896.23	2926.23	6.23	5.91	5.76	2896.23	23.82	23.88	24.19	13.44	13.71	13.46
3000.00	3030.00	6.25	5.99	5.85	3000.00	22.76	22.77	23.03	13.28	13.21	12.82
3292.45	3322.45	6.43	6.07	5.89	3292.45	21.27	21.14	21.08	12.92	12.38	11.92
3490.57	3520.57	6.70	6.36	6.15	3490.57	21.84	21.92	22.17	12.80	11.97	11.48
3688.68	3718.68	7.25	6.99	6.63	3688.68	22.34	22.48	22.67	12.67	11.77	11.29
3886.79	3916.79	6.76	6.62	6.40	3886.79	26.97	27.45	27.87	13.14	12.31	11.72
3952.83	3982.83	6.88	6.61	6.33	3952.83	26.40	26.77	27.48	14.36	13.27	12.48
4000.00	4030.00	6.93	6.63	6.31	4000.00	25.30	25.89	26.83	14.85	13.66	12.80
4283.02	4253.02	6.99	6.65	6.31	4283.02	46.88	41.81	37.96	17.86	16.55	15.65
4547.17	4517.17	7.24	6.78	6.40	4547.17	36.03	34.72	33.58	20.71	18.89	17.73
4811.32	4781.32	7.40	7.03	6.66	4811.32	29.87	29.66	28.97	23.42	21.64	20.46
4943.40	4913.40	7.32	7.02	6.64	4943.40	28.54	28.54	28.02	24.92	22.96	21.88
5000.00	4970.00	7.43	7.05	6.63	5000.00	29.10	29.40	28.77	25.72	23.76	22.81
5273.58	5243.58	7.56	7.11	6.74	5273.58	26.08	27.17	27.24	29.63	27.00	25.72
5537.74	5507.74	7.88	7.20	6.90	5537.74	24.37	25.62	25.42	33.24	29.31	27.40
5801.89	5771.89	9.39	7.84	7.60	5801.89	23.36	24.40	25.00	36.29	31.57	28.88
5867.92	5837.92	10.38	7.86	7.51	5867.92	23.29	24.32	24.90	36.71	31.80	29.15
6000.00	5970.00	10.94	7.63	7.21	6000.00	24.48	24.50	25.04	38.67	32.65	29.42

mixer VSWR

	VSWR RF port			VSWR LO port			VSWR IF port			
FREQ. MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	LO + 10 dBm	LO +13 dBm	LO +16 dBm	FREQ. MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
2500.00	5.25	3.16	2.67	5.51	5.04	5.89	2.17	1.78	1.12	1.35
2698.11	5.11	3.01	2.49	3.97	4.01	4.64	13.30	1.79	1.12	1.35
2896.23	4.83	2.96	2.44	2.96	3.38	4.08	25.50	1.79	1.12	1.36
3000.00	4.38	2.81	2.34	2.61	3.18	4.01	37.80	1.80	1.12	1.35
3292.45	3.32	2.17	1.91	2.21	2.99	3.80	50.00	1.80	1.12	1.35
3490.57	2.86	1.86	1.64	2.19	2.83	3.54	70.00	1.80	1.12	1.35
3688.68	2.66	1.72	1.53	2.36	3.03	3.78	177.50	1.86	1.14	1.35
3886.79	2.70	1.67	1.61	2.15	2.83	3.50	285.00	1.93	1.20	1.38
3952.83	2.66	1.71	1.56	2.28	2.88	3.52	392.50	1.92	1.26	1.41
4000.00	2.68	1.75	1.60	2.46	3.11	3.81	500.00	1.87	1.27	1.41
4283.02	3.19	2.08	1.94	2.86	3.31	3.95	600.00	1.84	1.23	1.37
4547.17	3.75	2.37	2.16	3.31	3.48	3.87	700.00	1.83	1.18	1.32
4811.32	4.13	2.54	2.41	3.38	3.43	4.01	800.00	1.83	1.11	1.26
4943.40	4.25	2.62	2.34	3.38	3.50	4.09	900.00	1.82	1.06	1.21
5000.00	4.19	2.63	2.33	3.41	3.42	3.98	1000.00	1.82	1.07	1.19
5273.58	4.17	2.60	2.29	5.23	4.33	4.52	1100.00	1.82	1.13	1.19
5537.74	3.87	2.41	2.18	6.63	4.78	4.91	1200.00	1.83	1.18	1.20
5801.89	4.98	2.82	2.38	10.07	6.07	5.83	1300.00	1.83	1.22	1.20
5867.92	4.95	2.84	2.40	10.56	6.46	5.66	1400.00	1.83	1.25	1.21
6000.00	5.72	2.83	2.63	12.80	7.17	5.99	1500.00	1.83	1.25	1.19

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
2500.00	447.00	42.95
2684.21	460.90	69.19
2868.42	392.30	43.06
3052.63	381.20	43.12
3236.84	336.30	81.29
3421.05	331.60	61.73
3605.26	314.90	48.56
3789.47	326.60	55.11
3973.68	292.34	28.89
4157.89	219.08	30.56
4342.11	207.38	47.37
4526.32	230.35	27.96
4710.53	217.17	37.29
4894.74	100.50	42.14
5078.95	64.17	42.02
5263.16	89.09	51.37
5447.37	74.76	51.54
5631.58	46.10	54.62
5815.79	-9.19	55.33
6000.00	-4.53	62.23

most widely used

Frequency Mixers Model SRA-2CM

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	7.75	7.36	7.16	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
38.133	68.13	5.84	5.59	5.49	56.05	54.82	54.04	54.35	53.34	52.98
71.266	41.27	5.54	5.30	5.22	50.40	49.15	48.69	49.20	48.13	47.93
137.530	107.53	5.50	5.33	5.28	46.96	46.10	45.62	45.97	45.22	45.20
200.000	170.00	5.52	5.35	5.27	43.52	42.68	42.28	42.30	41.91	41.97
236.930	206.93	5.46	5.27	5.21	41.88	41.09	40.58	40.59	40.29	40.32
303.200	273.20	5.46	5.28	5.20	39.83	39.42	39.20	38.94	38.94	39.35
336.330	306.33	5.57	5.42	5.31	40.07	39.72	39.32	36.53	36.88	37.57
402.600	372.60	5.88	5.63	5.54	38.76	38.13	37.74	35.41	35.49	36.02
468.860	438.86	5.87	5.62	5.54	36.36	37.15	37.25	34.20	35.09	36.00
535.130	505.13	6.19	5.87	5.72	34.59	35.49	36.19	31.24	32.57	34.19
568.260	538.26	6.56	6.01	5.77	34.55	35.26	36.09	30.16	31.27	32.93
634.530	604.53	7.22	6.17	5.57	36.21	36.03	36.59	29.26	29.46	30.74
700.790	670.79	7.51	6.68	5.99	37.17	38.00	38.67	29.58	30.29	31.32
767.060	737.06	7.37	6.49	5.85	36.88	38.00	39.61	28.98	29.92	31.27
800.190	770.19	6.81	6.11	5.78	37.47	39.26	41.53	28.01	28.34	29.27
833.330	803.33	6.88	6.37	6.22	37.91	39.87	41.80	27.20	27.52	28.51
899.590	869.59	7.04	6.80	6.81	38.42	40.23	41.59	26.73	26.99	27.39
965.860	935.86	7.10	6.86	6.82	40.37	42.61	43.57	26.04	25.65	25.38
1000.000	969.00	7.31	7.10	7.06	43.89	44.90	42.74	24.72	24.17	23.59

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	5.30	5.03	4.68	3.65	4.09	5.51	1.83	1.48	1.30
36.063	1.33	1.40	1.48	2.11	3.04	4.34	1.83	1.50	1.31
67.126	1.23	1.31	1.39	2.01	2.99	4.22	1.84	1.51	1.33
100.000	1.20	1.27	1.35	1.94	2.83	3.86	1.88	1.55	1.37
160.320	1.19	1.24	1.31	1.95	2.82	3.82	1.96	1.64	1.46
200.000	1.20	1.24	1.29	1.94	2.72	3.62	2.04	1.74	1.54
253.500	1.23	1.24	1.27	1.99	2.76	3.57	2.17	1.82	1.65
315.630	1.28	1.26	1.26	2.03	2.77	3.54	2.29	1.94	1.75
377.760	1.35	1.30	1.27	2.15	2.85	3.65	2.39	2.03	1.84
439.880	1.44	1.37	1.31	2.18	2.84	3.56	2.41	2.07	1.88
500.000	1.54	1.45	1.37	2.35	2.97	3.69	2.40	2.04	1.84
533.070	1.61	1.50	1.42	2.41	2.96	3.66	2.38	2.02	1.81
595.200	1.72	1.61	1.52	2.54	3.10	3.84	2.18	1.90	1.76
657.320	1.83	1.70	1.63	2.58	3.21	3.86	2.15	1.86	1.67
719.450	1.99	1.85	1.78	2.58	3.09	3.86	2.06	1.82	1.66
781.580	2.17	2.01	1.93	2.54	3.03	3.86	1.87	1.69	1.55
812.640	2.25	2.08	2.02	2.59	3.08	3.86	1.75	1.59	1.47
874.760	2.46	2.32	2.22	2.85	3.39	3.95	1.57	1.44	1.38
936.890	2.73	2.53	2.43	3.17	3.58	4.10	1.49	1.44	1.47
1000.000	2.93	2.76	2.64	3.48	3.76	4.27	1.58	1.63	1.73

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
5.000	−223.58	+.09
36.094	−231.75	+.08
67.188	−233.00	+.07
100.000	−236.12	+.10
160.470	−238.09	+.21
200.000	−236.09	+.29
253.750	−239.55	+.26
315.940	−224.28	+.60
378.130	−205.13	+.77
440.320	−196.55	+.48
500.000	−212.68	+1.14
533.600	−200.87	+1.45
595.790	−160.67	+1.44
657.970	−154.37	+1.02
720.160	−144.12	+.56
782.350	−133.92	+1.88
813.440	−142.24	+2.68
875.630	−155.17	+3.99
937.820	−142.49	+3.65
1000.000	−133.44	+4.19

Measurements at RF & LO Power +7 dBm

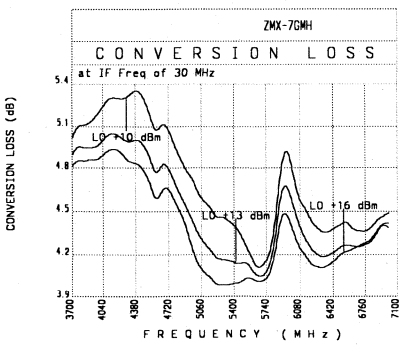
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

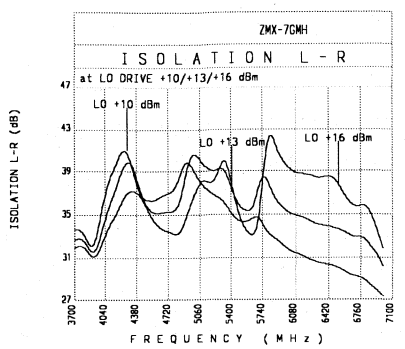
plug-in & coaxial

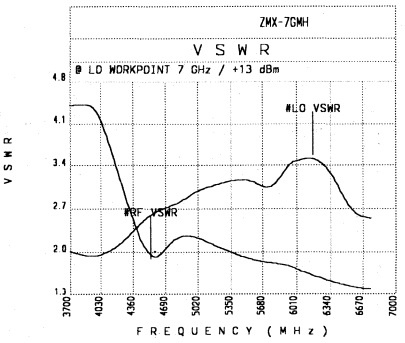
Frequency Mixers

Model
ZMX-7GMH

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)







mixer conversion loss and isolation

		Conversion Loss (dB)				Isolation L-R (dB)			Isolation L-I (dB)		
RF MHz	LO MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
3700.00	3730.00	5.02	4.90	4.82	3700.00	33.87	32.88	32.13	12.43	11.42	10.57
3886.79	3916.79	5.12	4.95	4.87	3886.79	31.86	31.48	31.17	13.02	11.82	10.92
4000.00	4030.00	5.21	4.98	4.88	4000.00	35.98	33.88	32.58	13.08	11.83	10.90
4198.11	4228.11	5.29	5.03	4.93	4198.11	41.06	38.98	36.13	13.62	12.38	11.44
4384.91	4414.91	5.36	5.01	4.84	4384.91	37.45	37.98	37.22	14.08	12.84	11.97
4571.70	4601.70	5.03	4.73	4.55	4571.70	36.50	35.25	34.38	14.38	13.27	12.42
4758.49	4788.49	4.97	4.71	4.58	4758.49	37.34	35.44	33.44	15.09	14.07	13.10
5000.00	4970.00	4.63	4.35	4.14	5000.00	38.92	40.91	37.27	15.84	14.80	13.88
5194.34	5164.34	4.45	4.17	3.99	5194.34	37.02	39.16	38.08	16.36	15.42	14.41
5381.13	5351.13	4.41	4.15	4.00	5381.13	35.41	37.97	38.73	16.66	15.73	14.89
5567.92	5537.92	4.18	4.10	4.04	5567.92	34.49	35.50	33.56	16.52	15.75	14.99
5754.72	5724.72	4.19	4.11	4.05	5754.72	33.76	39.07	40.94	16.33	15.80	15.15
5941.51	5911.51	4.98	4.70	4.49	5941.51	32.38	35.83	40.18	16.54	16.04	15.35
6000.00	5970.00	4.77	4.55	4.37	6000.00	31.88	35.31	39.52	16.54	16.19	15.53
6190.57	6160.57	4.43	4.24	4.13	6190.57	31.13	34.76	38.87	16.28	16.05	15.59
6377.36	6347.36	4.36	4.20	4.13	6377.36	30.59	34.16	38.68	16.09	16.17	15.68
6564.15	6534.15	4.44	4.27	4.22	6564.15	30.11	33.69	37.40	15.93	16.22	15.98
6750.94	6720.94	4.36	4.27	4.28	6750.94	29.42	33.14	35.92	15.92	16.57	16.36
6937.74	6907.74	4.51	4.42	4.42	6937.74	28.14	31.48	33.70	15.97	16.81	16.91
7000.00	6970.00	4.49	4.39	4.42	7000.00	27.55	30.37	32.02	16.03	16.87	17.06

mixer VSWR

	VSWR RF port			VSWR LO port			VSWR IF port					
FREQ. MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. MHz	LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	5.39	4.38	3.65	1.51	2.01	2.80	0.03	1.22	1.05	1.07	3700.00	299.88	34.23
3886.79	5.28	4.42	3.65	1.50	1.92	2.56	2.50	1.23	1.05	1.07	3873.68	261.71	33.62
4000.00	5.19	4.32	3.63	1.52	1.92	2.62	5.00	1.22	1.05	1.07	4047.37	203.19	35.53
4198.11	3.78	3.29	2.89	1.62	2.07	2.86	7.50	1.22	1.05	1.07	4221.05	215.12	33.89
4384.91	2.59	2.28	2.04	2.01	2.41	3.09	10.00	1.23	1.05	1.07	4394.74	174.67	33.18
4571.70	2.02	1.74	1.54	2.32	2.67	3.36	20.00	1.22	1.05	1.07	4568.42	98.87	32.21
4758.49	2.56	2.29	2.05	2.46	2.73	3.17	65.00	1.23	1.05	1.07	4742.11	130.70	29.96
5000.00	2.58	2.26	2.01	2.93	3.00	3.47	110.00	1.23	1.07	1.08	4915.79	38.81	27.49
5194.34	2.35	2.08	1.87	3.17	3.09	3.47	155.00	1.24	1.08	1.09	5089.47	67.15	26.94
5381.13	2.21	1.97	1.76	3.35	3.17	3.47	200.00	1.24	1.09	1.11	5263.16	62.51	26.40
5567.92	2.11	1.86	1.67	3.46	3.18	3.36	300.00	1.26	1.14	1.15	5436.84	10.06	29.22
5754.72	2.07	1.82	1.64	3.82	2.93	2.86	488.90	1.31	1.23	1.25	5610.53	66.03	26.04
5941.51	2.02	1.78	1.59	5.54	3.46	3.26	677.80	1.42	1.36	1.38	5784.21	55.25	23.35
6000.00	1.94	1.72	1.54	5.85	3.47	3.18	866.70	1.54	1.52	1.56	5957.89	-38.58	26.53
6190.57	1.84	1.61	1.44	5.56	3.57	3.18	1055.60	1.61	1.59	1.62	6131.58	10.29	26.58
6377.36	1.72	1.51	1.34	5.54	3.26	2.80	1244.40	1.72	1.67	1.68	6305.26	-76.42	26.09
6564.15	1.64	1.43	1.29	4.26	2.56	2.07	1433.30	1.85	1.77	1.75	6478.95	-111.30	24.72
6750.94	1.57	1.39	1.27	4.61	2.56	2.10	1622.20	1.99	1.85	1.80	6652.63	-102.93	24.68
6937.74	1.53	1.39	1.32	4.42	2.46	2.13	1811.10	2.14	1.96	1.85	6826.32	-167.59	23.96
7000.00	1.49	1.38	1.34	6.97	3.17	2.61	2000.00	2.28	2.04	1.88	7000.00	-193.62	22.46

ϕ detection

broadband, low distortion

Frequency Mixers

Model
SRA-2010MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
10.000	40.00	6.31	6.24	6.17	61.07	61.45	62.30	58.79	59.82	60.28
20.000	50.00	6.39	6.20	6.07	55.33	55.00	54.83	54.26	54.21	54.34
138.390	108.39	6.75	6.51	6.39	50.42	49.69	49.22	50.45	49.89	49.44
266.770	236.77	7.19	6.85	6.62	44.67	44.01	43.31	44.96	44.00	43.58
330.970	300.97	7.83	7.32	6.76	42.52	41.56	40.90	41.60	40.89	40.34
395.160	365.16	8.10	7.23	6.67	39.75	38.14	37.51	38.45	37.11	36.32
523.550	493.55	8.63	7.43	6.88	38.00	36.37	36.04	37.78	35.38	34.72
651.940	621.94	8.81	7.64	7.04	35.41	35.08	34.87	35.15	33.80	33.30
716.130	686.13	8.71	7.86	7.25	32.94	32.75	32.61	32.38	31.76	31.27
908.710	878.71	7.87	7.61	7.49	31.39	31.68	31.95	26.02	26.34	26.42
1000.000	970.00	7.20	6.95	6.81	36.08	35.00	33.84	27.79	28.22	28.37
1101.300	1071.30	7.10	6.76	6.65	34.58	34.66	33.60	28.94	29.26	29.12
1200.000	1170.00	7.30	6.90	6.74	31.34	31.53	31.53	27.34	27.67	27.34
1293.900	1263.90	7.83	7.26	6.96	29.22	29.55	30.14	26.28	26.63	26.48
1422.300	1392.30	8.39	7.65	7.07	26.99	27.31	27.59	23.72	24.03	23.75
1500.000	1470.00	8.44	7.45	7.11	27.94	28.63	29.48	32.24	32.27	32.18
1614.800	1584.80	8.66	7.77	7.34	30.41	31.09	31.26	40.71	40.59	39.77
1743.200	1713.20	8.27	7.62	7.23	32.17	32.79	32.98	32.86	33.64	34.77
1871.600	1841.60	8.05	7.54	7.10	30.21	30.56	30.25	28.32	29.04	29.30
2000.000	1970.00	7.75	7.25	7.04	26.62	27.05	27.53	22.69	23.55	24.27

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
10.000	3.18	2.94	2.75	1.48	2.22	3.37	1.81	1.85	1.87
50.000	4.25	3.81	3.59	1.32	2.10	3.54	1.28	1.38	1.44
100.000	4.57	4.09	3.84	1.31	2.11	3.27	1.24	1.33	1.38
200.000	4.66	4.33	4.23	1.32	1.93	2.70	1.21	1.27	1.33
266.770	4.86	4.45	4.37	1.37	1.96	2.62	1.24	1.28	1.32
395.160	4.47	4.45	4.43	1.44	1.88	2.50	1.35	1.35	1.37
500.000	4.16	4.13	4.06	1.46	1.82	2.37	1.47	1.46	1.48
587.740	3.50	3.56	3.63	1.45	1.74	2.29	1.60	1.62	1.68
716.130	3.07	3.11	3.17	1.50	1.67	2.14	1.88	2.09	2.18
844.520	2.82	2.84	2.78	1.70	1.69	2.15	2.45	2.80	2.87
972.900	2.45	2.37	2.35	1.87	1.63	1.98	3.35	3.66	3.90
1037.100	2.60	2.48	2.39	1.84	1.62	1.93	3.93	4.34	4.15
1165.500	2.19	1.97	1.86	1.95	1.55	1.82	4.75	5.14	4.98
1229.700	2.12	1.89	1.76	1.97	1.49	1.70	4.77	5.33	5.17
1358.100	2.16	1.90	1.75	2.01	1.40	1.62	3.46	3.75	3.69
1486.500	2.53	2.39	2.29	1.85	1.31	1.65	14.74	17.39	17.39
1550.600	2.71	2.58	2.44	1.77	1.26	1.57	15.67	17.39	17.39
1679.000	2.93	2.78	2.73	1.62	1.18	1.57	16.26	13.60	13.81
1807.400	3.10	2.99	2.98	1.53	1.11	1.62	15.00	14.87	14.38
2000.000	3.59	3.30	3.21	1.28	1.20	1.70	13.60	13.19	12.44

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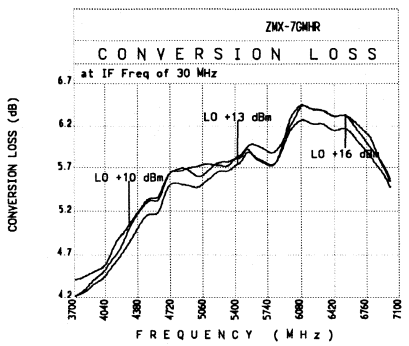
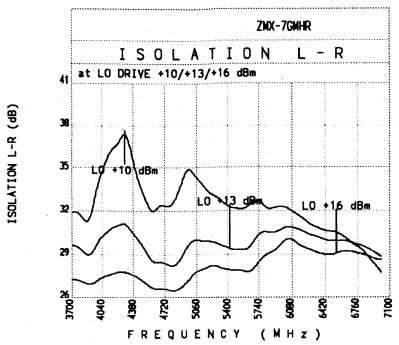
plug-in & coaxial

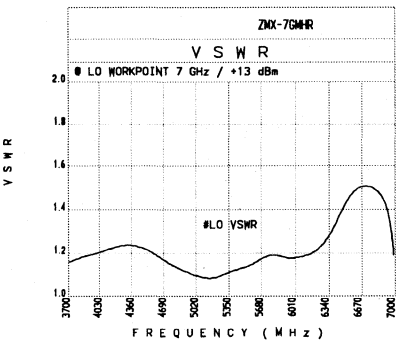
Frequency Mixers

Model
ZMX-7GMHR

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	Isolation L-I (dB) LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
3700.00	3730.00	4.42	4.23	4.22	3700.00	31.99	29.70	27.34	27.71	26.86	25.92
3886.79	3916.79	4.50	4.36	4.41	3886.79	31.18	28.88	26.95	28.43	28.20	27.62
4000.00	4030.00	4.55	4.43	4.50	4000.00	34.43	30.20	27.40	28.75	28.77	28.55
4198.11	4228.11	4.94	4.73	4.82	4198.11	36.68	31.06	27.85	29.43	29.85	29.94
4384.91	4414.91	5.24	5.08	5.23	4384.91	34.75	30.27	27.56	29.93	30.94	31.43
4571.70	4601.70	5.35	5.16	5.30	4571.70	31.81	28.45	26.67	30.70	31.75	32.77
4758.49	4788.49	5.68	5.55	5.69	4758.49	32.37	28.23	26.51	31.64	32.56	33.72
5000.00	4970.00	5.74	5.49	5.60	5000.00	34.71	30.09	27.71	33.96	34.76	35.40
5194.34	5164.34	5.75	5.68	5.78	5194.34	33.26	30.01	28.31	34.92	35.80	36.25
5381.13	5351.13	5.85	5.76	5.84	5381.13	32.41	29.54	28.01	35.41	35.99	36.18
5567.92	5537.92	5.85	5.86	6.00	5567.92	32.24	29.34	27.84	35.59	35.67	35.62
5754.72	5724.72	5.73	5.74	5.88	5754.72	32.61	30.66	28.82	36.27	35.75	35.24
5941.51	5911.51	6.29	6.15	6.20	5941.51	32.42	30.72	29.67	36.76	35.84	35.02
6000.00	5970.00	6.38	6.22	6.28	6000.00	32.37	30.98	30.11	36.83	35.78	34.94
6190.57	6160.57	6.40	6.22	6.39	6190.57	31.53	30.65	29.55	36.19	34.92	33.91
6377.36	6347.36	6.33	6.16	6.33	6377.36	30.78	30.15	29.05	35.37	34.09	32.87
6564.15	6534.15	6.31	6.16	6.32	6564.15	30.49	30.04	29.21	34.47	33.23	32.28
6750.94	6720.94	6.02	5.92	6.12	6750.94	29.57	29.73	29.13	33.54	32.46	31.49
6937.74	6907.74	5.74	5.64	5.72	6937.74	28.30	29.14	28.68	31.90	31.09	30.31
7000.00	6970.00	5.59	5.49	5.56	7000.00	27.79	28.86	28.65	31.40	30.72	30.09

mixer VSWR

FREQ. MHz	VSWR RF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm	VSWR LO port LO + 10 dBm	LO +13 dBm	LO + 16 dBm	FREQ. MHz	VSWR IF port LO + 10 dBm	LO + 13 dBm	LO + 16 dBm
3700.00	1.17	1.07	1.28	2.17	1.16	1.51	0.03	1.29	1.49	1.68
3886.79	1.55	1.49	1.62	2.10	1.19	1.34	2.50	1.29	1.49	1.68
4000.00	2.13	2.04	2.07	2.17	1.20	1.34	5.00	1.29	1.49	1.68
4198.11	3.08	3.05	3.08	2.28	1.24	1.34	7.50	1.29	1.49	1.68
4384.91	3.43	3.59	3.73	2.32	1.24	1.34	10.00	1.29	1.49	1.68
4571.70	3.08	3.31	3.55	2.24	1.20	1.36	20.00	1.29	1.49	1.68
4758.49	2.53	2.68	2.88	1.98	1.14	1.37	65.00	1.28	1.48	1.67
5000.00	3.01	2.94	2.95	1.92	1.10	1.50	110.00	1.27	1.47	1.65
5194.34	3.38	3.24	3.19	1.92	1.08	1.51	155.00	1.27	1.46	1.64
5381.13	3.60	3.40	3.28	1.81	1.12	1.54	200.00	1.25	1.44	1.61
5567.92	3.72	3.47	3.32	1.65	1.14	1.56	300.00	1.23	1.40	1.57
5754.72	3.97	3.65	3.48	1.69	1.21	1.62	377.80	1.22	1.37	1.53
5941.51	4.16	3.86	3.69	1.69	1.17	1.64	455.60	1.20	1.35	1.50
6000.00	4.20	3.89	3.62	1.69	1.18	1.64	533.30	1.17	1.30	1.45
6190.57	4.31	3.98	3.67	1.62	1.19	1.67	611.10	1.13	1.25	1.39
6377.36	4.18	3.84	3.60	1.58	1.28	1.74	688.90	1.09	1.20	1.33
6564.15	3.98	3.59	3.34	1.71	1.50	1.85	766.70	1.06	1.16	1.30
6750.94	3.60	3.24	3.02	1.83	1.52	1.87	844.40	1.04	1.14	1.28
6937.74	3.18	2.89	2.64	2.17	1.46	1.61	922.20	1.07	1.10	1.24
7000.00	2.95	2.65	2.44	1.87	1.19	1.62	1000.00	1.14	1.04	1.16

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
3700.00	324.10	-14.62
3873.68	280.61	-15.95
4047.37	230.52	-18.59
4221.05	286.90	-18.96
4394.74	226.80	-21.45
4568.42	199.64	-19.88
4742.11	216.75	-16.12
4915.79	152.31	-15.08
5089.47	137.45	-20.36
5263.16	172.97	-21.43
5436.84	60.88	-20.86
5610.53	119.84	-17.38
5784.21	90.86	-19.69
5957.89	36.40	-25.29
6131.58	46.56	-26.39
6305.26	-2.70	-26.05
6478.95	-43.42	-25.12
6652.63	-27.29	-27.11
6826.32	-140.62	-25.79
7000.00	-135.23	-30.82

most widely-used

Frequency Mixers

Model ROSE-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.000	5.67	5.45	5.34	1.000	32.33	34.92	37.55	66.11	67.77	68.84
2.000	32.000	5.46	5.27	5.16	2.000	34.96	37.59	40.14	64.35	65.02	65.10
5.000	35.000	5.26	5.04	4.94	5.000	38.52	41.17	43.73	59.81	59.48	58.85
10.000	40.000	5.31	5.04	4.91	10.000	40.39	42.84	45.20	55.48	54.45	53.88
20.000	50.000	5.29	5.06	4.93	20.000	40.87	42.95	44.78	49.26	48.34	47.81
40.933	70.933	5.60	5.28	5.07	40.933	39.08	40.34	41.16	42.55	41.63	41.28
50.000	80.000	5.38	5.12	5.00	50.000	38.39	39.28	39.86	40.52	39.65	39.38
60.900	90.900	5.45	5.19	5.01	60.900	37.74	38.51	38.94	39.18	38.46	38.21
100.000	70.000	5.43	5.14	4.99	100.000	36.80	36.62	36.21	36.49	35.64	35.20
120.800	90.800	5.38	5.13	4.98	120.800	36.55	36.20	35.67	36.06	35.30	34.77
160.733	130.733	5.28	5.09	4.97	160.733	35.52	34.21	33.38	34.05	33.10	32.47
200.000	170.000	5.27	5.08	4.99	200.000	34.90	32.97	31.92	32.96	31.83	31.06
240.600	210.600	5.37	5.17	5.07	240.600	33.33	31.27	30.28	30.19	29.54	29.23
300.000	270.000	5.46	5.23	5.10	300.000	31.41	29.42	28.34	27.50	27.31	27.24
340.433	310.433	5.48	5.25	5.17	340.433	29.84	27.80	26.75	25.53	25.44	25.47
400.333	370.333	5.46	5.21	5.03	400.333	27.80	26.14	25.34	23.06	23.22	23.44
460.233	430.233	5.66	5.44	5.28	460.233	26.92	25.11	24.08	21.43	21.77	21.89
500.000	470.000	5.74	5.46	5.24	500.000	26.88	25.19	24.13	20.62	21.08	21.38
540.100	510.100	5.90	5.65	5.48	540.100	25.79	24.29	23.34	19.27	19.74	20.07
600.000	570.000	6.34	5.89	5.61	600.000	25.17	24.10	23.51	18.29	19.03	19.67

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. MHz	max. DC output mV	DC offset mV
5.000	1.21	1.14	1.12	1.68	2.49	3.45	5.000	1.47	1.32	1.22	1.000	−242.57	+.16
10.000	1.20	1.11	1.06	1.64	2.42	3.34	10.000	1.48	1.33	1.23	2.000	−243.96	+.17
20.000	1.19	1.09	1.03	1.73	2.55	3.48	20.000	1.48	1.33	1.23	5.000	−247.52	+.18
42.188	1.18	1.08	1.02	1.65	2.46	3.42	42.188	1.48	1.33	1.23	10.000	−246.63	+.19
50.000	1.18	1.08	1.02	1.65	2.46	3.41	50.000	1.48	1.33	1.23	20.000	−244.39	+.24
79.375	1.18	1.08	1.03	1.66	2.44	3.39	79.375	1.50	1.35	1.25	40.933	−242.09	+.35
100.000	1.17	1.08	1.03	1.64	2.41	3.33	100.000	1.51	1.36	1.26	50.000	−242.56	+.32
135.156	1.17	1.08	1.04	1.66	2.42	3.36	135.156	1.55	1.40	1.29	60.900	−241.95	+.23
153.750	1.17	1.08	1.04	1.67	2.43	3.34	153.750	1.57	1.41	1.31	100.000	−244.81	−.31
172.344	1.17	1.08	1.05	1.66	2.40	3.28	172.344	1.59	1.43	1.33	120.800	−244.13	−.63
200.000	1.17	1.08	1.06	1.65	2.36	3.24	200.000	1.62	1.46	1.36	160.733	−244.76	−.48
246.719	1.16	1.08	1.07	1.68	2.40	3.25	246.719	1.68	1.53	1.41	200.000	−240.52	+2.28
265.313	1.16	1.09	1.08	1.65	2.36	3.18	265.313	1.71	1.55	1.44	240.600	−243.88	+3.47
300.000	1.16	1.09	1.09	1.68	2.34	3.14	300.000	1.78	1.61	1.49	300.000	−251.35	+12.43
339.688	1.16	1.11	1.11	1.69	2.37	3.15	339.688	1.83	1.64	1.52	340.433	−241.84	+16.64
395.469	1.17	1.14	1.15	1.74	2.36	3.05	395.469	1.91	1.73	1.59	400.333	−213.57	+15.89
451.250	1.19	1.18	1.20	1.73	2.29	2.93	451.250	1.98	1.79	1.66	460.233	−207.08	+14.31
500.000	1.22	1.22	1.25	1.84	2.40	3.11	500.000	2.04	1.85	1.72	500.000	−205.21	+18.70
544.219	1.26	1.27	1.29	1.90	2.43	3.16	544.219	2.07	1.90	1.77	540.100	−201.66	+29.21
600.000	1.31	1.33	1.36	2.01	2.63	3.41	600.000	2.08	1.93	1.81	600.000	−210.10	+36.97

ϕ detection

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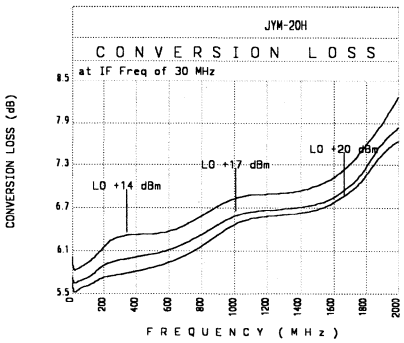
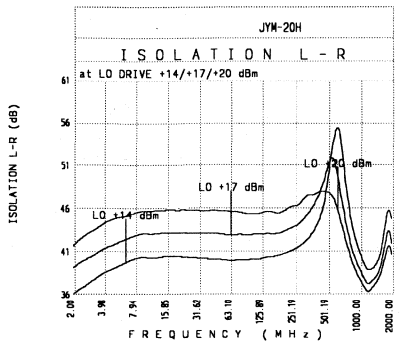
surface mount

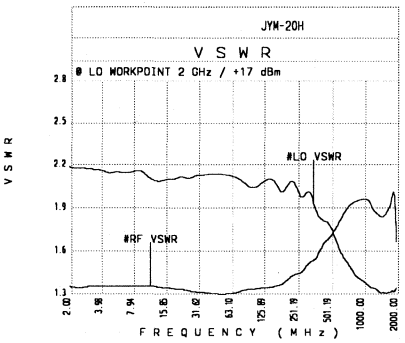
Frequency Mixers

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)

Models
JYM-20H
JYM-30H







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
2.00	32.00	6.04	5.76	5.71	2.00	36.48	39.54	42.11	40.00	42.16	43.85
4.00	34.00	5.89	5.71	5.58	4.00	39.05	41.85	44.78	43.65	45.90	47.47
10.86	40.86	5.86	5.68	5.55	10.86	40.60	43.45	46.14	45.97	48.50	49.80
21.97	51.97	5.86	5.68	5.55	21.97	40.84	43.66	46.28	46.23	48.79	50.22
51.19	81.19	5.90	5.72	5.62	51.19	40.47	43.43	46.12	46.00	48.54	50.18
78.14	108.14	5.94	5.74	5.63	78.14	40.45	43.45	45.99	45.93	48.09	49.20
119.27	89.27	5.99	5.78	5.66	119.27	40.52	43.43	45.80	45.43	47.49	48.62
182.06	152.06	6.16	5.93	5.77	182.06	40.98	43.53	45.77	45.06	46.37	46.72
277.90	247.90	6.38	6.00	5.78	277.90	41.95	44.53	46.65	44.62	45.19	44.68
562.35	532.35	6.34	6.10	5.93	562.35	54.41	53.42	48.13	40.86	38.85	37.22
745.52	715.52	6.54	6.28	6.10	745.52	48.90	44.63	42.64	37.50	35.21	33.44
1000.00	970.00	6.92	6.67	6.56	1000.00	41.20	39.28	38.13	33.34	30.58	28.88
1200.00	1170.00	6.91	6.69	6.61	1200.00	39.27	37.54	36.60	31.21	29.11	27.62
1400.00	1370.00	6.95	6.73	6.65	1400.00	39.83	38.37	37.70	29.83	28.60	27.65
1508.62	1478.62	7.04	6.78	6.70	1508.62	40.59	39.15	38.38	28.61	27.77	27.12
1600.00	1570.00	7.12	6.85	6.79	1600.00	41.42	39.91	38.93	27.44	26.76	26.23
1737.02	1707.02	7.40	7.09	7.00	1737.02	44.54	42.39	40.85	25.98	25.33	24.62
1800.00	1770.00	7.60	7.27	7.16	1800.00	46.29	43.91	42.00	25.61	24.94	24.22
1900.00	1870.00	7.89	7.65	7.50	1900.00	46.25	43.88	42.20	24.88	24.34	23.71
2000.00	1970.00	8.28	7.85	7.66	2000.00	45.17	42.31	41.08	24.15	23.90	23.51

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14dBm	LO + 17 dBm	LO + 20 dBm
2.00	1.48	1.37	1.29	1.53	2.20	3.02	4.00	1.28	1.51	1.68
4.00	1.49	1.37	1.29	1.49	2.18	2.98	8.00	1.27	1.50	1.67
10.86	1.49	1.37	1.28	1.47	2.12	2.94	12.00	1.26	1.49	1.65
21.97	1.47	1.35	1.27	1.48	2.14	2.99	16.00	1.26	1.48	1.64
51.19	1.44	1.31	1.24	1.50	2.15	3.12	20.00	1.25	1.46	1.62
78.14	1.47	1.34	1.26	1.48	2.11	2.98	25.00	1.24	1.44	1.60
119.27	1.49	1.36	1.28	1.46	2.09	2.95	56.30	1.17	1.35	1.50
182.06	1.51	1.38	1.31	1.43	1.99	2.67	87.50	1.23	1.44	1.60
277.90	1.56	1.45	1.38	1.39	1.93	2.57	118.80	1.28	1.48	1.63
562.35	1.88	1.77	1.70	1.26	1.69	2.34	150.00	1.22	1.39	1.52
745.52	2.07	1.94	1.87	1.16	1.52	2.04	200.00	1.27	1.45	1.60
1000.00	2.13	1.98	1.88	1.10	1.41	1.85	255.60	1.30	1.43	1.55
1200.00	2.07	1.90	1.79	1.10	1.36	1.78	311.10	1.34	1.50	1.63
1400.00	1.99	1.85	1.75	1.06	1.32	1.67	366.70	1.36	1.47	1.57
1508.62	1.97	1.85	1.75	1.03	1.33	1.67	422.20	1.43	1.56	1.67
1600.00	1.97	1.87	1.77	1.03	1.32	1.70	477.80	1.44	1.53	1.61
1737.02	2.00	1.92	1.83	1.08	1.33	1.69	533.30	1.50	1.61	1.69
1800.00	2.06	1.99	1.91	1.12	1.34	1.73	588.90	1.52	1.59	1.66
1900.00	2.14	2.08	1.99	1.16	1.33	1.67	644.40	1.57	1.66	1.72
2000.00	1.81	1.68	1.62	1.21	1.36	1.66	700.00	1.55	1.62	1.67

most widely used

Frequency Mixers

Models
SAM-1
TSM-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.00	7.31	7.00	6.81	>64.00	>67.00	>70.00	>64.00	>67.00	67.13
5.000	35.00	6.05	5.81	5.66	>64.00	>67.00	>70.00	>64.00	>67.00	66.56
20.000	50.00	6.07	5.82	5.64	>64.00	>67.00	66.62	>64.00	63.03	61.96
39.646	69.65	6.07	5.79	5.62	60.97	60.82	59.98	57.56	57.34	57.16
58.969	88.97	5.98	5.75	5.61	56.54	56.81	56.53	53.47	53.89	53.57
97.615	67.62	5.96	5.72	5.60	52.03	52.49	52.27	48.48	49.40	49.96
136.260	106.26	5.89	5.69	5.59	49.25	49.36	49.21	45.55	46.66	47.34
174.910	144.91	5.94	5.77	5.66	46.93	47.07	46.75	43.44	44.47	44.96
200.000	170.00	6.07	5.87	5.76	45.75	45.71	45.58	42.49	43.53	43.81
232.880	202.88	6.02	5.82	5.70	44.60	44.45	44.37	41.04	41.92	42.15
271.520	241.52	5.83	5.63	5.53	42.79	42.63	42.54	39.79	40.43	40.58
310.170	280.17	5.87	5.69	5.61	41.77	41.76	41.87	38.52	39.12	39.29
348.810	318.81	6.00	5.81	5.69	41.09	40.89	40.94	36.88	37.24	38.02
387.460	357.46	5.91	5.71	5.60	40.89	40.87	40.96	36.05	36.52	36.78
426.110	396.11	6.18	5.99	5.85	38.94	38.89	39.15	34.63	35.09	35.82
464.750	434.75	6.16	5.95	5.81	37.11	37.39	37.70	34.34	34.88	36.03
500.000	470.00	6.16	5.94	5.83	36.74	37.14	37.86	33.99	34.65	35.23
522.720	492.72	6.26	6.05	5.92	36.70	37.11	37.56	33.29	33.82	34.12
561.370	531.37	6.53	6.32	6.16	36.72	37.22	37.70	31.85	32.34	32.73
600.000	570.00	6.87	6.59	6.30	35.24	35.63	36.68	30.17	30.55	31.20

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	1.24	1.34	1.30	1.91	2.92	4.23	1.37	1.22	1.13
10.000	1.11	1.23	1.19	1.85	2.84	4.07	1.37	1.22	1.13
20.000	1.04	1.20	1.15	1.79	2.70	3.92	1.38	1.22	1.14
41.061	1.04	1.21	1.17	1.90	2.87	4.10	1.37	1.22	1.14
59.091	1.05	1.21	1.18	1.84	2.73	3.94	1.38	1.23	1.15
100.000	1.07	1.20	1.19	1.75	2.53	3.54	1.40	1.26	1.18
149.240	1.09	1.18	1.20	1.74	2.46	3.35	1.46	1.31	1.23
185.300	1.10	1.16	1.22	1.74	2.46	3.34	1.51	1.36	1.27
203.330	1.11	1.15	1.22	1.72	2.42	3.26	1.54	1.39	1.30
239.390	1.12	1.11	1.23	1.72	2.40	3.17	1.60	1.44	1.35
275.450	1.13	1.21	1.25	1.73	2.40	3.12	1.69	1.54	1.44
311.520	1.14	1.29	1.25	1.73	2.37	3.08	1.75	1.58	1.47
347.580	1.15	1.27	1.26	1.75	2.37	3.02	1.82	1.65	1.53
383.640	1.17	1.27	1.27	1.80	2.39	3.01	1.91	1.72	1.60
437.730	1.19	1.29	1.28	1.84	2.40	2.99	2.05	1.84	1.72
473.790	1.21	1.30	1.29	1.88	2.37	2.96	2.10	1.90	1.76
500.000	1.23	1.31	1.31	1.88	2.41	2.98	2.17	1.97	1.81
527.880	1.25	1.32	1.32	1.91	2.41	2.94	2.20	1.98	1.84
563.940	1.28	1.33	1.34	1.92	2.42	2.96	2.27	2.05	1.91
600.000	1.30	1.34	1.35	1.93	2.37	2.91	2.28	2.06	1.94

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
1.000	−219.74	−.14
5.000	−228.96	−.13
20.000	−229.16	−.13
39.646	−226.03	−.13
58.969	−226.83	−.14
100.000	−229.55	−.13
136.260	−233.59	−.11
174.910	−231.58	−.12
200.000	−231.48	−.14
232.880	−233.79	−.23
271.520	−237.93	−.29
310.170	−230.08	−.36
348.810	−220.21	−.33
387.460	−210.92	−.43
426.110	−211.73	−.34
464.750	−213.09	−.36
500.000	−217.98	−.98
522.720	−218.31	−.95
561.370	−210.89	−.87
600.000	−201.93	−.50

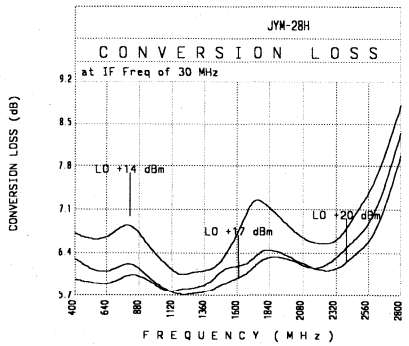
Measurements at RF & LO Power +7 dBm

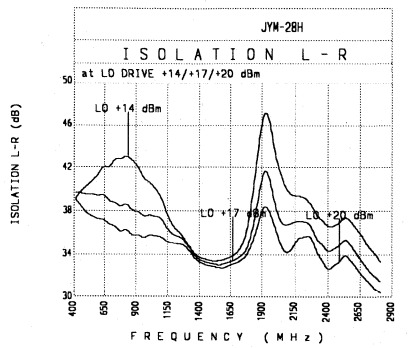
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

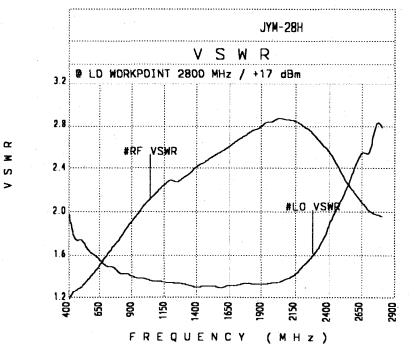
surface mount

Frequency Mixers Model JYM-28H

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
400.00	430.00	6.77	6.35	6.02	400.00	39.31	39.96	39.45	43.78	42.42	41.13
535.85	565.85	6.64	6.15	5.96	535.85	41.06	39.94	37.77	43.06	40.97	39.19
671.70	701.70	6.72	6.13	5.93	671.70	42.07	39.08	36.95	41.29	39.25	37.94
800.00	830.00	7.03	6.36	6.15	800.00	43.48	39.17	36.81	43.38	39.90	38.13
943.40	973.40	6.52	6.03	6.01	943.40	41.17	37.63	35.61	40.21	38.28	36.90
1079.25	1109.25	6.23	5.82	5.77	1079.25	39.65	37.76	35.96	41.08	38.87	37.46
1169.81	1199.81	6.06	5.76	5.87	1169.81	36.86	36.05	35.34	41.45	39.48	38.21
1260.38	1290.38	6.15	5.78	5.86	1260.38	35.81	35.62	35.18	41.51	40.30	39.09
1400.00	1430.00	6.16	5.83	5.96	1400.00	33.89	33.66	33.43	39.88	40.46	39.77
1486.79	1516.79	6.33	5.96	6.23	1486.79	33.61	33.40	33.14	39.33	40.25	40.28
1622.64	1592.64	6.86	6.05	6.22	1622.64	33.95	33.61	33.29	39.47	40.84	41.58
1713.21	1683.21	7.40	6.22	6.35	1713.21	34.78	34.09	33.68	39.75	41.86	43.08
1803.77	1773.77	7.24	6.41	6.56	1803.77	39.06	36.18	35.19	39.11	41.43	43.07
1984.91	1954.91	6.86	6.36	6.38	1984.91	43.23	38.60	36.73	42.33	49.09	52.27
2075.47	2045.47	6.68	6.23	6.27	2075.47	40.07	36.96	34.26	41.61	45.57	54.29
2211.32	2181.32	6.57	6.17	6.15	2211.32	39.55	37.30	35.77	41.73	45.52	48.82
2347.17	2317.17	6.63	6.42	6.18	2347.17	37.49	35.31	33.76	40.35	42.38	43.29
2483.02	2453.02	7.16	6.71	6.47	2483.02	37.20	35.03	33.54	38.27	38.65	38.24
2618.87	2588.87	7.58	7.05	6.71	2618.87	36.55	34.27	32.98	36.70	36.72	35.99
2800.00	2770.00	8.83	8.39	8.02	2800.00	33.54	31.73	30.68	34.09	33.90	33.75

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
400.00	1.35	1.21	1.13	1.37	2.00	2.99	4.00	1.52	1.38	1.28
535.85	1.54	1.38	1.27	1.25	1.68	2.26	8.00	1.52	1.38	1.29
671.70	1.79	1.60	1.47	1.18	1.53	2.00	12.00	1.53	1.39	1.29
800.00	1.99	1.78	1.63	1.14	1.43	1.84	16.00	1.53	1.39	1.30
943.40	2.22	2.01	1.84	1.11	1.41	1.86	20.00	1.53	1.40	1.30
1079.25	2.41	2.21	2.03	1.09	1.39	1.81	25.00	1.53	1.40	1.31
1169.81	2.50	2.31	2.14	1.09	1.37	1.79	56.30	1.50	1.37	1.29
1260.38	2.47	2.28	2.12	1.08	1.36	1.76	87.50	1.52	1.38	1.29
1400.00	2.63	2.46	2.30	1.05	1.32	1.69	118.80	1.58	1.44	1.34
1486.79	2.69	2.52	2.37	1.02	1.33	1.69	150.00	1.51	1.37	1.28
1622.64	2.76	2.61	2.46	1.04	1.35	1.73	200.00	1.63	1.47	1.36
1713.21	2.84	2.70	2.56	1.07	1.35	1.72	255.60	1.62	1.45	1.33
1803.77	2.92	2.77	2.64	1.11	1.36	1.71	311.10	1.73	1.54	1.39
1984.91	3.02	2.85	2.70	1.18	1.37	1.68	366.70	1.70	1.49	1.34
2075.47	3.05	2.87	2.72	1.24	1.40	1.70	422.20	1.82	1.60	1.43
2211.32	3.01	2.80	2.65	1.36	1.54	1.79	477.80	1.66	1.45	1.28
2347.17	2.85	2.63	2.46	1.52	1.75	2.01	533.30	1.74	1.52	1.35
2483.02	2.63	2.42	2.26	1.76	2.06	2.40	588.90	1.60	1.40	1.24
2618.87	2.26	2.13	2.04	2.00	2.36	2.78	644.40	1.60	1.40	1.25
2800.00	1.84	1.98	2.07	2.39	2.80	3.28	700.00	1.45	1.27	1.13

broadband, low distortion

Frequency Mixers

Model
TFM-12MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
.500	30.50	5.85	5.54	5.35	63.00	61.48	59.90	63.52	64.69	59.50
5.000	35.00	5.93	5.64	5.45	63.62	61.51	59.85	63.91	64.42	59.69
20.000	50.00	5.86	5.60	5.45	63.18	61.26	59.82	62.25	63.51	59.44
50.000	80.00	6.17	5.85	5.67	58.36	58.01	57.90	55.12	56.01	55.59
100.000	70.00	6.17	5.85	5.69	55.18	55.76	55.75	51.62	52.77	52.44
222.670	192.67	6.96	6.55	6.24	46.66	47.09	47.81	42.86	43.57	44.57
370.780	340.78	8.11	7.22	6.68	42.33	43.20	43.91	39.04	40.28	40.42
500.000	470.00	8.69	7.60	6.93	38.78	39.53	40.41	35.94	35.85	35.78
592.940	562.94	8.74	7.49	6.88	37.80	38.74	39.89	34.30	33.96	33.98
741.060	711.06	8.57	7.43	6.76	36.30	37.61	38.75	33.00	32.39	32.02
889.170	859.17	7.39	6.76	6.46	33.12	33.34	34.02	29.52	29.78	30.03
1037.300	1007.30	6.40	6.12	5.99	33.46	34.59	35.34	30.14	30.40	30.09
1111.300	1081.30	6.31	6.07	5.96	34.15	35.77	36.33	32.12	31.30	30.32
1259.400	1229.40	6.89	6.35	6.20	34.81	37.02	37.87	33.86	32.22	31.04
1333.500	1303.50	7.20	6.58	6.36	34.21	36.62	37.75	32.92	31.95	31.07
1481.600	1451.60	7.92	7.15	6.83	33.20	35.23	37.05	34.03	34.09	34.32
1555.700	1525.70	8.10	7.34	7.00	31.91	34.20	35.89	38.52	39.23	40.02
1703.800	1673.80	8.40	7.82	7.59	32.83	35.34	37.63	39.07	39.62	39.16
1851.900	1821.90	8.69	8.07	7.86	35.67	38.03	39.61	35.44	35.98	34.70
2000.000	1970.00	9.24	8.50	8.30	33.40	32.12	30.71	38.85	36.12	31.03

mixer VSWR

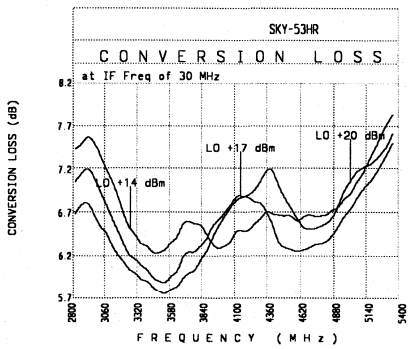
freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.000	4.80	4.43	4.04	1.19	1.96	3.06	1.11	1.13	1.22
10.000	4.86	4.51	4.05	1.14	1.88	2.85	1.09	1.10	1.19
20.000	4.92	4.59	4.06	1.25	2.04	2.95	1.08	1.09	1.19
50.000	4.78	4.43	3.96	1.16	1.91	2.90	1.09	1.11	1.20
71.500	4.84	4.31	3.87	1.18	1.86	2.69	1.11	1.13	1.21
200.000	4.88	4.70	4.24	1.30	1.78	2.40	1.26	1.27	1.32
337.500	4.93	4.92	4.41	1.39	1.67	2.19	1.43	1.43	1.47
470.500	4.75	4.52	4.33	1.46	1.58	2.07	1.60	1.64	1.69
537.000	4.62	4.48	4.20	1.50	1.56	2.06	1.70	1.75	1.81
670.000	3.58	3.42	3.33	1.56	1.43	1.86	1.93	2.07	2.14
869.500	2.52	2.40	2.39	1.47	1.27	1.61	2.61	2.81	2.95
1000.000	1.98	1.85	1.75	1.45	1.19	1.57	3.28	3.49	3.57
1069.000	1.75	1.61	1.50	1.46	1.18	1.56	3.76	3.93	4.05
1200.000	1.48	1.35	1.22	1.40	1.24	1.64	4.80	5.22	5.13
1335.000	1.37	1.25	1.11	1.36	1.31	1.72	4.93	5.06	5.13
1468.000	1.41	1.32	1.14	1.34	1.42	1.88	6.53	7.41	7.50
1534.500	1.53	1.43	1.22	1.37	1.43	1.83	10.96	10.37	10.89
1667.500	1.90	1.79	1.53	1.52	1.53	1.86	11.85	10.31	9.69
1867.000	2.74	2.62	2.35	1.84	1.59	1.72	9.08	8.81	8.43
2000.000	3.46	3.22	3.16	1.99	1.58	1.54	6.39	6.58	6.68

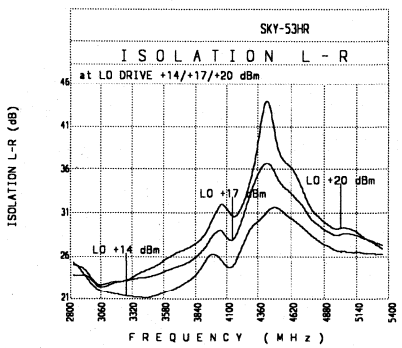
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers / NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

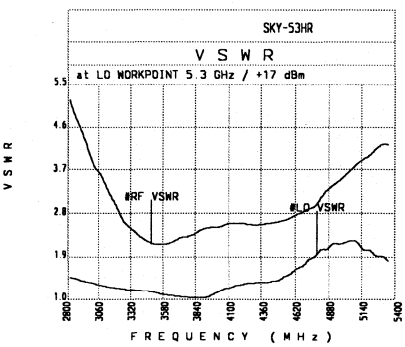
surface mount

Frequency Mixers Model SKY-53HR

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
2800.00	2830.00	7.48	7.10	6.73	2800.00	25.58	25.34	24.14	17.68	15.62	13.20
3000.00	3030.00	7.40	6.98	6.56	3000.00	22.35	22.86	22.71	13.63	13.43	11.65
3224.53	3254.53	6.55	6.23	6.06	3224.53	21.61	23.41	23.44	11.44	12.37	11.29
3413.21	3443.21	6.26	5.97	5.86	3413.21	21.36	23.89	24.75	10.24	11.51	11.04
3601.89	3631.89	6.44	6.04	5.86	3601.89	22.30	24.83	26.30	9.37	10.82	10.56
3649.06	3679.06	6.64	6.25	5.99	3649.06	22.64	25.12	26.80	9.68	10.85	10.70
3837.74	3867.74	6.49	6.43	6.28	3837.74	24.90	26.76	28.30	10.09	11.38	11.70
4000.00	4030.00	6.38	6.79	6.75	4000.00	26.09	29.48	32.38	10.90	12.17	12.64
4120.75	4090.75	6.53	6.93	6.93	4120.75	25.22	28.14	30.59	11.65	12.90	13.67
4215.09	4185.09	6.62	6.85	7.00	4215.09	28.45	31.91	33.19	12.10	13.36	14.29
4356.60	4326.60	6.72	6.62	7.26	4356.60	30.97	37.08	44.35	12.51	13.80	14.94
4498.11	4468.11	6.73	6.32	6.80	4498.11	31.68	34.50	37.60	12.99	14.18	15.49
4639.62	4609.62	6.73	6.33	6.55	4639.62	29.96	32.59	34.87	13.79	15.24	16.77
4781.13	4751.13	6.71	6.41	6.62	4781.13	28.30	30.09	31.13	15.54	16.99	18.71
4828.30	4798.30	6.79	6.48	6.68	4828.30	27.70	29.50	30.38	15.82	17.34	19.12
5000.00	4970.00	7.07	6.87	7.20	5000.00	26.92	29.02	29.67	18.11	19.53	21.24
5111.32	5081.32	7.36	7.09	7.29	5111.32	26.87	28.71	28.97	19.19	20.48	22.37
5158.49	5128.49	7.47	7.16	7.34	5158.49	26.60	28.33	28.41	19.41	20.99	22.87
5252.83	5222.83	7.78	7.42	7.50	5252.83	26.57	27.80	27.62	20.17	21.67	23.38
5300.00	5270.00	7.88	7.55	7.66	5300.00	26.60	27.61	27.15	20.63	22.02	23.51

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	max. DC output mV	DC offset mV
2800.00	6.12	5.19	4.61	2.46	1.49	1.48	1.55	1.36	1.01	1.15	2800.00	773.20	-23.06
3000.00	4.60	3.73	3.75	1.97	1.35	1.44	3.30	1.36	1.01	1.15	2931.58	667.10	11.77
3224.53	2.87	2.66	2.93	1.70	1.24	1.43	5.50	1.36	1.01	1.15	3063.16	715.90	10.79
3413.21	1.97	2.26	2.70	1.63	1.19	1.41	7.80	1.36	1.01	1.15	3194.74	616.30	-27.82
3601.89	1.59	2.21	2.81	1.42	1.10	1.46	10.00	1.36	1.01	1.15	3326.32	491.60	-76.80
3649.06	1.59	2.28	2.88	1.39	1.09	1.53	12.00	1.36	1.01	1.15	3457.89	483.70	-6.34
3837.74	1.73	2.48	3.24	1.18	1.05	1.48	34.00	1.37	1.01	1.15	3589.47	527.90	-6.38
4000.00	1.94	2.55	3.09	1.34	1.21	1.55	56.00	1.37	1.02	1.13	3721.05	448.50	-19.11
4120.75	2.08	2.61	3.03	1.48	1.33	1.57	78.00	1.36	1.02	1.14	3852.63	388.00	-16.44
4215.09	2.08	2.61	3.07	1.61	1.38	1.57	100.00	1.36	1.02	1.14	3984.21	478.40	10.22
4356.60	2.11	2.62	3.04	1.69	1.37	1.57	150.00	1.36	1.03	1.13	4115.79	435.00	-8.51
4498.11	2.19	2.69	3.16	1.84	1.53	1.71	188.90	1.37	1.04	1.11	4247.37	278.20	-25.26
4639.62	2.36	2.85	3.32	2.01	1.70	1.84	227.80	1.38	1.04	1.11	4378.95	174.53	-24.83
4781.13	2.67	3.17	3.71	2.73	2.13	2.13	266.70	1.42	1.07	1.07	4510.53	333.80	-2.64
4828.30	2.81	3.32	3.85	2.62	2.02	1.95	305.60	1.46	1.10	1.07	4642.11	339.40	-1.26
5000.00	3.24	3.70	4.24	3.20	2.27	1.95	344.40	1.51	1.14	1.06	4773.68	93.35	-10.15
5111.32	3.55	3.97	4.48	2.77	2.01	1.67	383.30	1.57	1.18	1.08	4905.26	126.96	-22.47
5158.49	3.61	4.03	4.54	3.04	2.12	1.72	422.20	1.63	1.22	1.09	5036.84	232.72	-26.14
5252.83	3.89	4.30	4.77	2.87	1.98	1.64	461.10	1.69	1.27	1.12	5168.42	24.94	-22.22
5300.00	3.91	4.27	4.77	2.53	1.84	1.57	500.00	1.74	1.30	1.13	5300.00	-100.92	-25.84

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SAM-3
TSM-3

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.100	30.10	6.00	5.74	5.57	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	66.23
.200	30.20	5.45	5.22	5.09	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	65.77
.500	30.50	5.20	4.98	4.85	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	65.50
1.000	31.00	5.12	4.89	4.76	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	65.49
2.000	32.00	5.08	4.86	4.74	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	65.24
5.000	35.00	5.03	4.82	4.72	> 64.00	> 67.00	> 70.00	> 64.00	> 67.00	64.20
10.000	40.00	5.09	4.86	4.72	> 64.00	> 67.00	64.53	> 64.00	> 67.00	60.90
20.000	50.00	5.14	4.94	4.79	> 64.00	58.85	57.49	> 64.00	58.01	56.70
41.470	71.47	5.07	4.85	4.78	52.92	51.90	51.32	52.89	51.69	50.98
55.260	85.26	5.06	4.89	4.78	50.20	49.48	48.87	50.06	49.53	48.71
100.000	70.00	4.95	4.79	4.73	45.42	44.78	44.29	45.39	44.91	44.39
151.790	121.79	4.99	4.81	4.78	42.39	41.85	41.22	41.97	41.77	41.34
200.000	170.00	5.16	5.01	4.91	40.15	39.70	39.49	39.45	39.48	39.58
220.740	190.74	5.19	5.05	4.95	40.31	39.83	39.25	38.69	38.88	38.68
248.320	218.32	5.15	5.02	4.93	39.82	39.44	38.87	37.84	38.41	38.66
303.480	273.48	5.23	5.11	5.14	36.90	36.66	36.33	36.10	36.25	36.28
331.060	301.06	5.40	5.25	5.29	36.17	36.60	36.55	35.34	36.25	36.67
358.640	328.64	5.66	5.48	5.47	35.52	36.34	36.77	33.90	35.29	36.31
386.220	356.22	5.67	5.50	5.48	35.15	36.21	37.07	31.88	33.15	34.38
400.000	370.00	5.78	5.52	5.39	35.10	36.19	36.99	31.08	32.27	33.43

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.20	1.11	1.05	1.72	2.55	3.62	.58	1.44	1.33
10.000	1.20	1.11	1.05	1.74	2.49	3.53	.59	1.45	1.33
20.000	1.20	1.11	1.04	1.68	2.41	3.35	.60	1.46	1.34
39.853	1.18	1.09	1.03	1.81	2.51	3.56	.60	1.46	1.34
50.000	1.18	1.09	1.03	1.81	2.51	3.47	.61	1.47	1.35
74.706	1.18	1.09	1.03	1.70	2.40	3.23	.64	1.50	1.38
100.000	1.17	1.08	1.03	1.66	2.27	3.10	.69	1.55	1.42
132.790	1.16	1.07	1.02	1.67	2.30	3.09	.76	1.63	1.51
167.650	1.14	1.06	1.01	1.67	2.31	2.98	.85	1.73	1.60
190.880	1.13	1.05	1.00	1.69	2.30	3.00	.94	1.80	1.67
200.000	1.12	1.05	1.01	1.68	2.30	3.00	.96	1.83	1.71
225.740	1.11	1.04	1.03	1.72	2.30	2.95	.04	1.91	1.77
248.970	1.09	1.04	1.04	1.75	2.30	3.00	.15	2.01	1.86
272.210	1.08	1.05	1.07	1.80	2.36	2.98	.24	2.11	1.95
295.440	1.07	1.06	1.09	1.80	2.38	3.00	.34	2.19	2.04
307.060	1.07	1.08	1.11	1.78	2.40	3.00	.38	2.24	2.08
330.290	1.07	1.11	1.14	1.83	2.46	3.06	.48	2.36	2.18
353.530	1.09	1.14	1.18	1.84	2.47	3.06	.58	2.45	2.26
376.760	1.11	1.17	1.21	1.90	2.52	3.09	.66	2.57	2.37
400.000	1.13	1.20	1.24	1.98	2.58	3.13	.72	2.65	2.45

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
.100	−236.30	+.13
.200	−237.64	+.12
.500	−239.63	+.12
1.000	−239.96	+.12
2.000	−240.28	+.12
5.000	−241.56	+.12
10.000	−241.74	+.12
20.000	−240.48	+.12
41.470	−239.23	+.12
55.260	−240.62	+.14
100.000	−241.67	+.20
151.790	−239.61	+.30
200.000	−242.22	+.31
220.740	−242.19	+.32
248.320	−239.84	+.40
303.480	−220.69	+.36
331.060	−213.10	+.48
358.640	−214.55	+.75
386.220	−208.18	+1.12
400.000	−206.78	+1.26

Measurements at RF & LO Power +7 dBm

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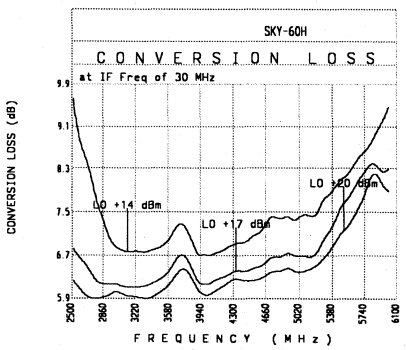
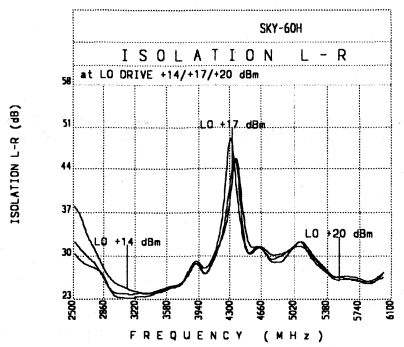
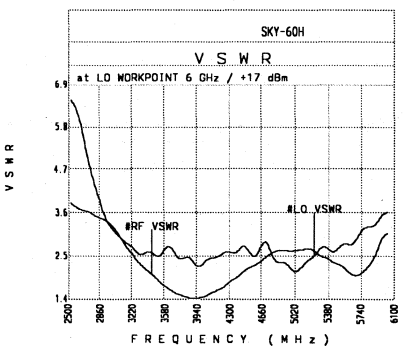
surface mount

Frequency Mixers Model SKY-60H

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
2500.00	2530.00	9.69	6.88	6.29	2500.00	37.99	32.29	30.35	10.18	13.59	16.49
2698.11	2728.11	8.27	6.44	5.96	2698.11	31.89	29.33	28.29	10.99	13.15	14.54
2896.23	2926.23	7.09	6.21	6.01	2896.23	26.51	24.54	24.61	10.44	11.85	12.80
3000.00	3030.00	6.89	6.21	6.08	3000.00	25.23	23.79	23.18	10.27	11.50	12.01
3292.45	3322.45	6.81	6.19	5.96	3292.45	23.86	23.83	23.35	10.38	11.18	11.25
3490.57	3520.57	6.94	6.35	6.11	3490.57	24.48	24.27	24.02	10.62	11.04	10.84
3688.68	3718.68	7.39	6.80	6.52	3688.68	25.13	24.82	24.76	11.41	11.25	10.90
3886.79	3916.79	6.72	6.23	6.09	3886.79	29.41	29.18	29.51	12.28	11.92	11.60
3952.83	3982.83	6.80	6.22	6.02	3952.83	27.34	27.07	27.96	13.54	13.08	12.58
4000.00	4030.00	6.73	6.21	6.01	4000.00	26.69	26.84	27.83	14.13	13.50	12.89
4283.02	4253.02	6.97	6.47	6.34	4283.02	53.76	41.78	38.10	17.15	15.81	14.82
4547.17	4517.17	7.16	6.54	6.31	4547.17	31.17	30.70	31.31	19.51	17.48	16.13
4811.32	4781.32	7.44	6.73	6.47	4811.32	30.22	29.83	28.97	21.30	19.11	17.70
4943.40	4913.40	7.38	6.75	6.47	4943.40	30.74	30.97	30.63	22.61	20.26	18.76
5000.00	4970.00	7.48	6.75	6.44	5000.00	31.49	31.42	31.42	22.43	20.35	18.95
5273.58	5243.58	7.84	7.08	6.71	5273.58	28.24	28.94	28.71	24.61	22.12	20.62
5537.74	5507.74	8.24	7.79	7.28	5537.74	26.44	26.69	26.14	26.77	23.62	21.73
5801.89	5771.89	8.85	8.51	8.29	5801.89	25.57	25.77	25.37	28.10	24.37	22.35
5867.92	5837.92	9.10	8.43	8.30	5867.92	25.64	25.88	25.43	28.46	24.64	22.50
6000.00	5970.00	9.54	8.38	7.96	6000.00	26.44	27.21	27.26	28.66	24.76	22.77

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO +17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
2500.00	5.05	3.93	3.07	13.09	6.58	6.17	2.17	1.29	1.13	1.47
2698.11	5.04	3.72	2.79	6.66	4.96	4.70	13.30	1.29	1.13	1.46
2896.23	4.63	3.49	2.63	4.34	3.45	3.94	25.50	1.29	1.13	1.46
3000.00	4.14	3.26	2.47	3.33	3.17	3.82	37.80	1.29	1.13	1.46
3292.45	2.76	2.33	1.93	2.07	2.57	3.38	50.00	1.29	1.13	1.46
3490.57	2.27	1.89	1.59	1.89	2.50	3.34	70.00	1.30	1.12	1.44
3688.68	1.94	1.60	1.35	1.85	2.49	3.28	177.50	1.33	1.13	1.43
3886.79	1.78	1.49	1.32	1.72	2.32	3.12	285.00	1.38	1.13	1.38
3952.83	1.79	1.52	1.35	1.72	2.29	3.02	392.50	1.41	1.15	1.35
4000.00	1.82	1.55	1.39	1.85	2.50	3.47	500.00	1.41	1.15	1.30
4283.02	2.17	1.95	1.82	2.24	2.66	3.35	600.00	1.38	1.12	1.29
4547.17	2.63	2.33	2.14	2.44	2.46	2.71	700.00	1.34	1.08	1.26
4811.32	3.12	2.72	2.36	2.55	2.39	2.73	800.00	1.30	1.05	1.24
4943.40	3.06	2.69	2.39	2.31	2.25	2.78	900.00	1.29	1.08	1.24
5000.00	3.09	2.73	2.43	2.26	2.14	2.55	1000.00	1.28	1.14	1.27
5273.58	2.86	2.54	2.28	3.33	2.83	3.03	1100.00	1.30	1.19	1.28
5537.74	2.56	2.26	2.13	4.05	2.94	3.00	1200.00	1.32	1.24	1.30
5801.89	3.03	2.35	2.10	4.37	3.31	3.40	1300.00	1.36	1.27	1.30
5867.92	3.34	2.58	2.25	4.45	3.36	3.34	1400.00	1.39	1.29	1.29
6000.00	3.97	3.17	3.04	5.36	3.70	3.48	1500.00	1.42	1.29	1.26

ϕ detection

FREQ. MHz	max. DC output mV	DC offset mV
2500.00	748.20	65.91
2684.21	779.80	116.50
2868.42	751.90	77.59
3052.63	755.00	56.32
3236.84	637.50	122.84
3421.05	596.70	89.80
3605.26	590.70	46.64
3789.47	640.60	72.84
3973.68	506.00	23.75
4157.89	340.60	24.32
4342.11	429.50	50.28
4526.32	519.20	48.91
4710.53	495.80	63.60
4894.74	197.49	60.99
5078.95	182.80	66.56
5263.16	337.10	89.82
5447.37	281.60	86.42
5631.58	154.88	77.00
5815.79	-20.98	82.82
6000.00	79.62	89.13

most widely used

Frequency Mixers

Model SAM-4

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	6.26	5.94	5.69	59.83	59.43	57.96	>64.00	61.56	59.99
20.000	50.00	6.35	6.01	5.75	58.99	57.85	57.24	61.19	60.18	58.72
43.906	73.91	6.35	6.01	5.76	56.19	55.63	54.65	57.82	56.61	55.69
121.720	91.72	6.27	5.97	5.72	48.39	48.05	47.50	49.68	49.15	48.47
199.530	169.53	6.52	6.14	5.87	43.81	44.14	44.62	45.64	45.36	44.99
238.440	208.44	6.52	6.15	5.88	42.30	43.00	43.56	44.33	43.97	43.62
316.250	286.25	6.41	6.08	5.84	40.10	41.40	42.11	42.50	42.08	41.70
394.060	364.06	6.49	6.14	5.92	38.29	39.59	40.33	40.89	40.42	39.98
471.870	441.87	6.74	6.42	6.12	36.72	38.20	39.11	41.19	40.40	39.92
549.680	519.68	6.71	6.44	6.17	36.02	37.71	38.46	39.78	39.04	38.23
588.590	558.59	6.86	6.59	6.28	35.62	37.59	37.96	38.53	38.26	37.96
666.400	636.40	7.07	6.81	6.48	33.97	35.77	35.88	36.80	36.89	36.81
744.210	714.21	6.88	6.56	6.23	32.09	33.69	33.73	36.44	36.91	37.23
822.030	792.03	6.67	6.31	5.97	30.51	32.17	32.64	35.91	36.54	37.05
899.840	869.84	6.74	6.35	6.00	29.07	30.79	31.49	35.74	36.37	37.04
977.650	947.65	6.50	6.12	5.77	27.98	29.61	30.39	35.75	36.61	37.16
1016.600	986.60	6.44	6.07	5.77	27.58	29.23	29.91	35.83	36.74	37.35
1094.400	1064.40	6.34	5.99	5.68	26.93	28.64	29.40	36.01	36.86	37.72
1172.200	1142.20	6.40	6.09	5.84	26.39	28.41	29.20	34.94	35.96	36.47
1250.000	1220.00	6.54	6.33	6.13	26.25	28.31	29.37	35.21	35.12	35.29

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	1.73	1.47	1.27	2.04	3.00	4.04	1.20	1.28	1.38
10.000	1.73	1.47	1.27	1.95	2.89	3.94	1.12	1.22	1.32
20.000	1.73	1.47	1.28	1.90	2.85	3.86	1.10	1.21	1.30
50.000	1.72	1.47	1.28	2.00	2.93	4.00	1.11	1.23	1.32
100.000	1.75	1.52	1.32	1.87	2.63	3.62	1.12	1.23	1.32
160.630	1.84	1.60	1.41	1.82	2.58	3.42	1.12	1.22	1.31
200.000	1.90	1.67	1.49	1.81	2.55	3.35	1.11	1.22	1.31
277.340	2.01	1.81	1.64	1.77	2.40	3.16	1.11	1.21	1.30
355.160	2.18	1.96	1.79	1.77	2.36	3.06	1.12	1.21	1.29
432.970	2.39	2.11	1.96	1.79	2.35	3.01	1.13	1.21	1.27
500.000	2.42	2.20	2.06	1.76	2.31	2.92	1.13	1.21	1.24
549.690	2.47	2.24	2.11	1.80	2.28	2.87	1.13	1.19	1.22
627.500	2.56	2.30	2.17	1.80	2.25	2.81	1.13	1.17	1.17
783.130	2.44	2.23	2.07	1.81	2.26	2.72	1.07	1.04	1.03
860.940	2.41	2.17	2.00	1.84	2.22	2.69	1.11	1.06	1.08
938.750	2.33	2.03	1.86	1.88	2.19	2.66	1.23	1.20	1.22
1000.000	2.24	1.95	1.77	1.91	2.22	2.65	1.38	1.36	1.38
1055.500	2.12	1.86	1.68	1.92	2.21	2.61	1.54	1.52	1.53
1133.300	1.98	1.74	1.59	1.94	2.26	2.66	1.83	1.81	1.80
1250.000	1.80	1.65	1.59	1.96	2.20	2.64	2.32	2.19	2.17

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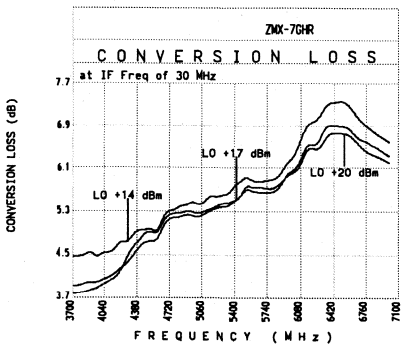
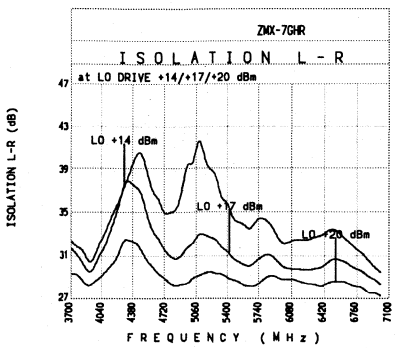
coaxial

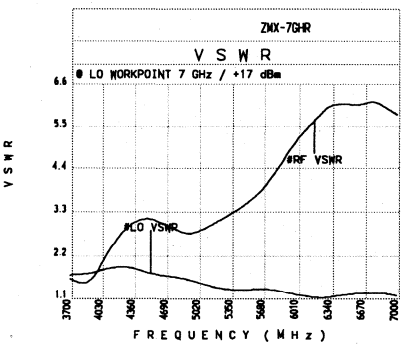
Frequency Mixers

Model
ZMX-7GHR

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
3700.00	3730.00	4.50	3.95	3.80	3700.00	32.65	31.94	29.57	29.65	27.92	26.50
3886.79	3916.79	4.61	4.04	3.88	3886.79	30.37	29.49	28.33	29.05	29.05	28.50
4000.00	4030.00	4.58	4.07	3.97	4000.00	32.47	31.32	29.16	29.10	29.24	29.00
4260.38	4290.38	4.75	4.38	4.50	4260.38	37.53	38.08	32.96	29.78	31.10	31.73
4509.43	4539.43	5.04	4.80	4.98	4509.43	39.34	35.04	30.74	29.25	30.94	32.55
4696.23	4726.23	5.37	5.21	5.29	4696.23	34.90	31.75	29.28	29.37	31.14	32.95
4883.02	4913.02	5.46	5.30	5.36	4883.02	36.99	31.22	28.59	30.58	31.93	33.52
5000.00	4970.00	5.47	5.23	5.30	5000.00	39.09	32.26	29.24	31.38	32.82	34.31
5194.34	5164.34	5.61	5.41	5.44	5194.34	39.19	32.90	29.81	32.75	34.00	35.06
5381.13	5351.13	5.84	5.55	5.56	5381.13	36.56	31.71	29.16	33.47	34.53	35.15
5567.92	5537.92	5.92	5.73	5.79	5567.92	34.18	30.38	28.42	33.74	34.46	34.83
5754.72	5724.72	5.94	5.70	5.77	5754.72	34.77	31.17	28.94	34.31	34.72	34.66
6000.00	5970.00	6.35	6.11	6.07	6000.00	32.28	30.09	28.98	35.01	34.77	34.21
6252.83	6222.83	7.06	6.58	6.49	6252.83	32.72	29.87	28.60	35.41	34.26	33.29
6315.09	6285.09	7.29	6.91	6.66	6315.09	32.97	30.08	28.59	35.62	34.24	33.20
6501.89	6471.89	7.43	6.95	6.82	6501.89	33.83	30.95	28.87	35.58	33.65	32.17
6626.42	6596.42	7.22	6.82	6.72	6626.42	32.83	30.68	28.88	35.03	32.90	31.53
6750.94	6720.94	6.96	6.68	6.49	6750.94	31.78	29.96	28.36	34.25	32.03	30.64
6875.47	6845.47	6.80	6.55	6.39	6875.47	30.78	29.25	27.67	33.35	31.16	29.76
7000.00	6970.00	6.66	6.40	6.27	7000.00	29.71	28.57	27.47	32.03	30.32	29.24

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	2.09	1.61	1.35	4.25	1.71	1.12	0.03	1.45	1.83	2.22	3700.00	365.20	-23.14
3886.79	1.77	1.40	1.23	3.95	1.73	1.03	2.50	1.45	1.82	2.21	3873.68	541.40	-25.85
4000.00	2.00	1.88	1.81	4.42	1.81	1.02	5.00	1.44	1.82	2.22	4047.37	374.20	-23.50
4260.38	2.60	2.99	3.22	5.27	1.98	1.12	7.50	1.44	1.82	2.22	4221.05	432.90	-22.36
4509.43	2.67	3.21	3.67	3.95	1.73	1.17	10.00	1.44	1.82	2.21	4394.74	419.20	-27.28
4696.23	2.51	2.95	3.34	3.82	1.69	1.20	20.00	1.44	1.82	2.21	4568.42	147.18	-24.81
4883.02	2.53	2.73	2.93	3.82	1.61	1.25	40.00	1.44	1.82	2.20	4742.11	448.40	-18.42
5000.00	2.79	2.78	2.88	3.36	1.52	1.28	60.00	1.44	1.81	2.19	4915.79	3.04	-16.45
5194.34	3.33	3.05	2.97	2.86	1.36	1.31	80.00	1.44	1.81	2.19	5089.47	351.20	-24.13
5381.13	3.71	3.31	3.12	2.67	1.31	1.29	100.00	1.43	1.80	2.18	5263.16	84.53	-28.71
5567.92	4.07	3.64	3.41	2.80	1.33	1.33	200.00	1.42	1.78	2.14	5436.84	263.66	-24.88
5754.72	4.58	4.13	3.95	2.80	1.35	1.39	288.90	1.42	1.77	2.11	5610.53	139.00	-23.15
6000.00	5.98	5.23	5.10	2.24	1.17	1.49	377.80	1.42	1.76	2.10	5784.21	97.89	-22.70
6252.83	6.41	5.86	5.49	1.90	1.10	1.56	466.70	1.42	1.75	2.08	5957.89	160.02	-25.84
6315.09	6.78	6.08	5.64	1.87	1.13	1.55	555.60	1.42	1.75	2.07	6131.58	-88.94	-28.31
6501.89	6.85	6.11	5.63	1.98	1.20	1.51	644.40	1.42	1.73	2.05	6305.26	156.72	-31.99
6626.42	6.83	6.05	5.70	2.20	1.23	1.41	733.30	1.39	1.70	2.02	6478.95	-260.33	-41.02
6750.94	6.94	6.20	5.50	2.36	1.23	1.37	822.20	1.35	1.66	1.96	6652.63	93.77	-47.48
6875.47	6.76	6.04	5.40	2.41	1.23	1.42	911.10	1.30	1.59	1.88	6826.32	-255.70	-47.70
7000.00	6.47	5.81	5.10	2.24	1.17	1.61	1000.00	1.25	1.51	1.79	7000.00	2.33	-46.14

most widely used

Frequency Mixers

Model SAM-5

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	5.86	5.58	5.34	>64.00	61.45	60.51	>64.00	>67.00	>70.00
20.000	50.00	6.13	5.81	5.51	59.93	58.66	58.81	>64.00	>67.00	>70.00
100.000	70.00	5.99	5.73	5.47	50.27	50.13	50.06	52.31	51.69	51.44
145.160	115.16	6.15	5.90	5.61	46.83	47.16	47.51	48.76	48.88	48.59
238.600	208.60	6.21	5.85	5.61	41.63	42.72	43.77	44.44	44.36	44.24
332.030	302.03	6.26	5.93	5.68	38.60	40.12	41.18	41.62	41.77	41.68
425.470	395.47	6.54	6.14	5.84	35.60	37.03	38.42	40.36	40.50	40.38
500.000	470.00	6.45	6.14	5.89	34.59	36.19	36.97	39.59	39.52	39.04
565.630	535.63	6.50	6.18	5.93	33.44	34.87	35.84	37.74	38.30	38.26
612.350	582.35	6.76	6.39	6.08	32.05	33.19	34.23	36.63	37.13	37.48
705.790	675.86	6.43	6.14	5.86	30.03	31.05	31.51	36.26	37.14	37.65
799.220	769.48	6.02	5.71	5.48	28.25	29.41	30.44	35.93	37.01	37.45
892.660	862.67	6.12	5.64	5.38	26.86	27.93	28.82	34.92	35.99	36.61
986.100	956.07	6.11	5.72	5.40	25.19	26.32	27.19	34.47	35.42	36.07
1032.800	1002.80	6.01	5.68	5.40	24.40	25.45	26.49	33.74	34.44	35.42
1126.300	1096.50	5.98	5.72	5.45	23.25	24.03	25.24	32.13	32.06	33.24
1219.700	1189.70	6.06	5.83	5.64	22.69	23.54	23.67	34.44	34.42	33.22
1313.100	1283.10	6.42	6.22	6.09	22.73	23.61	24.30	35.68	36.18	36.05
1406.600	1376.80	6.80	6.67	6.57	23.69	24.24	24.56	35.83	36.02	36.15
1500.000	1469.90	7.49	7.43	7.35	24.18	24.41	24.62	35.50	35.83	35.74

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.003	1.86	1.61	1.48	1.98	2.93	4.03	1.37	1.45	1.55
20.000	1.87	1.62	1.49	1.79	2.80	3.96	1.22	1.32	1.44
50.000	1.87	1.62	1.49	1.90	2.89	4.05	1.22	1.33	1.44
100.000	1.86	1.67	1.52	1.79	2.68	3.62	1.21	1.33	1.42
200.000	2.07	1.83	1.72	1.72	2.50	3.42	1.21	1.32	1.40
285.310	2.25	2.05	1.90	1.69	2.48	3.17	1.20	1.32	1.37
378.750	2.34	2.25	2.03	1.66	2.37	3.02	1.17	1.29	1.31
472.190	2.50	2.39	2.18	1.68	2.39	3.01	1.12	1.22	1.24
500.000	2.49	2.40	2.17	1.66	2.39	2.97	1.10	1.20	1.20
565.630	2.46	2.39	2.12	1.65	2.37	2.89	1.05	1.12	1.12
659.060	2.42	2.20	2.03	1.64	2.39	2.85	1.10	1.02	1.09
752.500	2.31	2.16	1.89	1.62	2.33	2.84	1.28	1.23	1.28
845.940	2.14	1.99	1.68	1.75	2.47	2.84	1.55	1.55	1.58
939.380	2.01	1.86	1.52	1.81	2.60	2.82	1.93	1.97	1.97
1000.000	1.95	1.77	1.46	1.82	2.65	2.80	2.23	2.27	2.28
1079.500	1.83	1.67	1.40	1.82	2.59	2.82	2.70	2.77	2.74
1173.000	1.58	1.48	1.31	1.80	2.59	2.80	3.26	3.24	3.26
1266.400	1.33	1.30	1.25	1.84	2.57	2.79	3.62	3.41	3.63
1359.800	1.23	1.33	1.38	1.89	2.69	2.91	3.91	3.48	4.15
1500.000	1.70	2.05	1.97	2.22	3.14	3.12	4.32	4.37	4.57

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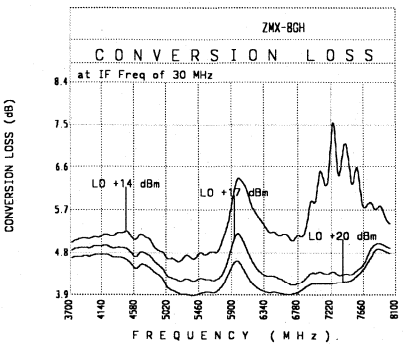
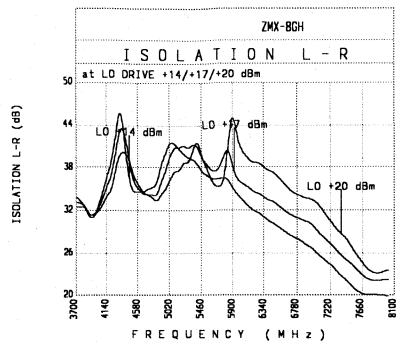
coaxial

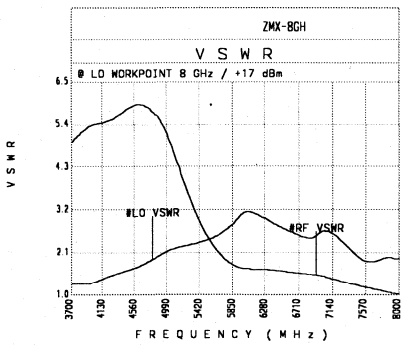
Frequency Mixers

Model ZMX-8GH

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
3700.00	3730.00	5.09	4.92	4.76	3700.00	34.16	33.44	32.74	12.46	12.23	11.75
3886.79	3916.79	5.19	4.99	4.82	3886.79	31.18	31.47	31.47	13.45	12.75	12.17
4000.00	4030.00	5.23	5.03	4.84	4000.00	32.63	32.33	32.02	13.95	13.05	12.40
4260.38	4290.38	5.19	4.94	4.77	4260.38	43.84	41.36	38.85	15.81	14.54	13.64
4509.43	4539.43	5.20	4.87	4.65	4509.43	34.70	35.93	36.70	15.85	14.36	13.31
4758.49	4788.49	5.19	4.82	4.56	4758.49	35.50	34.53	34.18	17.34	15.93	15.05
5000.00	4970.00	4.70	4.34	4.10	5000.00	42.07	40.09	36.65	18.77	17.09	15.97
5256.60	5226.60	4.86	4.34	3.99	5256.60	39.66	40.85	38.67	18.50	17.27	16.40
5505.66	5475.66	4.77	4.30	4.03	5505.66	37.26	38.82	38.30	20.02	18.71	17.75
5754.72	5724.72	5.19	4.42	4.17	5754.72	36.97	40.06	36.14	19.30	18.33	17.38
6000.00	5970.00	6.38	5.20	4.61	6000.00	33.99	36.23	40.89	19.07	18.33	17.36
6439.62	6409.62	5.34	4.38	4.04	6439.62	30.50	33.53	37.71	17.70	17.51	16.78
6688.68	6658.68	5.03	4.17	3.99	6688.68	28.68	31.56	34.92	17.23	17.45	17.11
7000.00	6970.00	5.66	4.42	4.20	7000.00	26.66	29.88	33.55	17.41	17.86	17.63
7240.00	7210.00	8.39	4.51	4.22	7240.00	24.59	27.35	30.53	17.33	17.67	17.46
7493.33	7463.33	5.88	4.39	4.28	7493.33	21.68	24.88	27.33	16.63	17.03	17.08
7683.33	7653.33	5.82	4.71	4.60	7683.33	20.27	22.85	24.51	16.05	16.56	16.98
7746.67	7716.67	6.00	4.97	4.75	7746.67	20.33	22.55	23.82	16.91	17.30	17.53
7810.00	7780.00	5.66	5.05	4.96	7810.00	20.39	22.39	23.54	17.29	17.74	17.99
8000.00	7970.00	5.48	4.96	4.85	8000.00	20.11	22.56	23.91	20.78	21.24	21.52

mixer VSWR

ϕ detection

FREQ. MHz	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. MHz	max. DC output mV	DC offset mV
3700.00	5.78	5.02	4.35	1.36	1.98	2.67	0.03	1.26	1.08	1.04	3700.00	201.50	15.74
3918.64	6.27	5.42	4.66	1.34	1.90	2.51	2.50	1.27	1.09	1.03	3926.32	168.68	18.38
4000.00	6.39	5.47	4.71	1.39	2.04	2.67	5.00	1.27	1.09	1.03	4152.63	144.60	18.89
4283.05	6.75	5.55	4.80	1.62	2.28	2.93	7.50	1.27	1.09	1.03	4378.95	123.28	14.47
4574.58	7.66	6.15	5.05	1.76	2.32	2.93	10.00	1.27	1.09	1.03	4605.26	110.67	15.85
4866.10	6.88	5.69	4.73	2.07	2.46	3.01	20.00	1.27	1.09	1.03	4831.58	98.31	15.50
5000.00	5.89	5.09	4.26	2.24	2.46	3.01	65.00	1.28	1.10	1.04	5057.89	95.51	15.63
5303.39	3.74	3.30	2.88	2.36	2.51	2.86	110.00	1.28	1.10	1.05	5284.21	79.27	14.91
5594.92	2.49	2.15	1.91	2.51	2.32	2.56	155.00	1.28	1.11	1.06	5510.53	47.87	16.20
5886.44	2.09	1.77	1.56	2.93	2.56	2.80	200.00	1.29	1.12	1.07	5736.84	25.58	13.40
6000.00	2.05	1.74	1.53	3.35	2.61	2.56	300.00	1.29	1.14	1.11	5963.16	-8.67	16.07
6323.73	2.02	1.73	1.53	2.93	2.28	2.01	488.90	1.35	1.22	1.19	6189.47	-21.63	16.56
6615.25	1.89	1.64	1.48	2.67	1.87	1.74	677.80	1.42	1.31	1.28	6415.79	-42.40	15.93
6906.78	1.81	1.59	1.45	2.41	1.81	1.88	866.70	1.53	1.44	1.41	6642.11	-53.90	15.95
7000.00	1.75	1.55	1.42	2.86	2.13	2.21	1055.60	1.67	1.58	1.54	6868.42	-67.50	16.45
7271.19	1.58	1.40	1.31	2.46	1.76	1.67	1244.40	1.78	1.70	1.66	7094.74	-85.44	16.25
7562.71	1.37	1.25	1.22	1.76	1.27	1.28	1433.30	1.94	1.83	1.77	7321.05	-95.10	12.36
7854.24	1.20	1.13	1.18	2.10	1.29	1.17	1622.20	2.05	1.90	1.82	7547.37	-125.81	15.92
7927.12	1.16	1.10	1.17	1.98	1.27	1.16	1811.10	2.19	2.01	1.89	7773.68	-165.12	10.46
8000.00	1.14	1.08	1.15	2.01	1.28	1.13	2000.00	2.31	2.06	1.89	8000.00	-197.39	-5.52

broadband, low distortion

Frequency Mixers

Model ROK-186MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	Isolation L-R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L-I (dB) LO +10dBm	LO +13dBm	LO +16dBm
2.000	102.000	7.20	6.50	6.10	2.000	28.60	31.80	35.20	35.20	37.80	40.20
5.000	105.000	7.10	6.40	6.10	5.000	31.00	34.00	37.20	40.02	43.60	46.40
10.000	110.000	7.00	6.30	6.00	10.000	31.10	34.00	36.90	41.80	45.60	49.00
50.000	150.000	6.60	5.80	5.50	50.000	30.70	33.80	36.80	41.10	45.20	48.70
100.000	200.000	6.50	6.30	5.80	100.000	30.90	34.10	37.00	40.90	45.20	48.90
251.800	351.800	7.40	6.60	6.20	251.800	31.60	34.70	36.80	42.10	47.20	50.90
584.870	484.870	7.50	6.60	6.10	584.870	33.20	36.10	36.90	48.80	63.40	56.10
668.130	568.130	7.60	6.70	6.20	668.130	33.80	36.90	37.10	49.50	65.10	50.90
834.670	734.670	7.27	6.48	6.13	834.670	36.70	41.70	38.20	50.20	55.50	45.70
1001.200	901.200	7.42	6.66	6.26	1001.200	39.10	48.40	38.60	43.10	45.30	41.50
1167.700	1067.700	7.30	6.51	6.20	1167.700	40.20	51.90	39.10	38.90	41.00	39.60
1334.300	1234.300	7.42	6.63	6.28	1334.300	38.70	44.20	38.40	35.70	37.90	38.80
1500.800	1400.800	6.99	6.34	6.04	1500.800	37.80	41.30	37.60	32.90	34.50	35.60
1667.300	1567.300	6.93	6.27	6.01	1667.300	37.80	39.90	37.30	31.60	32.90	34.00
1833.900	1733.900	7.11	6.40	6.11	1833.900	35.40	37.90	38.30	29.80	31.10	32.50
2000.400	1900.400	7.83	6.92	6.48	2000.400	33.50	35.70	37.40	28.50	29.80	31.20
2083.700	1983.700	8.20	7.03	6.45	2083.700	33.40	35.20	36.70	28.00	29.20	30.90
2250.200	2150.200	7.65	6.65	6.15	2250.200	34.00	35.80	37.00	26.70	28.40	30.30
2416.700	2316.700	7.22	6.50	6.15	2416.700	36.00	39.90	41.30	26.30	28.20	30.00
2500.000	2400.000	7.20	6.65	6.33	2500.000	37.90	46.80	44.60	26.00	28.10	29.80

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.001	1.84	1.68	1.57	1.11	1.48	2.18	5.001	1.59	1.36	1.21
10.000	1.84	1.68	1.56	1.12	1.46	2.18	10.000	1.60	1.36	1.21
50.000	1.82	1.67	1.56	1.11	1.44	2.16	50.000	1.60	1.36	1.21
100.000	1.87	1.70	1.58	1.12	1.43	2.14	100.000	1.61	1.36	1.22
200.000	1.88	1.73	1.60	1.17	1.38	2.12	200.000	1.57	1.33	1.20
337.670	1.92	1.76	1.64	1.17	1.38	2.04	337.670	1.48	1.28	1.19
500.000	1.96	1.81	1.68	1.25	1.34	2.06	500.000	1.37	1.23	1.23
587.170	1.97	1.82	1.70	1.25	1.33	2.01	587.170	1.30	1.23	1.28
753.500	2.01	1.87	1.76	1.32	1.34	2.14	753.500	1.24	1.29	1.40
919.830	2.04	1.89	1.80	1.34	1.30	2.03	919.830	1.19	1.32	1.45
1068.200	2.03	1.88	1.77	1.34	1.28	1.91	1068.200	1.10	1.27	1.41
1252.500	2.06	1.88	1.76	1.25	1.27	1.91	1252.500	1.16	1.26	1.39
1418.800	2.12	1.89	1.76	1.27	1.21	1.80	1418.800	1.46	1.47	1.54
1585.200	2.08	1.87	1.71	1.23	1.20	1.68	1585.200	1.74	1.69	1.71
1751.500	2.10	1.87	1.71	1.20	1.24	1.58	1751.500	1.92	1.84	1.81
1917.800	2.06	1.84	1.68	1.12	1.34	1.54	1917.800	2.08	1.97	1.96
2000.000	2.03	1.81	1.66	1.10	1.38	1.51	2000.000	2.16	2.04	2.01
2167.300	1.91	1.73	1.59	1.17	1.51	1.52	2167.300	2.23	2.12	2.08
2333.700	1.75	1.59	1.49	1.34	1.71	1.65	2333.700	2.32	2.25	2.18
2500.000	1.46	1.36	1.31	1.52	1.88	1.80	2500.000	2.40	2.32	2.27

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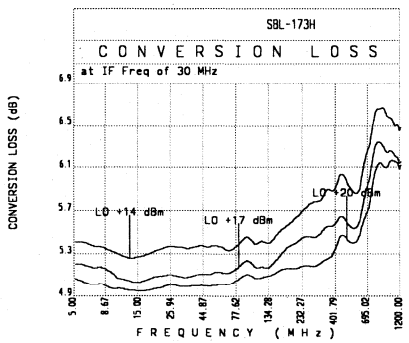
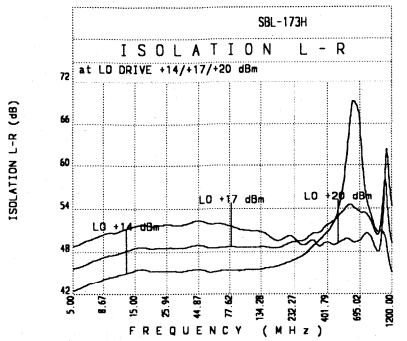
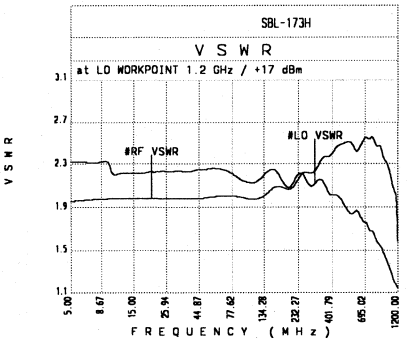
plug-in

Frequency Mixers Model SBL-173H

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
5.00	35.00	5.41	5.20	5.06	5.00	42.38	45.59	48.68	47.82	50.12	51.86
6.99	36.99	5.36	5.16	5.00	6.99	43.47	46.64	49.67	49.28	51.61	53.24
10.10	40.10	5.30	5.06	4.97	10.10	44.36	47.44	50.48	50.57	52.62	54.09
15.30	45.30	5.27	5.03	4.94	15.30	45.46	48.55	51.60	51.47	53.65	55.13
21.40	51.40	5.34	5.08	4.97	21.40	45.30	48.48	51.61	51.14	53.46	55.02
33.48	63.48	5.34	5.07	4.99	33.48	45.17	48.38	51.66	50.94	53.36	55.23
50.00	80.00	5.38	5.11	5.00	50.00	45.30	48.63	52.01	51.02	53.56	55.64
91.61	121.61	5.49	5.26	5.12	91.61	45.23	48.47	51.01	50.99	53.40	55.46
114.58	84.58	5.44	5.18	5.07	114.58	45.44	48.49	50.80	50.92	53.47	55.99
160.26	130.26	5.52	5.28	5.15	160.26	45.75	48.38	49.66	51.17	54.02	56.19
250.68	220.68	5.75	5.47	5.19	250.68	47.17	49.33	48.74	52.48	54.15	54.63
350.63	320.63	5.95	5.57	5.25	350.63	49.38	50.28	48.13	52.71	52.83	51.12
600.00	570.00	5.87	5.59	5.46	600.00	68.34	54.66	49.51	47.99	42.79	40.27
700.00	670.00	6.26	5.97	5.74	700.00	63.29	53.29	49.59	43.07	39.00	36.94
900.00	870.00	6.68	6.30	6.11	900.00	51.11	50.66	48.51	38.50	33.36	31.16
1000.00	970.00	6.57	6.27	6.17	1000.00	51.02	51.81	48.87	38.73	33.04	29.94
1100.00	1070.00	6.47	6.20	6.15	1100.00	48.61	55.56	64.53	37.14	32.46	30.16
1150.00	1120.00	6.52	6.20	6.15	1150.00	46.28	50.87	56.97	35.37	31.12	29.58
1170.00	1140.00	6.42	6.12	6.06	1170.00	45.46	49.82	55.59	34.42	30.74	29.67
1200.00	1170.00	6.47	6.15	6.12	1200.00	45.10	49.09	54.23	34.05	30.54	29.81

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14 dBm	LO + 17 dBm	LO +20 dBm
5.00	2.21	1.97	1.78	1.52	2.34	3.34	5.00	1.19	1.38	1.62
6.99	2.23	1.99	1.80	1.52	2.33	3.31	6.99	1.15	1.35	1.59
10.10	2.24	2.00	1.80	1.50	2.22	3.34	10.10	1.15	1.35	1.59
15.30	2.24	2.00	1.80	1.49	2.24	3.31	15.30	1.14	1.34	1.59
21.40	2.24	2.00	1.80	1.50	2.24	3.33	21.40	1.17	1.36	1.60
33.48	2.24	2.00	1.80	1.48	2.25	3.36	33.48	1.16	1.33	1.56
50.00	2.25	2.01	1.81	1.49	2.27	3.41	50.00	1.12	1.29	1.53
91.61	2.23	2.01	1.82	1.45	2.16	3.13	91.61	1.18	1.35	1.58
114.58	2.21	1.99	1.81	1.45	2.14	3.03	114.58	1.17	1.28	1.49
160.26	2.34	2.12	1.93	1.49	2.28	3.54	160.26	1.16	1.29	1.51
250.68	2.47	2.27	2.09	1.51	2.27	3.74	250.68	1.24	1.33	1.54
350.63	2.57	2.41	2.26	1.46	2.19	3.39	350.63	1.30	1.34	1.52
600.00	2.54	2.43	2.34	1.33	1.89	2.71	600.00	1.46	1.52	1.70
700.00	2.67	2.57	2.49	1.34	1.80	2.47	700.00	1.57	1.71	1.94
900.00	2.65	2.53	2.45	1.34	1.57	2.08	900.00	1.83	2.08	2.36
1000.00	2.49	2.35	2.26	1.32	1.42	1.83	1000.00	1.88	2.16	2.43
1100.00	2.30	2.12	2.02	1.31	1.27	1.68	1100.00	1.97	2.26	2.53
1150.00	2.24	2.05	1.92	1.29	1.20	1.59	1150.00	2.12	2.43	2.72
1170.00	2.23	2.04	1.90	1.31	1.18	1.59	1170.00	2.17	2.47	2.77
1200.00	1.48	1.60	1.63	1.27	1.16	1.56	1200.00	3.40	3.24	6.56

most economical

Frequency Mixers Model SBL-1Z

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
10.000	40.00	7.43	6.98	6.75	>64.00	64.02	62.91	51.31	52.18	52.52
39.088	69.09	7.12	6.66	6.51	54.89	52.99	51.43	40.88	41.66	42.39
68.176	98.18	7.26	6.76	6.68	49.27	47.28	46.36	36.71	37.96	38.83
100.000	70.00	7.14	6.63	6.45	44.65	43.53	43.70	34.34	35.77	36.27
184.530	154.53	6.67	6.42	6.34	40.00	40.41	40.88	31.81	32.64	33.03
242.710	212.71	6.62	6.33	6.20	38.06	39.05	39.32	29.92	30.64	31.21
271.790	241.79	6.80	6.52	6.43	37.93	38.77	38.72	27.98	28.77	29.53
329.970	299.97	6.74	6.49	6.40	36.58	36.87	36.75	25.83	26.53	27.30
388.150	358.15	6.84	6.51	6.37	35.74	35.36	34.79	24.14	24.66	25.55
446.320	416.32	7.14	6.80	6.60	36.22	34.53	33.10	22.77	23.26	23.83
504.500	474.50	7.53	7.15	6.96	35.59	32.41	30.74	21.54	21.71	22.00
533.590	503.59	7.26	6.88	6.77	34.94	31.87	30.11	20.94	21.16	21.64
591.760	561.76	7.55	6.96	6.73	33.66	31.63	29.09	20.30	21.41	22.05
649.940	619.94	8.43	7.46	6.77	30.26	29.54	28.38	20.96	22.56	24.29
708.120	678.12	8.70	7.80	7.10	29.51	28.43	27.92	20.92	22.26	23.75
766.290	736.29	8.95	7.88	7.23	29.14	28.16	27.74	20.62	21.92	22.99
824.470	794.47	8.94	7.92	7.21	28.69	27.76	26.91	19.91	21.01	21.60
882.650	852.65	8.85	7.81	7.19	28.27	27.27	26.65	18.66	19.21	19.15
940.820	910.82	8.86	7.88	7.44	28.13	26.94	26.12	17.19	17.55	17.37
1000.000	969.00	8.87	8.07	7.65	29.82	28.45	27.36	14.38	14.47	14.04

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mv
10.000	1.38	1.45	1.52	1.63	2.51	3.83	2.00	1.72	1.53	10.000	−236.03	+.11
39.088	1.25	1.34	1.42	1.71	2.57	3.87	1.99	1.71	1.52	39.088	−235.42	+.13
68.176	1.25	1.34	1.42	1.58	2.42	3.54	2.00	1.72	1.53	68.176	−235.70	+.12
100.000	1.26	1.35	1.43	1.55	2.37	3.45	2.02	1.74	1.55	100.000	−239.09	+.11
155.440	1.27	1.37	1.44	1.58	2.36	3.42	2.06	1.79	1.60	155.440	−243.47	+.21
200.000	1.29	1.39	1.45	1.60	2.33	3.34	2.11	1.83	1.64	200.000	−242.64	+.32
242.710	1.30	1.40	1.47	1.63	2.32	3.24	2.14	1.88	1.69	242.710	−247.61	+.33
300.880	1.33	1.43	1.50	1.69	2.36	3.27	2.22	1.94	1.76	300.880	−243.91	+.47
359.060	1.35	1.45	1.52	1.78	2.44	3.25	2.30	2.01	1.85	359.060	−221.38	+.71
417.240	1.37	1.46	1.53	1.87	2.53	3.37	2.37	2.09	1.90	417.240	−205.96	+.68
475.410	1.38	1.46	1.52	1.95	2.59	3.40	2.41	2.13	1.94	475.410	−209.28	+1.42
504.500	1.37	1.45	1.50	2.01	2.61	3.37	2.42	2.13	1.97	504.500	−212.10	+.83
562.680	1.36	1.42	1.46	2.16	2.74	3.45	2.34	2.06	1.88	562.680	−205.18	+.13
620.850	1.34	1.40	1.45	2.32	2.86	3.52	2.30	2.02	1.83	620.850	−178.98	+.16
679.030	1.38	1.42	1.46	2.41	3.00	3.70	2.25	1.97	1.77	679.030	−165.25	−.20
737.210	1.49	1.53	1.57	2.52	3.04	3.73	2.14	1.88	1.69	737.210	−159.75	−.87
795.380	1.71	1.73	1.77	2.61	3.14	3.79	2.05	1.80	1.62	795.380	−160.74	−1.60
853.560	2.04	2.04	2.07	2.67	3.16	3.81	1.94	1.72	1.58	853.560	−159.34	−2.37
911.740	2.46	2.44	2.44	2.75	3.20	3.82	1.83	1.63	1.52	911.740	−167.51	−3.31
1000.000	3.20	3.10	3.03	3.06	3.37	3.71	1.64	1.47	1.39	1000.000	−145.30	−3.69

Measurements at RF & LO Power +7 dBm

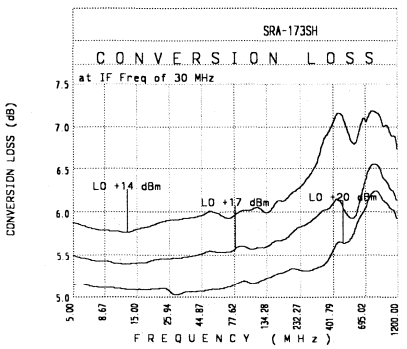
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

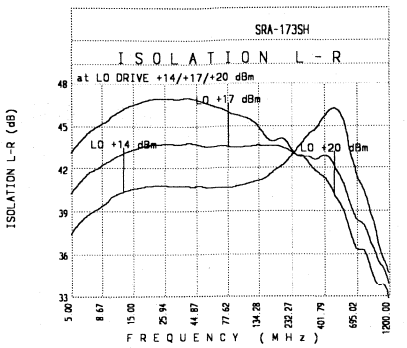
plug-in

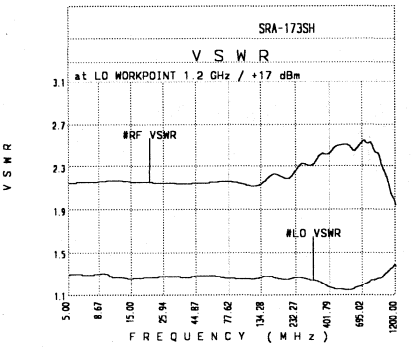
Frequency Mixers

LEVEL 17 (+17 dBm LO, up to +14 dBm RF)

Models
SBL-173SH
SRA-173SH
SRA-2500SH







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17dBm	LO + 20 dBm
5.00	35.00	5.94	5.56	5.20	5.00	37.80	40.62	43.49	46.47	50.03	52.95
10.10	40.10	5.84	5.46	5.16	10.10	40.37	42.94	46.02	48.12	51.88	55.95
21.40	51.40	5.94	5.51	5.15	21.40	41.16	44.09	47.25	47.89	52.09	56.97
50.00	80.00	6.08	5.61	5.14	50.00	41.11	43.93	46.99	47.70	51.67	56.37
102.45	72.45	6.07	5.60	5.20	102.45	41.23	43.86	45.94	47.65	51.46	54.82
128.13	98.13	6.03	5.63	5.28	128.13	41.49	44.00	45.44	47.71	51.18	54.40
200.43	170.43	6.29	5.81	5.41	200.43	42.53	43.82	44.61	48.48	51.52	53.71
250.68	220.68	6.41	5.90	5.37	250.68	43.67	43.25	43.13	48.95	51.27	51.63
350.63	320.63	6.94	6.10	5.43	350.63	44.96	42.81	42.23	51.45	50.45	49.80
438.53	408.53	7.26	6.28	5.74	438.53	46.40	43.34	41.54	56.52	54.02	50.70
548.47	518.47	6.84	5.96	5.72	548.47	46.09	41.64	39.77	56.28	47.95	45.22
600.00	570.00	6.85	6.01	5.90	600.00	44.74	40.51	38.55	57.74	46.98	41.45
685.97	655.97	7.23	6.40	6.09	685.97	42.22	38.84	36.61	54.90	42.47	37.50
700.00	670.00	7.04	6.43	6.10	700.00	41.71	38.74	36.71	55.55	42.62	37.69
800.00	770.00	7.33	6.68	6.35	800.00	40.86	38.43	36.72	51.48	40.80	35.78
900.00	870.00	7.21	6.58	6.27	900.00	39.00	36.94	35.17	42.22	41.01	34.14
1000.00	970.00	7.11	6.44	6.18	1000.00	37.07	35.80	34.09	39.26	40.06	32.90
1100.00	1070.00	6.93	6.32	6.09	1100.00	35.99	35.37	34.25	41.15	38.43	32.25
1150.00	1120.00	6.96	6.30	6.09	1150.00	35.67	34.95	33.88	42.40	38.07	32.16
1200.00	1170.00	6.80	6.20	5.99	1200.00	35.02	34.28	33.16	43.62	36.48	31.71

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
5.00	2.51	2.20	1.99	1.26	1.34	2.05	1.00	1.14	1.09	1.21
10.10	2.54	2.22	2.01	1.24	1.32	2.03	10.10	1.16	1.06	1.18
21.40	2.52	2.20	2.00	1.23	1.31	2.05	21.40	1.17	1.06	1.18
50.00	2.53	2.20	1.99	1.25	1.33	2.10	50.00	1.15	1.08	1.20
102.45	2.47	2.18	1.99	1.24	1.31	1.97	102.45	1.24	1.11	1.17
128.13	2.47	2.18	2.00	1.28	1.32	2.03	128.13	1.24	1.09	1.15
200.43	2.48	2.22	2.05	1.29	1.29	1.89	200.43	1.37	1.19	1.17
250.68	2.67	2.41	2.23	1.36	1.32	2.15	250.68	1.37	1.20	1.21
350.63	2.72	2.50	2.35	1.39	1.27	2.01	350.63	1.51	1.29	1.25
438.53	2.75	2.55	2.42	1.53	1.20	1.89	438.53	1.61	1.36	1.28
548.47	2.75	2.57	2.46	1.53	1.19	1.61	548.47	1.68	1.43	1.37
600.00	2.65	2.48	2.38	1.67	1.20	1.66	600.00	1.78	1.56	1.50
685.97	2.76	2.58	2.49	1.82	1.23	1.52	685.97	1.77	1.60	1.57
700.00	2.81	2.61	2.51	1.87	1.25	1.54	700.00	1.76	1.58	1.55
800.00	2.85	2.61	2.51	2.04	1.29	1.43	800.00	1.65	1.56	1.59
900.00	2.78	2.51	2.39	2.21	1.31	1.31	900.00	1.55	1.58	1.67
1000.00	2.64	2.31	2.17	2.35	1.35	1.18	1000.00	1.44	1.58	1.73
1100.00	2.50	2.12	1.93	2.44	1.40	1.07	1100.00	1.34	1.58	1.76
1150.00	2.47	2.06	1.84	2.47	1.41	1.07	1150.00	1.31	1.56	1.76
1200.00	2.44	2.00	1.74	2.45	1.42	1.13	1200.00	1.28	1.54	1.70

most economical

Frequency Mixers Model SBL-1-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.100	30.10	6.29	5.97	5.79	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.200	30.20	5.79	5.50	5.33	>64.00	>67.00	>70.00	>64.00	>67.00	>70.00
.500	30.50	5.39	5.10	4.97	>64.00	>67.00	>70.00	>64.00	60.77	58.85
1.000	31.00	5.26	5.03	4.88	>64.00	>67.00	>70.00	>64.00	61.39	59.31
2.000	32.00	5.17	4.95	4.83	>64.00	>67.00	>70.00	>64.00	61.65	59.31
5.000	35.00	5.09	4.94	4.79	>64.00	>67.00	>70.00	>64.00	62.29	59.84
10.000	40.00	5.11	4.92	4.82	>64.00	>67.00	60.40	>64.00	61.63	57.18
20.000	50.00	5.23	5.01	4.91	>64.00	>67.00	59.96	>64.00	61.41	57.08
50.000	80.00	5.11	4.95	4.85	>64.00	57.89	55.46	>64.00	55.93	53.10
69.828	99.83	5.07	4.92	4.82	57.45	53.82	52.57	54.47	51.57	50.50
100.000	70.00	4.98	4.82	4.77	53.52	51.38	50.35	51.19	49.30	48.15
121.450	91.45	5.00	4.86	4.82	52.86	50.92	50.33	50.39	48.83	47.91
155.860	125.86	5.02	4.95	4.87	49.47	48.48	47.39	46.94	46.32	45.35
200.000	170.00	5.19	5.08	4.99	42.69	42.54	43.78	40.65	40.81	42.06
224.690	194.69	5.33	5.23	5.09	42.78	42.61	43.16	40.33	40.35	40.99
241.900	211.90	5.32	5.21	5.10	42.94	43.39	44.16	40.17	40.85	41.71
293.520	263.52	5.41	5.32	5.28	38.29	38.74	39.32	36.72	36.85	37.59
327.930	297.93	5.64	5.57	5.50	36.69	37.88	39.26	35.47	36.40	37.52
379.550	349.55	5.89	5.70	5.54	35.04	36.54	37.94	32.97	33.55	34.49
413.970	383.97	6.34	5.75	5.31	36.38	37.59	38.39	34.55	34.68	33.66

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.38	1.27	1.20	1.50	2.30	3.45	2.13	1.92	1.78
10.000	1.38	1.27	1.20	1.42	2.24	3.20	2.12	1.91	1.77
20.000	1.37	1.27	1.20	1.51	2.26	3.25	2.12	1.90	1.76
34.118	1.35	1.25	1.18	1.47	2.20	3.09	2.13	1.91	1.77
50.000	1.33	1.23	1.16	1.43	2.16	3.02	2.15	1.92	1.78
77.795	1.28	1.18	1.12	1.41	2.11	2.89	2.16	1.93	1.80
100.000	1.25	1.15	1.09	1.40	2.08	2.88	2.21	1.96	1.85
121.470	1.21	1.12	1.07	1.47	2.09	2.94	2.24	2.00	1.87
150.590	1.16	1.09	1.07	1.50	2.12	2.86	2.34	2.05	1.93
179.710	1.13	1.10	1.10	1.51	2.18	2.87	2.42	2.13	1.99
200.000	1.12	1.11	1.14	1.53	2.22	2.96	2.44	2.19	2.04
223.390	1.12	1.15	1.19	1.58	2.23	2.93	2.51	2.24	2.08
252.500	1.14	1.19	1.24	1.64	2.35	3.02	2.55	2.30	2.14
267.060	1.16	1.22	1.27	1.69	2.38	3.05	2.60	2.32	2.17
296.180	1.20	1.27	1.33	1.71	2.43	3.15	2.66	2.37	2.24
325.300	1.24	1.31	1.38	1.80	2.44	3.20	2.68	2.41	2.25
354.420	1.27	1.34	1.41	1.93	2.56	3.26	2.66	2.37	2.25
368.980	1.29	1.35	1.42	2.00	2.65	3.37	2.68	2.42	2.27
383.530	1.29	1.36	1.41	2.09	2.75	3.42	2.65	2.37	2.23
398.090	1.29	1.35	1.41	2.14	2.83	3.52	2.65	2.38	2.23

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.100	−252.07	+.02
.200	−255.06	+.03
.500	−256.56	+.02
1.000	−257.44	+.02
2.000	−256.78	+.02
5.000	−258.91	+.02
10.000	−257.73	+.02
20.000	−259.14	+.03
50.000	−256.04	+.02
73.912	−260.65	+.03
100.000	−261.64	+.05
137.820	−258.93	+.04
159.130	−256.39	+.09
200.000	−257.48	+.15
223.040	−261.16	+.20
244.340	−258.10	+.14
300.000	−236.58	+.14
350.860	−220.32	+.07
372.170	−208.88	−.07
400.000	−197.61	−.18

Measurements at RF & LO Power +7 dBm

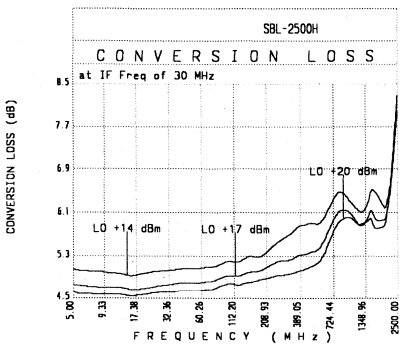
Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

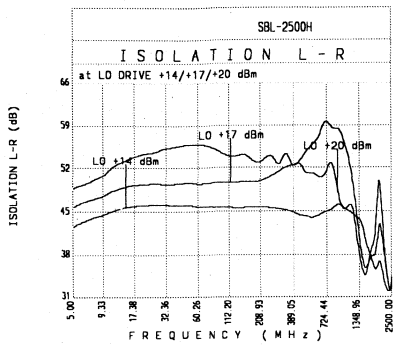
plug-in

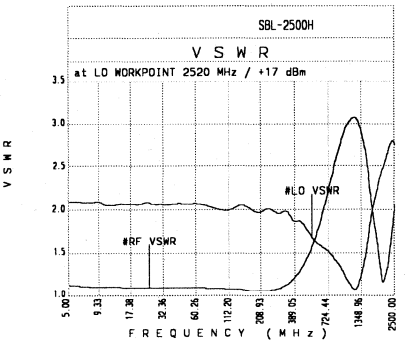
Frequency Mixers

Model
SBL-2500H

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)







mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	Isolation L-I (dB) LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
5.00	35.00	5.09	4.79	4.65	5.00	42.94	46.09	49.22	47.50	49.97	52.01
7.32	37.32	5.04	4.76	4.61	7.32	44.31	47.36	50.39	48.81	51.34	53.24
10.10	40.10	5.02	4.73	4.60	10.10	45.19	48.47	52.07	49.56	52.16	54.22
20.18	50.18	5.01	4.72	4.60	20.18	46.44	49.91	54.80	50.37	53.09	55.21
29.52	59.52	5.06	4.78	4.64	29.52	46.49	49.91	55.74	50.37	53.09	55.17
49.03	79.03	5.10	4.83	4.67	49.03	46.47	50.29	56.33	50.40	53.02	54.86
81.42	111.42	5.16	4.91	4.76	81.42	46.07	50.15	55.56	50.02	52.33	53.94
135.23	165.23	5.30	5.01	4.83	135.23	45.83	50.16	54.61	49.46	51.67	53.16
224.60	194.60	5.50	5.18	4.95	224.60	46.03	50.69	54.28	49.42	50.77	50.88
328.58	298.58	5.76	5.26	5.01	328.58	45.49	52.69	56.20	49.23	48.44	47.05
480.71	450.71	5.97	5.42	5.14	480.71	44.68	55.02	51.07	48.19	44.47	41.13
703.28	673.28	6.32	5.93	5.73	703.28	45.40	61.21	51.06	41.38	37.07	34.62
1028.90	998.90	6.33	6.15	6.07	1028.90	45.56	56.44	44.92	39.91	34.57	30.10
1400.00	1370.00	6.25	5.99	5.96	1400.00	44.03	37.44	35.66	32.71	31.00	29.99
1600.00	1570.00	6.57	6.08	5.86	1600.00	39.33	36.63	36.47	29.78	28.96	28.42
1800.00	1770.00	6.36	6.00	5.87	1800.00	35.23	37.51	40.54	28.17	28.07	28.04
2000.00	1970.00	6.20	6.01	5.93	2000.00	37.66	44.38	50.94	26.25	26.06	25.74
2200.00	2170.00	6.66	6.52	6.59	2200.00	33.47	37.75	38.44	23.11	23.23	23.19
2400.00	2370.00	7.76	7.58	7.79	2400.00	31.45	31.44	31.36	21.59	22.02	22.55
2500.00	2470.00	8.23	8.03	8.32	2500.00	34.56	33.58	33.08	21.27	21.87	22.64

mixer VSWR

FREQ. MHz	VSWR RF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	VSWR LO port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm	FREQ. MHz	VSWR IF port LO + 14 dBm	LO + 17 dBm	LO + 20 dBm
5.00	1.08	1.14	1.27	1.42	2.12	2.93	1.00	1.63	1.31	1.08
7.32	1.07	1.12	1.26	1.42	2.11	2.94	3.30	1.67	1.33	1.08
10.10	1.06	1.12	1.26	1.41	2.07	2.92	5.50	1.68	1.34	1.08
20.18	1.06	1.11	1.25	1.42	2.08	2.99	7.80	1.69	1.34	1.08
29.52	1.06	1.11	1.25	1.41	2.09	3.00	10.00	1.69	1.34	1.08
49.03	1.06	1.11	1.25	1.43	2.08	3.07	20.00	1.69	1.35	1.08
81.42	1.06	1.10	1.24	1.40	2.04	2.89	52.50	1.69	1.35	1.09
135.23	1.09	1.09	1.21	1.41	2.09	3.02	85.00	1.68	1.34	1.08
224.60	1.16	1.07	1.15	1.42	2.05	3.04	117.50	1.66	1.33	1.08
328.58	1.30	1.14	1.08	1.43	2.05	3.09	150.00	1.64	1.32	1.07
480.71	1.64	1.44	1.29	1.30	1.79	2.59	200.00	1.61	1.29	1.06
703.28	2.42	2.17	1.97	1.32	1.55	2.03	275.00	1.57	1.27	1.05
1028.90	3.26	3.03	2.84	1.40	1.20	1.56	350.00	1.51	1.23	1.05
1400.00	3.02	2.80	2.63	1.53	1.39	1.66	425.00	1.43	1.18	1.07
1600.00	2.41	2.21	2.08	1.70	1.90	2.40	500.00	1.32	1.11	1.13
1800.00	1.76	1.60	1.49	1.86	2.28	2.94	570.00	1.22	1.08	1.21
2000.00	1.23	1.13	1.09	1.91	2.49	3.27	677.50	1.07	1.18	1.38
2200.00	1.26	1.36	1.46	2.11	2.68	3.50	785.00	1.12	1.38	1.62
2400.00	1.69	1.80	1.92	2.28	2.86	3.56	892.50	1.35	1.67	1.96
2500.00	1.96	2.08	2.20	2.26	2.77	3.43	1000.00	1.64	2.02	2.39

most widely-used

Frequency Mixers Model SBL-3

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.025	30.025	9.03	8.41	8.05	.025	68.38	70.32	73.64	71.48	73.42	79.24
.040	30.040	7.34	6.80	6.48	.040	64.91	68.24	72.87	70.01	73.04	81.87
.050	30.050	6.79	6.31	6.01	.050	64.32	68.06	72.79	69.72	73.56	83.69
.100	30.100	5.94	5.51	5.27	.100	63.53	67.57	72.70	69.83	74.37	88.60
.200	30.200	5.67	5.27	5.02	.200	63.80	67.72	72.52	69.80	74.82	91.52
.500	30.500	5.53	5.15	4.92	.500	63.65	67.66	72.44	70.15	75.16	95.14
1.000	31.000	5.38	4.98	4.80	1.000	63.35	67.06	71.74	69.95	74.46	89.64
2.000	32.000	5.27	4.89	4.71	2.000	63.09	66.83	71.61	69.19	74.03	87.61
5.000	35.000	5.26	4.86	4.70	5.000	63.12	66.56	70.96	68.22	72.56	82.86
10.000	40.000	5.34	4.93	4.75	10.000	62.81	66.04	69.84	65.21	69.54	77.34
20.000	50.000	5.48	5.06	4.81	20.000	61.82	64.65	67.17	59.82	63.95	70.07
30.790	60.790	5.54	5.13	4.90	30.790	60.76	63.14	65.62	56.36	60.24	64.82
38.482	68.482	5.56	5.16	4.92	38.482	60.50	62.80	64.66	54.22	57.90	61.76
50.000	80.000	5.47	5.09	4.88	50.000	59.30	61.63	62.89	51.24	53.78	57.85
76.938	46.938	5.45	4.97	4.80	76.938	57.86	58.56	59.12	45.53	48.75	53.79
100.000	70.000	5.16	4.81	4.70	100.000	57.01	58.22	58.59	42.87	46.67	51.18
123.087	93.087	5.13	4.85	4.77	123.087	53.35	52.38	52.58	40.55	44.01	47.17
146.161	116.161	5.21	4.94	4.84	146.161	61.41	58.82	56.52	41.29	46.22	49.60
176.926	146.926	5.43	5.26	5.18	176.926	51.71	51.25	50.35	37.12	39.55	42.10
200.000	170.000	5.53	5.36	5.29	200.000	44.42	44.86	46.05	36.79	38.02	37.46

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.67	1.44	1.28	1.25	1.33	2.01	5.000	1.78	1.61	1.51	.025	−233.99	−.30
10.000	1.68	1.45	1.29	1.25	1.32	1.99	10.000	1.79	1.63	1.52	.030	−261.03	−.32
16.143	1.69	1.45	1.29	1.28	1.29	1.96	16.143	1.80	1.63	1.53	.050	−293.94	−.29
20.000	1.68	1.44	1.28	1.29	1.28	1.94	20.000	1.80	1.63	1.53	.100	−309.10	−.25
27.286	1.68	1.43	1.28	1.22	1.34	1.99	27.286	1.80	1.64	1.53	.500	−318.60	−.24
32.857	1.68	1.43	1.27	1.19	1.35	2.04	32.857	1.81	1.64	1.54	1.000	−320.60	−.24
38.429	1.67	1.43	1.27	1.19	1.37	2.02	38.429	1.82	1.65	1.54	2.000	−317.20	−.23
50.000	1.67	1.42	1.25	1.19	1.37	2.01	50.000	1.85	1.68	1.57	10.000	−318.80	−.22
60.714	1.67	1.40	1.24	1.21	1.36	2.00	60.714	1.88	1.70	1.59	20.000	−312.40	−.23
71.857	1.66	1.39	1.22	1.22	1.36	1.98	71.857	1.93	1.74	1.63	30.790	−316.60	−.24
83.000	1.64	1.37	1.20	1.23	1.35	1.98	83.000	1.97	1.78	1.66	46.173	−314.90	−.26
94.143	1.62	1.35	1.17	1.24	1.36	1.99	94.143	2.02	1.82	1.70	53.864	−314.80	−.25
100.000	1.60	1.33	1.16	1.25	1.36	1.98	100.000	2.04	1.85	1.72	69.247	−309.50	−.22
116.429	1.56	1.29	1.12	1.25	1.39	2.01	116.429	2.12	1.91	1.78	92.321	−317.30	−.07
127.571	1.53	1.26	1.10	1.28	1.41	2.01	127.571	2.19	1.98	1.84	100.013	−318.90	−.08
133.143	1.53	1.26	1.10	1.29	1.45	2.00	133.143	2.27	2.04	1.90	107.704	−313.80	−.09
149.857	1.47	1.22	1.07	1.29	1.49	2.03	149.857	2.37	2.13	1.98	130.778	−313.30	−.07
166.571	1.43	1.19	1.07	1.29	1.51	2.07	166.571	2.50	2.25	2.09	153.852	−318.70	+.45
183.286	1.38	1.17	1.09	1.36	1.55	2.10	183.286	2.67	2.38	2.20	176.926	−319.90	+.26
200.000	1.34	1.18	1.14	1.44	1.60	2.10	200.000	2.82	2.52	2.31	200.000	−312.20	−.13

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very low distortion

Frequency Mixers

LEVEL 17S (+17 dBm LO, up to +14 dBm RF)

Models
TUF-860H
ZP-860H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
800.000	770.000	5.77	5.50	5.53	800.000	40.22	42.94	42.74	27.72	32.30	35.52
819.740	789.737	5.77	5.46	5.47	819.740	37.95	39.99	39.77	26.85	29.95	33.28
839.470	809.474	5.99	5.60	5.54	839.470	36.44	38.50	39.38	26.99	29.66	32.91
846.050	816.053	6.04	5.64	5.56	846.050	35.98	37.79	38.82	26.88	29.59	32.82
859.210	829.211	6.17	5.71	5.57	859.210	35.14	36.58	37.70	26.88	28.89	31.95
878.950	848.947	6.31	5.84	5.55	878.950	35.21	36.32	37.47	27.66	28.63	31.54
892.110	862.105	6.51	5.88	5.57	892.110	34.84	35.24	35.81	27.80	28.30	30.92
898.680	868.684	6.54	5.89	5.53	898.680	34.60	34.75	35.09	27.90	28.11	30.63
918.420	888.421	6.67	6.10	5.56	918.420	34.43	34.28	34.27	28.69	28.64	30.50
938.160	908.158	7.04	6.44	5.73	938.160	34.35	34.32	34.19	28.84	28.87	30.30
944.740	914.737	6.98	6.51	5.81	944.740	34.47	34.65	34.64	29.11	29.01	30.29
957.890	927.895	7.03	6.57	5.83	957.890	35.24	35.85	36.30	29.78	29.81	30.72
977.630	947.632	7.39	6.86	6.17	977.630	35.28	36.15	36.66	29.91	30.31	31.30
990.790	960.790	7.52	6.97	6.46	990.790	34.75	35.55	35.69	29.99	30.56	31.42
997.370	967.368	7.58	7.03	6.56	997.370	34.58	35.23	35.03	30.03	30.76	31.55
1000.000	970.000	7.58	7.05	6.54	1000.000	34.58	35.11	34.70	30.01	30.86	31.53
1017.110	987.105	7.81	7.26	6.84	1017.110	33.85	33.80	32.86	29.35	30.51	31.20
1036.840	1006.842	7.96	7.35	6.86	1036.840	33.04	32.91	31.85	29.04	30.12	30.51
1043.420	1013.421	7.98	7.37	6.89	1043.420	32.92	32.80	31.73	28.84	29.93	30.26
1050.000	1020.000	8.07	7.43	6.93	1050.000	32.69	32.67	31.58	28.57	29.64	29.94

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm
800.000	1.63	1.55	1.52	1.97	1.64	1.96
818.750	1.60	1.53	1.48	2.02	1.74	2.08
838.750	1.58	1.51	1.46	2.04	1.82	2.15
845.000	1.56	1.49	1.46	2.04	1.83	2.16
857.500	1.57	1.49	1.42	2.05	1.86	2.14
877.500	1.55	1.48	1.38	2.03	1.86	2.11
890.000	1.55	1.45	1.35	2.01	1.84	2.08
896.250	1.55	1.45	1.34	2.00	1.83	2.06
915.000	1.52	1.42	1.29	1.97	1.79	2.01
935.000	1.51	1.39	1.25	1.98	1.75	1.98
941.250	1.50	1.38	1.24	1.99	1.75	1.98
953.750	1.49	1.35	1.21	2.02	1.74	2.02
972.500	1.49	1.34	1.19	2.05	1.72	2.05
986.250	1.49	1.33	1.17	2.05	1.72	2.07
992.500	1.45	1.40	1.11	2.05	1.72	2.07
1000.000	1.48	1.32	1.15	2.05	1.70	2.07
1017.500	1.49	1.31	1.14	2.02	1.67	2.01
1037.500	1.50	1.30	1.14	2.00	1.61	1.88
1043.750	1.50	1.31	1.15	2.00	1.59	1.83
1050.000	1.50	1.34	1.16	2.01	1.56	1.80

ϕ detection

FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
1.000	3.39	2.78	2.03	800.000	-831.00	-9.84
2.000	3.39	2.78	2.03	819.740	-823.20	-10.33
5.000	3.39	2.78	2.03	839.470	-801.60	-9.02
10.000	3.39	2.79	2.03	846.050	-793.10	-7.50
20.000	3.40	2.80	2.04	859.210	-781.60	-5.10
40.000	3.40	2.82	2.04	878.950	-774.50	-5.12
50.000	3.42	2.82	2.05	892.110	-758.10	-6.60
67.000	3.43	2.84	2.07	898.680	-748.30	-7.57
86.000	3.45	2.86	2.09	918.420	-723.60	-10.06
100.000	3.47	2.88	2.10	938.160	-739.00	-11.09
112.000	3.48	2.89	2.12	944.740	-735.10	-10.71
125.000	3.50	2.90	2.14	957.890	-729.10	-9.87
139.000	3.50	2.92	2.15	977.630	-715.10	-9.13
158.000	3.51	2.93	2.18	990.790	-711.00	-9.21
175.000	3.51	2.94	2.20	997.370	-710.40	-8.97
200.000	3.51	2.95	2.23	1000.000	-709.40	-8.77
204.000	3.50	2.95	2.23	1017.110	-712.50	-9.18
224.000	3.50	2.96	2.26	1036.840	-694.70	-10.05
243.000	3.51	2.98	2.29	1043.420	-690.00	-10.18
250.000	3.51	2.99	2.30	1050.000	-696.30	-10.31

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-5
ZLW-5

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	5.26	5.19	5.23	46.45	47.86	48.59	48.34	49.36	49.99
20.000	50.00	6.29	6.09	5.99	46.85	48.24	48.94	48.18	49.31	50.03
51.719	81.72	6.53	6.29	6.17	46.29	47.39	47.85	47.82	48.80	49.03
145.160	115.16	6.65	6.43	6.31	43.70	43.93	43.85	43.97	44.02	43.97
238.600	208.60	6.98	6.60	6.33	40.89	40.69	40.39	40.01	39.98	39.94
332.030	302.03	7.18	6.70	6.41	38.95	38.28	37.72	37.38	37.11	36.86
425.470	395.47	7.78	7.15	6.76	37.52	36.61	36.03	34.44	34.20	33.94
500.000	470.00	7.62	7.01	6.68	36.23	35.64	35.02	35.68	34.86	33.97
565.630	535.63	7.85	7.33	6.97	35.19	34.43	33.73	35.23	34.15	32.88
659.070	629.07	8.32	7.84	7.51	34.06	33.47	32.87	33.96	32.77	31.70
752.500	722.38	7.85	7.61	7.43	33.77	33.21	32.96	32.65	31.65	30.92
845.940	816.02	7.55	7.30	7.14	33.17	32.60	31.98	32.17	31.29	30.04
939.380	909.31	7.42	7.20	7.07	31.66	31.12	30.52	33.22	31.57	30.00
1000.000	969.82	7.31	7.11	6.99	31.06	30.45	30.03	33.33	31.53	30.18
1079.500	1049.30	7.28	7.08	6.94	31.01	30.12	29.69	32.96	31.21	29.64
1173.000	1143.00	7.34	7.05	6.97	31.12	30.51	29.72	33.13	30.75	28.48
1266.400	1236.40	7.83	7.40	7.15	32.81	32.04	31.40	33.08	29.64	26.95
1359.900	1329.80	7.95	7.48	7.21	35.41	35.34	35.27	32.11	27.77	25.26
1453.300	1423.30	8.31	7.81	7.56	39.62	36.11	33.37	37.02	32.82	30.65
1500.000	1469.90	8.24	7.78	7.55	38.41	36.51	34.92	40.65	37.91	36.13

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	2.87	2.75	2.71	2.31	3.11	4.50	3.79	3.85	3.69
10.000	2.32	2.18	2.10	1.89	2.80	4.01	1.87	1.92	1.93
50.000	2.22	2.05	1.95	1.90	2.89	4.29	1.24	1.36	1.41
100.000	2.29	2.13	2.03	1.78	2.58	3.54	1.14	1.26	1.33
200.000	2.76	2.53	2.38	1.78	2.57	3.54	1.15	1.25	1.37
285.310	3.11	2.88	2.68	1.78	2.43	3.26	1.18	1.28	1.41
378.750	3.64	3.26	3.08	1.75	2.30	3.07	1.24	1.33	1.47
472.190	3.57	3.35	3.26	1.71	2.18	2.82	1.34	1.42	1.56
518.910	3.68	3.49	3.40	1.68	2.13	2.75	1.40	1.51	1.63
612.340	3.40	3.28	3.19	1.66	1.99	2.56	1.55	1.65	1.75
705.780	3.19	3.24	3.12	1.68	1.93	2.48	1.83	1.98	2.05
799.220	3.25	3.37	3.40	1.69	1.84	2.31	2.46	2.76	2.86
892.660	2.67	2.65	2.55	1.69	1.76	2.20	2.57	2.87	2.90
986.090	2.58	2.54	2.46	1.67	1.67	2.00	3.22	3.49	3.48
1032.800	2.49	2.46	2.36	1.68	1.60	1.91	3.44	3.77	3.72
1126.300	2.37	2.33	2.24	1.63	1.50	1.78	4.47	4.66	4.59
1219.700	2.23	2.20	2.08	1.56	1.39	1.67	4.74	4.93	4.80
1313.100	2.17	2.11	2.00	1.44	1.32	1.66	4.78	5.06	4.78
1406.600	2.04	2.08	1.88	1.37	1.25	1.62	3.90	4.40	3.86
1500.000	2.22	2.32	2.11	1.25	1.24	1.65	8.43	12.01	8.31

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EUROPE 44-252-835094 Fax 44-252-837010

very low distortion

Frequency Mixers

LEVEL 17S (+17 dBm LO, up to +14 dBm RF)

Models
TUF-11AH
ZP-11AH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
1400.000	1350.000	7.85	7.77	7.80	1400.000	30.53	31.27	32.16	31.96	32.09	29.95
1439.470	1389.474	7.83	7.67	7.61	1440.540	29.73	30.76	31.83	30.90	31.93	30.12
1478.950	1428.947	7.66	7.43	7.34	1481.080	29.17	30.37	31.60	29.87	32.04	30.70
1492.110	1442.105	7.60	7.32	7.23	1494.590	29.12	30.35	31.68	29.59	32.12	30.89
1505.260	1455.263	7.47	7.19	7.08	1508.110	29.12	30.39	31.76	29.18	32.21	31.09
1544.740	1494.737	7.31	7.04	6.91	1548.650	28.98	30.61	32.19	28.19	31.36	31.05
1571.050	1521.053	7.31	6.98	6.82	1562.160	29.00	30.75	32.35	27.78	30.93	31.04
1584.210	1534.211	7.26	6.93	6.79	1575.680	29.00	30.78	32.42	27.56	30.41	30.85
1623.680	1573.684	7.07	6.83	6.72	1616.220	28.76	30.74	32.40	26.66	29.48	30.56
1663.160	1613.158	7.05	6.76	6.68	1656.760	28.81	30.90	32.79	25.82	28.37	29.89
1676.320	1626.316	6.98	6.70	6.65	1670.270	28.80	30.97	32.87	25.55	28.01	29.52
1702.630	1652.632	6.93	6.67	6.63	1697.300	28.70	30.92	32.73	24.84	27.27	28.81
1742.110	1692.105	6.86	6.61	6.58	1737.840	28.51	31.00	32.89	24.05	26.47	28.16
1768.420	1718.421	6.92	6.63	6.58	1764.860	28.62	31.24	33.32	23.63	26.03	27.61
1781.580	1731.579	6.86	6.59	6.52	1778.380	28.63	31.22	33.50	23.34	25.77	27.32
1821.050	1771.053	6.90	6.59	6.52	1818.920	28.63	30.92	33.01	22.71	25.12	26.62
1860.530	1810.526	6.94	6.68	6.63	1859.460	28.60	30.65	32.31	22.13	24.63	26.37
1873.680	1823.684	6.89	6.67	6.63	1872.970	28.55	30.61	32.30	21.92	24.43	26.26
1886.840	1836.842	7.00	6.74	6.72	1886.490	28.58	30.60	32.27	21.70	24.19	26.09
1900.000	1850.000	7.00	6.79	6.75	1900.000	28.65	30.64	32.22	21.61	24.07	25.97

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm
1400.000	2.21	2.14	2.04	2.07	2.49	3.00	40.000	1.30	1.24	1.25
1437.500	2.03	1.96	1.87	2.02	2.36	2.93	50.000	1.27	1.21	1.21
1477.500	1.85	1.78	1.70	2.05	2.40	2.96	75.000	1.20	1.13	1.14
1490.000	1.80	1.73	1.65	2.05	2.42	2.99	100.000	1.16	1.08	1.09
1515.000	1.69	1.63	1.56	2.03	2.40	2.98	110.000	1.15	1.07	1.08
1555.000	1.53	1.47	1.43	2.03	2.41	2.92	145.000	1.14	1.04	1.06
1580.000	1.41	1.37	1.35	2.04	2.43	2.95	182.500	1.13	1.03	1.05
1592.500	1.37	1.35	1.35	2.02	2.40	2.94	200.000	1.13	1.02	1.05
1630.000	1.30	1.30	1.32	2.03	2.39	2.92	227.500	1.13	1.02	1.06
1670.000	1.21	1.25	1.30	2.04	2.39	2.87	250.000	1.13	1.02	1.06
1682.500	1.18	1.24	1.29	2.03	2.39	2.85	275.000	1.13	1.03	1.07
1707.500	1.14	1.22	1.30	2.01	2.37	2.84	287.500	1.13	1.03	1.08
1745.000	1.10	1.20	1.29	2.02	2.38	2.87	312.500	1.13	1.04	1.10
1772.500	1.08	1.19	1.28	2.02	2.38	2.88	347.500	1.13	1.06	1.12
1785.000	1.08	1.19	1.29	2.02	2.37	2.85	382.500	1.13	1.09	1.14
1822.500	1.09	1.21	1.32	2.01	2.36	2.85	400.000	1.14	1.10	1.16
1862.500	1.14	1.25	1.36	2.00	2.37	2.98	430.000	1.14	1.12	1.18
1875.000	1.16	1.27	1.38	2.00	2.35	2.93	465.000	1.16	1.15	1.21
1887.500	1.19	1.29	1.40	2.00	2.33	2.86	487.500	1.17	1.17	1.23
1900.000	1.22	1.31	1.41	2.00	2.31	2.81	500.000	1.18	1.18	1.24

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SRA-4
ZAD-4

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.00	6.20	5.79	5.59	>64.00	>67.00	67.93	>64.00	>67.00	>70.00
10.000	40.00	6.26	5.84	5.60	>64.00	65.29	64.57	>64.00	>67.00	66.23
20.000	50.00	6.29	5.86	5.61	61.44	60.94	59.26	62.27	62.65	60.88
50.000	80.00	6.21	5.81	5.59	54.39	53.43	51.96	56.06	54.72	53.49
121.720	91.72	6.23	5.83	5.65	47.32	46.46	45.38	48.15	47.50	46.41
199.530	169.53	6.51	6.05	5.80	43.86	43.59	42.89	44.96	44.16	43.05
238.440	208.44	6.54	6.06	5.82	42.86	42.83	42.10	44.17	43.15	42.01
316.250	286.25	6.53	6.13	5.88	40.35	40.50	40.30	41.79	40.40	39.25
394.060	364.06	6.68	6.22	5.98	38.40	38.94	38.73	40.33	38.72	37.59
471.870	441.87	7.07	6.61	6.43	37.52	37.04	37.76	39.42	38.51	38.50
549.680	519.68	6.92	6.55	6.33	34.62	35.20	34.82	36.71	36.00	35.34
588.590	558.59	6.75	6.42	6.22	34.10	35.15	35.39	35.43	35.26	34.89
666.400	636.40	6.31	5.83	5.62	33.00	34.65	36.01	35.87	36.42	37.60
744.210	714.21	6.48	5.84	5.52	33.58	33.43	34.37	37.35	37.93	38.56
822.030	792.03	6.52	6.00	5.57	32.19	33.14	33.71	35.23	35.39	36.51
899.840	869.84	6.26	5.78	5.49	31.98	33.09	33.50	32.30	32.26	32.82
977.650	947.65	6.02	5.48	4.98	32.50	32.58	33.12	29.54	30.17	30.75
1055.500	1025.50	6.40	6.01	5.77	31.24	31.93	33.07	29.21	30.37	31.94
1172.200	1142.20	6.86	6.59	6.51	31.96	32.33	32.22	31.58	33.65	36.10
1250.000	1220.00	7.61	7.40	7.35	30.54	30.84	30.36	33.65	35.76	37.50

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.002	2.31	2.00	1.65	2.06	2.93	4.28	1.36	1.48	1.58
10.000	2.31	2.00	1.65	1.96	2.80	4.16	1.27	1.40	1.51
20.000	2.31	2.02	1.67	1.92	2.71	4.05	1.26	1.40	1.51
50.000	2.32	2.03	1.65	2.00	2.82	4.17	1.29	1.43	1.55
121.720	2.45	2.14	1.79	1.86	2.56	3.67	1.33	1.46	1.56
199.530	2.62	2.36	2.04	1.86	2.53	3.50	1.39	1.50	1.60
238.440	2.71	2.49	2.18	1.86	2.50	3.45	1.41	1.52	1.61
316.250	2.91	2.72	2.42	1.92	2.57	3.37	1.41	1.52	1.61
394.060	2.98	2.80	2.55	2.00	2.57	3.27	1.39	1.49	1.57
471.880	2.90	2.67	2.44	2.10	2.63	3.28	1.32	1.40	1.45
549.690	2.77	2.52	2.28	2.21	2.66	3.25	1.19	1.25	1.28
588.590	2.66	2.36	2.15	2.22	2.61	3.21	1.10	1.17	1.21
666.410	2.52	2.19	1.94	2.38	2.80	3.29	1.16	1.19	1.28
744.220	2.41	2.03	1.71	2.53	2.98	3.43	1.52	1.53	1.62
822.030	2.37	2.04	1.70	2.65	3.12	3.58	2.05	2.05	2.18
899.840	2.43	2.21	1.88	2.74	3.17	3.57	2.76	2.72	2.78
977.660	2.46	2.42	2.09	2.71	3.14	3.43	3.57	3.47	3.43
1055.500	2.30	2.32	2.09	2.71	3.13	3.46	4.37	4.25	4.10
1172.200	2.01	2.10	2.07	3.25	3.47	3.67	5.02	4.84	4.69
1250.000	2.00	2.15	2.29	3.62	3.60	3.88	5.25	4.79	4.64

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

very low distortion

Frequency Mixers

LEVEL 17S (+17 dBm LO, up to +14 dBm RF)

Models
TUF-5H
ZP-5H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF FREQ. (MHz)	FREQ. (MHz)	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
20.0000	50.0000	7.79	6.69	5.99	20.0000	78.70	76.70	71.60	53.50	54.80	55.70
50.0000	80.0000	7.47	6.37	5.67	45.0000	71.40	69.50	64.30	46.80	48.00	49.10
110.0000	140.0000	7.09	5.99	5.49	80.0000	67.10	65.00	60.10	41.90	43.50	44.80
200.0000	230.0000	6.98	5.98	5.58	140.0000	64.20	61.10	55.50	37.50	39.10	41.50
320.0000	350.0000	6.93	6.13	5.73	230.0000	60.70	58.30	53.80	33.90	36.40	37.80
500.0000	530.0000	7.29	6.49	6.09	350.0000	57.40	56.50	58.00	31.70	33.60	34.50
635.0000	665.0000	8.16	6.96	6.46	455.0000	50.30	50.80	56.80	29.60	31.50	32.70
740.0000	770.0000	8.89	7.59	6.69	530.0000	46.50	47.20	47.60	28.10	30.20	32.00
845.0000	875.0000	9.69	8.29	7.49	560.0000	45.60	46.10	46.60	27.70	29.80	31.70
950.0000	980.0000	9.48	8.38	7.48	665.0000	43.50	44.20	43.20	26.40	28.60	30.90
1000.0000	1030.0000	9.41	8.21	7.41	770.0000	40.40	41.40	40.50	26.00	27.80	29.90
1055.0000	1085.0000	8.97	7.97	7.27	875.0000	37.80	38.90	38.20	25.50	27.10	28.40
1100.0000	1130.0000	8.78	7.98	7.28	1000.0000	35.60	36.60	36.20	24.30	25.20	25.70
1200.0000	1230.0000	8.23	7.63	7.33	1085.0000	36.50	37.20	36.60	23.80	24.10	23.80
1250.0000	1280.0000	8.15	7.55	7.15	1190.0000	35.00	36.30	36.10	23.00	22.90	22.10
1300.0000	1330.0000	7.97	7.47	7.17	1280.0000	33.50	35.00	35.00	21.90	21.70	20.90
1350.0000	1380.0000	7.73	7.23	6.93	1330.0000	32.70	34.50	34.50	21.20	21.10	20.20
1400.0000	1430.0000	7.80	7.30	7.00	1380.0000	32.10	34.00	34.20	20.30	19.90	18.90
1470.0000	1500.0000	7.77	7.17	6.77	1400.0000	31.90	33.80	34.00	19.80	19.30	18.40
1500.0000	1470.0000	7.91	7.21	6.91	1500.0000	31.20	33.30	33.50	17.30	17.00	16.10

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
20.000	1.78	1.64	1.57	1.31	1.69	2.49	20.000	2.50	1.86	1.55	20.000	-852.20	0.34
58.000	1.68	1.53	1.45	1.29	1.71	2.50	57.000	2.49	1.87	1.54	40.000	-890.00	0.32
172.000	1.75	1.61	1.52	1.26	1.63	2.38	167.000	2.39	1.80	1.52	50.000	-913.20	0.32
200.000	1.80	1.64	1.55	1.27	1.63	2.35	204.000	2.34	1.80	1.50	100.000	-882.20	0.49
324.000	1.97	1.80	1.70	1.26	1.58	2.21	315.000	2.20	1.71	1.46	158.750	-863.30	0.28
399.000	2.13	1.94	1.83	1.24	1.62	2.18	388.000	2.11	1.68	1.44	200.000	-905.00	0.42
437.000	2.22	2.02	1.90	1.24	1.62	2.18	425.000	2.03	1.64	1.41	297.500	-915.90	1.01
551.000	2.56	2.32	2.18	1.28	1.69	2.26	536.000	1.89	1.56	1.35	436.250	-767.80	1.09
665.000	3.06	2.73	2.55	1.41	1.77	2.18	646.000	1.77	1.46	1.30	500.000	-761.00	3.09
750.000	3.38	3.05	2.83	1.51	1.89	2.42	720.000	1.64	1.37	1.22	575.000	-804.60	-0.16
779.000	3.54	3.16	2.94	1.51	1.86	2.34	774.000	1.62	1.43	1.35	713.750	-708.80	0.13
817.000	3.67	3.29	3.05	1.53	1.84	2.25	812.000	1.58	1.39	1.32	750.000	-687.20	0.99
931.000	3.97	3.59	3.35	1.66	1.93	2.30	927.000	1.48	1.35	1.36	852.500	-681.80	0.97
1045.000	4.03	3.70	3.48	1.73	2.03	2.46	1041.000	1.44	1.43	1.49	991.250	-687.50	3.49
1121.000	3.93	3.65	3.43	1.85	2.08	2.52	1118.000	1.46	1.54	1.63	1000.000	-699.60	3.93
1158.000	3.90	3.58	3.44	1.87	2.08	2.52	1156.000	1.49	1.60	1.73	1130.000	-731.90	4.42
1272.000	3.67	3.45	3.26	1.97	2.14	2.50	1271.000	1.70	1.91	2.12	1268.750	-724.00	2.86
1386.000	3.41	3.21	3.08	2.27	2.24	2.50	1385.000	2.17	2.43	2.65	1407.500	-718.80	-0.60
1462.000	3.26	3.06	2.94	2.34	2.24	2.38	1462.000	2.63	2.91	3.14	1453.750	-701.80	-0.53
1500.000	3.09	2.92	2.79	2.54	2.37	2.50	1500.000	2.91	3.19	3.42	1500.000	-709.00	-5.05

most widely used

Frequency Mixers

Model ZP-10514

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.200	30.20	9.17	8.36	7.86	>64.00	59.54	62.04	52.01	51.65	53.47
.500	30.50	7.55	6.85	6.42	55.84	57.86	60.96	49.41	50.98	53.52
2.000	32.00	6.82	6.13	5.80	54.49	56.96	59.91	49.09	50.94	53.57
10.000	40.00	6.29	5.67	5.35	53.72	55.15	56.21	48.79	50.65	52.76
32.445	62.45	6.01	5.43	5.20	51.70	51.84	51.79	47.98	49.39	50.53
64.690	94.69	6.23	5.61	5.29	49.42	48.95	48.04	46.61	47.53	47.89
100.000	70.00	6.17	5.53	5.27	48.04	47.52	46.63	46.06	46.53	46.75
145.300	115.30	6.36	5.74	5.42	46.01	45.03	44.42	44.48	44.48	44.82
177.550	147.55	5.96	5.41	5.24	43.72	42.85	42.50	42.67	42.69	43.01
200.000	170.00	6.26	5.73	5.48	42.35	41.70	41.42	41.45	41.72	41.88
225.920	195.92	5.96	5.49	5.30	41.03	40.73	40.48	40.28	40.61	40.65
258.160	228.16	6.13	5.71	5.47	39.27	39.01	39.10	38.71	39.00	39.35
290.410	260.41	5.90	5.50	5.27	38.44	38.47	38.27	37.99	38.33	38.28
322.650	292.65	6.18	5.79	5.51	37.51	37.73	37.71	36.88	37.34	37.49
354.900	324.90	5.88	5.52	5.28	36.11	36.24	36.64	35.77	35.86	36.45
387.140	357.14	5.97	5.63	5.40	35.06	35.26	35.53	34.86	34.80	35.10
419.390	389.39	6.15	5.74	5.44	34.65	35.03	35.44	34.28	34.31	34.71
435.510	405.51	6.00	5.66	5.43	34.42	35.44	35.96	34.08	34.71	35.19
467.750	437.75	6.48	6.15	5.88	33.63	35.03	35.77	33.16	34.13	34.76
500.000	470.00	6.29	5.98	5.77	33.08	34.57	35.18	32.48	33.52	33.89

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.19	1.28	1.46	2.33	1.46	1.41	1.41	1.59	1.87
10.000	1.15	1.26	1.47	2.30	1.41	1.34	1.41	1.60	1.88
20.000	1.12	1.25	1.45	2.25	1.39	1.33	1.40	1.58	1.86
34.118	1.11	1.24	1.45	2.30	1.48	1.14	1.41	1.59	1.89
63.235	1.09	1.21	1.42	2.23	1.45	1.15	1.39	1.57	1.84
100.000	1.08	1.20	1.40	2.15	1.42	1.16	1.39	1.57	1.83
121.470	1.08	1.20	1.41	2.08	1.39	1.18	1.41	1.60	1.88
150.590	1.08	1.19	1.40	2.09	1.38	1.20	1.42	1.61	1.90
179.710	1.07	1.17	1.36	2.02	1.36	1.22	1.40	1.58	1.86
200.000	1.07	1.17	1.37	2.01	1.37	1.22	1.43	1.62	1.90
237.940	1.08	1.16	1.35	1.97	1.36	1.26	1.44	1.62	1.91
267.060	1.09	1.16	1.35	2.01	1.42	1.24	1.47	1.65	1.93
296.180	1.10	1.16	1.33	2.08	1.43	1.29	1.45	1.63	1.89
339.850	1.14	1.19	1.34	2.02	1.51	1.32	1.49	1.66	1.94
354.410	1.15	1.20	1.36	2.03	1.53	1.34	1.53	1.71	2.01
383.530	1.17	1.22	1.35	2.06	1.58	1.37	1.54	1.70	1.98
398.090	1.19	1.24	1.38	2.07	1.58	1.39	1.58	1.76	2.07
427.210	1.21	1.26	1.38	2.19	1.62	1.44	1.59	1.76	2.03
470.880	1.26	1.30	1.42	2.17	1.67	1.54	1.66	1.82	2.11
500.000	1.27	1.32	1.42	2.17	1.65	1.57	1.67	1.82	2.08

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.200	−232.81	−.83
1.000	−291.85	−.86
5.000	−305.20	−.83
33.520	−303.90	−.79
66.840	−301.66	−.79
100.000	−303.60	−.88
116.820	−301.78	−.92
150.140	−302.79	−.98
183.460	−308.60	−1.01
200.120	−312.40	−1.03
233.440	−320.90	−.83
266.760	−323.40	−.95
300.080	−327.00	−.54
333.400	−313.00	−.09
350.060	−302.94	−.03
383.380	−289.39	−.14
400.040	−282.90	−.16
433.360	−277.11	−.14
466.680	−279.21	−.33
500.000	−279.37	−.73

Measurements at RF & LO Power +7 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband, high dynamic range

Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
TUF-860MH
ZP-860MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. MHz	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
800.000	770.000	5.66	5.33	5.17	800.000	37.81	39.13	39.39	26.14	28.16	29.08
819.740	789.737	5.64	5.36	5.19	819.740	36.36	38.29	38.63	25.17	27.23	28.44
839.470	809.474	5.77	5.35	5.14	839.470	34.14	36.76	37.44	24.28	26.25	27.55
846.050	816.053	5.88	5.39	5.17	846.050	33.61	36.42	37.13	24.12	25.98	27.28
859.210	829.211	6.03	5.47	5.21	859.210	32.80	35.77	36.54	23.90	25.54	26.95
878.950	848.947	6.15	5.50	5.23	878.950	31.74	34.77	35.89	23.76	25.00	26.48
892.110	862.105	6.29	5.60	5.28	892.110	31.34	34.17	35.54	23.81	24.77	26.32
898.680	868.684	6.34	5.65	5.30	898.680	31.06	33.59	35.12	23.77	24.65	26.14
918.420	888.421	6.48	5.81	5.41	918.420	29.91	31.73	33.34	23.72	24.34	25.49
938.160	908.158	6.70	6.07	5.54	938.160	29.00	30.37	31.92	23.62	24.13	25.05
944.740	914.737	6.79	6.15	5.60	944.740	28.77	30.14	31.53	23.56	24.05	24.93
957.890	927.895	6.81	6.23	5.57	957.890	28.34	29.60	30.78	23.47	23.94	24.74
977.630	947.632	6.99	6.40	5.73	977.630	27.94	29.08	29.88	23.36	23.93	24.55
990.790	960.790	7.23	6.57	5.91	990.790	28.10	29.24	30.01	23.18	23.75	24.44
997.370	967.368	7.23	6.60	5.98	997.370	28.13	29.33	29.98	23.07	23.70	24.38
1000.000	970.000	7.22	6.60	5.98	1000.000	28.10	29.29	29.90	23.03	23.67	24.36
1017.110	987.105	7.43	6.79	6.14	1017.110	27.53	28.57	29.02	22.76	23.50	24.23
1036.840	1006.842	7.63	7.07	6.49	1036.840	27.01	27.91	28.14	22.61	23.42	24.09
1043.420	1013.421	7.66	7.20	6.58	1043.420	26.86	27.74	27.94	22.53	23.36	24.03
1050.000	1020.000	7.71	7.22	6.65	1050.000	26.71	27.57	27.77	22.44	23.28	23.97

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
800.000	1.24	1.23	1.27	1.80	2.28	3.12	1.000	3.08	2.49	1.98	800.000	-448.70	5.05
805.000	1.23	1.22	1.27	1.81	2.29	3.12	2.000	3.08	2.49	1.98	821.430	-436.10	6.06
827.000	1.21	1.21	1.27	1.89	2.33	3.13	5.000	3.08	2.49	1.98	842.860	-406.70	8.55
834.000	1.18	1.17	1.22	1.91	2.35	3.14	6.000	3.08	2.49	1.98	850.000	-400.10	8.29
847.000	1.16	1.14	1.20	1.91	2.37	3.14	9.000	3.08	2.49	1.98	857.140	-395.80	7.74
868.000	1.13	1.08	1.16	1.95	2.41	3.18	10.000	3.09	2.49	1.98	878.570	-378.80	7.87
881.000	1.11	1.04	1.15	1.96	2.44	3.20	20.000	3.09	2.50	1.99	900.000	-358.90	6.27
888.000	1.10	1.03	1.15	1.96	2.45	3.21	50.000	3.13	2.52	2.01	907.140	-356.70	5.92
908.000	1.11	1.05	1.17	1.98	2.48	3.25	55.000	3.14	2.52	2.01	914.290	-355.60	6.10
928.000	1.14	1.11	1.21	1.98	2.50	3.29	80.000	3.16	2.55	2.03	935.710	-354.00	4.72
935.000	1.15	1.12	1.21	1.99	2.51	3.30	100.000	3.18	2.57	2.06	950.000	-358.80	4.58
949.000	1.20	1.16	1.25	1.99	2.51	3.31	110.000	3.18	2.58	2.07	964.290	-351.90	3.99
969.000	1.29	1.25	1.33	2.00	2.51	3.32	125.000	3.20	2.59	2.09	971.430	-350.00	3.99
982.000	1.34	1.30	1.37	2.00	2.50	3.31	141.000	3.21	2.61	2.11	992.860	-350.30	3.15
989.000	1.36	1.35	1.38	2.00	2.50	3.31	164.000	3.23	2.64	2.14	1000.000	-350.90	2.80
1000.000	1.43	1.39	1.46	2.00	2.49	3.31	188.000	3.25	2.67	2.18	1000.000	-350.90	2.80
1016.000	1.50	1.47	1.53	1.98	2.48	3.31	211.000	3.28	2.69	2.21	1021.430	-353.30	2.18
1036.000	1.60	1.56	1.62	1.98	2.47	3.29	234.000	3.30	2.71	2.25	1035.710	-344.30	2.16
1043.000	1.65	1.60	1.66	1.98	2.46	3.29	242.000	3.31	2.72	2.26	1042.860	-339.20	1.81
1050.000	1.69	1.66	1.71	1.98	2.46	3.28	250.000	3.33	2.73	2.28	1050.000	-338.20	1.37

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10dBm LO, up to +5dBm RF)

Models
TFM-15
ZFM-15

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
10.000	40.00	7.09	6.53	6.23	23.88	26.10	27.81	23.04	25.08	27.01
20.000	50.00	7.15	6.60	6.36	28.07	30.38	32.40	27.25	29.74	31.89
100.000	70.00	7.10	6.55	6.27	33.54	35.82	38.01	32.56	35.93	38.89
200.000	170.00	7.14	6.60	6.32	35.25	37.35	39.48	34.67	38.21	41.31
400.000	370.00	7.36	6.74	6.38	35.50	36.49	37.50	37.43	39.50	39.44
500.000	470.00	7.13	6.52	6.23	34.59	35.42	36.65	37.49	38.00	37.53
790.000	760.00	7.40	6.70	6.39	31.76	32.94	34.27	35.00	33.60	34.14
920.000	890.00	7.71	6.76	6.35	30.94	32.80	34.84	33.13	33.97	33.68
1180.000	1150.00	8.13	7.30	6.99	30.06	31.62	33.62	31.75	32.89	33.47
1310.000	1280.00	8.32	7.30	6.91	29.59	31.27	33.27	32.10	34.31	35.08
1500.000	1470.00	7.32	6.54	6.25	28.50	29.76	30.77	30.68	32.85	34.76
1700.000	1670.00	7.69	6.91	6.53	28.13	28.49	28.63	31.86	30.87	31.34
1830.000	1800.00	7.60	6.97	6.65	28.52	29.46	29.52	29.41	28.22	28.72
2000.000	1970.00	7.61	7.07	6.84	27.07	28.32	29.26	28.50	27.77	27.62
2200.000	2170.00	7.47	6.97	6.80	27.16	27.89	28.41	29.65	27.68	25.61
2480.000	2450.00	7.51	6.93	6.70	28.24	28.37	28.05	25.87	24.64	20.89
2610.000	2580.00	7.71	7.08	6.90	27.17	27.10	27.02	24.02	23.13	20.35
2740.000	2710.00	8.11	7.45	7.20	27.49	26.79	26.50	22.65	21.95	20.52
2870.000	2840.00	8.18	7.56	7.37	26.75	26.23	24.58	21.48	21.25	20.52
3000.000	2970.00	8.63	8.31	8.20	27.78	29.30	29.14	20.68	20.32	19.50

mixer VSWR

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm
10.000	2.11	1.84	1.62	1.62	1.71	2.26	1.56	1.45	1.39
20.000	1.77	1.54	1.35	1.26	1.51	2.32	1.48	1.29	1.22
50.000	1.75	1.50	1.30	1.08	1.37	2.18	1.50	1.25	1.17
100.000	1.81	1.55	1.33	1.07	1.44	2.07	1.53	1.26	1.17
200.000	2.02	1.72	1.48	1.23	1.40	1.96	1.56	1.27	1.19
316.150	2.26	1.99	1.72	1.43	1.34	1.78	1.56	1.26	1.20
500.000	2.79	2.45	2.22	1.75	1.33	1.57	1.55	1.23	1.19
622.300	3.09	2.70	2.51	1.96	1.36	1.40	1.52	1.20	1.16
851.920	3.28	2.85	2.67	2.19	1.36	1.11	1.43	1.16	1.07
1000.000	3.18	2.75	2.04	2.35	1.38	1.12	1.40	1.20	1.24
1200.000	2.64	2.28	1.96	1.98	1.30	1.33	1.48	1.37	1.14
1311.100	2.23	1.94	1.83	1.74	1.27	1.51	1.58	1.48	1.04
1500.000	1.63	1.44	1.52	1.27	1.29	1.75	1.74	1.56	1.19
1617.300	1.38	1.25	1.27	1.12	1.34	1.92	1.76	1.52	1.37
1770.400	1.49	1.42	1.24	1.08	1.34	1.98	1.59	1.31	1.62
2000.000	2.09	1.97	1.83	1.50	1.44	1.89	1.34	1.14	1.87
2200.000	2.17	2.18	2.12	1.71	1.52	1.60	1.37	1.30	1.80
2500.000	2.63	2.37	2.45	2.94	1.93	1.31	2.37	2.66	1.72
2800.000	2.10	2.09	1.95	2.96	2.25	2.04	3.68	3.79	3.80
3000.000	2.21	2.18	2.28	3.00	2.63	1.80	3.82	4.88	3.98

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
10.000	+216.05	−2.26
20.000	+216.68	−.18
50.000	+217.07	+.25
100.000	+214.73	+.40
200.000	+218.98	+.57
324.690	+232.84	+.80
414.600	+206.43	+1.02
500.000	+192.47	+.93
639.370	+223.80	+1.05
729.280	+205.59	+1.39
800.000	+179.59	+1.40
909.100	+183.16	+1.28
1000.000	+190.29	+1.27
1200.000	+196.42	+1.71
1500.000	+178.74	+3.01
1800.000	+175.84	+2.71
2000.000	+195.03	+1.08
2200.000	+171.75	−.67
2500.000	+177.30	−2.90
2800.000	+163.24	−5.28
3000.000	+180.13	−6.79

Measurements at RF & LO Power +10 dBm

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broadband, high dynamic range

Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
TUF-11AMH
ZP-11AMH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. MHz	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
1400.000	1430.000	7.61	7.21	7.01	1400.000	27.30	29.10	31.50	29.40	35.50	35.40
1426.316	1456.316	7.79	7.29	7.09	1426.316	27.10	28.80	31.00	28.30	34.80	37.10
1452.632	1482.632	7.88	7.38	7.18	1430.000	27.10	28.80	30.90	28.20	34.60	37.30
1478.947	1508.947	8.11	7.51	7.21	1456.316	26.90	28.70	30.80	27.30	33.90	38.50
1505.263	1535.263	8.14	7.54	7.24	1482.632	26.70	28.70	30.40	26.90	33.30	39.40
1531.579	1561.579	8.33	7.53	7.13	1508.947	26.30	28.40	30.30	26.40	32.70	40.10
1557.895	1587.895	8.31	7.51	7.11	1535.263	26.20	28.40	30.20	25.90	31.70	40.30
1584.211	1614.211	8.28	7.38	6.98	1561.579	26.10	28.40	30.20	25.00	30.60	39.80
1610.526	1640.526	8.37	7.47	7.07	1587.895	25.60	28.00	29.80	24.50	29.90	39.40
1636.842	1666.842	8.47	7.37	6.97	1614.211	25.50	27.80	29.50	24.20	29.50	38.50
1663.158	1693.158	8.54	7.34	6.94	1640.526	25.20	27.80	29.40	23.50	28.70	36.90
1689.474	1719.474	8.36	7.46	6.96	1666.842	25.00	27.50	29.30	23.00	27.60	35.70
1715.790	1745.790	8.43	7.43	6.93	1693.158	24.50	27.20	28.80	22.10	26.90	33.90
1742.105	1772.105	8.38	7.38	6.88	1745.790	24.30	26.80	28.60	21.50	25.80	32.40
1768.421	1798.421	8.62	7.32	6.82	1772.105	24.20	26.60	28.60	20.90	25.00	31.50
1794.737	1824.737	8.51	7.51	6.91	1798.421	23.90	26.50	28.40	20.20	24.40	30.30
1821.053	1851.053	8.56	7.46	6.96	1824.737	23.70	26.20	28.10	19.90	23.80	29.30
1847.368	1877.368	8.56	7.56	6.96	1851.053	23.80	26.40	28.20	19.40	23.40	28.60
1873.684	1903.684	8.65	7.45	6.95	1877.368	23.80	26.10	27.90	19.20	22.90	27.60
1900.000	1870.000	8.55	7.55	6.95	1900.000	23.70	26.20	28.00	18.80	22.50	27.10

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
1400.000	2.20	2.16	2.20	2.10	2.08	2.35	40.000	1.55	1.36	1.26
1426.316	2.16	2.12	2.18	2.14	2.20	2.52	64.211	1.53	1.32	1.20
1452.632	2.06	2.01	2.04	2.20	2.23	2.52	88.421	1.53	1.31	1.17
1478.947	1.94	1.89	1.94	2.20	2.16	2.46	112.632	1.52	1.30	1.16
1505.263	1.85	1.81	1.87	2.20	2.12	2.37	136.842	1.52	1.30	1.16
1531.579	1.74	1.70	1.74	2.23	2.16	2.43	161.053	1.51	1.29	1.15
1557.895	1.64	1.61	1.64	2.35	2.25	2.49	185.263	1.48	1.28	1.14
1584.211	1.54	1.51	1.54	2.37	2.23	2.43	209.474	1.47	1.26	1.14
1610.526	1.43	1.41	1.46	2.32	2.18	2.37	233.684	1.45	1.25	1.13
1636.842	1.28	1.29	1.34	2.32	2.18	2.35	257.895	1.44	1.25	1.14
1663.158	1.40	1.49	1.58	2.37	2.23	2.40	282.105	1.42	1.23	1.14
1689.474	1.28	1.34	1.40	2.40	2.20	2.40	306.316	1.40	1.23	1.15
1715.789	1.20	1.27	1.33	2.40	2.18	2.32	330.526	1.38	1.22	1.16
1742.105	1.13	1.22	1.28	2.32	2.12	2.14	354.737	1.37	1.22	1.17
1768.421	1.06	1.18	1.26	2.35	2.12	2.16	378.947	1.35	1.22	1.19
1794.737	1.01	1.17	1.25	2.40	2.16	2.14	403.158	1.34	1.23	1.22
1821.053	1.05	1.17	1.25	2.37	2.14	2.14	427.368	1.32	1.23	1.24
1847.368	1.11	1.19	1.26	2.37	2.10	2.12	451.579	1.30	1.25	1.27
1873.684	1.16	1.21	1.28	2.40	2.10	2.10	475.789	1.29	1.26	1.30
1900.000	1.22	1.25	1.31	2.40	2.12	2.12	500.000	1.28	1.28	1.34

broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10dBm LO, up to +5dBm RF)

Models
TFM-150
ZFM-150

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
10.000	40.00	6.86	6.45	6.13	23.51	25.80	27.54	22.38	24.40	26.34
20.000	50.00	7.14	6.61	6.34	27.97	30.46	32.63	26.63	29.11	31.31
130.610	100.61	6.67	6.30	6.00	34.46	36.94	39.60	32.59	35.84	38.84
251.210	221.21	6.94	6.42	6.17	35.54	37.51	39.45	34.37	37.82	39.94
432.120	402.12	6.84	6.38	6.09	35.30	36.22	37.73	36.99	37.58	36.81
500.000	470.00	7.12	6.61	6.25	34.85	35.79	37.53	36.86	36.42	35.18
552.730	522.73	6.97	6.47	6.11	34.54	35.50	37.47	36.16	35.14	35.44
673.330	643.33	7.02	6.53	6.27	33.75	34.67	36.91	34.23	33.34	33.16
793.940	763.68	7.22	6.64	6.26	33.34	34.16	36.05	32.63	31.81	31.03
914.550	884.43	7.46	6.67	6.23	30.90	32.34	34.63	30.74	30.81	32.29
974.850	944.91	6.89	6.11	5.73	30.08	31.59	34.71	29.97	30.10	31.00
1035.200	1005.40	7.68	7.04	6.58	29.48	30.74	33.95	29.59	29.56	29.88
1155.800	1125.60	7.87	7.24	6.86	29.06	30.26	33.04	30.57	30.08	29.66
1276.400	1246.50	7.25	6.75	6.45	28.54	29.72	32.56	30.95	30.93	30.95
1397.000	1366.80	7.13	6.57	6.29	27.77	28.85	31.02	31.65	31.94	31.72
1517.600	1487.50	7.13	6.59	6.31	27.47	28.61	30.81	31.07	31.80	31.80
1638.200	1608.00	7.27	6.63	6.41	26.64	27.94	31.04	28.51	29.65	29.86
1758.800	1728.70	7.54	6.91	6.59	27.21	28.39	31.71	26.22	26.17	26.74
1879.400	1849.50	7.63	7.01	6.70	29.18	30.98	33.15	26.60	26.61	26.54
2000.000	1970.00	8.00	7.24	7.00	30.21	32.51	39.43	25.08	24.79	24.71

mixer VSWR

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm
10.000	1.78	1.62	1.57	1.65	1.69	2.23	1.45	1.35	1.36
50.000	1.43	1.29	1.21	1.10	1.49	2.18	1.34	1.15	1.09
100.000	1.43	1.29	1.20	1.09	1.39	2.01	1.36	1.15	1.05
200.000	1.52	1.34	1.25	1.18	1.36	1.96	1.39	1.16	1.04
251.210	1.55	1.38	1.28	1.24	1.34	1.91	1.39	1.17	1.04
371.820	1.70	1.49	1.37	1.36	1.30	1.77	1.43	1.20	1.05
492.420	1.81	1.60	1.45	1.49	1.29	1.66	1.48	1.23	1.08
552.730	1.88	1.62	1.46	1.56	1.28	1.60	1.49	1.23	1.10
673.330	1.98	1.70	1.53	1.66	1.26	1.48	1.50	1.24	1.14
793.940	2.03	1.79	1.62	1.75	1.26	1.40	1.49	1.24	1.17
914.550	2.13	1.89	1.74	1.80	1.22	1.31	1.44	1.21	1.17
1000.000	2.24	2.02	1.87	1.73	1.20	1.25	1.47	1.24	1.20
1095.500	2.35	2.07	1.93	1.90	1.20	1.20	1.49	1.25	1.20
1216.100	2.44	2.13	1.98	1.86	1.18	1.21	1.51	1.26	1.18
1336.700	2.43	2.13	2.00	1.86	1.13	1.30	1.51	1.27	1.15
1457.300	2.30	2.05	1.95	1.65	1.07	1.43	1.47	1.26	1.15
1577.900	2.12	1.88	1.79	1.41	1.12	1.88	1.41	1.23	1.18
1698.500	1.88	1.45	1.61	1.31	1.18	1.79	1.33	1.19	1.20
1819.100	1.75	1.43	1.47	1.26	1.21	1.76	1.27	1.16	1.19
2000.000	1.69	1.55	1.42	1.22	1.26	1.72	1.18	1.12	1.16

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
10.000	+210.73	−2.85
20.000	+214.48	−.81
50.000	+212.90	+0.00
100.000	+210.61	+.22
124.110	+210.10	+.33
200.000	+216.58	+.50
238.230	+221.12	+.34
352.340	+223.97	+.50
428.420	+194.95	+.42
500.000	+185.02	+.71
542.530	+191.96	+.74
656.650	+223.05	+.75
770.760	+183.02	+1.43
846.840	+171.52	+2.48
922.910	+195.29	+1.61
1000.000	+173.82	+2.06
1250.000	+177.10	+2.00
1500.000	+188.05	+3.99
1750.000	+181.99	+4.17
2000.000	+199.73	+4.20

Measurements at RF & LO Power +10 dBm

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband, high dynamic range

Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
TUF-5MH
ZP-5MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
20.000	50.000	6.39	5.87	5.53	20.000	65.84	65.81	64.84	49.39	50.21	50.60
50.000	80.000	6.10	5.57	5.24	50.000	58.21	58.31	57.35	42.06	42.94	43.60
100.000	70.000	5.91	5.41	5.13	100.000	52.10	52.44	51.84	36.17	37.15	38.07
158.750	128.750	5.89	5.37	5.13	158.750	48.51	48.96	48.57	32.75	34.29	35.15
200.000	170.000	5.95	5.43	5.20	200.000	46.79	47.29	47.65	31.34	32.96	33.26
297.500	267.500	5.93	5.51	5.27	297.500	44.21	45.30	46.22	29.18	30.09	30.33
436.250	406.250	6.23	5.79	5.45	436.250	42.99	45.57	48.43	26.22	27.35	27.95
500.000	470.000	6.44	5.90	5.56	500.000	42.69	45.56	48.33	24.87	26.32	27.21
575.000	545.000	6.77	6.21	5.87	575.000	42.05	44.68	48.92	23.86	25.44	26.70
713.750	683.750	7.78	6.95	6.23	713.750	40.89	43.61	45.83	22.46	24.34	26.31
750.000	720.000	7.96	7.16	6.50	750.000	40.72	43.15	45.02	22.28	24.17	26.13
760.000	730.000	7.97	7.15	6.56	760.000	40.64	43.01	44.85	22.23	24.16	26.18
852.500	822.500	8.07	7.16	6.65	852.500	40.07	41.36	41.87	22.06	23.95	25.76
991.250	961.250	8.34	7.16	6.51	991.250	39.14	39.32	39.27	21.48	22.75	23.21
1000.000	970.000	8.41	7.32	6.53	1000.000	39.04	39.30	39.25	21.38	22.64	23.00
1130.000	1100.000	8.06	7.38	6.79	1130.000	35.74	36.80	37.72	20.32	20.71	20.06
1222.500	1192.500	7.87	7.32	6.89	1222.500	37.55	38.30	39.00	18.83	18.60	17.80
1361.250	1331.250	7.68	7.13	6.85	1361.250	37.36	37.67	38.39	15.95	15.58	14.94
1453.750	1423.750	7.79	7.10	6.82	1453.750	37.48	37.62	38.02	14.11	13.78	13.23
1500.000	1470.000	7.70	7.00	6.71	1500.000	37.18	37.26	37.76	13.23	12.95	12.46

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
20.000	1.66	1.57	1.52	1.71	2.60	3.86	1.000	1.69	1.32	1.13	20.000	-487.40	0.16
50.000	1.48	1.38	1.29	1.67	2.52	3.67	2.000	1.69	1.32	1.13	40.000	-486.80	0.16
100.000	1.50	1.37	1.29	1.59	2.40	3.52	5.000	1.69	1.32	1.13	50.000	-488.70	0.16
200.000	1.60	1.48	1.40	1.53	2.28	3.32	10.000	1.69	1.32	1.13	100.000	-487.30	0.16
250.000	1.71	1.56	1.49	1.57	2.37	3.41	20.000	1.69	1.32	1.13	158.750	-484.10	-0.05
350.000	2.00	1.77	1.71	1.57	2.30	3.29	50.000	1.70	1.32	1.13	200.000	-489.10	-0.09
475.000	2.36	2.15	2.04	1.65	2.34	3.21	100.000	1.70	1.33	1.14	297.500	-488.20	0.12
500.000	2.45	2.23	2.11	1.66	2.33	3.22	167.000	1.70	1.33	1.14	436.250	-450.90	0.60
627.000	3.02	2.70	2.65	1.77	2.39	3.15	200.000	1.70	1.33	1.14	500.000	-426.20	0.46
740.000	3.46	3.13	2.95	1.85	2.40	3.14	278.000	1.68	1.33	1.15	575.000	-410.80	-0.06
750.000	3.50	3.17	2.98	1.87	2.43	3.18	350.000	1.65	1.32	1.14	713.750	-421.90	-0.10
800.000	3.65	3.31	3.15	1.94	2.44	3.09	450.000	1.61	1.30	1.13	750.000	-419.90	-0.05
900.000	3.85	3.52	3.33	2.06	2.50	3.10	500.000	1.57	1.28	1.12	852.500	-404.80	-0.49
1000.000	3.96	3.65	3.48	2.13	2.58	3.16	550.000	1.54	1.26	1.11	991.250	-391.40	-0.86
1045.000	4.01	3.71	3.53	2.16	2.59	3.18	650.000	1.46	1.21	1.10	1000.000	-389.70	-0.60
1158.000	3.95	3.70	3.52	2.28	2.62	3.12	722.000	1.37	1.16	1.10	1130.000	-402.70	0.02
1272.000	3.83	3.63	3.50	2.42	2.70	3.12	800.000	1.31	1.17	1.14	1268.750	-405.20	0.11
1400.000	3.60	3.42	3.31	2.59	2.64	2.97	900.000	1.25	1.21	1.27	1407.500	-409.50	0.29
1462.000	3.49	3.33	3.21	2.76	2.62	2.88	972.000	1.26	1.31	1.40	1453.750	-394.50	0.30
1500.000	3.38	3.23	3.11	2.78	2.57	2.89	1000.000	1.27	1.34	1.44	1500.000	-389.20	0.27

broadband high dynamic range

Frequency Mixers

Model
LMX-123

LEVEL 10 (+10dBm LO, up to +5dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	Isolation L-R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L-I (dB) LO +7dBm	LO +10dBm	LO +13dBm
10.000	40.000	7.50	7.00	6.58	10.000	48.60	51.60	53.30	34.20	37.80	40.90
20.000	50.000	7.20	6.80	6.30	20.000	48.40	51.60	53.00	33.80	37.30	40.50
103.440	73.440	6.94	6.24	5.93	103.440	49.20	51.70	52.60	33.80	37.00	40.10
200.000	170.000	7.01	6.59	5.97	200.000	51.00	50.10	48.00	33.20	36.20	38.00
383.750	353.750	7.13	6.56	6.03	383.750	49.90	45.10	43.10	33.80	34.80	34.50
500.000	470.000	7.28	6.65	6.10	500.000	47.00	43.70	41.70	33.80	33.70	32.90
664.070	634.070	7.55	6.86	6.10	664.070	45.10	42.20	40.10	33.40	32.00	30.80
850.940	820.940	7.41	6.75	6.00	850.940	46.50	43.10	41.00	32.50	30.30	29.00
1000.000	970.000	7.59	6.91	6.65	1000.000	46.80	46.50	43.00	32.80	29.80	28.10
1131.300	1101.300	7.88	7.12	6.76	1131.300	43.40	50.00	48.00	32.80	29.50	27.40
1318.100	1288.100	8.46	7.41	6.88	1318.100	40.20	43.30	45.00	35.70	31.00	27.00
1505.000	1475.000	9.08	7.87	7.21	1505.000	35.50	36.20	37.20	35.00	30.70	27.40
1691.900	1661.900	9.02	7.91	7.28	1691.900	32.10	32.60	32.90	33.10	30.90	28.40
1878.800	1848.800	9.11	7.97	7.33	1878.800	31.00	31.50	31.60	33.20	31.30	30.10
2000.000	1970.000	8.87	7.88	7.31	2000.000	30.60	30.90	31.00	32.60	31.20	31.90
2159.100	2129.100	8.53	7.68	7.31	2159.100	29.70	29.90	30.10	32.00	30.50	33.00
2439.400	2409.400	7.95	7.29	6.89	2439.400	30.60	30.60	30.30	29.70	28.90	30.40
2626.300	2596.300	8.20	7.52	7.12	2626.300	30.90	30.60	30.60	29.10	28.90	29.30
2813.100	2783.100	8.33	7.75	7.36	2813.100	29.00	28.50	28.40	28.50	29.00	28.50
3000.000	2970.000	8.82	8.24	7.88	3000.000	29.20	28.20	28.30	27.70	31.40	28.90

mixer VSWR

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm
10.000	1.65	1.45	1.33	1.15	1.34	1.92	10.000	1.45	1.19	1.07
50.000	1.66	1.46	1.33	1.17	1.30	1.91	50.000	1.46	1.19	1.06
100.610	1.66	1.45	1.33	1.21	1.27	1.87	100.610	1.46	1.18	1.05
200.000	1.71	1.49	1.37	1.25	1.27	1.81	200.000	1.43	1.16	1.03
372.420	1.84	1.60	1.48	1.32	1.25	1.74	372.420	1.36	1.09	1.04
500.000	1.96	1.71	1.58	1.40	1.22	1.65	500.000	1.31	1.04	1.09
644.240	2.10	1.81	1.67	1.49	1.17	1.56	644.240	1.25	1.02	1.15
825.450	2.25	1.92	1.76	1.62	1.18	1.45	825.450	1.18	1.07	1.21
1000.000	2.37	2.03	1.85	1.76	1.21	1.36	1000.000	1.13	1.10	1.24
1097.300	2.52	2.16	1.97	1.81	1.26	1.31	1097.300	1.12	1.12	1.26
1369.100	2.80	2.43	2.25	1.92	1.31	1.16	1369.100	1.16	1.16	1.25
1550.300	2.80	2.46	2.25	2.04	1.33	1.07	1550.300	1.18	1.12	1.19
1731.500	2.72	2.40	2.23	2.01	1.36	1.20	1731.500	1.38	1.22	1.19
1912.700	2.76	2.43	2.23	1.91	1.39	1.39	1912.700	1.60	1.40	1.33
2003.300	2.61	2.30	2.12	1.80	1.41	1.48	2003.300	1.68	1.48	1.40
2184.500	2.58	2.43	2.12	1.91	1.47	1.57	2184.500	1.81	1.59	1.54
2456.400	2.10	1.91	1.67	1.34	1.51	1.77	2456.400	1.97	1.75	1.66
2637.600	2.10	1.84	1.75	1.27	1.48	1.70	2637.600	1.65	1.51	1.43
2818.800	1.87	1.67	1.65	1.63	2.03	2.30	2818.800	1.54	1.59	1.53
3000.000	1.34	1.33	1.33	2.12	2.61	2.92	3000.000	1.88	1.99	1.96

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broadband, high dynamic range

Frequency Mixers

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

Models
TUF-2MH
ZP-2MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
50.000	80.000	6.34	5.81	5.58	50.000	57.04	57.10	59.54	57.87	55.26	54.31
100.000	70.000	6.39	5.85	5.57	100.000	51.05	51.37	53.73	52.23	49.62	48.10
129.170	99.167	6.31	5.79	5.50	129.170	48.92	49.27	51.69	50.28	47.63	45.72
200.000	170.000	6.30	5.74	5.51	200.000	45.30	46.10	48.87	46.99	44.54	43.71
208.330	178.333	6.26	5.73	5.50	208.330	45.02	45.84	48.58	46.51	44.23	43.24
287.500	257.500	6.16	5.70	5.47	287.500	42.82	43.58	46.61	44.04	42.34	40.82
340.280	310.278	6.09	5.67	5.48	340.280	41.78	42.34	45.17	42.79	40.78	39.76
366.670	336.667	6.06	5.69	5.51	366.670	41.22	41.82	44.74	42.05	40.13	38.74
445.830	415.833	6.03	5.72	5.54	445.830	40.09	40.63	43.75	39.05	37.78	37.01
498.610	468.611	6.03	5.75	5.58	498.610	39.11	39.34	42.50	36.86	36.04	35.26
500.000	470.000	6.03	5.75	5.58	500.000	39.08	39.30	42.47	36.82	36.00	35.19
551.390	521.389	6.18	5.86	5.68	551.390	38.58	38.49	41.63	35.29	34.15	33.50
630.560	600.556	6.28	5.90	5.88	630.560	38.05	38.05	41.00	33.16	32.59	31.97
683.330	653.333	6.43	6.06	5.96	683.330	37.49	38.00	40.27	32.12	31.67	30.86
709.720	679.722	6.46	6.12	5.98	709.720	37.53	38.21	40.42	31.65	31.02	30.84
788.890	758.889	6.68	6.33	6.20	788.890	37.21	38.31	39.99	30.21	29.48	28.84
868.060	838.056	6.91	6.58	6.42	868.060	36.74	37.78	39.70	28.56	28.55	28.69
947.220	917.222	7.26	6.88	6.68	947.220	36.30	37.88	38.74	27.07	27.56	27.30
973.610	943.611	7.38	6.98	6.82	973.610	36.06	37.84	39.04	26.43	27.05	27.46
1000.000	970.000	7.54	7.05	6.89	1000.000	35.72	37.64	39.10	25.79	26.57	27.38

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
50.000	1.10	1.03	1.09	1.66	2.51	3.64	1.000	1.91	1.60	1.44	50.000	-490.90	0.21
100.000	1.11	1.05	1.09	1.58	2.39	3.50	27.000	1.92	1.61	1.45	100.000	-485.50	0.24
150.000	1.12	1.07	1.11	1.58	2.41	3.56	52.000	1.93	1.62	1.46	148.280	-495.60	0.31
200.000	1.14	1.10	1.14	1.53	2.28	3.31	100.000	1.96	1.64	1.48	200.000	-501.50	0.29
250.000	1.15	1.13	1.16	1.57	2.36	3.42	150.000	1.98	1.66	1.51	246.550	-502.80	0.18
318.000	1.18	1.17	1.20	1.53	2.26	3.26	200.000	2.03	1.71	1.55	312.070	-502.40	0.04
367.000	1.21	1.19	1.23	1.55	2.29	3.33	250.000	2.08	1.76	1.60	377.590	-525.90	0.10
400.000	1.22	1.21	1.25	1.56	2.28	3.27	334.000	2.18	1.86	1.70	400.000	-530.70	0.24
475.000	1.26	1.26	1.30	1.58	2.29	3.22	400.000	2.26	1.95	1.79	475.860	-506.40	0.28
500.000	1.28	1.28	1.32	1.61	2.29	3.25	475.000	2.34	2.03	1.88	500.000	-491.90	0.37
513.000	1.28	1.29	1.33	1.61	2.28	3.20	500.000	2.37	2.07	1.92	508.620	-490.80	0.34
586.000	1.32	1.33	1.37	1.67	2.32	3.24	550.000	2.44	2.14	1.99	600.000	-440.70	0.51
650.000	1.37	1.38	1.42	1.71	2.35	3.22	600.000	2.45	2.17	2.03	672.410	-441.00	1.11
700.000	1.40	1.41	1.45	1.77	2.33	3.18	667.000	2.47	2.21	2.07	705.170	-446.60	1.24
732.000	1.41	1.43	1.47	1.77	2.30	3.11	750.000	2.49	2.23	2.11	737.930	-454.30	1.23
800.000	1.47	1.49	1.52	1.86	2.44	3.24	821.000	2.49	2.23	2.11	800.000	-444.20	1.25
878.000	1.52	1.53	1.56	1.89	2.37	3.19	900.000	2.47	2.22	2.10	868.970	-390.00	0.51
950.000	1.60	1.60	1.62	1.98	2.48	3.24	950.000	2.48	2.22	2.09	934.480	-330.30	0.07
976.000	1.63	1.62	1.64	2.02	2.49	3.22	974.000	2.49	2.22	2.08	967.240	-339.60	0.75
1000.000	1.65	1.64	1.66	2.04	2.45	3.17	1000.000	2.50	2.22	2.08	1000.000	-362.10	1.10

broadband, high dynamic range

Frequency Mixers

Model LMX-148

LEVEL 10 (+10dBm LO, up to +5dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
10.000	40.00	7.37	6.90	6.65	>67.00	64.68	62.31	61.17	60.27	59.92
20.000	50.00	7.40	6.90	6.59	58.80	57.03	55.86	56.53	55.29	54.47
145.460	115.46	6.97	6.64	6.36	41.16	40.03	39.26	39.55	38.47	37.87
190.610	160.61	7.02	6.65	6.49	39.35	38.12	37.24	37.49	36.59	36.12
235.760	205.76	7.06	6.70	6.56	37.82	36.49	35.69	35.96	35.34	35.03
326.060	296.06	6.92	6.62	6.48	35.29	33.99	33.20	33.58	33.41	33.18
416.370	386.37	6.93	6.61	6.28	33.43	32.19	31.31	32.03	32.13	31.67
500.000	470.00	6.84	6.49	6.19	32.21	31.44	30.69	30.59	31.07	30.85
551.820	521.82	6.94	6.69	6.46	31.88	30.70	29.81	29.47	29.80	29.54
642.130	612.13	6.99	6.77	6.42	31.42	30.59	30.17	28.14	28.89	28.44
732.430	702.43	7.15	6.76	6.51	30.92	30.56	29.70	27.20	28.27	28.10
822.740	792.62	7.21	6.83	6.59	29.91	29.70	29.30	26.33	27.37	27.26
913.040	883.14	7.22	6.83	6.60	29.34	28.80	28.79	25.55	26.25	26.42
1000.000	969.69	7.15	6.70	6.51	29.13	28.33	28.90	24.39	25.23	25.58
1048.500	1018.40	7.11	6.66	6.42	28.85	28.38	29.46	23.97	25.01	25.26
1138.800	1109.00	7.39	6.92	6.61	29.03	28.78	29.02	23.11	24.73	25.55
1229.100	1199.00	7.48	6.98	6.63	29.58	29.42	28.32	22.32	24.27	25.44
1319.400	1289.30	7.51	7.04	6.91	28.71	28.58	28.24	21.83	23.87	25.00
1409.700	1379.70	7.75	7.26	7.06	29.45	29.70	30.28	21.28	22.98	24.10
1500.000	1470.20	8.02	7.52	7.22	30.21	30.65	31.63	20.91	22.63	23.60

mixer VSWR

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm
10.000	1.19	1.23	1.28	1.48	2.19	3.30	2.22	1.80	1.56
50.000	1.06	1.13	1.19	1.50	2.33	3.52	2.17	1.77	1.54
100.000	1.05	1.13	1.19	1.42	2.12	3.12	2.18	1.78	1.54
145.450	1.06	1.14	1.20	1.40	2.13	3.06	2.16	1.77	1.53
200.000	1.07	1.16	1.22	1.40	2.10	3.04	2.10	1.75	1.52
280.910	1.11	1.20	1.28	1.42	2.17	3.09	2.04	1.72	1.52
371.210	1.18	1.29	1.36	1.52	2.20	3.08	1.95	1.67	1.52
461.520	1.30	1.41	1.48	1.63	2.34	3.16	1.87	1.64	1.52
506.670	1.37	1.49	1.55	1.68	2.38	3.17	1.86	1.64	1.53
596.970	1.54	1.64	1.70	1.82	2.51	3.34	1.82	1.63	1.54
687.270	1.77	1.88	1.90	1.95	2.65	3.46	1.82	1.64	1.55
777.580	1.99	2.07	2.05	2.08	2.79	3.62	1.81	1.64	1.57
867.880	2.29	2.35	2.26	2.33	2.95	3.82	1.83	1.64	1.54
958.180	2.67	2.71	2.50	2.56	3.10	4.03	1.93	1.69	1.54
1003.300	2.88	2.90	2.64	2.68	3.19	4.08	1.96	1.71	1.54
1093.600	3.34	3.38	2.95	2.98	3.44	4.40	1.98	1.75	1.55
1183.900	3.79	3.69	3.20	3.13	3.46	4.21	2.02	1.77	1.55
1274.200	4.22	4.10	3.41	3.26	3.38	3.82	2.05	1.80	1.55
1364.500	4.70	4.68	3.60	3.52	3.31	3.85	2.01	1.79	1.52
1500.000	4.95	6.17	3.83	4.22	3.81	4.40	1.94	1.73	1.45

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
10.000	−344.80	+.06
20.000	−347.60	+.07
48.038	−341.00	+.12
50.000	−342.50	+.13
100.000	−341.70	+.21
162.150	−352.50	+.34
200.190	−352.60	+.52
276.270	−371.30	+.94
352.340	−340.80	+2.43
390.380	−325.60	+2.53
466.460	−315.10	+2.37
504.490	−326.60	+2.35
580.570	−350.30	+3.50
694.680	−303.50	+5.10
770.760	−288.52	+4.55
884.870	−312.80	+5.62
960.950	−297.30	+7.04
1250.000	−281.48	+5.52
1333.300	−287.26	+2.70
1500.000	−296.21	+3.60

Measurements at RF & LO Power +10 dBm

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
TUF-860LH
ZP-860LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
800.000	770.000	5.36	5.19	5.03	800.000	40.94	42.18	41.77	30.16	32.59	34.92
819.740	789.737	5.43	5.24	5.07	819.740	40.10	41.36	40.73	29.17	31.65	34.01
839.470	809.474	5.56	5.32	5.09	839.470	38.59	39.91	39.43	28.25	30.97	33.18
846.050	816.053	5.59	5.32	5.08	846.050	38.02	39.41	38.94	27.93	30.72	32.97
859.210	829.211	5.59	5.29	5.01	859.210	36.80	38.30	38.05	27.50	30.18	32.39
878.950	848.947	5.70	5.21	4.94	878.950	35.25	36.80	36.87	26.65	29.56	31.87
892.110	862.105	5.65	5.13	4.88	892.110	34.42	35.94	36.15	26.29	29.12	31.43
898.680	868.684	5.67	5.14	4.88	898.680	34.02	35.44	35.68	26.08	28.84	31.34
918.420	888.421	5.74	5.24	4.98	918.420	32.99	34.29	34.48	25.55	28.03	30.63
938.160	908.158	5.82	5.35	5.09	938.160	32.17	33.59	33.76	25.04	27.36	29.86
944.740	914.737	5.85	5.39	5.14	944.740	32.00	33.27	33.53	24.91	27.06	29.58
957.890	927.895	6.03	5.50	5.28	957.890	31.45	32.80	33.14	24.65	26.54	29.00
977.630	947.632	6.11	5.57	5.33	977.630	30.60	32.01	32.36	24.12	25.91	28.20
990.790	960.790	6.26	5.59	5.34	990.790	30.18	31.63	31.94	23.82	25.51	27.73
997.370	967.368	6.31	5.71	5.34	997.370	29.94	31.41	31.70	23.67	25.25	27.44
1000.000	970.000	6.37	5.71	5.34	1000.000	29.83	31.30	31.57	23.60	25.13	27.30
1017.110	987.105	6.72	5.87	5.42	1017.110	29.39	30.72	30.95	23.37	24.52	26.56
1036.840	1006.842	7.11	6.03	5.47	1036.840	28.99	30.35	30.77	22.95	23.82	25.67
1043.420	1013.421	7.18	6.07	5.49	1043.420	28.91	30.20	30.63	22.89	23.65	25.43
1050.000	1020.000	7.23	6.09	5.49	1050.000	28.88	30.15	30.56	22.84	23.53	25.19

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
800.000	1.14	1.04	1.03	1.81	2.33	3.16	1.000	1.99	1.67	1.51	800.000	-320.10	1.05
818.750	1.16	1.06	1.03	1.83	2.33	3.15	2.000	1.99	1.67	1.51	819.737	-307.30	1.57
838.750	1.19	1.09	1.06	1.91	2.39	3.18	5.000	1.99	1.68	1.51	839.474	-295.46	2.02
845.000	1.20	1.11	1.08	1.90	2.37	3.15	10.000	2.00	1.68	1.51	846.053	-289.39	2.16
857.500	1.23	1.14	1.10	1.92	2.39	3.17	20.000	2.02	1.69	1.52	859.210	-282.73	2.50
877.500	1.28	1.19	1.15	1.97	2.46	3.24	40.000	2.03	1.70	1.53	878.947	-279.35	2.76
890.000	1.32	1.24	1.19	2.00	2.47	3.24	50.000	2.04	1.71	1.53	892.105	-279.34	2.73
896.250	1.34	1.25	1.21	2.02	2.50	3.27	67.000	2.05	1.72	1.55	898.684	-279.17	2.64
915.000	1.39	1.30	1.27	2.03	2.51	3.29	86.000	2.06	1.74	1.57	918.421	-289.20	2.55
935.000	1.46	1.39	1.33	2.06	2.52	3.27	100.000	2.08	1.75	1.58	938.158	-295.71	2.66
941.250	1.49	1.40	1.35	2.06	2.52	3.28	112.000	2.10	1.76	1.60	944.737	-294.68	2.68
953.750	1.52	1.44	1.40	2.07	2.55	3.34	125.000	2.12	1.78	1.61	957.895	-285.84	2.79
972.500	1.60	1.51	1.48	2.10	2.57	3.34	139.000	2.13	1.80	1.63	977.632	-274.82	2.93
986.250	1.66	1.58	1.53	2.11	2.57	3.33	158.000	2.15	1.82	1.66	990.790	-269.93	3.07
992.500	1.68	1.60	1.56	2.13	2.59	3.35	175.000	2.17	1.84	1.69	997.368	-269.68	3.37
1000.000	1.72	1.64	1.59	2.13	2.57	3.33	198.000	2.20	1.88	1.72	1000.000	-268.97	3.39
1017.500	1.82	1.72	1.68	2.13	2.54	3.26	217.000	2.24	1.91	1.75	1017.105	-270.03	3.87
1037.500	1.90	1.81	1.77	2.16	2.57	3.32	237.000	2.28	1.95	1.79	1036.842	-271.23	4.38
1043.750	1.94	1.84	1.80	2.16	2.57	3.32	243.000	2.29	1.96	1.80	1043.421	-274.02	4.44
1050.000	1.96	1.86	1.83	2.17	2.59	3.35	250.000	2.31	1.97	1.81	1050.000	-276.45	4.35

broadband, high dynamic range

Frequency Mixers

Model SRA-215

LEVEL 10 (+10dBm LO, up to +5dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
.050	30.05	5.77	5.33	5.05	22.98	24.71	26.17	21.28	23.12	24.73
10.000	40.00	5.47	5.08	4.87	45.65	48.23	50.78	43.04	46.45	49.49
115.430	85.43	5.57	5.19	5.03	44.59	45.24	45.16	44.45	46.67	47.45
173.120	143.12	5.64	5.24	5.06	43.32	43.11	42.59	44.48	45.09	44.76
230.810	200.81	6.03	5.59	5.32	42.11	41.58	41.28	43.12	42.58	42.64
346.190	316.19	6.11	5.62	5.36	39.99	40.30	40.19	40.21	40.08	40.44
403.880	373.88	6.41	5.89	5.58	40.31	41.28	40.80	41.29	41.07	40.45
461.570	431.57	6.81	6.16	5.82	41.55	41.91	40.76	44.70	43.59	41.14
519.260	489.26	7.21	6.64	6.31	41.80	41.57	40.14	42.78	42.48	40.13
576.950	546.95	7.40	6.70	6.40	41.71	41.57	40.17	39.62	41.28	40.37
634.640	604.64	8.16	7.21	6.77	41.11	40.91	39.79	37.06	40.14	41.88
750.020	720.27	8.94	7.47	6.94	35.49	36.00	35.86	30.90	32.11	34.08
807.710	777.89	8.72	7.54	7.06	32.59	33.02	33.07	28.44	29.22	30.52
923.090	893.31	8.71	7.72	7.20	29.59	29.93	29.91	25.01	25.21	25.92
1000.000	970.32	8.09	7.20	6.75	29.52	29.90	29.59	23.75	23.76	23.95
1038.500	1008.50	7.82	6.97	6.57	29.89	30.30	30.15	23.63	23.38	23.44
1096.200	1066.30	7.58	6.73	6.40	29.83	30.30	30.09	23.34	22.89	22.61
1211.500	1181.60	7.60	6.90	6.59	30.04	30.75	31.15	24.46	23.23	22.20
1384.600	1354.60	7.79	7.21	6.89	32.70	32.95	32.65	23.21	21.78	20.16
1500.000	1470.40	8.29	7.62	7.30	33.63	33.70	33.14	22.13	20.86	19.38

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.001	1.68	1.43	1.28	1.09	1.50	2.29	1.69	1.22	1.03
10.000	1.69	1.43	1.29	1.11	1.45	2.13	1.69	1.22	1.03
20.000	1.71	1.46	1.31	1.16	1.44	2.12	1.71	1.23	1.03
50.000	1.73	1.48	1.32	1.09	1.50	2.17	1.69	1.22	1.03
100.000	1.81	1.57	1.41	1.17	1.39	2.01	1.68	1.23	1.04
200.000	2.25	1.96	1.79	1.25	1.35	1.88	1.69	1.27	1.09
285.310	2.79	2.44	2.24	1.39	1.29	1.77	1.73	1.36	1.20
425.470	3.72	3.21	2.97	1.61	1.22	1.58	1.98	1.69	1.52
500.000	4.02	3.50	3.27	1.77	1.24	1.49	2.18	1.90	1.73
565.630	4.16	3.45	3.19	1.83	1.24	1.41	2.30	2.03	1.86
705.780	3.80	3.26	3.09	1.83	1.19	1.24	2.35	2.12	1.98
752.500	3.80	3.30	3.10	1.83	1.20	1.23	2.37	2.14	1.99
845.940	3.29	2.97	2.83	1.67	1.15	1.30	2.21	2.03	1.94
986.090	2.40	2.18	2.09	1.38	1.16	1.46	1.96	1.87	1.80
1000.000	2.31	2.10	2.02	1.38	1.16	1.50	1.93	1.85	1.79
1079.500	1.88	1.75	1.67	1.27	1.20	1.57	1.91	1.87	1.82
1219.700	1.32	1.21	1.15	1.11	1.24	1.59	2.06	2.11	2.08
1313.100	1.21	1.16	1.15	1.08	1.28	1.62	2.21	2.35	2.31
1406.600	1.37	1.34	1.35	1.20	1.32	1.62	2.57	2.83	2.80
1500.000	1.54	1.48	1.47	1.29	1.35	1.61	2.62	3.04	2.98

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
TUF-11ALH
ZP-11ALH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
1400.000	1350.000	8.08	7.64	7.36	1400.000	30.85	32.04	33.03	33.97	35.28	30.00
1439.470	1389.474	8.00	7.59	7.26	1439.470	30.14	31.29	32.31	33.93	34.81	29.09
1478.950	1428.947	8.05	7.56	7.18	1478.950	29.56	31.02	32.25	32.69	36.41	30.19
1492.110	1442.105	8.09	7.57	7.17	1492.110	29.53	31.07	32.34	32.11	37.32	30.74
1505.260	1455.263	8.13	7.55	7.13	1505.260	29.54	31.07	32.35	31.60	37.67	31.09
1544.740	1494.737	8.05	7.38	6.98	1544.740	29.25	30.74	31.93	30.31	37.43	30.86
1571.050	1521.053	7.95	7.27	6.85	1571.050	29.06	30.53	31.75	30.18	37.11	30.77
1584.210	1534.211	7.95	7.24	6.83	1584.210	28.95	30.45	31.66	30.07	37.02	30.97
1623.680	1573.684	8.01	7.15	6.73	1623.680	28.80	30.47	31.45	28.93	36.30	32.12
1663.160	1613.158	7.88	6.99	6.62	1663.160	28.56	30.12	30.97	28.13	35.15	31.41
1676.320	1626.316	7.86	7.00	6.61	1676.320	28.37	29.89	30.70	28.03	34.75	30.89
1702.630	1652.632	7.91	7.01	6.61	1702.630	27.99	29.56	30.25	27.51	33.82	30.64
1742.110	1692.105	7.91	6.97	6.57	1742.110	27.97	29.37	29.91	26.96	32.60	30.63
1768.420	1718.421	7.92	6.96	6.57	1768.420	27.91	29.26	29.47	26.36	31.76	29.76
1781.580	1731.579	7.93	7.02	6.57	1781.580	27.88	29.13	29.21	26.18	31.35	29.21
1821.050	1771.053	7.92	7.06	6.58	1821.050	27.57	28.58	28.61	25.82	30.17	27.89
1860.530	1810.526	7.98	7.10	6.59	1860.530	27.61	28.45	28.38	25.46	29.36	27.44
1873.680	1823.684	7.97	7.10	6.62	1873.680	27.66	28.39	28.22	25.37	29.09	27.08
1886.840	1836.842	7.93	7.08	6.61	1886.840	27.70	28.35	28.01	25.21	28.81	26.75
1900.000	1850.000	7.94	7.10	6.60	1900.000	27.72	28.25	27.70	25.13	28.47	26.31

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
1400.000	1.90	1.80	1.78	2.60	2.08	2.16	40.000	1.40	1.26	1.25
1438.750	1.74	1.65	1.63	2.76	2.12	2.13	50.000	1.33	1.20	1.18
1477.500	1.60	1.52	1.50	2.79	2.12	2.16	80.000	1.28	1.12	1.09
1490.000	1.56	1.47	1.46	2.72	2.12	2.17	90.000	1.28	1.11	1.07
1515.000	1.49	1.40	1.39	2.65	2.12	2.16	100.000	1.28	1.10	1.06
1550.000	1.39	1.28	1.28	2.80	2.17	2.13	148.000	1.27	1.08	1.03
1580.000	1.31	1.19	1.20	2.85	2.18	2.14	173.000	1.27	1.08	1.04
1592.500	1.29	1.15	1.17	2.86	2.18	2.15	200.000	1.27	1.09	1.05
1631.250	1.21	1.12	1.16	2.77	2.18	2.16	222.000	1.27	1.09	1.07
1668.750	1.17	1.07	1.16	2.89	2.22	2.15	250.000	1.26	1.10	1.09
1682.500	1.17	1.05	1.17	2.89	2.22	2.16	270.000	1.26	1.11	1.11
1707.500	1.16	1.05	1.16	2.78	2.21	2.17	282.000	1.26	1.11	1.12
1750.000	1.21	1.06	1.14	2.95	2.25	2.17	306.000	1.26	1.12	1.13
1771.250	1.23	1.11	1.16	2.99	2.24	2.17	343.000	1.26	1.14	1.16
1785.000	1.25	1.14	1.17	2.89	2.23	2.19	379.000	1.26	1.16	1.19
1822.500	1.31	1.21	1.22	2.85	2.24	2.18	400.000	1.26	1.17	1.21
1861.250	1.37	1.28	1.28	3.02	2.28	2.17	427.000	1.26	1.19	1.23
1873.750	1.39	1.30	1.30	3.08	2.30	2.18	464.000	1.26	1.21	1.27
1887.500	1.41	1.32	1.32	3.12	2.30	2.18	488.000	1.26	1.23	1.29
1900.000	1.43	1.34	1.34	3.13	2.30	2.18	500.000	1.26	1.24	1.30

broadband, high dynamic range

Frequency Mixers

Model SRA-220

LEVEL 10 (+10dBm LO, up to +5dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
.050	30.05	6.72	6.31	6.12	19.76	20.56	21.43	19.41	20.32	21.13
1.000	31.00	5.70	5.23	4.97	34.56	37.02	39.25	32.42	35.22	37.57
5.000	35.00	5.72	5.34	5.14	38.79	41.42	44.03	37.41	40.80	43.89
20.000	50.00	6.05	5.57	5.34	40.05	42.73	45.50	38.84	42.42	45.76
50.000	80.00	6.00	5.59	5.34	40.21	42.75	45.39	38.91	42.09	44.58
100.000	70.00	5.89	5.50	5.26	40.21	42.49	44.61	38.78	40.87	41.49
153.890	123.89	5.87	5.49	5.31	40.00	42.03	43.89	38.30	38.92	38.67
230.810	200.81	6.20	5.78	5.49	39.83	41.75	43.18	36.73	36.48	36.04
307.730	277.73	6.21	5.75	5.50	39.84	41.49	42.59	34.88	34.62	34.09
500.000	470.00	6.52	5.97	5.69	36.82	38.13	39.37	33.67	32.70	31.47
615.420	585.42	6.87	6.37	6.05	40.83	40.61	41.60	37.12	34.50	31.97
692.340	662.34	7.57	6.90	6.63	42.69	42.63	42.42	37.25	35.22	32.66
846.180	816.12	8.43	7.39	6.93	40.44	40.51	40.40	32.43	34.89	35.43
1076.900	1047.20	8.19	7.31	6.89	38.74	36.30	34.19	26.42	27.82	29.03
1230.800	1200.80	7.55	6.91	6.52	33.08	32.05	31.14	23.07	23.22	23.11
1307.700	1277.80	7.39	6.81	6.47	31.81	30.96	29.93	21.58	21.56	21.16
1461.500	1431.70	8.11	7.49	7.14	26.03	24.40	23.02	19.18	19.73	19.59
1615.400	1585.50	7.86	7.29	7.00	34.22	34.31	35.01	20.11	19.71	18.51
1769.200	1739.20	8.28	7.80	7.55	38.09	38.84	37.67	19.64	18.84	17.68
2000.000	1970.30	9.50	8.89	8.50	32.05	31.97	33.54	19.92	19.56	18.37

mixer VSWR

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm
5.002	1.80	1.42	1.25	1.16	1.38	2.09	1.72	1.18	1.04
10.000	1.80	1.42	1.27	1.14	1.38	2.03	1.73	1.18	1.03
20.000	1.82	1.44	1.27	1.18	1.34	2.02	1.74	1.18	1.01
50.000	1.82	1.45	1.29	1.12	1.41	2.08	1.73	1.18	1.02
67.344	1.80	1.44	1.28	1.17	1.37	1.96	1.73	1.19	1.01
100.000	1.84	1.49	1.32	1.19	1.34	1.94	1.75	1.21	1.03
200.000	1.95	1.63	1.49	1.30	1.30	1.81	1.81	1.31	1.11
316.720	2.33	2.03	1.89	1.47	1.24	1.65	1.99	1.50	1.28
441.410	3.04	2.73	2.61	1.65	1.22	1.51	2.25	1.80	1.55
566.090	3.50	3.06	3.05	1.88	1.24	1.35	2.47	2.01	1.79
690.780	3.69	3.23	3.33	2.06	1.30	1.20	2.51	2.12	1.94
877.810	3.79	3.35	3.32	1.83	1.25	1.22	2.58	2.35	2.24
1000.000	3.27	2.98	2.97	1.76	1.34	1.44	2.60	2.47	2.34
1127.200	2.65	2.40	2.36	1.61	1.38	1.60	2.59	2.42	2.30
1314.200	1.75	1.60	1.59	1.31	1.36	1.67	2.19	2.20	2.17
1438.900	1.30	1.20	1.17	1.20	1.31	1.61	2.25	2.37	2.38
1625.900	1.12	1.04	1.06	1.07	1.35	1.66	2.56	2.73	2.71
1750.600	1.11	1.19	1.26	1.12	1.37	1.61	3.15	3.34	3.25
1875.300	1.24	1.31	1.38	1.22	1.43	1.65	4.26	4.20	4.03
2000.000	1.36	1.41	1.48	1.34	1.56	1.83	5.13	6.37	5.68

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
TUF-5LH
ZP-5LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
20.000	50.000	6.16	5.60	5.32	20.000	60.03	62.84	65.31	52.95	53.81	53.97
50.000	80.000	5.94	5.38	5.11	50.000	56.16	57.81	58.63	45.17	46.30	46.99
100.000	70.000	5.77	5.25	5.02	100.000	51.45	52.60	53.19	39.63	40.86	42.17
158.750	128.750	5.75	5.20	4.99	158.750	48.07	49.11	49.80	36.46	38.29	39.36
200.000	170.000	5.73	5.25	5.04	200.000	46.20	47.45	48.56	35.21	36.98	37.90
297.500	267.500	5.84	5.37	5.14	297.500	43.08	44.43	45.38	32.91	34.13	34.88
436.250	406.250	6.00	5.54	5.29	436.250	40.45	42.14	43.65	30.51	31.89	32.83
500.000	470.000	6.31	5.74	5.40	500.000	39.72	41.47	42.99	29.22	30.68	32.12
575.000	545.000	6.44	5.89	5.58	575.000	38.96	40.90	42.85	28.19	30.02	31.84
713.750	683.750	7.34	6.61	5.94	713.750	37.91	40.16	42.29	26.80	28.61	30.68
750.000	720.000	7.54	6.80	6.29	750.000	37.69	39.71	41.82	26.74	28.48	30.42
760.000	730.000	7.61	6.83	6.33	760.000	37.61	39.62	41.68	26.70	28.42	30.30
852.500	822.500	7.81	7.07	6.57	852.500	37.34	39.30	41.26	26.36	28.00	29.52
991.250	961.250	8.07	6.99	6.35	991.250	37.60	38.97	40.14	25.48	26.26	26.11
1000.000	970.000	8.11	7.07	6.39	1000.000	37.58	38.98	40.00	25.42	26.16	25.85
1130.000	1100.000	7.74	7.19	6.80	1130.000	34.64	35.93	36.66	23.92	24.11	23.00
1222.500	1192.500	7.52	7.02	6.74	1222.500	36.37	38.43	39.92	22.38	22.14	20.59
1361.250	1331.250	7.39	6.88	6.66	1361.250	37.05	39.21	41.17	19.42	19.23	18.11
1453.750	1423.750	7.46	6.78	6.53	1453.750	36.58	38.09	39.40	16.89	16.51	15.40
1500.000	1470.000	7.35	6.66	6.38	1500.000	36.61	37.95	39.53	16.37	16.08	15.11

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
20.000	1.50	1.43	1.37	1.75	2.57	3.66	20.000	1.15	1.01	1.12	20.000	-342.60	-0.57
40.000	1.41	1.32	1.25	1.71	2.51	3.56	40.000	1.16	1.02	1.11	40.000	-351.00	-0.57
50.000	1.40	1.31	1.23	1.70	2.50	3.55	50.000	1.16	1.02	1.11	50.000	-353.80	-0.56
100.000	1.44	1.34	1.24	1.62	2.38	3.37	100.000	1.18	1.04	1.10	100.000	-343.30	-0.58
200.000	1.58	1.48	1.38	1.57	2.28	3.19	200.000	1.19	1.05	1.10	158.750	-341.10	-0.61
253.100	1.72	1.59	1.48	1.62	2.36	3.30	253.100	1.20	1.05	1.10	200.000	-350.50	-0.66
371.500	2.06	1.91	1.77	1.67	2.34	3.17	371.500	1.20	1.05	1.09	297.500	-351.60	-0.64
500.000	2.57	2.36	2.17	1.77	2.36	3.11	500.000	1.21	1.05	1.09	436.250	-332.10	-0.81
526.900	2.72	2.49	2.29	1.80	2.36	3.08	526.900	1.20	1.05	1.09	500.000	-310.40	-0.97
641.600	3.27	2.97	2.71	1.93	2.45	3.07	641.600	1.19	1.04	1.12	575.000	-306.90	-1.09
750.000	3.75	3.40	3.09	2.03	2.46	3.04	750.000	1.16	1.05	1.16	713.750	-318.90	-1.34
800.700	3.88	3.53	3.22	2.11	2.48	3.01	800.700	1.14	1.07	1.18	750.000	-316.20	-1.31
915.400	4.15	3.80	3.54	2.27	2.56	2.95	915.400	1.09	1.14	1.28	852.500	-306.70	-2.09
1000.000	4.20	3.86	3.64	2.35	2.67	3.08	1000.000	1.19	1.31	1.47	991.250	-283.48	-2.21
1070.800	4.28	3.95	3.73	2.42	2.70	3.11	1070.800	1.22	1.37	1.55	1000.000	-285.87	-2.14
1189.200	4.21	3.91	3.73	2.59	2.73	3.06	1189.200	1.43	1.64	1.84	1130.000	-294.84	-0.72
1303.900	4.01	3.77	3.62	2.70	2.73	3.00	1303.900	1.81	2.06	2.30	1268.750	-304.60	2.11
1422.300	3.90	3.65	3.53	2.94	2.77	2.92	1422.300	2.41	2.71	3.00	1407.500	-302.59	2.20
1459.300	3.78	3.54	3.42	3.09	2.78	2.88	1459.300	2.67	2.97	3.25	1453.750	-293.30	2.56
1500.000	3.72	3.47	3.36	3.12	2.77	2.86	1500.000	2.98	3.32	3.60	1500.000	-291.46	2.84

broadband, low distortion

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Models
TFM-1MH
TUF-1MH
ZP-1MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
2.000	32.00	7.06	6.55	6.24	65.69	61.53	59.57	> 70.00	62.13	57.11
5.000	35.00	6.49	6.06	5.82	64.70	60.97	59.24	> 70.00	60.92	56.61
10.000	40.00	6.42	5.98	5.73	64.09	60.65	59.12	> 70.00	60.61	56.57
20.000	50.00	6.47	6.00	5.73	62.88	60.05	58.36	> 70.00	59.98	56.14
34.130	64.13	6.40	5.97	5.72	60.04	58.47	57.25	64.40	59.11	55.82
50.000	80.00	6.34	5.96	5.71	57.81	56.47	55.53	60.98	57.96	55.23
98.390	68.39	6.20	5.88	5.69	52.57	52.10	51.25	54.82	54.24	52.74
100.000	70.00	6.21	5.89	5.69	52.48	52.04	51.17	54.67	54.11	52.66
130.520	100.52	6.24	5.90	5.69	50.38	49.90	49.14	52.37	52.13	51.57
162.650	132.65	6.40	5.95	5.76	48.58	47.90	47.13	50.32	50.16	50.32
200.000	170.00	6.41	6.00	5.84	46.76	45.86	45.12	48.20	48.87	47.95
259.040	229.04	6.08	5.85	5.75	43.95	43.28	43.00	45.59	46.20	44.51
291.170	261.17	6.06	5.87	5.78	42.69	42.16	41.98	44.62	44.62	42.93
323.300	293.30	6.16	6.02	5.93	41.51	41.14	41.06	43.63	43.00	41.88
355.430	325.43	6.40	6.19	6.04	40.55	40.26	40.19	42.70	41.67	40.76
387.560	357.56	6.38	6.19	6.04	40.00	39.90	39.94	41.59	41.00	40.08
419.690	389.69	6.51	6.32	6.13	39.33	39.24	39.19	40.82	40.20	39.53
451.820	421.82	6.50	6.22	5.98	38.62	38.55	38.88	40.01	38.94	38.26
483.950	453.95	6.43	6.16	5.96	37.86	38.04	38.47	39.22	37.91	37.19
500.000	470.00	6.45	6.17	5.96	37.70	37.96	38.29	38.55	37.30	36.53

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.001	1.31	1.24	1.23	1.25	1.92	2.86	1.54	1.35	1.25
10.000	1.23	1.12	1.11	1.15	1.78	2.68	1.55	1.35	1.26
20.000	1.19	1.06	1.04	1.20	1.84	2.66	1.54	1.35	1.25
35.938	1.17	1.03	1.04	1.15	1.82	2.64	1.53	1.34	1.24
50.000	1.16	1.02	1.05	1.13	1.80	2.75	1.54	1.35	1.25
66.876	1.15	1.02	1.05	1.12	1.78	2.51	1.53	1.34	1.24
100.000	1.15	1.02	1.05	1.12	1.78	2.51	1.54	1.35	1.25
144.220	1.14	1.01	1.05	1.12	1.75	2.40	1.53	1.35	1.25
175.160	1.14	1.01	1.06	1.12	1.73	2.40	1.55	1.36	1.27
200.000	1.13	1.01	1.06	1.10	1.68	2.31	1.55	1.37	1.27
237.040	1.13	1.01	1.06	1.10	1.67	2.28	1.59	1.40	1.30
267.970	1.12	1.01	1.07	1.10	1.71	2.34	1.61	1.42	1.32
298.910	1.11	1.01	1.07	1.09	1.65	2.28	1.64	1.44	1.34
329.850	1.11	1.02	1.08	1.08	1.71	2.35	1.68	1.47	1.36
360.790	1.10	1.02	1.09	1.10	1.69	2.29	1.69	1.49	1.38
391.730	1.09	1.03	1.09	1.14	1.70	2.37	1.74	1.53	1.41
422.660	1.08	1.04	1.10	1.13	1.71	2.30	1.80	1.57	1.45
453.600	1.07	1.05	1.11	1.17	1.72	2.34	1.83	1.60	1.48
484.540	1.06	1.06	1.12	1.17	1.72	2.33	1.89	1.63	1.51
500.000	1.05	1.06	1.13	1.20	1.74	2.36	1.89	1.64	1.52

ϕ detection

Freq. (MHz)	max. output/DC offset vs. freq. max. DC output mV	DC offset mV
2.000	−509.70	+.20
5.000	−528.00	+.26
10.000	−529.40	+.28
20.000	−528.30	+.29
47.273	−519.90	+.30
50.000	−519.30	+.30
100.000	−524.40	+.32
122.730	−534.10	+.30
152.910	−539.70	+.33
183.090	−545.40	+.41
200.000	−547.90	+.48
243.460	−562.60	+.69
288.730	−576.40	+1.04
334.000	−538.60	+1.57
349.090	−524.10	+1.73
379.280	−503.50	+1.78
424.550	−497.90	+1.85
454.730	−490.70	+1.96
469.820	−496.30	+1.89
500.000	−508.30	+1.87

Measurements at RF & LO Power +13 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers / NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
TUF-3LH
ZP-3LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
0.150	30.150	5.18	4.98	4.81	0.150	68.61	69.38	70.23	95.61	85.98	81.23
0.300	30.300	5.09	4.90	4.75	0.300	68.54	69.38	70.31	95.14	85.28	81.11
0.500	30.500	5.02	4.83	4.68	0.500	68.43	69.26	70.29	91.53	86.26	81.09
1.000	31.000	4.92	4.74	4.59	1.000	68.40	69.26	70.08	86.70	83.06	79.78
1.500	31.500	4.86	4.69	4.55	1.500	68.24	69.08	70.11	84.04	80.98	78.01
2.000	32.000	4.84	4.66	4.52	2.000	68.12	68.95	69.89	81.22	78.75	76.49
5.000	35.000	4.78	4.62	4.47	5.000	67.27	68.20	69.26	73.17	71.20	69.86
10.000	40.000	4.78	4.59	4.48	10.000	65.60	66.47	67.46	67.00	65.07	63.96
20.000	50.000	4.85	4.68	4.52	20.000	62.39	63.23	64.03	61.39	59.53	58.49
50.000	80.000	4.82	4.66	4.53	50.000	55.08	56.07	57.00	52.77	50.61	49.95
57.271	87.271	4.79	4.67	4.55	57.271	53.94	54.97	55.81	51.39	49.44	48.90
100.000	70.000	4.79	4.67	4.56	100.000	49.62	50.23	50.46	46.30	45.42	44.83
114.393	84.393	4.80	4.68	4.57	114.393	48.13	48.98	49.51	45.94	45.06	44.19
171.514	141.514	4.89	4.80	4.70	171.514	44.32	45.17	45.57	45.37	42.49	40.72
200.000	170.000	4.91	4.81	4.71	200.000	42.08	42.29	43.40	42.82	40.27	38.37
228.636	198.636	4.99	4.90	4.80	228.636	41.98	41.00	41.55	38.69	37.35	35.80
285.757	255.757	5.16	5.11	4.97	285.757	48.96	48.00	49.13	36.58	34.00	32.56
342.879	312.879	5.33	5.17	5.10	342.879	37.90	39.79	40.14	35.55	33.43	29.25
385.720	355.720	5.85	5.29	5.08	385.720	33.47	34.24	35.13	31.36	31.62	29.70
400.000	370.000	6.33	5.48	5.12	400.000	33.80	34.34	34.65	29.69	30.09	29.15

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
0.300	1.20	1.21	1.24	1.82	2.67	3.81	0.300	1.33	1.22	1.10	0.150	367.10	0.25
0.500	1.14	1.15	1.19	1.78	2.64	3.77	0.500	1.34	1.23	1.11	0.300	368.90	0.04
1.000	1.09	1.10	1.14	1.73	2.57	3.67	1.000	1.35	1.23	1.11	0.500	368.30	0.24
2.000	1.08	1.06	1.11	1.69	2.52	3.61	2.000	1.36	1.24	1.12	1.000	370.80	0.22
5.000	1.09	1.03	1.09	1.55	2.36	3.42	5.000	1.39	1.26	1.13	1.500	371.40	0.21
10.000	1.12	1.02	1.07	1.59	2.40	3.46	10.000	1.47	1.31	1.16	2.000	371.70	0.22
20.000	1.11	1.01	1.07	1.54	2.33	3.33	20.000	1.45	1.30	1.16	5.000	374.20	0.20
50.000	1.12	1.02	1.05	1.53	2.31	3.30	50.000	1.49	1.34	1.20	10.000	370.80	0.21
70.765	1.13	1.02	1.05	1.51	2.25	3.19	70.765	1.52	1.37	1.23	20.000	366.80	0.23
100.000	1.14	1.02	1.06	1.51	2.25	3.20	100.000	1.58	1.43	1.29	50.000	376.70	0.25
129.235	1.13	1.01	1.06	1.56	2.29	3.22	129.235	1.64	1.48	1.35	57.271	377.60	0.32
177.211	1.13	1.01	1.06	1.58	2.25	3.10	177.211	1.75	1.60	1.48	100.000	363.10	0.51
199.700	1.13	1.01	1.06	1.60	2.28	3.13	199.700	1.81	1.65	1.53	114.393	380.20	0.77
211.694	1.12	1.01	1.06	1.66	2.33	3.18	211.694	1.83	1.68	1.56	171.514	359.20	0.95
235.682	1.13	1.01	1.06	1.75	2.44	3.30	235.682	1.89	1.73	1.61	200.000	364.40	0.85
282.159	1.14	1.04	1.03	1.77	2.39	3.21	282.159	1.96	1.80	1.70	228.636	384.70	1.05
330.135	1.19	1.09	1.04	1.85	2.41	3.21	330.135	2.03	1.86	1.78	285.757	368.30	0.88
376.612	1.30	1.20	1.17	2.02	2.58	3.35	376.612	2.04	1.87	1.79	342.879	335.10	1.35
388.606	1.33	1.23	1.20	2.11	2.76	3.50	388.606	2.05	1.88	1.81	385.720	308.20	2.59
400.600	1.37	1.27	1.24	2.10	2.78	3.54	400.600	2.05	1.89	1.81	400.000	296.56	2.36

broadband, low distortion

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Models
TFM-3MH
TUF-3MH
ZP-3MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
.100	30.10	5.47	5.15	4.95	>70.00	>73.00	>76.00	59.41	60.91	63.34
1.000	31.00	4.85	4.57	4.42	>70.00	>73.00	>76.00	59.03	60.66	63.06
5.000	35.00	4.92	4.68	4.54	>70.00	>73.00	>76.00	58.89	60.53	62.89
10.000	40.00	4.99	4.73	4.56	>70.00	>73.00	71.81	58.55	60.07	62.11
20.000	50.00	5.09	4.80	4.61	65.25	65.05	64.42	57.10	58.37	59.62
33.420	63.42	4.93	4.67	4.53	59.88	59.52	59.13	54.59	55.39	56.16
50.000	80.00	4.91	4.68	4.57	55.23	55.49	53.26	51.75	52.20	51.48
58.410	88.41	4.84	4.65	4.57	53.68	53.27	50.86	50.45	50.21	49.34
66.740	96.74	4.87	4.68	4.55	52.40	50.90	49.02	49.03	48.39	47.78
83.400	53.40	4.90	4.66	4.55	48.74	46.98	45.89	45.72	45.26	44.91
100.060	70.06	4.74	4.54	4.48	45.35	44.09	43.84	43.05	42.57	42.68
116.720	86.72	4.80	4.62	4.56	42.52	41.59	41.71	40.83	40.51	40.95
133.380	103.38	4.86	4.69	4.63	40.42	40.36	40.85	38.94	38.94	39.71
150.040	120.04	4.90	4.74	4.69	38.88	38.78	39.39	37.73	37.88	38.66
166.700	136.70	4.95	4.82	4.76	36.88	37.43	38.44	36.06	36.81	38.02
183.360	153.36	5.03	4.90	4.83	36.07	36.56	37.14	35.07	35.51	36.27
200.000	170.00	5.04	4.89	4.80	35.72	36.59	37.11	34.90	35.86	36.73
216.680	186.68	5.03	4.88	4.78	34.55	35.77	36.72	33.92	35.35	36.86
233.340	203.34	4.98	4.84	4.77	32.96	33.97	35.32	32.41	33.58	35.36
250.000	220.00	5.08	4.93	4.84	32.36	33.05	34.27	32.08	32.71	33.84

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	max. DC output mV	DC offset mv
5.001	1.51	1.33	1.21	1.05	1.72	2.63	1.69	1.54	1.45	.100	−549.80	+0.00
10.000	1.52	1.33	1.22	1.04	1.65	2.54	1.69	1.54	1.45	.500	−571.90	+.01
20.000	1.51	1.33	1.21	1.06	1.74	2.61	1.68	1.54	1.44	2.000	−572.60	+.02
27.969	1.50	1.32	1.21	1.06	1.73	2.56	1.68	1.53	1.44	10.000	−572.00	+.03
35.625	1.50	1.32	1.21	1.04	1.68	2.49	1.69	1.54	1.45	25.952	−567.70	+.03
50.000	1.50	1.32	1.21	1.02	1.67	2.47	1.69	1.55	1.46	34.569	−565.30	+.03
58.594	1.49	1.32	1.21	1.03	1.64	2.43	1.69	1.55	1.46	50.000	−562.90	+.01
73.907	1.48	1.31	1.20	1.03	1.59	2.34	1.71	1.57	1.47	60.420	−567.60	−.02
96.876	1.46	1.29	1.19	1.03	1.64	2.34	1.72	1.58	1.48	77.655	−573.00	−.01
100.000	1.46	1.29	1.19	1.02	1.62	2.36	1.73	1.59	1.49	94.889	−579.40	−.07
119.840	1.43	1.26	1.17	1.04	1.64	2.34	1.75	1.61	1.51	100.000	−581.30	−.02
135.160	1.41	1.25	1.15	1.06	1.63	2.28	1.78	1.64	1.53	112.120	−583.10	−.20
150.470	1.39	1.23	1.14	1.08	1.64	2.30	1.81	1.65	1.56	129.360	−580.50	−.15
165.780	1.36	1.21	1.12	1.10	1.64	2.30	1.84	1.69	1.58	146.590	−575.90	−.06
181.090	1.34	1.19	1.10	1.11	1.63	2.26	1.87	1.73	1.63	163.830	−576.50	+0.00
200.000	1.31	1.16	1.07	1.12	1.64	2.26	1.93	1.78	1.67	181.060	−577.40	−.09
211.720	1.29	1.14	1.05	1.15	1.65	2.27	1.94	1.80	1.70	200.000	−585.90	+.68
227.030	1.26	1.12	1.03	1.19	1.65	2.25	2.02	1.85	1.74	206.910	−586.90	+.89
242.350	1.23	1.09	1.01	1.19	1.67	2.26	2.08	1.89	1.79	224.150	−584.30	+1.07
250.000	1.22	1.08	1.01	1.19	1.68	2.28	2.12	1.93	1.82	250.000	−570.10	+.49

Measurements at RF & LO Power +13 dBm

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
TUF-1LH
ZP-1LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. MHz	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
2.000	32.000	6.66	6.28	6.06	2.000	66.96	67.01	67.63	80.76	84.01	77.93
4.000	34.000	6.32	5.95	5.72	4.000	66.09	65.93	66.27	79.49	80.03	76.17
5.000	35.000	6.26	5.89	5.67	5.000	65.82	65.47	66.09	78.22	78.57	75.39
10.000	40.000	6.19	5.80	5.58	10.000	64.67	63.93	64.36	74.47	73.13	71.36
20.000	50.000	6.18	5.82	5.60	20.000	62.97	61.72	62.40	69.87	68.22	66.96
50.000	80.000	6.21	5.82	5.60	50.000	56.94	56.12	56.72	62.84	60.69	59.63
59.871	89.871	6.17	5.78	5.57	59.871	55.67	54.83	55.54	61.60	59.50	58.36
100.000	70.000	6.12	5.77	5.56	100.000	50.25	51.13	52.07	58.11	55.91	54.81
117.742	87.742	6.18	5.79	5.57	117.742	49.18	50.12	51.11	56.96	55.10	54.06
175.613	145.613	6.03	5.69	5.52	175.613	46.10	47.32	48.54	53.92	52.30	51.45
200.000	170.000	6.11	5.73	5.55	200.000	45.29	46.57	47.64	52.66	51.26	50.23
233.484	203.484	6.03	5.70	5.53	233.484	44.07	45.24	46.43	50.91	49.36	48.64
291.355	261.355	5.99	5.69	5.53	291.355	42.58	43.94	45.05	47.28	46.68	46.58
300.000	270.000	5.98	5.68	5.53	300.000	42.36	43.65	44.82	46.40	46.00	45.91
349.226	319.226	5.98	5.71	5.55	349.226	41.48	42.63	43.57	43.35	43.46	44.17
407.097	377.097	5.95	5.70	5.54	407.097	40.33	41.85	42.83	41.12	41.86	42.45
464.968	434.968	5.98	5.72	5.56	464.968	38.99	40.61	41.76	38.50	39.52	40.80
522.839	492.839	6.05	5.77	5.58	522.839	37.97	39.23	40.34	37.05	37.60	38.20
580.710	550.710	6.10	5.84	5.68	580.710	37.75	38.82	39.86	35.98	36.92	37.78
600.000	570.000	6.14	5.87	5.69	600.000	37.80	38.87	39.80	35.37	36.44	37.42

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
2.000	1.44	1.47	1.49	2.03	2.80	3.90	2.000	1.19	1.10	1.04	2.000	-351.00	0.40
4.000	1.23	1.27	1.30	1.86	2.68	3.79	4.000	1.19	1.10	1.05	4.000	-357.00	0.39
5.000	1.19	1.23	1.26	1.83	2.65	3.78	5.000	1.20	1.10	1.05	5.000	-358.20	0.35
10.000	1.09	1.14	1.18	1.66	2.48	3.58	10.000	1.24	1.13	1.06	10.000	-355.60	0.36
20.000	1.05	1.12	1.16	1.70	2.53	3.64	20.000	1.23	1.12	1.06	20.000	-351.60	0.34
50.000	1.03	1.11	1.15	1.65	2.47	3.53	50.000	1.24	1.14	1.08	50.000	-354.50	0.41
100.000	1.06	1.11	1.16	1.58	2.35	3.37	100.000	1.27	1.17	1.11	81.733	-336.90	0.39
115.742	1.07	1.12	1.16	1.58	2.37	3.38	115.742	1.28	1.17	1.12	100.000	-333.10	0.36
163.718	1.11	1.15	1.18	1.57	2.32	3.30	163.718	1.31	1.21	1.16	161.467	-349.30	0.33
211.694	1.15	1.18	1.21	1.55	2.26	3.19	211.694	1.35	1.25	1.20	200.000	-357.00	0.24
261.169	1.19	1.21	1.24	1.59	2.33	3.29	261.169	1.40	1.29	1.24	241.200	-366.00	0.19
300.000	1.23	1.25	1.27	1.59	2.27	3.18	300.000	1.43	1.33	1.28	281.067	-350.10	0.14
325.637	1.25	1.27	1.30	1.58	2.24	3.14	325.637	1.46	1.36	1.31	300.000	-358.40	0.02
373.613	1.29	1.31	1.33	1.61	2.29	3.19	373.613	1.51	1.40	1.35	320.933	-368.10	0.08
421.589	1.34	1.35	1.37	1.64	2.28	3.13	421.589	1.56	1.46	1.40	400.667	-382.70	0.42
471.064	1.39	1.40	1.42	1.67	2.28	3.12	471.064	1.63	1.52	1.46	480.400	-345.90	0.26
519.041	1.45	1.45	1.46	1.71	2.29	3.10	519.041	1.70	1.59	1.53	500.000	-340.40	0.35
567.016	1.50	1.49	1.51	1.75	2.33	3.12	567.016	1.78	1.66	1.60	560.133	-303.70	0.51
583.508	1.52	1.51	1.52	1.78	2.33	3.10	583.508	1.80	1.68	1.62	580.067	-301.93	0.66
600.000	1.53	1.53	1.54	1.78	2.31	3.06	600.000	1.82	1.70	1.64	600.000	-302.48	0.77

broadband, low distortion

Frequency Mixers

Model
LMX-125MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
.500	30.50	7.73	7.33	7.06	60.33	60.14	60.12	56.94	55.51	55.30
1.000	31.00	7.12	6.76	6.49	57.51	57.75	58.63	55.07	54.44	54.93
2.000	32.00	6.50	6.15	5.94	55.86	56.14	56.94	53.68	53.50	53.94
10.000	40.00	6.02	5.71	5.53	53.09	52.53	52.03	51.06	50.06	49.68
20.000	50.00	6.03	5.72	5.52	50.95	49.82	48.92	48.88	47.53	46.69
50.000	80.00	5.98	5.72	5.56	47.97	46.71	45.52	45.89	44.39	43.32
81.065	51.07	5.98	5.71	5.55	46.62	45.31	44.28	44.70	43.06	42.08
113.290	83.29	6.11	5.75	5.58	44.63	43.35	42.33	42.86	41.40	40.43
161.630	131.63	6.15	5.79	5.60	43.08	41.69	40.67	41.31	39.69	38.79
193.860	163.86	6.24	5.84	5.68	41.81	40.32	39.32	39.96	38.37	37.52
226.080	196.08	6.23	5.88	5.76	41.20	40.13	39.02	39.34	37.83	37.11
242.200	212.20	6.22	5.87	5.75	39.86	40.04	37.79	38.11	36.88	36.20
274.420	244.42	6.06	5.77	5.64	39.40	38.60	37.16	37.24	36.13	35.40
306.650	276.65	5.88	5.67	5.56	38.53	37.50	36.38	36.31	35.36	34.95
338.870	308.87	5.94	5.75	5.63	37.07	36.40	35.74	35.71	34.86	34.31
371.100	341.10	6.35	6.10	5.94	37.58	36.52	35.17	34.95	34.41	33.71
403.330	373.33	6.07	5.84	5.67	37.49	36.16	34.66	34.36	33.90	33.51
435.550	405.55	6.36	6.10	5.84	37.40	35.64	34.46	34.02	33.65	32.96
467.780	437.78	6.41	6.11	5.83	37.07	35.27	34.03	33.43	33.28	32.59
500.000	470.00	6.28	5.97	5.75	36.62	35.18	33.01	32.87	32.82	31.67

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.002	1.45	1.25	1.25	1.41	2.21	3.42	1.59	1.37	1.24
10.000	1.24	1.13	1.12	1.36	2.15	3.35	1.60	1.37	1.24
34.118	1.12	1.05	1.04	1.39	2.21	3.46	1.57	1.36	1.24
50.000	1.12	1.04	1.04	1.37	2.22	3.48	1.58	1.36	1.23
77.794	1.11	1.04	1.05	1.32	2.10	3.21	1.57	1.36	1.23
100.000	1.11	1.04	1.06	1.27	2.02	3.06	1.56	1.36	1.23
136.030	1.11	1.04	1.07	1.29	2.06	3.08	1.57	1.36	1.23
165.150	1.10	1.04	1.07	1.27	2.02	2.96	1.56	1.36	1.23
194.260	1.09	1.04	1.09	1.28	2.01	3.00	1.57	1.36	1.23
208.820	1.09	1.04	1.09	1.26	1.98	2.91	1.57	1.36	1.23
237.940	1.07	1.05	1.10	1.29	2.00	2.88	1.56	1.36	1.23
267.060	1.06	1.05	1.12	1.32	1.99	2.90	1.57	1.36	1.23
310.740	1.04	1.06	1.14	1.33	1.99	2.89	1.57	1.37	1.23
339.850	1.02	1.07	1.15	1.32	2.00	2.80	1.59	1.37	1.23
368.970	1.01	1.08	1.17	1.33	2.07	2.82	1.59	1.37	1.22
398.090	1.02	1.10	1.19	1.35	2.06	2.82	1.60	1.38	1.22
427.210	1.05	1.12	1.21	1.41	2.08	2.86	1.60	1.38	1.23
456.320	1.07	1.14	1.23	1.42	2.08	2.84	1.60	1.38	1.23
485.440	1.10	1.17	1.26	1.46	2.15	2.88	1.60	1.39	1.23
500.000	1.12	1.18	1.27	1.49	2.15	2.90	1.61	1.39	1.24

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.500	−486.90	−1.78
2.000	−563.60	−1.76
10.000	−579.50	−1.68
32.726	−583.80	−1.71
50.000	−578.20	−1.71
81.065	−557.90	−1.67
100.000	−544.00	−1.60
129.400	−544.90	−1.36
161.630	−547.80	−1.40
193.860	−554.50	−1.41
209.970	−555.90	−1.24
242.200	−565.00	−1.06
274.420	−582.30	−1.20
306.650	−564.90	−.45
338.870	−531.60	+.41
371.100	−506.30	+.41
403.330	−501.10	+.26
435.550	−497.50	+.39
467.780	−498.90	+.05
500.000	−517.50	−.33

Measurements at RF & LO Power +13 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

ultra-low distortion

Frequency Mixers

LEVEL 23 (+23dBm LO, up to +15dBm RF)

Model
RAY-11

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20 dBm	LO +23 dBm	LO +26 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +20 dBm	LO +23 dBm	LO +26 dBm	Isolation L-I (dB) LO +20 dBm	LO +23 dBm	LO +26 dBm
100.000	130.000	8.26	6.80	5.95	100.000	56.64	57.63	56.43	42.08	42.09	42.22
200.000	230.000	7.78	6.92	6.09	200.000	50.45	51.54	46.32	39.00	42.54	47.95
332.260	362.258	8.07	6.89	5.99	332.260	45.92	47.39	42.95	34.27	38.02	48.90
500.000	530.000	7.03	6.39	5.94	500.000	44.78	47.64	46.77	27.06	31.79	37.13
564.520	534.516	7.13	6.40	5.92	564.520	44.87	47.27	42.20	25.63	29.16	34.90
796.770	766.774	9.12	7.84	6.92	796.770	45.01	48.68	52.69	23.56	25.70	27.49
1000.000	970.000	7.62	7.12	6.84	1000.000	40.46	43.65	48.41	19.46	20.91	22.20
1029.030	999.032	7.75	7.09	6.79	1029.030	39.73	42.35	48.15	19.00	20.20	21.38
1200.000	1170.000	7.40	6.60	6.35	1200.000	38.22	40.57	42.78	17.72	18.33	18.93
1250.000	1220.000	7.18	6.54	6.30	1250.000	38.63	40.50	42.82	18.30	18.94	19.49
1261.290	1231.290	7.33	6.61	6.36	1261.290	38.52	40.48	43.47	18.50	19.06	19.65
1416.130	1386.129	8.90	8.12	7.61	1416.130	37.63	40.54	45.65	19.18	19.84	20.37
1570.970	1540.968	9.71	8.52	7.93	1570.970	36.63	38.53	41.52	19.91	21.16	22.38
1803.230	1773.226	8.79	7.98	7.58	1803.230	36.21	37.48	39.26	21.42	23.58	25.52
2000.000	1970.000	8.68	7.79	7.29	2000.000	35.13	36.62	38.14	24.78	26.62	26.69
2035.480	2005.484	8.73	7.71	7.17	2035.480	35.13	36.57	38.35	25.82	27.20	26.83
2200.000	2170.000	8.50	7.86	7.37	2200.000	34.45	36.32	37.72	30.93	28.35	25.92
2345.160	2315.161	8.01	7.50	7.04	2345.160	34.03	36.12	37.73	30.54	26.61	24.35
2422.580	2392.581	7.75	7.31	6.98	2422.580	33.88	36.72	39.23	28.22	25.92	24.69
2500.000	2470.000	7.53	7.10	6.78	2500.000	34.65	38.10	41.97	27.20	26.17	25.27

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +20 dBm	LO +23 dBm	LO +26 dBm	VSWR LO port LO +20 dBm	LO +23 dBm	LO +26 dBm	FREQ. (MHz)	VSWR IF port LO +20 dBm	LO +23 dBm	LO +26 dBm
100.000	2.35	2.26	2.14	2.03	2.35	2.53	5.000	1.59	1.31	1.14
200.000	2.81	2.58	2.36	1.65	2.14	2.42	10.000	1.62	1.32	1.15
325.000	3.00	2.84	2.58	1.41	2.00	2.28	20.000	1.63	1.33	1.16
500.000	3.11	3.10	2.95	1.35	1.64	1.74	50.000	1.66	1.37	1.20
550.000	2.98	2.98	2.83	1.35	1.59	1.74	57.500	1.64	1.36	1.21
775.000	2.69	2.58	2.49	1.39	1.47	1.52	95.000	1.66	1.41	1.27
1000.000	2.15	2.08	2.09	2.42	2.39	2.42	100.000	1.68	1.42	1.28
1037.500	2.22	2.15	2.17	2.31	2.24	2.26	140.000	1.81	1.52	1.37
1200.000	2.57	2.39	2.23	2.80	2.37	2.33	185.000	1.85	1.58	1.44
1225.000	2.53	2.33	2.16	3.91	2.92	2.78	200.000	1.89	1.63	1.48
1300.000	2.94	2.59	2.25	3.99	2.98	2.81	230.000	1.95	1.68	1.52
1450.000	3.39	3.18	2.84	3.89	2.70	2.43	245.000	1.98	1.71	1.54
1600.000	3.72	3.66	3.38	2.53	1.85	1.71	250.000	1.96	1.69	1.53
1825.000	2.32	2.29	2.16	1.76	1.34	1.29	275.000	2.07	1.77	1.59
2000.000	2.09	2.04	1.94	1.93	1.47	1.40	320.000	2.06	1.76	1.58
2050.000	2.22	2.18	2.07	2.12	1.60	1.52	365.000	2.18	1.85	1.63
2237.500	2.90	2.83	2.66	2.59	2.41	2.44	410.000	2.10	1.79	1.57
2350.000	2.92	2.85	2.67	2.51	2.63	2.64	455.000	2.13	1.80	1.59
2425.000	2.75	2.74	2.60	2.62	2.75	2.76	485.000	2.10	1.79	1.59
2500.000	2.25	2.29	2.27	2.86	2.90	2.88	500.000	2.11	1.80	1.60

ϕ detection

FREQ. (MHz)	max DC output mV	DC offset mV
100.000	-1147.50	8.65
200.000	-1288.80	6.90
254.840	-1206.70	9.88
487.100	-1347.60	10.62
500.000	-1315.60	10.26
719.350	-1066.90	-7.51
951.610	-978.70	-6.22
1000.000	-892.30	-8.33
1183.870	-1071.50	13.53
1200.000	-1100.30	12.83
1261.290	-724.70	10.94
1416.130	-577.30	-5.47
1570.970	-522.60	-13.41
1803.230	-321.80	-4.06
2000.000	-236.61	0.95
2035.480	-205.96	0.60
2200.000	-23.73	5.68
2345.160	59.99	9.59
2422.580	205.10	12.75
2500.000	146.84	13.51

broadband, low distortion

Frequency Mixers

Model SBL-1MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
1.000	31.00	7.80	7.26	6.98	65.00	66.63	67.65	60.52	59.30	58.20
2.000	32.00	6.97	6.48	6.25	64.11	65.04	67.03	59.98	58.69	58.03
20.000	50.00	6.13	5.69	5.41	61.77	63.01	64.15	55.56	55.53	55.89
47.782	77.78	6.00	5.60	5.40	58.71	58.78	58.86	49.92	50.86	51.65
63.376	93.38	5.88	5.57	5.42	56.62	56.72	56.88	47.61	48.94	50.30
141.350	111.35	5.70	5.41	5.33	50.77	48.96	48.93	41.83	44.44	46.51
172.530	142.53	5.65	5.46	5.41	47.99	47.22	47.70	40.61	43.17	45.20
203.720	173.72	5.78	5.61	5.58	45.77	45.85	46.60	39.76	42.14	44.06
219.320	189.32	5.71	5.58	5.54	44.49	44.34	44.51	39.45	41.70	43.40
234.910	204.91	5.73	5.62	5.54	43.75	44.18	44.24	38.89	40.98	42.69
266.100	236.10	5.59	5.48	5.41	43.77	44.90	45.11	38.15	40.38	42.42
281.690	251.69	5.59	5.53	5.46	43.01	43.24	43.01	37.72	40.07	42.12
328.470	298.47	5.84	5.70	5.60	40.40	41.21	41.56	36.13	38.04	39.63
359.660	329.66	6.00	5.95	5.85	39.76	41.01	42.19	35.23	37.04	38.81
390.850	360.85	5.94	5.89	5.83	37.64	39.17	40.22	34.39	36.14	37.66
422.040	392.04	6.35	6.29	6.21	36.47	38.02	39.34	33.44	34.90	36.34
453.230	423.23	6.52	6.32	6.07	35.89	37.70	39.47	33.27	34.14	35.33
468.820	438.82	6.53	6.23	5.97	35.79	37.66	39.68	33.82	34.16	35.36
484.410	454.41	6.58	6.27	5.99	36.08	37.86	39.93	34.00	34.53	35.09
500.000	470.00	6.76	6.32	5.96	36.95	38.19	40.32	33.29	35.22	35.61

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.001	1.30	1.29	1.33	1.31	1.95	2.96	1.80	1.67	1.53
30.353	1.08	1.07	1.15	1.22	1.98	2.97	1.78	1.66	1.53
59.706	1.07	1.08	1.16	1.20	1.89	2.78	1.81	1.68	1.54
74.382	1.06	1.08	1.16	1.18	1.82	2.60	1.81	1.68	1.54
100.000	1.05	1.08	1.16	1.16	1.80	2.57	1.87	1.71	1.58
118.410	1.05	1.09	1.16	1.16	1.79	2.54	1.90	1.75	1.62
147.760	1.04	1.09	1.16	1.18	1.83	2.52	1.97	1.78	1.66
177.120	1.03	1.09	1.17	1.17	1.78	2.49	2.05	1.87	1.74
191.790	1.03	1.10	1.17	1.20	1.85	2.55	2.07	1.91	1.77
206.470	1.02	1.10	1.18	1.24	1.83	2.46	2.18	1.95	1.81
235.820	1.02	1.11	1.18	1.26	1.88	2.48	2.29	2.04	1.90
265.180	1.04	1.12	1.19	1.32	1.91	2.51	2.38	2.13	2.00
294.530	1.07	1.15	1.21	1.36	1.96	2.51	2.48	2.17	2.04
323.880	1.11	1.18	1.24	1.42	2.04	2.54	2.69	2.21	2.08
353.240	1.16	1.23	1.30	1.45	2.06	2.56	2.81	2.41	2.25
397.260	1.24	1.32	1.37	1.57	2.08	2.52	3.06	2.58	2.40
426.620	1.30	1.37	1.42	1.64	2.11	2.53	3.34	2.69	2.53
441.290	1.33	1.41	1.47	1.70	2.19	2.64	3.28	2.84	2.62
470.650	1.39	1.45	1.51	1.88	2.34	2.73	3.48	2.87	2.68
500.000	1.43	1.49	1.56	1.87	2.45	2.85	3.31	3.02	2.77

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
1.000	−503.30	+.28
32.188	−538.20	+.28
50.000	−538.30	+.28
78.970	−549.50	+.21
100.000	−560.30	+.18
110.160	−553.40	+.18
141.350	−562.30	+.22
172.530	−561.80	+.27
188.130	−560.20	+.47
203.720	−561.30	+.42
234.910	−574.60	+.23
266.100	−572.70	+.56
297.290	−556.00	+.67
328.470	−521.00	+.78
359.660	−489.60	+.72
390.850	−483.90	+.94
422.040	−470.80	+.92
437.630	−464.30	+.79
468.820	−463.30	+.72
500.000	−439.10	+1.61

Measurements at RF & LO Power +13 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
RMS-2UH
LRMS-2UH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
10.000	40.000	7.08	6.57	6.19	10.000	65.08	63.77	61.28	57.77	56.97	56.13
20.000	50.000	7.08	6.50	6.13	20.000	60.51	60.57	59.58	56.03	55.13	54.27
50.000	80.000	7.01	6.37	5.98	50.000	54.05	55.16	55.63	54.73	52.62	50.70
97.350	67.353	6.91	6.33	5.95	97.350	48.32	49.98	51.11	54.30	49.21	46.37
100.000	70.000	6.91	6.34	5.96	100.000	48.10	49.79	50.93	54.36	49.22	46.29
184.710	154.706	7.06	6.58	6.34	184.710	43.52	44.84	45.99	60.38	46.89	41.99
200.000	170.000	7.03	6.61	6.36	200.000	42.86	44.17	45.31	55.81	46.34	41.53
272.060	242.059	7.67	7.05	6.61	272.060	40.38	41.60	43.02	45.75	42.28	38.59
359.410	329.412	8.57	7.68	6.91	359.410	38.04	39.85	41.63	40.20	39.62	36.25
446.760	416.765	9.29	8.11	7.36	446.760	36.84	39.07	41.12	37.27	36.19	34.46
475.880	445.882	9.40	8.07	7.24	475.880	37.13	39.72	41.74	36.93	35.21	33.32
500.000	470.000	9.46	8.04	7.20	500.000	37.07	39.78	42.20	36.28	35.17	33.32
534.120	504.118	9.34	8.08	7.27	534.120	36.84	39.35	41.66	35.62	35.18	33.45
621.470	591.471	9.70	8.27	7.45	621.470	36.35	37.94	39.71	34.47	34.61	33.76
708.820	678.824	10.44	8.76	7.79	708.820	35.92	37.24	38.09	36.46	34.54	33.07
796.180	766.177	10.20	8.91	8.00	796.180	35.31	36.08	36.37	43.54	36.92	34.17
883.530	853.529	10.34	9.44	8.77	883.530	36.06	36.18	36.17	40.31	42.57	37.49
941.760	911.765	10.27	9.54	8.98	941.760	36.50	36.44	36.20	34.52	38.78	37.29
970.880	940.882	9.94	9.32	8.90	970.880	36.90	36.79	36.44	32.01	35.40	35.45
1000.000	970.000	10.18	9.47	9.22	1000.000	36.43	36.36	36.07	29.80	32.59	32.96

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm
10.000	1.49	1.46	1.45	1.54	1.86	2.56	10.000	1.85	1.80	1.80
20.000	1.29	1.25	1.23	1.26	1.74	2.49	20.000	1.43	1.40	1.44
50.000	1.26	1.20	1.16	1.16	1.80	2.56	50.000	1.21	1.12	1.19
100.000	1.41	1.34	1.30	1.17	1.68	2.34	100.000	1.24	1.05	1.10
115.000	1.46	1.39	1.35	1.18	1.68	2.35	115.000	1.27	1.09	1.11
190.000	1.83	1.73	1.69	1.44	1.64	2.11	190.000	1.43	1.24	1.18
200.000	1.90	1.80	1.75	1.49	1.64	2.08	200.000	1.46	1.26	1.19
280.000	2.34	2.19	2.11	1.68	1.58	1.87	280.000	1.60	1.35	1.23
370.000	3.00	2.71	2.54	1.85	1.52	1.68	370.000	1.69	1.38	1.21
460.000	3.18	2.81	2.58	1.82	1.40	1.50	460.000	1.60	1.30	1.13
490.000	3.21	2.82	2.56	1.82	1.36	1.45	490.000	1.57	1.28	1.14
500.000	3.17	2.77	2.52	1.82	1.33	1.49	500.000	1.54	1.26	1.14
550.000	2.97	2.53	2.26	1.70	1.29	1.47	550.000	1.46	1.33	1.35
640.000	2.49	2.14	1.96	1.54	1.25	1.56	640.000	1.37	1.46	1.60
730.000	2.29	2.01	1.85	1.41	1.35	1.78	730.000	1.50	1.78	2.02
820.000	2.57	2.28	2.13	1.49	1.58	1.98	820.000	1.87	2.24	2.56
910.000	3.14	2.83	2.64	1.78	1.83	2.19	910.000	2.26	2.59	2.92
970.000	3.81	3.45	3.21	2.12	2.04	2.34	970.000	2.52	2.82	3.11
985.000	4.26	3.82	3.54	2.28	2.11	2.34	985.000	2.64	2.93	3.21
1000.000	4.39	3.91	3.67	2.49	2.20	2.35	1000.000	2.65	2.91	3.16

broadband, low distortion

Frequency Mixers

Model SRA-1MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
1.000	31.00	7.80	7.26	6.98	65.00	66.63	67.65	60.52	59.30	58.20
2.000	32.00	6.97	6.48	6.25	64.11	65.04	67.03	59.98	58.69	58.03
5.000	35.00	6.18	5.80	5.58	63.48	64.44	66.47	59.23	58.27	57.87
10.000	40.00	6.18	5.74	5.49	60.53	61.13	61.76	52.68	53.40	53.84
20.000	50.00	6.13	5.69	5.41	58.47	58.51	58.55	49.57	50.54	51.38
50.000	80.00	5.96	5.58	5.39	56.62	56.72	56.88	47.61	48.94	50.30
78.970	48.97	6.00	5.62	5.41	55.09	55.44	54.35	45.80	47.33	49.28
100.000	70.00	5.82	5.44	5.31	53.72	53.92	52.29	44.32	46.33	48.44
125.750	95.75	5.79	5.44	5.32	53.39	53.09	51.79	43.87	46.06	48.14
141.350	111.35	5.70	5.41	5.33	52.79	52.16	51.00	43.26	45.59	47.85
172.530	142.53	5.65	5.46	5.41	50.77	48.96	48.93	41.83	44.44	46.51
200.000	170.00	5.77	5.64	5.58	47.99	47.22	47.70	40.61	43.17	45.20
250.500	220.50	5.67	5.55	5.46	44.49	44.34	44.51	39.45	41.70	43.40
297.290	267.29	5.69	5.63	5.55	43.67	44.71	45.46	38.59	40.68	42.41
344.070	314.07	5.90	5.80	5.72	40.87	41.06	41.30	36.61	38.65	40.40
390.850	360.85	5.94	5.89	5.83	39.76	41.01	42.19	35.23	37.04	38.81
422.040	392.04	6.35	6.29	6.21	37.64	39.17	40.22	34.39	36.14	37.66
453.230	423.23	6.52	6.32	6.07	36.47	38.02	39.34	33.44	34.90	36.34
484.410	454.41	6.58	6.27	5.99	35.89	37.70	39.47	33.27	34.14	35.33
500.000	470.00	6.76	6.32	5.96	36.95	38.19	40.32	33.29	35.22	35.61

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.001	1.30	1.29	1.33	1.31	1.95	2.96	1.80	1.67	1.53
10.000	1.16	1.13	1.18	1.24	1.91	2.72	1.80	1.63	1.49
20.000	1.10	1.07	1.14	1.16	1.85	2.81	1.76	1.66	1.52
30.353	1.08	1.07	1.15	1.22	1.98	2.97	1.78	1.66	1.53
45.029	1.07	1.07	1.15	1.24	1.94	2.83	1.80	1.66	1.53
74.382	1.06	1.08	1.16	1.18	1.82	2.60	1.81	1.68	1.54
100.000	1.05	1.08	1.16	1.16	1.80	2.57	1.87	1.71	1.58
118.410	1.05	1.09	1.16	1.16	1.79	2.54	1.90	1.75	1.62
147.760	1.04	1.09	1.16	1.18	1.83	2.52	1.97	1.78	1.66
200.000	1.03	1.10	1.17	1.23	1.85	2.52	2.13	1.94	1.80
221.150	1.02	1.11	1.18	1.26	1.88	2.56	2.25	2.03	1.88
250.500	1.03	1.11	1.19	1.29	1.87	2.60	2.32	2.11	1.99
294.530	1.07	1.15	1.21	1.36	1.96	2.51	2.48	2.17	2.04
323.880	1.11	1.18	1.24	1.42	2.04	2.54	2.69	2.21	2.08
353.240	1.16	1.23	1.30	1.45	2.06	2.56	2.81	2.41	2.25
397.260	1.24	1.32	1.37	1.57	2.08	2.52	3.06	2.58	2.40
426.620	1.30	1.37	1.42	1.64	2.11	2.53	3.34	2.69	2.53
455.970	1.36	1.42	1.49	1.80	2.22	2.64	3.29	2.83	2.60
470.650	1.39	1.45	1.51	1.88	2.34	2.73	3.48	2.87	2.68
500.000	1.43	1.49	1.56	1.87	2.45	2.85	3.31	3.02	2.77

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
1.000	−503.30	+.28
2.000	−526.90	+.27
5.000	−537.50	+.27
10.000	−540.60	+.27
20.000	−538.40	+.28
32.188	−538.20	+.28
50.000	−538.30	+.28
78.970	−549.50	+.21
100.000	−560.30	+.18
156.940	−559.80	+.17
200.000	−560.10	+.43
250.500	−575.90	+.39
297.290	−556.00	+.67
344.070	−504.10	+.78
359.660	−489.60	+.72
390.850	−463.90	+.94
422.040	−470.80	+.92
453.230	−470.20	+.65
468.820	−463.30	+.72
500.000	−439.10	+1.61

Measurements at RF & LO Power +13 dBm

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very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
RMS-2H
LRMS-2H
JMS-2H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
5.000	35.000	9.06	7.85	7.26	5.000	64.63	66.33	68.05	72.73	72.89	71.08
10.000	40.000	8.86	7.64	7.07	10.000	62.11	63.63	65.24	71.84	68.70	65.74
20.000	50.000	8.86	7.69	7.10	20.000	57.30	58.93	60.41	69.99	63.79	60.12
50.000	80.000	8.75	7.55	6.99	50.000	50.35	52.00	53.52	65.16	56.89	53.18
95.450	65.454	8.71	7.54	7.02	95.450	44.81	46.41	47.87	61.07	50.84	47.07
100.000	70.000	8.71	7.53	7.00	100.000	44.43	46.04	47.54	61.18	50.67	46.89
185.910	155.909	8.67	7.51	6.95	185.910	39.30	40.70	42.05	59.00	46.79	42.59
200.000	170.000	8.52	7.37	6.86	200.000	38.67	40.02	41.52	59.36	46.99	42.87
276.360	246.364	8.47	7.35	6.86	276.360	36.16	37.35	38.55	52.92	44.46	40.70
366.820	336.818	8.38	7.22	6.85	366.820	33.78	35.28	36.25	47.94	42.69	38.37
457.270	427.273	7.95	7.11	6.80	457.270	32.51	33.66	34.50	42.04	39.45	37.22
487.420	457.424	8.05	7.17	6.86	487.420	32.07	33.17	33.88	39.68	37.61	35.77
500.000	470.000	7.90	7.07	6.78	500.000	31.88	33.04	33.73	38.94	37.36	35.77
547.730	517.727	7.89	7.11	6.83	547.730	31.74	32.95	33.80	36.39	35.68	34.48
638.180	608.182	8.02	7.46	7.13	638.180	31.12	32.78	33.65	32.03	31.60	32.17
728.640	698.636	8.08	7.45	7.16	728.640	30.41	31.90	32.72	29.84	30.61	30.26
819.090	789.091	8.61	7.76	7.43	819.090	29.53	30.74	31.45	26.63	28.78	30.22
909.550	879.546	8.97	8.24	7.88	909.550	28.77	29.67	30.61	24.81	27.10	29.16
969.850	939.849	9.36	8.54	8.05	969.850	28.63	29.46	30.42	24.08	25.48	27.85
1000.000	970.000	9.53	8.75	8.20	1000.000	28.51	29.31	30.21	23.73	24.84	27.16

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.40	1.54	1.67	1.52	1.95	2.77	5.000	1.31	1.07	1.07	5.000	891.20	0.22
10.000	1.32	1.49	1.62	1.31	1.85	2.65	10.000	1.32	1.08	1.06	10.000	889.50	0.21
20.000	1.30	1.47	1.61	1.22	1.79	2.54	20.000	1.32	1.08	1.07	20.000	885.70	0.19
50.000	1.29	1.45	1.59	1.29	1.91	2.70	50.000	1.34	1.12	1.10	50.000	892.20	0.01
98.280	1.29	1.44	1.56	1.23	1.79	2.53	95.450	1.41	1.20	1.17	95.450	890.80	0.00
100.000	1.30	1.43	1.55	1.23	1.79	2.54	100.000	1.41	1.21	1.17	100.000	886.60	-0.64
191.560	1.36	1.43	1.52	1.31	1.69	2.30	185.910	1.62	1.41	1.32	185.910	876.90	-2.53
200.000	1.37	1.42	1.50	1.32	1.68	2.29	200.000	1.67	1.45	1.35	200.000	896.10	-2.87
284.840	1.43	1.40	1.42	1.38	1.56	2.09	276.360	1.92	1.64	1.50	276.360	893.90	-5.26
378.130	1.44	1.34	1.32	1.48	1.47	1.82	366.820	2.24	1.88	1.67	366.820	994.90	-5.70
471.410	1.40	1.25	1.20	1.49	1.36	1.62	457.270	2.47	2.05	1.78	457.270	927.00	-10.54
500.000	1.38	1.24	1.18	1.49	1.34	1.69	487.420	2.56	2.10	1.81	487.420	931.30	-10.77
502.500	1.35	1.21	1.15	1.49	1.34	1.69	500.000	2.57	2.11	1.82	500.000	939.80	-11.79
564.690	1.25	1.11	1.07	1.45	1.28	1.60	547.730	2.60	2.11	1.80	547.730	833.30	-9.46
657.970	1.09	1.06	1.16	1.35	1.29	1.78	638.180	2.54	2.07	1.75	638.180	821.00	-13.64
751.250	1.13	1.27	1.39	1.24	1.46	2.24	728.640	2.34	1.89	1.60	728.640	826.00	-19.87
844.530	1.39	1.54	1.66	1.33	1.81	2.80	819.090	2.03	1.65	1.42	819.090	795.10	-23.51
937.810	1.74	1.90	2.04	1.60	2.21	3.20	909.550	1.74	1.44	1.24	909.550	764.20	-28.50
984.450	1.91	2.06	2.19	1.73	2.34	3.29	969.850	1.61	1.34	1.18	969.850	656.10	-29.12
1000.000	1.97	2.10	2.23	1.79	2.40	3.39	1000.000	1.57	1.32	1.19	1000.000	669.00	-27.57

broadband, low distortion

Frequency Mixers

Model
SRA-3MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L–I (dB) LO +10dBm	LO +13dBm	LO +16dBm
.025	30.03	7.66	7.47	7.24	>70.00	>73.00	71.40	>70.00	68.27	65.79
5.000	35.00	5.25	4.97	4.89	>70.00	68.46	66.56	59.18	58.54	57.93
20.000	50.00	5.35	5.12	5.01	61.88	61.10	59.95	57.74	56.96	56.24
28.593	58.59	5.33	5.10	5.00	59.36	58.49	57.19	56.88	56.16	55.40
35.735	65.74	5.30	5.10	5.02	56.32	55.30	53.21	54.86	54.57	52.46
42.877	72.88	5.28	5.07	5.00	55.01	53.39	51.43	54.32	53.33	51.21
50.000	80.00	5.24	5.05	4.98	52.83	51.26	49.70	52.92	51.58	49.80
64.303	94.30	5.16	5.00	4.96	49.34	48.21	46.87	49.57	48.64	47.17
121.440	91.44	5.08	4.95	4.94	39.62	40.55	41.49	39.89	41.10	42.02
128.580	98.58	5.14	5.04	5.02	39.12	39.34	39.90	39.33	40.10	40.89
135.720	105.72	5.12	5.04	5.05	39.51	39.85	40.17	39.32	40.26	40.71
142.870	112.87	5.07	4.99	5.03	39.76	40.78	41.83	39.11	40.74	42.00
150.010	120.01	5.16	5.06	5.06	39.05	40.53	42.04	38.26	40.11	42.01
157.150	127.15	5.19	5.11	5.10	37.95	39.65	41.17	37.38	39.23	40.80
164.290	134.29	5.22	5.14	5.13	36.71	38.33	39.63	36.71	38.13	39.47
171.430	141.43	5.29	5.21	5.20	35.60	36.83	37.79	36.39	37.20	38.17
178.580	148.58	5.36	5.29	5.27	34.99	35.77	36.61	36.34	36.86	37.65
185.720	155.72	5.43	5.36	5.31	35.16	35.84	36.47	36.83	37.45	38.03
192.860	162.86	5.51	5.42	5.34	35.21	36.35	37.02	37.09	38.14	38.78
200.000	170.00	5.59	5.45	5.38	34.68	36.17	37.04	36.75	38.15	38.89

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.002	1.42	1.27	1.15	1.29	2.12	3.35	1.58	1.50	1.44
32.857	1.39	1.25	1.14	1.32	2.13	3.22	1.59	1.52	1.47
38.429	1.39	1.24	1.13	1.34	2.18	3.24	1.59	1.53	1.47
50.000	1.37	1.23	1.12	1.33	2.14	3.24	1.61	1.54	1.49
60.714	1.36	1.22	1.11	1.29	2.11	3.20	1.64	1.57	1.52
66.286	1.35	1.21	1.11	1.31	2.12	3.25	1.66	1.59	1.53
71.857	1.34	1.20	1.10	1.27	2.09	3.17	1.68	1.60	1.54
83.000	1.31	1.18	1.09	1.26	2.06	2.97	1.71	1.63	1.57
88.571	1.30	1.17	1.08	1.27	2.03	2.94	1.72	1.64	1.58
94.143	1.28	1.16	1.06	1.27	2.03	2.91	1.73	1.65	1.59
99.714	1.26	1.14	1.05	1.29	1.99	2.89	1.74	1.67	1.61
105.290	1.25	1.13	1.04	1.28	2.02	2.90	1.77	1.69	1.63
110.860	1.23	1.12	1.03	1.31	2.01	2.94	1.75	1.67	1.61
122.000	1.21	1.09	1.01	1.32	2.03	2.91	1.84	1.75	1.69
133.140	1.19	1.07	1.02	1.37	2.10	3.07	1.92	1.82	1.76
144.290	1.16	1.04	1.04	1.36	2.10	3.06	1.98	1.88	1.82
149.860	1.14	1.03	1.06	1.37	2.07	2.99	2.02	1.92	1.86
155.430	1.12	1.02	1.08	1.42	2.05	2.99	2.04	1.95	1.88
161.000	1.11	1.02	1.09	1.42	2.07	2.94	2.07	1.97	1.91
200.000	1.05	1.12	1.22	1.47	2.19	3.07	2.37	2.22	2.15

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.025	−505.28	−.02
5.000	−541.50	−.08
20.000	−543.80	−.06
28.593	−544.00	−.06
35.735	−541.60	−.06
42.877	−542.50	−.05
50.000	−542.80	−.03
64.303	−555.40	−.02
121.440	−549.90	+.17
128.580	−541.90	+.03
135.720	−542.80	+0.00
142.870	−541.90	+.02
150.010	−546.60	+.05
157.150	−551.60	+.27
164.290	−558.10	+.39
171.430	−557.20	+.54
178.580	−552.20	+.63
185.720	−547.40	+.54
192.860	−543.30	+.44
200.000	−541.00	+.27

Measurements at RF & LO Power +13 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
RMS-1WH
LRMS-1WH

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
5.000	35.000	8.68	7.75	7.20	5.000	64.86	66.55	68.27	73.06	73.50	71.89
10.000	40.000	8.40	7.52	7.00	10.000	62.27	63.83	65.42	72.36	69.50	66.38
20.000	50.000	8.41	7.55	7.01	20.000	57.44	59.08	60.58	71.26	64.80	60.89
50.000	80.000	8.43	7.42	6.90	50.000	50.45	52.11	53.60	67.76	57.91	53.86
74.840	44.844	8.30	7.41	6.91	74.840	46.95	48.49	49.98	64.89	53.78	49.60
100.000	70.000	8.32	7.39	6.91	100.000	44.50	46.11	47.57	63.75	51.70	47.52
144.690	114.688	8.42	7.45	6.92	144.690	41.50	42.99	44.25	62.95	49.47	45.02
200.000	170.000	8.27	7.30	6.79	200.000	38.70	40.13	41.60	60.40	47.34	43.07
214.530	184.531	8.37	7.40	6.84	214.530	38.06	39.53	40.73	59.55	46.89	42.48
284.370	254.375	8.22	7.23	6.78	284.370	35.96	37.33	38.39	53.28	45.02	41.00
354.220	324.219	8.24	7.16	6.80	354.220	34.04	35.54	36.42	48.78	43.14	39.28
375.000	345.000	8.06	7.05	6.70	375.000	33.67	35.14	36.16	48.58	42.85	38.45
424.060	394.063	8.08	7.16	6.82	424.060	32.81	34.14	35.33	44.82	41.59	38.28
493.910	463.906	7.83	7.03	6.75	493.910	32.03	33.18	33.86	39.28	37.59	35.97
500.000	470.000	7.82	7.01	6.74	500.000	31.90	33.08	33.79	39.07	37.44	35.96
563.750	533.750	7.84	7.11	6.82	563.750	31.59	32.88	33.69	35.77	35.30	34.45
633.590	603.594	7.87	7.37	7.07	633.590	31.33	32.86	33.79	32.18	31.86	32.61
703.440	673.438	7.83	7.34	7.10	703.440	30.56	32.15	33.18	30.77	31.10	30.99
726.720	696.719	7.97	7.41	7.12	726.720	30.39	32.02	32.84	29.94	30.76	30.43
750.000	720.000	8.11	7.47	7.15	750.000	30.20	31.80	32.59	28.89	30.34	30.31

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.94	2.02	2.07	1.52	1.97	2.71	5.000	1.30	1.07	1.07	5.000	887.60	0.25
10.000	1.58	1.71	1.83	1.32	1.87	2.69	10.000	1.31	1.07	1.06	10.000	888.60	0.23
20.000	1.45	1.61	1.74	1.24	1.84	2.58	20.000	1.31	1.08	1.07	20.000	876.20	0.19
50.000	1.39	1.56	1.68	1.31	1.92	2.70	50.000	1.33	1.12	1.10	50.000	891.10	-0.04
74.840	1.35	1.53	1.65	1.25	1.86	2.61	74.840	1.37	1.16	1.13	74.840	889.60	-0.22
100.000	1.33	1.50	1.62	1.25	1.81	2.54	100.000	1.41	1.21	1.17	100.000	885.20	-0.61
144.690	1.32	1.47	1.58	1.27	1.77	2.47	144.690	1.52	1.31	1.25	144.690	863.50	-1.53
200.000	1.32	1.43	1.52	1.31	1.70	2.32	200.000	1.67	1.45	1.36	200.000	892.30	-2.85
214.530	1.32	1.41	1.50	1.33	1.70	2.29	214.530	1.71	1.48	1.38	214.530	913.00	-3.22
284.370	1.34	1.37	1.42	1.38	1.58	2.07	284.370	1.94	1.66	1.52	284.370	886.10	-5.61
354.220	1.35	1.32	1.34	1.45	1.51	1.94	354.220	2.20	1.86	1.66	354.220	990.80	-5.62
375.000	1.35	1.30	1.31	1.48	1.50	1.86	375.000	2.25	1.90	1.69	375.000	988.60	-6.15
424.060	1.34	1.25	1.25	1.50	1.44	1.85	424.060	2.41	2.00	1.75	424.060	892.00	-8.95
493.910	1.30	1.17	1.15	1.49	1.36	1.71	493.910	2.60	2.12	1.82	493.910	933.30	-11.44
500.000	1.29	1.17	1.14	1.48	1.36	1.74	500.000	2.58	2.14	1.82	500.000	936.50	-11.69
563.750	1.22	1.08	1.07	1.42	1.29	1.64	563.750	2.62	2.15	1.81	563.750	822.90	-10.06
633.590	1.11	1.03	1.13	1.33	1.29	1.72	633.590	2.59	2.10	1.77	633.590	829.40	-14.53
703.440	1.02	1.17	1.27	1.25	1.36	1.92	703.440	2.45	1.99	1.67	703.440	779.80	-16.35
726.720	1.06	1.22	1.33	1.22	1.40	1.94	726.720	2.39	1.93	1.63	726.720	818.70	-19.81
750.000	1.12	1.28	1.39	1.21	1.46	2.11	750.000	2.31	1.87	1.58	750.000	860.40	-20.55

ϕ detection

very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Models

GRA-1H
SRA-1H
ZAD-1H
ZLW-1H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
.500	30.50	7.59	7.38	7.34	67.77	64.73	63.33	63.62	58.33	55.14
2.000	32.00	6.46	6.29	6.29	64.57	62.80	62.04	61.48	57.04	54.11
10.000	40.00	6.01	5.89	5.94	59.83	58.80	57.71	56.42	53.94	51.93
20.000	50.00	6.09	5.93	5.96	53.53	51.76	50.63	48.99	47.62	46.21
50.000	80.00	6.02	5.91	6.00	49.57	48.13	47.38	45.62	44.45	43.31
81.065	51.07	5.94	5.84	5.90	44.91	43.91	43.68	41.40	40.75	39.82
100.000	70.00	5.91	5.82	5.91	43.58	42.51	42.42	40.12	39.43	38.57
129.400	99.40	5.89	5.85	5.94	42.72	41.76	41.26	39.37	38.65	37.85
161.630	131.63	5.93	5.90	5.99	40.72	39.94	39.60	37.76	37.09	36.22
193.860	163.86	6.06	5.98	6.04	39.50	38.70	38.14	36.29	35.65	34.57
226.080	196.08	6.18	6.10	6.16	38.71	38.27	37.93	36.04	35.36	34.32
258.310	228.31	6.10	6.01	6.05	37.84	37.16	36.49	35.32	34.23	32.87
274.420	244.42	6.08	5.97	6.03	37.40	36.62	35.89	33.67	33.23	32.23
306.650	276.65	6.14	6.07	6.17	36.25	35.81	35.25	33.23	32.42	31.59
338.870	308.87	6.21	6.16	6.27	36.02	34.78	34.05	31.92	30.96	30.14
371.100	341.10	6.50	6.34	6.34	35.50	33.92	32.90	30.95	29.51	28.53
403.330	373.33	6.61	6.42	6.39	36.28	33.83	32.11	30.44	28.51	27.55
435.550	405.55	6.86	6.60	6.39	37.45	34.53	32.39	29.80	28.16	26.66
467.780	437.78	7.03	6.76	6.62	38.15	35.55	33.44	28.62	28.51	26.88
500.000	470.00	7.17	6.85	6.62	36.57	34.97	33.67	29.76	28.71	27.01

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.23	1.26	1.28	1.95	2.93	4.04	1.47	1.30	1.17
10.000	1.10	1.13	1.17	1.89	2.80	3.90	1.47	1.30	1.18
20.000	1.02	1.08	1.14	1.81	2.61	3.52	1.46	1.30	1.18
34.118	1.02	1.09	1.15	1.84	2.57	3.35	1.45	1.29	1.18
50.000	1.03	1.10	1.16	1.85	2.57	3.39	1.46	1.31	1.19
77.794	1.05	1.12	1.17	1.88	2.72	3.76	1.52	1.35	1.23
100.000	1.06	1.12	1.18	1.80	2.57	3.33	1.55	1.38	1.26
136.030	1.08	1.14	1.19	1.77	2.45	3.12	1.59	1.43	1.31
165.150	1.10	1.16	1.21	1.84	2.59	3.32	1.68	1.51	1.38
194.260	1.12	1.17	1.22	1.76	2.39	2.99	1.72	1.56	1.42
208.820	1.13	1.18	1.23	1.76	2.34	2.95	1.74	1.59	1.45
252.500	1.18	1.24	1.28	1.87	2.56	3.19	1.90	1.73	1.57
281.620	1.20	1.26	1.30	1.80	2.43	3.06	1.94	1.77	1.61
310.740	1.24	1.28	1.33	1.83	2.47	3.11	1.95	1.80	1.64
339.850	1.28	1.33	1.39	1.92	2.54	3.15	2.14	1.95	1.75
368.970	1.30	1.34	1.38	1.89	2.45	2.99	2.14	1.95	1.75
398.090	1.33	1.36	1.41	1.95	2.59	3.21	2.16	1.97	1.78
441.760	1.37	1.39	1.44	1.88	2.55	3.12	2.27	2.11	1.86
470.880	1.37	1.40	1.45	1.91	2.52	3.06	2.21	2.07	1.83
500.000	1.40	1.42	1.47	1.92	2.52	3.10	2.30	2.17	1.88

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.500	−671.80	−1.35
1.000	−709.80	−1.42
10.000	−720.20	−.69
34.130	−715.90	−.67
50.195	−716.20	−.65
82.325	−723.70	−.52
100.000	−717.90	−.49
130.520	−721.80	−.72
162.650	−704.20	−1.05
194.780	−706.00	−1.53
210.850	−708.20	−1.56
242.980	−718.00	−1.83
275.110	−723.30	−2.91
307.240	−706.60	−3.24
339.370	−674.20	−3.34
371.500	−642.80	−3.19
403.630	−613.30	−3.29
435.760	−597.90	−3.37
467.890	−600.20	−5.58
500.000	−604.10	−3.89

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14 dBm RF)

Models
RMS-1H
LRMS-1H
JMS-1H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
2.000	32.000	7.57	6.78	6.41	2.000	81.98	79.29	82.48	71.18	69.19	68.76
4.000	34.000	7.39	6.60	6.22	4.000	72.53	72.35	71.57	69.53	63.39	60.08
5.000	35.000	7.37	6.57	6.17	5.000	71.15	71.51	71.45	68.75	62.98	59.64
10.000	40.000	7.34	6.55	6.16	10.000	65.40	65.84	66.21	67.50	61.30	57.95
20.000	50.000	7.21	6.48	6.14	20.000	58.89	59.50	59.74	65.57	58.68	55.05
35.200	65.200	6.96	6.36	6.09	50.000	50.89	51.64	52.16	59.79	53.67	50.73
50.000	80.000	7.24	6.53	6.15	50.190	50.86	51.61	52.13	59.74	53.63	50.71
85.000	55.000	7.14	6.47	6.15	98.390	44.74	45.13	45.32	57.32	48.67	45.35
100.000	70.000	7.16	6.48	6.15	100.000	44.61	44.98	45.16	57.39	48.52	45.07
134.800	104.800	7.10	6.32	6.01	146.580	40.93	41.19	41.80	54.39	46.50	42.42
184.600	154.600	7.14	6.35	6.03	194.770	37.95	38.78	39.25	48.00	44.90	41.99
200.000	170.000	7.22	6.40	6.03	200.000	37.74	38.62	39.06	47.27	44.42	41.61
234.400	204.400	6.97	6.30	6.00	242.970	36.20	36.44	36.72	43.46	41.20	38.39
250.000	220.000	6.93	6.22	5.96	250.000	35.88	36.14	36.35	43.00	41.01	37.98
284.200	254.200	7.07	6.22	5.96	291.160	34.03	35.11	35.73	39.80	38.57	37.07
334.000	304.000	6.77	6.18	6.04	339.350	33.02	33.38	33.79	37.62	37.07	35.58
383.800	353.800	6.68	6.11	5.93	387.550	32.06	32.33	31.78	34.32	33.77	33.58
433.600	403.600	6.58	6.16	6.06	435.740	31.30	32.22	32.26	31.30	31.10	31.71
483.400	453.400	6.75	6.45	6.35	483.940	30.58	31.29	31.48	29.60	29.09	29.35
500.000	470.000	6.80	6.45	6.33	500.000	29.94	30.80	30.79	29.14	28.30	28.39

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
2.000	1.31	1.33	1.37	1.22	1.77	2.58	2.000	1.02	1.07	1.13	2.000	930.60	0.13
5.000	1.17	1.20	1.25	1.15	1.75	2.56	5.000	1.01	1.06	1.12	5.000	940.10	0.07
10.000	1.11	1.15	1.20	1.22	1.82	2.67	10.000	1.02	1.04	1.10	10.000	949.80	0.11
20.000	1.10	1.14	1.19	1.22	1.82	2.66	20.000	1.01	1.04	1.10	20.000	938.60	0.12
50.000	1.09	1.13	1.19	1.19	1.75	2.54	50.000	1.03	1.04	1.10	47.270	923.80	0.09
81.000	1.09	1.14	1.20	1.19	1.75	2.54	81.000	1.04	1.04	1.09	92.550	928.70	0.08
100.000	1.10	1.14	1.19	1.20	1.76	2.54	100.000	1.05	1.05	1.10	100.000	922.30	0.09
133.000	1.12	1.15	1.20	1.24	1.74	2.52	133.000	1.07	1.06	1.10	137.820	922.70	-0.01
172.000	1.14	1.17	1.22	1.31	1.71	2.40	172.000	1.09	1.08	1.10	183.090	931.60	-0.32
212.000	1.17	1.19	1.24	1.40	1.69	2.33	212.000	1.11	1.09	1.11	200.000	907.80	-0.39
250.000	1.20	1.22	1.26	1.45	1.65	2.23	250.000	1.15	1.12	1.13	228.360	942.00	-0.62
264.000	1.21	1.23	1.27	1.46	1.62	2.18	264.000	1.10	1.06	1.08	243.450	949.20	-1.12
277.000	1.22	1.24	1.28	1.47	1.63	2.17	277.000	1.14	1.11	1.11	250.000	956.30	-1.28
303.000	1.24	1.26	1.30	1.52	1.62	2.12	303.000	1.16	1.13	1.13	273.640	937.60	-1.45
343.000	1.28	1.30	1.34	1.60	1.58	1.99	343.000	1.19	1.16	1.15	318.910	987.10	-0.87
382.000	1.32	1.34	1.38	1.65	1.54	1.88	382.000	1.22	1.18	1.17	364.180	1026.20	-1.12
421.000	1.37	1.39	1.42	1.68	1.51	1.79	421.000	1.24	1.20	1.19	409.450	992.40	-1.66
461.000	1.42	1.44	1.47	1.64	1.45	1.73	461.000	1.27	1.23	1.21	454.730	988.00	-1.93
487.000	1.46	1.47	1.50	1.63	1.41	1.70	487.000	1.28	1.25	1.23	484.910	924.50	-1.88
500.000	1.48	1.49	1.53	1.62	1.39	1.71	500.000	1.29	1.25	1.23	500.000	909.60	-2.66

very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Models

SRA-1WH
ZAD-1WH
ZLW-1WH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
1.000	31.00	7.14	6.91	6.75	60.43	59.17	57.31	57.95	55.91	53.06
5.000	35.00	6.27	6.06	5.93	59.29	55.98	53.74	55.96	51.59	48.81
20.000	50.00	6.20	5.98	5.85	59.53	56.29	53.93	56.41	51.86	49.03
50.000	80.00	6.16	5.98	5.87	59.44	56.10	53.54	55.96	51.57	48.59
75.901	45.90	6.10	5.94	5.85	58.28	55.67	53.32	54.89	51.09	48.26
100.870	70.87	6.01	5.88	5.83	56.39	54.02	51.68	52.32	49.21	47.12
150.800	120.80	6.04	5.94	5.89	51.14	48.90	47.58	47.13	45.61	44.68
225.700	195.70	6.20	6.05	5.95	45.88	44.92	44.58	43.31	42.84	42.59
250.670	220.67	6.04	5.93	5.88	44.01	43.34	43.27	41.56	41.39	41.63
275.640	245.64	6.01	5.92	5.85	41.51	41.46	41.32	40.17	40.34	40.39
350.540	320.54	6.37	6.22	6.12	40.62	40.96	41.22	39.87	39.92	39.74
400.470	370.47	6.53	6.34	6.23	38.50	38.85	38.80	38.61	39.12	38.97
450.410	420.41	6.46	6.25	6.08	36.13	35.90	35.87	35.38	35.56	35.71
500.000	470.00	6.74	6.34	6.08	35.98	35.92	35.30	33.74	33.02	32.63
525.310	495.31	7.10	6.71	6.34	36.02	36.74	35.75	34.77	33.42	31.76
575.240	545.24	7.48	7.06	6.60	36.54	37.19	37.29	35.88	34.02	31.91
625.180	595.18	7.19	6.59	6.20	36.18	37.15	36.99	36.56	33.53	30.16
675.110	645.11	6.85	6.45	6.40	35.15	35.08	34.39	34.31	31.94	28.55
725.040	695.04	7.09	6.86	6.49	34.37	34.11	33.35	32.33	30.41	25.93
750.000	720.00	7.28	6.96	6.27	35.04	34.12	33.72	29.43	26.97	23.38

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.23	1.21	1.21	3.35	2.46	1.77	1.29	1.43	1.58
10.000	1.14	1.10	1.10	3.23	2.36	1.72	1.29	1.43	1.58
20.000	1.10	1.05	1.04	3.10	2.36	1.74	1.29	1.42	1.57
29.032	1.10	1.04	1.02	3.04	2.38	1.72	1.29	1.42	1.57
50.000	1.11	1.05	1.01	3.20	2.39	1.69	1.30	1.43	1.58
100.000	1.13	1.07	1.02	2.98	2.27	1.63	1.32	1.46	1.61
125.160	1.13	1.08	1.03	2.89	2.23	1.67	1.34	1.47	1.62
173.220	1.16	1.10	1.05	2.91	2.29	1.68	1.39	1.53	1.69
221.290	1.19	1.13	1.07	2.94	2.30	1.67	1.44	1.58	1.76
269.350	1.21	1.17	1.10	2.90	2.32	1.71	1.50	1.64	1.86
341.450	1.25	1.21	1.14	2.90	2.29	1.76	1.59	1.75	1.99
365.480	1.27	1.22	1.15	2.80	2.23	1.76	1.63	1.80	2.04
437.580	1.28	1.24	1.18	2.87	2.34	1.85	1.71	1.86	2.11
485.640	1.27	1.23	1.18	2.86	2.35	1.91	1.74	1.89	2.14
500.000	1.26	1.23	1.18	2.90	2.37	1.90	1.73	1.88	2.11
557.740	1.27	1.23	1.20	2.89	2.38	1.98	1.74	1.89	2.12
605.800	1.30	1.27	1.25	2.84	2.33	1.92	1.70	1.85	2.05
653.860	1.40	1.37	1.36	2.86	2.38	1.92	1.64	1.79	1.95
701.930	1.57	1.54	1.54	2.81	2.36	1.99	1.60	1.73	1.86
750.000	1.78	1.78	1.78	2.74	2.28	1.99	1.54	1.65	1.77

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
1.000	−706.70	−1.88
5.000	−728.60	−1.83
10.000	−736.40	−1.85
30.960	−736.80	−1.91
50.000	−729.10	−1.80
90.880	−742.90	−1.89
120.840	−750.10	−1.98
180.760	−754.20	−2.27
210.720	−749.00	−2.19
270.640	−759.80	−2.32
330.560	−725.90	−2.52
360.520	−688.40	−2.53
420.440	−641.80	−2.36
480.360	−641.30	−4.62
500.000	−644.90	−5.29
540.280	−634.40	−4.12
600.000	−623.20	+.70
660.120	−606.10	+.65
700.000	−605.40	+1.18
750.000	−644.30	+4.48

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

very high dynamic range

Frequency Mixers

Model
SYM-11H

LEVEL 17 (+17dBm LO, up to +10dBm RF)

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
50.000	120.000	6.60	6.20	6.10	50.000	42.44	47.66	51.38	35.38	38.14	40.17
90.000	160.000	6.50	6.10	6.20	80.000	46.39	50.07	50.74	37.39	39.91	42.42
100.000	170.000	6.51	6.24	6.15	100.000	47.33	50.35	50.28	38.07	41.04	43.72
218.750	288.750	6.60	6.35	6.20	250.000	45.74	43.82	42.54	40.23	40.83	40.03
250.000	320.000	6.52	6.27	6.13	293.750	44.27	41.93	40.58	40.18	39.07	37.70
337.500	407.500	6.69	6.37	6.24	415.625	41.81	39.87	39.01	38.85	37.13	35.75
500.000	570.000	6.72	6.37	6.24	500.000	40.39	38.49	37.76	37.92	35.80	34.52
575.000	645.000	6.88	6.48	6.33	659.375	38.47	36.98	36.50	36.01	33.49	32.28
750.000	820.000	6.82	6.46	6.33	903.125	37.24	36.16	35.35	33.44	31.66	30.83
812.500	882.500	6.90	6.51	6.36	1000.000	36.68	36.06	35.29	31.72	30.99	30.63
931.250	1001.250	6.94	6.63	6.48	1025.000	37.25	36.75	36.19	32.17	31.46	31.13
1000.000	1070.000	7.00	6.69	6.53	1146.875	38.03	36.24	35.47	29.84	29.45	29.10
1168.750	1238.750	6.87	6.60	6.51	1268.750	34.07	32.26	31.71	30.35	29.68	28.87
1287.500	1357.500	6.84	6.54	6.48	1500.000	33.43	31.19	30.07	29.83	29.69	29.53
1406.250	1476.250	7.06	6.68	6.59	1512.500	32.90	30.99	30.09	29.30	29.28	29.21
1500.000	1570.000	7.73	7.13	6.86	1634.375	36.41	34.38	33.03	29.06	29.85	30.41
1643.750	1713.750	8.05	7.50	7.22	1756.250	35.26	33.53	32.54	29.49	31.92	33.36
1881.250	1951.250	8.16	7.62	7.48	1878.125	35.89	33.28	31.64	29.38	31.14	31.53
1930.000	2000.000	8.28	7.63	7.43	1930.000	35.80	33.28	31.51	29.61	31.51	31.64
2000.000	1930.000	8.15	7.48	7.29	2000.000	34.92	32.60	31.02	29.62	30.67	30.81

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm
50.000	1.28	1.18	1.13	1.51	2.12	2.80	50.000	1.14	1.12	1.14
80.000	1.28	1.16	1.10	1.48	2.12	2.92	80.000	1.15	1.12	1.12
100.000	1.28	1.16	1.09	1.48	2.12	2.92	100.000	1.17	1.13	1.12
250.000	1.29	1.15	1.08	1.44	2.08	2.84	250.000	1.34	1.23	1.16
279.412	1.29	1.15	1.08	1.42	1.97	2.58	279.412	1.38	1.25	1.17
394.118	1.30	1.17	1.10	1.45	2.10	2.80	394.118	1.51	1.31	1.19
500.000	1.32	1.19	1.12	1.51	2.06	2.76	500.000	1.63	1.37	1.21
623.529	1.33	1.22	1.16	1.48	1.96	2.55	623.529	1.73	1.41	1.23
852.941	1.37	1.26	1.20	1.44	1.82	2.25	852.941	1.67	1.38	1.21
967.647	1.43	1.31	1.26	1.47	1.84	2.27	967.647	1.75	1.44	1.27
1000.000	1.44	1.33	1.27	1.51	1.92	2.46	1000.000	1.75	1.44	1.28
1082.353	1.48	1.36	1.30	1.43	1.74	2.14	1082.353	1.70	1.44	1.30
1250.000	1.57	1.44	1.38	1.62	2.04	2.58	1250.000	1.57	1.40	1.31
1426.471	1.68	1.54	1.47	1.61	1.84	2.23	1426.471	1.44	1.38	1.35
1500.000	1.71	1.57	1.49	1.85	1.89	2.23	1500.000	1.41	1.40	1.39
1541.176	1.74	1.59	1.51	1.80	1.80	2.08	1541.176	1.42	1.43	1.43
1750.000	1.84	1.67	1.58	1.92	1.85	2.08	1750.000	1.63	1.68	1.74
1885.294	1.85	1.69	1.59	2.01	1.77	1.87	1885.294	1.94	1.96	1.97
1930.000	1.84	1.68	1.59	2.10	1.80	1.91	1930.000	2.03	2.03	2.03
2000.000	1.84	1.67	1.58	1.92	1.68	1.74	2000.000	2.14	2.12	2.12

very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Models

SRA-2H
ZAD-2H
ZLW-2H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
2.000	32.00	6.93	6.71	6.48	52.91	49.37	46.27	49.31	47.92	43.98
34.194	64.19	6.30	6.17	6.03	49.62	46.77	43.88	47.55	45.60	42.10
66.388	96.39	6.37	6.25	6.18	48.79	45.81	43.01	45.80	44.10	41.18
130.780	100.78	6.29	6.14	6.03	47.13	44.80	42.75	41.01	41.52	40.71
195.160	165.16	6.40	6.30	6.19	45.10	43.07	41.76	39.16	39.47	39.17
227.360	197.36	6.45	6.32	6.20	42.87	41.46	40.52	37.32	37.60	37.35
291.750	261.75	6.33	6.23	6.13	40.85	39.76	38.85	34.92	35.26	35.12
356.130	326.13	6.56	6.42	6.28	39.56	38.97	38.28	32.79	33.32	33.47
420.520	390.52	6.70	6.62	6.47	39.57	37.70	36.28	30.93	31.07	31.04
484.910	454.91	6.83	6.65	6.40	39.10	37.81	36.00	29.95	29.46	29.08
517.100	487.10	6.90	6.59	6.40	38.41	37.82	36.22	29.98	29.13	28.32
549.300	519.30	7.32	6.96	6.60	37.39	38.18	37.18	29.72	30.50	29.89
645.880	615.88	7.74	7.10	6.67	36.98	37.13	35.93	28.19	29.06	27.86
678.070	648.07	7.67	7.02	6.65	33.72	33.22	32.85	26.17	26.56	24.82
742.460	712.46	7.38	6.87	6.50	33.81	32.76	32.02	24.46	24.80	23.87
806.850	776.85	7.48	7.04	6.63	32.85	31.78	32.24	23.69	23.82	22.91
871.240	841.24	8.64	8.09	7.55	32.04	32.53	33.39	23.09	23.46	22.87
935.630	905.63	9.31	8.66	8.07	32.55	33.52	34.06	22.99	23.26	22.52
967.820	937.82	9.39	8.70	8.18	32.76	34.06	34.42	22.83	22.82	22.53
1000.000	970.00	9.34	8.81	8.38	32.61	33.66	33.51	22.51	22.59	22.51

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.000	1.31	1.29	1.35	1.73	2.33	3.08	2.04	1.50	1.22
35.121	1.11	1.02	1.16	1.59	2.11	2.78	1.97	1.47	1.22
65.242	1.11	1.01	1.18	1.61	2.15	2.92	2.01	1.50	1.25
100.000	1.12	1.01	1.20	1.53	2.04	2.68	2.02	1.53	1.31
155.610	1.15	1.02	1.24	1.56	2.05	2.82	2.08	1.60	1.41
200.000	1.17	1.04	1.27	1.54	1.99	2.62	2.03	1.62	1.45
245.970	1.19	1.05	1.32	1.53	1.99	2.60	2.12	1.69	1.53
336.330	1.22	1.07	1.34	1.56	1.98	2.58	2.11	1.70	1.56
366.450	1.24	1.08	1.36	1.62	2.04	2.75	2.13	1.71	1.57
426.700	1.27	1.09	1.34	1.61	2.01	2.60	2.05	1.63	1.50
500.000	1.35	1.12	1.28	1.68	2.01	2.61	1.93	1.50	1.35
547.180	1.44	1.15	1.23	1.68	2.02	2.62	1.87	1.41	1.22
637.550	1.64	1.30	1.20	1.66	1.97	2.53	1.73	1.30	1.10
667.670	1.73	1.38	1.23	1.64	1.93	2.50	1.68	1.32	1.21
727.910	1.98	1.62	1.43	1.65	1.92	2.46	1.71	1.49	1.54
788.150	2.42	2.00	1.80	1.71	1.96	2.50	1.88	1.82	2.06
848.390	2.95	2.47	2.27	1.79	1.97	2.57	2.15	2.27	2.75
908.640	3.42	3.33	2.72	1.81	1.98	2.57	2.54	2.80	3.62
938.760	3.74	3.56	2.96	1.81	2.02	2.63	2.78	3.22	4.32
1000.000	4.10	3.82	3.37	1.93	2.11	2.69	3.30	3.87	5.46

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
2.000	−711.40	+3.28
33.188	−755.00	+4.40
64.376	−759.10	+4.15
100.000	−749.60	+3.83
157.940	−762.10	+4.25
200.000	−753.40	+3.77
251.500	−768.70	+2.77
313.880	−761.30	+2.01
376.260	−700.90	+.48
438.630	−650.60	+1.04
500.000	−680.80	+1.03
532.200	−657.30	+.11
625.760	−636.50	+2.34
656.950	−623.10	+4.71
719.320	−599.60	+5.21
781.700	−594.40	+2.49
844.080	−547.40	+4.53
906.450	−565.00	+5.64
937.640	−551.90	+8.10
1000.000	−466.70	10.32

Measurements at RF & LO Power +17 dBm

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Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband high dynamic range

Frequency Mixers

Model
ZEM-4300MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
300.000	500.000	7.57	7.02	6.67	300.000	43.35	42.09	40.49	11.43	9.54	8.77
500.000	700.000	8.37	6.66	6.00	500.000	37.14	33.47	33.25	8.74	9.04	10.15
575.860	775.862	7.38	6.30	5.60	575.860	37.70	35.56	35.06	8.18	9.47	11.38
600.000	800.000	7.34	6.62	5.88	600.000	37.59	35.00	34.05	8.22	9.79	11.86
989.660	789.655	7.80	6.61	5.89	989.660	38.03	36.09	34.58	14.54	17.49	19.75
1000.000	800.000	7.61	6.53	5.99	1000.000	38.18	36.06	34.71	14.52	17.37	19.48
1403.450	1203.448	6.77	6.30	6.02	1403.450	31.74	32.65	33.06	15.13	14.72	14.13
1679.310	1479.310	6.07	5.89	5.60	1679.310	36.70	39.70	41.55	17.17	19.11	20.80
2000.000	1800.000	6.80	6.16	5.89	2000.000	33.37	34.09	34.46	21.40	23.50	24.76
2093.100	1893.103	7.06	6.43	5.91	2093.100	33.03	33.26	33.41	22.06	23.82	24.49
2231.030	2031.035	7.11	6.54	6.15	2231.030	32.10	32.41	32.35	23.59	25.64	25.83
2368.970	2168.966	6.71	6.30	6.03	2368.970	31.01	31.34	31.40	24.92	28.66	29.56
2506.900	2306.897	6.64	6.24	5.91	2506.900	29.33	29.89	30.01	22.30	27.33	32.64
2920.690	2720.690	6.63	6.23	5.91	2920.690	27.36	27.73	28.35	15.11	17.77	20.51
3000.000	2800.000	6.54	6.20	5.89	3000.000	25.60	26.08	26.50	13.82	16.39	18.66
3334.480	3134.483	6.54	6.22	6.15	3334.480	26.40	27.73	29.51	15.10	15.67	14.59
3610.340	3410.345	7.35	6.38	6.20	3610.340	29.54	30.12	32.02	16.80	13.56	10.92
4000.000	3800.000	6.98	6.47	6.37	4000.000	30.72	33.12	34.86	11.63	10.27	9.25
4162.070	3962.069	6.89	6.54	6.24	4162.070	31.76	35.73	39.24	10.73	10.47	10.18
4300.000	4100.000	7.00	6.83	6.66	4300.000	34.27	39.65	43.08	11.43	11.87	11.95

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
300.000	2.29	2.21	2.06	7.63	5.54	4.24	5.000	1.13	1.33	1.49
500.000	3.42	3.20	2.94	12.26	5.20	3.78	12.500	1.12	1.32	1.48
600.000	3.47	3.19	2.90	11.93	5.14	4.27	20.000	1.12	1.32	1.48
733.330	2.74	2.55	2.34	7.80	6.32	6.63	50.000	1.11	1.30	1.45
1000.000	1.78	1.64	1.56	3.81	4.48	5.99	95.450	1.06	1.23	1.37
1166.670	2.81	2.66	2.48	2.35	3.06	4.03	100.000	1.05	1.22	1.36
1455.560	5.89	5.34	4.91	1.78	2.48	3.34	185.910	1.07	1.09	1.21
1744.440	4.73	4.31	3.90	3.30	4.59	7.44	200.000	1.10	1.06	1.18
2000.000	2.81	2.63	2.55	2.44	2.77	3.62	276.360	1.22	1.09	1.13
2100.000	2.62	2.48	2.40	1.84	1.88	2.33	366.820	1.42	1.31	1.32
2177.780	2.57	2.42	2.35	1.83	1.88	2.30	457.270	1.63	1.60	1.65
2200.000	2.50	2.35	2.29	1.85	1.89	2.33	487.420	1.72	1.72	1.79
2466.670	2.44	2.26	2.15	1.77	1.90	2.34	500.000	1.74	1.76	1.83
2755.560	2.51	2.30	2.17	2.25	2.41	3.01	547.730	1.84	1.94	2.05
3000.000	2.45	2.29	2.17	2.21	2.23	2.63	638.180	2.01	2.28	2.47
3188.890	2.42	2.29	2.20	3.37	3.01	3.32	728.640	2.09	2.51	2.81
3500.000	1.89	1.82	1.78	3.82	2.73	2.36	819.090	2.02	2.45	2.78
3911.110	2.57	2.35	2.18	2.49	1.84	1.71	909.550	1.91	2.21	2.51
4055.560	2.51	2.27	2.09	2.17	2.41	2.84	969.850	1.87	2.04	2.21
4200.000	2.58	2.30	2.08	2.39	3.08	3.75	1000.000	1.94	2.03	2.13

ϕ detection

FREQ. (MHz)	max DC output mV	DC offset mV
300.000	-310.80	6.58
500.000	-387.70	2.49
575.860	-434.10	2.32
600.000	-457.50	2.75
989.660	-287.88	-0.77
1000.000	-313.30	-5.56
1403.450	-165.40	-10.71
1679.310	-48.66	-12.26
2000.000	2.35	-10.07
2093.100	74.80	-5.66
2231.030	136.41	-9.20
2368.970	218.78	-5.88
2506.900	288.56	-4.73
2920.690	401.60	-3.67
3000.000	364.70	-1.95
3334.480	535.80	11.35
3610.340	512.70	11.36
4000.000	498.80	4.45
4162.070	454.50	-12.32
4300.000	349.10	-18.78

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very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Models

GRA-3H
SRA-3H
ZAD-3H
ZLW-3H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
.050	30.05	5.94	5.79	5.69	63.58	61.52	59.06	63.39	58.47	54.35
.200	30.20	5.43	5.33	5.26	63.56	61.30	59.59	63.01	55.83	51.32
1.000	31.00	5.36	5.25	5.17	63.21	61.00	59.26	62.31	55.41	51.09
5.000	35.00	5.30	5.18	5.09	59.91	58.85	57.26	59.04	54.15	50.39
10.000	40.00	5.45	5.36	5.31	55.77	54.85	53.74	54.60	51.92	49.03
20.000	50.00	5.47	5.40	5.33	49.45	48.89	47.90	48.40	47.33	45.75
41.419	71.42	5.44	5.37	5.34	41.90	41.07	40.20	41.58	40.89	39.80
50.000	80.00	5.42	5.37	5.32	40.52	39.79	38.86	40.62	39.78	38.31
68.998	99.00	5.41	5.34	5.35	38.92	39.34	39.48	39.24	38.19	35.81
89.682	59.68	5.34	5.33	5.35	37.88	38.45	37.92	37.20	35.45	32.36
103.470	73.47	5.36	5.34	5.31	36.43	36.25	35.85	36.57	36.39	35.76
110.370	80.37	5.43	5.37	5.35	36.01	35.73	35.39	36.26	35.84	35.00
117.260	87.26	5.44	5.38	5.38	35.44	35.17	34.90	36.13	35.59	34.54
131.050	101.05	5.47	5.40	5.42	34.56	34.48	34.34	35.04	35.04	34.25
137.950	107.95	5.48	5.42	5.44	33.93	33.95	33.85	34.02	34.10	33.54
151.740	121.74	5.59	5.50	5.46	32.76	32.91	32.94	32.01	31.97	31.41
165.530	135.53	5.76	5.66	5.59	31.48	31.97	32.47	30.24	30.09	29.81
179.310	149.31	5.87	5.76	5.71	30.68	31.41	31.64	29.03	28.67	28.08
193.100	163.10	5.84	5.77	5.71	31.03	31.62	31.68	29.24	28.17	27.46
200.000	170.00	5.84	5.75	5.75	31.73	32.02	31.51	30.13	28.21	26.97

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.32	1.22	1.15	1.61	2.35	3.15	1.63	1.53	1.40
10.000	1.33	1.23	1.15	1.57	2.27	3.04	1.64	1.54	1.41
20.000	1.32	1.22	1.15	1.54	2.14	2.85	1.64	1.53	1.41
27.285	1.31	1.21	1.14	1.56	2.17	2.81	1.63	1.53	1.41
38.429	1.30	1.20	1.13	1.62	2.19	2.83	1.65	1.55	1.43
44.000	1.29	1.20	1.13	1.61	2.19	2.85	1.66	1.56	1.44
50.000	1.29	1.19	1.12	1.61	2.18	2.87	1.70	1.60	1.47
66.286	1.28	1.18	1.11	1.62	2.27	2.99	1.76	1.66	1.53
77.429	1.24	1.15	1.09	1.61	2.20	2.97	1.76	1.66	1.55
83.000	1.24	1.15	1.09	1.60	2.21	2.92	1.79	1.71	1.58
94.143	1.22	1.13	1.08	1.58	2.14	2.77	1.83	1.73	1.61
100.000	1.21	1.13	1.08	1.57	2.07	2.69	1.87	1.77	1.65
110.860	1.20	1.11	1.08	1.59	2.12	2.71	1.90	1.79	1.66
127.570	1.17	1.10	1.08	1.62	2.15	2.76	2.02	1.91	1.77
138.710	1.16	1.10	1.09	1.65	2.24	2.88	2.06	1.94	1.82
149.860	1.16	1.11	1.11	1.68	2.21	2.88	2.15	2.03	1.90
166.570	1.16	1.12	1.14	1.64	2.17	2.74	2.32	2.18	2.02
177.710	1.17	1.14	1.16	1.66	2.13	2.67	2.43	2.30	2.12
188.860	1.19	1.17	1.19	1.68	2.20	2.72	2.56	2.40	2.22
200.000	1.20	1.19	1.22	1.74	2.23	2.77	2.59	2.43	2.26

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.050	−715.82	−.19
.200	−730.20	−.31
1.000	−777.50	−.37
5.000	−776.90	−.34
10.000	−780.10	−.35
20.000	−779.70	−.37
27.629	−781.70	−.40
34.524	−777.00	−.41
50.000	−773.40	−.53
68.998	−778.30	−.62
82.788	−781.90	−1.02
100.000	−785.10	−1.24
110.370	−754.50	−1.37
124.160	−746.40	−1.54
137.950	−741.40	−1.89
151.740	−751.90	−2.28
165.530	−768.40	−3.12
179.310	−750.20	−2.75
186.210	−739.60	−3.02
200.000	−715.40	−4.31

Measurements at RF & LO Power +17 dBm

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broadband high dynamic range

Frequency Mixers

Model
SYM-11MH

LEVEL 13 (+13dBm LO, up to +9dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
50.000	120.000	6.50	6.10	6.00	50.000	43.36	48.54	52.92	33.44	36.59	39.33
90.000	160.000	6.50	6.10	6.00	80.000	47.82	52.28	55.37	35.43	38.66	41.86
100.000	170.000	6.51	6.21	6.05	100.000	48.94	53.00	55.79	36.19	39.60	42.92
218.750	288.750	6.65	6.33	6.14	250.000	57.88	56.74	54.36	38.94	42.55	42.85
250.000	320.000	6.55	6.25	6.06	293.750	61.57	56.65	53.21	40.22	42.72	41.13
337.500	407.500	6.76	6.41	6.20	415.625	60.94	54.53	51.12	42.81	42.69	39.68
500.000	570.000	6.82	6.41	6.18	500.000	58.79	53.04	49.66	45.32	42.69	38.63
575.000	645.000	7.05	6.59	6.35	659.375	52.21	46.93	44.50	64.23	41.91	36.80
750.000	820.000	6.94	6.56	6.33	903.125	51.03	44.61	41.15	38.74	36.84	34.33
812.500	882.500	7.00	6.58	6.36	1000.000	43.98	40.78	38.95	35.90	35.69	34.01
931.250	1001.250	6.89	6.61	6.46	1025.000	43.78	40.83	39.12	35.41	35.95	34.73
1000.000	1070.000	7.00	6.67	6.51	1146.875	36.83	35.04	33.63	32.54	33.54	32.88
1168.750	1238.750	7.15	6.74	6.60	1268.750	37.61	34.57	32.40	30.53	32.06	31.94
1287.500	1357.500	7.29	6.82	6.63	1500.000	33.93	31.92	30.71	27.14	29.63	30.59
1406.250	1476.250	8.01	7.43	7.16	1512.500	33.06	31.39	30.29	26.62	29.04	30.30
1500.000	1570.000	8.45	7.93	7.73	1634.375	32.63	31.63	30.90	25.24	28.06	30.43
1643.750	1713.750	8.56	8.15	8.01	1756.250	30.31	30.24	30.02	24.68	27.57	29.76
1881.250	1951.250	8.97	8.50	8.30	1878.125	29.28	29.31	29.42	24.31	26.39	28.47
1930.000	2000.000	9.01	8.49	8.28	1930.000	28.57	28.89	29.63	24.25	25.96	28.10
2000.000	1930.000	8.82	8.12	7.83	2000.000	27.33	27.68	29.26	24.01	25.70	27.78

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
50.000	1.33	1.21	1.14	1.42	2.10	2.84	50.000	1.50	1.33	1.21
80.000	1.33	1.20	1.11	1.42	2.06	2.88	80.000	1.51	1.34	1.20
100.000	1.33	1.20	1.10	1.41	2.06	2.84	100.000	1.53	1.34	1.21
250.000	1.32	1.17	1.07	1.40	1.97	2.76	250.000	1.54	1.35	1.21
279.412	1.31	1.17	1.06	1.40	1.94	2.65	279.412	1.54	1.34	1.21
394.118	1.28	1.14	1.03	1.46	1.92	2.52	394.118	1.51	1.33	1.20
500.000	1.26	1.12	1.02	1.48	1.96	2.55	500.000	1.48	1.32	1.21
623.529	1.24	1.12	1.08	1.54	1.97	2.55	623.529	1.44	1.31	1.23
852.941	1.26	1.20	1.20	1.54	1.92	2.55	852.941	1.33	1.25	1.24
967.647	1.35	1.32	1.32	1.54	1.85	2.40	967.647	1.34	1.28	1.30
1000.000	1.39	1.35	1.35	1.56	1.75	2.20	1000.000	1.34	1.30	1.32
1082.353	1.46	1.43	1.44	1.62	1.80	2.32	1082.353	1.34	1.31	1.35
1250.000	1.69	1.64	1.64	1.64	1.68	2.04	1250.000	1.38	1.38	1.44
1426.471	1.92	1.85	1.82	1.80	1.59	1.81	1426.471	1.48	1.48	1.55
1500.000	2.01	1.92	1.88	1.97	1.66	1.74	1500.000	1.53	1.53	1.59
1541.176	2.06	1.96	1.91	2.04	1.67	1.74	1541.176	1.57	1.56	1.61
1750.000	2.25	2.12	2.01	2.04	1.64	1.66	1750.000	1.84	1.80	1.81
1885.294	2.37	2.20	2.06	2.08	1.54	1.46	1885.294	2.08	2.03	2.01
1930.000	2.40	2.23	2.06	2.14	1.54	1.42	1930.000	2.14	2.08	2.08
2000.000	2.40	2.23	2.04	2.01	1.47	1.34	2000.000	2.23	2.18	2.16

very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Models

SRA-11H
ZAD-11H
ZLW-11H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
10.000	40.00	6.65	6.43	6.25	29.46	32.26	35.15	31.29	35.01	38.32
20.000	50.00	6.86	6.58	6.38	30.90	33.52	36.23	32.90	36.85	40.67
103.440	73.44	6.82	6.60	6.56	30.27	32.25	34.14	31.34	33.97	35.97
200.000	170.00	6.97	6.78	6.69	29.63	30.89	31.97	30.19	32.03	32.50
290.310	260.31	6.98	6.75	6.69	29.02	29.76	30.82	29.68	30.61	30.29
500.000	470.00	7.33	6.94	6.74	28.37	28.74	29.10	29.59	29.28	27.72
570.630	540.69	7.10	6.81	6.69	28.55	28.80	28.62	30.12	29.04	26.81
757.500	727.50	7.47	7.00	6.71	28.55	28.06	27.68	30.93	28.08	25.88
944.380	913.91	7.46	7.05	6.78	28.81	28.00	27.12	29.49	26.87	24.90
1037.800	1007.40	7.78	7.37	7.11	29.43	28.67	28.02	28.79	26.49	24.62
1318.100	1288.00	7.07	6.81	6.68	29.84	27.69	25.93	28.34	26.66	24.74
1505.000	1474.90	6.96	6.68	6.61	31.40	27.57	26.66	29.47	27.97	27.14
1598.400	1568.30	6.85	6.65	6.51	31.75	27.30	26.37	29.82	28.78	27.76
1785.300	1755.00	6.96	6.71	6.55	28.51	27.75	27.33	28.81	28.96	28.87
1972.200	1942.10	6.81	6.57	6.40	28.55	29.51	29.42	31.67	31.44	30.97
2065.600	2035.10	7.10	6.76	6.62	28.65	28.94	29.95	33.33	33.79	33.26
2252.500	2222.10	6.97	6.61	6.61	29.37	30.22	32.20	36.04	36.80	35.41
2439.400	2408.60	6.83	6.63	6.65	29.97	31.19	32.76	42.63	37.00	33.69
2626.300	2596.00	7.07	6.95	6.93	29.64	30.21	31.34	34.17	30.13	28.25
3000.000	2969.30	8.76	8.58	8.44	33.36	32.46	36.85	31.03	26.88	26.71

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
10.000	1.18	1.13	1.09	1.40	2.07	3.20	1.24	1.13	1.07
50.000	1.13	1.07	1.02	1.46	2.19	3.04	1.20	1.08	1.02
100.000	1.14	1.08	1.04	1.36	2.01	2.84	1.20	1.09	1.03
196.880	1.18	1.13	1.08	1.35	1.96	2.69	1.24	1.13	1.06
290.310	1.24	1.18	1.12	1.32	1.91	2.76	1.30	1.19	1.11
477.190	1.36	1.29	1.20	1.33	1.83	2.54	1.37	1.28	1.19
570.630	1.42	1.34	1.24	1.33	1.81	2.40	1.38	1.29	1.20
757.500	1.57	1.48	1.36	1.36	1.81	2.35	1.36	1.27	1.17
944.380	1.78	1.66	1.50	1.30	1.80	2.24	1.36	1.27	1.18
1037.800	1.84	1.72	1.57	1.30	1.74	2.21	1.37	1.32	1.26
1224.700	2.04	1.92	1.74	1.38	1.69	2.20	1.53	1.55	1.58
1411.600	2.19	1.99	1.87	1.43	1.65	2.37	1.84	1.97	1.76
1598.400	1.94	1.75	1.89	1.50	1.91	3.60	1.96	2.35	2.14
1785.300	1.71	1.89	1.81	1.51	1.91	4.51	1.87	2.73	2.49
1972.200	1.79	1.76	1.66	1.50	1.75	2.40	2.74	3.31	2.87
2065.600	1.82	1.68	1.70	1.51	1.66	2.11	3.26	3.87	3.37
2252.500	1.80	1.68	1.64	1.46	1.49	1.72	5.79	7.31	4.88
2439.400	1.79	1.69	1.62	1.35	1.14	1.39	9.33	11.77	7.70
2626.300	1.63	1.49	1.42	1.31	1.26	1.49	14.50	16.72	10.50
3000.000	1.70	1.90	1.86	2.15	2.47	3.16	9.28	14.03	6.78

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broadband high dynamic range

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Model
LMX-123MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
10.000	40.000	6.66	5.96	5.69	10.000	43.33	47.24	50.75	32.59	36.58	40.18
20.000	50.000	6.61	5.94	5.65	20.000	45.45	49.26	52.34	33.22	37.43	41.45
50.000	80.000	6.71	6.02	5.73	50.000	47.15	51.02	53.61	33.30	37.48	41.16
100.000	70.000	6.75	6.07	5.84	100.000	47.44	51.06	52.59	32.42	36.26	39.32
200.000	170.000	6.86	6.17	5.90	200.000	49.05	49.57	48.15	32.39	35.73	37.14
250.970	220.968	6.91	6.21	5.95	250.970	49.18	47.46	46.68	32.42	35.21	35.83
491.940	461.936	7.07	6.37	5.96	491.940	43.78	43.41	42.70	33.40	33.02	31.68
500.000	470.000	7.10	6.40	5.97	500.000	43.46	43.15	42.50	33.27	32.80	31.47
732.900	702.903	7.36	6.57	6.10	732.900	40.23	39.19	39.03	32.76	30.53	28.79
973.870	943.871	7.47	6.58	6.13	973.870	42.67	40.45	39.30	32.84	29.30	27.40
1000.000	970.000	7.45	6.53	6.10	1000.000	43.41	40.71	39.31	32.77	29.02	27.11
1214.840	1184.839	8.18	7.15	6.66	1214.840	57.02	45.72	42.84	31.98	28.05	25.97
1250.000	1220.000	8.32	7.24	6.73	1250.000	54.87	48.70	44.82	32.31	28.19	25.79
1455.810	1425.807	9.02	7.63	6.92	1455.810	44.81	46.72	47.10	30.36	27.96	26.43
1696.770	1666.774	9.25	7.81	7.18	1696.770	41.11	41.63	41.65	29.00	27.83	26.86
1937.740	1907.742	9.44	7.88	7.26	1937.740	36.14	36.07	36.28	29.07	28.31	27.92
2000.000	1970.000	9.25	7.76	7.15	2000.000	35.17	35.31	35.73	28.95	28.30	28.14
2178.710	2148.710	8.62	7.48	6.98	2178.710	32.52	32.54	33.54	28.59	28.58	29.21
2419.680	2389.677	8.10	7.17	6.79	2419.680	30.43	30.75	32.06	27.41	27.78	28.99
2500.000	2470.000	8.12	7.18	6.81	2500.000	31.96	32.18	33.66	29.35	29.47	30.45

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
10.000	1.74	1.46	1.29	1.16	1.41	2.12	10.000	1.58	1.16	1.05
20.000	1.75	1.46	1.29	1.11	1.44	2.15	20.000	1.57	1.15	1.04
50.000	1.75	1.46	1.28	1.14	1.40	2.06	50.000	1.53	1.14	1.05
100.000	1.72	1.45	1.28	1.21	1.33	1.99	100.000	1.53	1.14	1.05
200.000	1.74	1.47	1.31	1.28	1.29	1.90	200.000	1.51	1.13	1.05
408.400	1.88	1.62	1.47	1.45	1.25	1.77	408.400	1.48	1.12	1.05
500.000	2.02	1.73	1.57	1.55	1.24	1.70	500.000	1.47	1.15	1.05
682.300	2.38	2.08	1.90	1.78	1.27	1.56	682.300	1.47	1.13	1.03
881.500	2.69	2.37	2.17	2.15	1.35	1.39	881.500	1.50	1.18	1.06
1000.000	2.78	2.45	2.24	2.50	1.49	1.30	1000.000	1.54	1.24	1.12
1155.400	2.76	2.41	2.22	2.74	1.58	1.23	1155.400	1.63	1.35	1.22
1250.000	2.69	2.36	2.17	2.84	1.62	1.15	1250.000	1.71	1.43	1.30
1429.300	2.55	2.24	2.05	2.69	1.61	1.09	1429.300	1.86	1.58	1.43
1628.500	2.54	2.24	2.05	2.72	1.62	1.04	1628.500	1.99	1.68	1.52
1827.700	2.49	2.23	2.06	2.44	1.55	1.05	1827.700	2.06	1.73	1.56
2000.000	2.28	2.06	1.92	2.45	1.56	1.10	2000.000	1.97	1.66	1.49
2101.600	2.15	1.94	1.82	2.57	1.61	1.12	2101.600	1.86	1.57	1.42
2300.800	1.92	1.75	1.65	2.47	1.61	1.25	2300.800	1.64	1.41	1.29
2425.300	1.86	1.70	1.59	2.26	1.57	1.42	2425.300	1.55	1.37	1.29
2500.000	1.83	1.68	1.57	2.16	1.56	1.48	2500.000	1.52	1.37	1.31

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very high dynamic range

Frequency Mixers

Models
SRA-173H

LEVEL 17 (+17dBm LO, up to +10dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
5.000	35.00	5.61	5.36	5.21	38.90	40.90	43.43	37.50	39.89	41.78
10.000	40.00	5.47	5.22	5.15	39.23	41.90	44.17	40.65	43.43	45.51
20.000	50.00	5.63	5.36	5.25	40.04	42.71	45.06	41.68	44.48	46.35
50.000	80.00	5.57	5.33	5.26	39.43	41.81	43.72	40.61	42.82	43.93
100.000	70.00	5.55	5.34	5.26	38.64	40.38	41.69	39.38	40.38	40.76
128.620	98.62	5.59	5.36	5.33	38.20	39.66	40.47	38.61	39.17	39.09
200.000	170.00	5.70	5.47	5.38	37.19	38.20	38.80	36.75	36.56	36.05
252.240	222.24	5.83	5.54	5.42	36.66	37.74	37.96	35.55	35.15	34.45
334.660	304.66	5.69	5.46	5.40	36.35	37.00	36.84	33.82	33.06	32.19
417.070	387.07	5.75	5.47	5.39	35.71	36.23	36.50	32.59	31.39	30.37
500.000	470.00	5.95	5.65	5.57	36.91	37.19	36.50	32.04	30.16	28.71
581.900	551.90	5.78	5.49	5.40	37.93	37.86	37.28	32.32	29.87	28.35
623.110	593.11	5.97	5.61	5.52	34.30	34.99	35.07	32.27	29.66	27.90
705.520	675.52	6.10	5.76	5.59	35.89	35.63	34.99	32.51	29.66	27.57
800.000	770.00	6.75	6.43	6.38	37.22	36.96	36.12	32.61	29.67	27.61
911.550	881.55	7.21	6.71	6.39	35.14	35.83	35.11	32.87	30.27	28.30
1000.000	970.00	7.15	6.65	6.34	35.08	33.44	31.61	33.03	32.10	30.71
1076.400	1046.40	7.01	6.45	6.20	36.33	35.45	33.54	30.48	31.19	31.23
1158.800	1128.80	7.04	6.29	6.04	34.81	35.75	35.82	33.57	36.16	37.63
1200.000	1170.00	6.80	6.08	6.01	34.39	34.68	34.53	34.21	37.45	39.04

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.25	1.18	1.09	1.68	2.53	3.86	1.10	1.06	1.12
10.000	1.24	1.18	1.08	1.69	2.52	3.46	1.09	1.03	1.10
20.000	1.25	1.18	1.07	1.70	2.54	3.85	1.08	1.00	1.10
50.000	1.24	1.17	1.06	1.62	2.44	3.65	1.08	1.01	1.11
100.000	1.26	1.18	1.08	1.65	2.36	3.41	1.09	1.01	1.10
124.500	1.27	1.20	1.09	1.69	2.40	3.40	1.10	1.02	1.10
200.000	1.34	1.26	1.14	1.57	2.16	2.92	1.14	1.05	1.07
283.830	1.42	1.34	1.21	1.48	1.99	2.77	1.20	1.10	1.04
363.500	1.52	1.44	1.29	1.43	1.93	2.59	1.25	1.14	1.03
443.160	1.67	1.56	1.40	1.32	1.75	2.37	1.31	1.20	1.06
500.000	1.76	1.66	1.47	1.28	1.67	2.21	1.36	1.25	1.10
602.500	1.95	1.85	1.61	1.26	1.55	2.01	1.42	1.32	1.18
682.160	2.12	2.01	1.76	1.24	1.40	1.87	1.46	1.38	1.27
761.830	2.37	2.24	1.98	1.20	1.29	1.70	1.55	1.48	1.39
841.490	2.59	2.43	2.15	1.23	1.21	1.60	1.64	1.59	1.52
921.160	2.82	2.66	2.31	1.20	1.17	1.52	1.74	1.71	1.66
1000.000	2.92	2.61	2.37	1.24	1.20	1.52	1.81	1.79	1.75
1080.500	2.99	2.78	2.46	1.31	1.32	1.54	1.91	1.88	1.83
1160.200	2.78	2.59	2.33	1.39	1.48	1.64	1.85	1.83	1.78
1200.000	2.68	2.53	2.26	1.49	1.59	1.73	1.87	1.84	1.81

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
5.000	+397.20	−1.85
10.000	+397.00	−1.96
20.000	+392.50	−2.11
50.000	+385.40	−2.50
100.000	+390.90	−2.89
200.000	+397.50	−1.99
289.000	+407.20	−1.11
360.000	+387.50	+0.00
431.000	+334.40	−.48
537.500	+352.60	−1.94
608.500	+357.50	−4.39
679.500	+311.20	−3.23
750.500	+293.80	−2.37
800.000	+297.03	−1.95
857.000	+309.00	−1.18
928.000	+319.80	−.76
1000.000	+346.00	−.84
1100.000	+353.40	−.53
1150.000	+361.10	−.93
1200.000	+351.60	−1.13

Measurements at RF & LO Power +17 dBm

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broadband high dynamic range

Frequency Mixers

LEVEL 10 (+10dBm LO, up to +5dBm RF)

Model
SYM-11LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
1.000	31.000	6.90	6.50	6.30	1.000	58.40	61.00	64.00	58.50	60.60	61.40
5.000	35.000	6.80	6.40	6.30	5.000	58.20	60.80	63.60	58.50	60.00	61.00
10.000	40.000	6.70	6.30	6.20	10.000	58.18	60.77	63.32	58.45	59.99	60.87
20.000	50.000	6.50	6.10	6.00	20.000	58.44	61.07	63.59	58.53	59.34	59.43
50.000	80.000	6.24	5.93	5.73	60.000	57.45	60.38	62.67	56.35	54.58	52.68
80.000	110.000	6.20	5.94	5.77	100.000	56.24	59.60	62.21	53.49	51.54	49.60
100.000	130.000	6.12	5.84	5.69	134.375	54.67	58.27	60.27	51.54	48.96	46.75
250.000	280.000	7.08	6.38	6.08	383.125	45.79	48.22	49.08	37.30	36.40	34.89
440.000	470.000	7.37	6.40	6.25	500.000	42.37	45.06	46.96	33.66	34.17	33.48
500.000	530.000	7.91	7.29	6.42	631.875	39.53	42.23	43.76	31.03	31.50	31.12
700.000	730.000	8.47	7.50	7.14	880.625	36.87	38.46	39.70	28.49	29.07	29.00
830.000	860.000	8.67	7.95	7.53	1000.000	36.13	38.08	39.55	27.90	28.07	27.58
1000.000	1030.000	8.36	7.91	7.76	1005.000	36.02	37.94	39.72	27.70	28.08	27.79
1090.000	1120.000	8.66	8.16	8.01	1129.375	33.89	36.12	37.96	27.30	27.65	27.28
1250.000	1280.000	8.72	8.27	8.33	1253.750	34.00	36.11	37.68	26.01	27.37	27.60
1480.000	1510.000	9.00	8.38	8.56	1500.000	34.45	36.02	38.01	24.03	25.08	25.44
1610.000	1640.000	9.39	8.70	8.73	1626.875	34.58	36.26	38.33	24.17	25.19	25.54
1870.000	1900.000	9.75	8.97	8.80	1875.625	33.82	35.66	37.48	26.15	25.82	25.24
1970.000	2000.000	9.71	8.88	8.66	1970.000	31.57	33.51	34.92	29.07	28.03	27.09
2000.000	1970.000	9.58	8.78	8.59	2000.000	31.23	32.77	34.14	32.88	31.12	29.66

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
1.000	1.80	1.69	1.59	1.51	2.23	3.16	1.000	1.26	1.31	1.42
5.000	2.04	1.91	1.78	1.50	2.25	3.16	5.000	1.16	1.10	1.24
10.000	2.06	1.92	1.78	1.45	2.23	3.21	10.000	1.15	1.06	1.22
20.000	2.04	1.91	1.78	1.48	2.18	3.16	20.000	1.14	1.06	1.23
60.000	2.03	1.89	1.77	1.44	2.10	3.06	60.000	1.12	1.08	1.24
100.000	2.08	1.92	1.80	1.43	2.14	3.11	100.000	1.11	1.09	1.25
118.588	2.08	1.94	1.81	1.43	2.14	3.06	118.588	1.10	1.09	1.25
250.000	2.27	2.12	1.99	1.46	2.08	2.88	250.000	1.05	1.14	1.30
471.353	2.80	2.58	2.40	1.62	2.10	2.84	471.353	1.13	1.33	1.49
500.000	2.84	2.65	2.46	1.62	2.12	2.80	500.000	1.16	1.36	1.52
600.000	3.06	2.84	2.61	1.71	2.06	2.65	600.000	1.30	1.50	1.67
750.000	3.38	3.11	2.92	1.78	1.92	2.37	750.000	1.61	1.84	2.03
941.706	3.64	3.38	3.21	1.91	2.08	2.58	941.706	2.14	2.40	2.58
1000.000	3.57	3.38	3.26	2.01	1.92	2.18	1000.000	2.32	2.58	2.80
1176.882	3.44	3.26	3.16	2.25	1.97	2.10	1176.882	2.96	3.16	3.32
1412.059	3.71	3.57	3.44	2.32	1.97	2.08	1412.059	3.57	3.71	3.79
1529.647	3.57	3.44	3.38	2.32	1.94	1.94	1529.647	3.71	3.79	3.86
1764.824	3.57	3.44	3.38	2.32	1.89	1.88	1764.824	3.95	3.95	3.95
1970.000	3.64	3.50	3.38	2.25	1.85	1.84	1970.000	5.33	5.33	5.17
2000.000	3.57	3.44	3.32	2.20	1.84	1.82	2000.000	5.49	5.49	5.49

very high dynamic range

Frequency Mixers

LEVEL 17 (+17dBm LO, up to +10dBm RF)

Model GRA-6H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
.010	10.01	5.92	5.62	5.42	43.33	46.56	49.30	46.90	51.09	54.83
.050	10.05	5.73	5.43	5.23	42.58	45.58	48.19	46.82	51.49	56.32
1.000	11.00	5.50	5.12	4.91	42.61	45.58	48.08	46.98	51.68	56.53
2.000	12.00	5.61	5.21	5.02	42.60	45.54	48.01	47.06	51.74	56.56
5.181	15.18	5.54	5.17	4.96	42.31	45.34	47.48	46.90	51.91	55.58
8.629	18.63	5.44	5.12	4.94	41.97	44.70	46.04	46.70	50.82	50.82
10.353	20.35	5.33	4.99	4.86	41.97	44.63	45.26	46.84	50.65	47.94
12.077	22.08	5.46	5.14	4.98	41.37	42.99	42.09	46.65	47.65	45.24
15.524	25.52	5.54	5.22	5.04	41.05	43.04	42.82	45.55	47.43	45.02
18.972	28.97	5.56	5.23	5.06	40.67	41.43	40.61	43.85	42.53	41.12
20.696	30.70	5.46	5.15	5.00	40.72	41.90	42.20	43.06	42.00	41.06
24.143	34.14	5.33	5.09	4.98	40.51	40.47	39.70	40.69	39.58	38.89
29.315	19.32	5.42	5.11	4.98	39.39	39.44	38.13	39.85	38.64	37.56
31.038	21.04	5.43	5.15	5.02	37.98	38.02	36.56	38.30	37.39	36.36
34.486	24.49	5.32	5.06	4.95	37.39	38.02	37.21	37.34	37.16	36.94
37.934	27.93	5.31	5.10	5.02	36.58	36.77	36.47	36.10	35.53	36.04
41.381	31.38	5.37	5.14	5.06	35.34	35.53	34.68	35.32	34.73	34.04
44.829	34.83	5.41	5.19	5.11	33.71	34.19	34.01	34.11	33.90	33.73
46.553	36.55	5.45	5.20	5.11	32.44	32.84	32.27	32.99	32.71	32.42
50.000	40.00	5.49	5.28	5.17	32.15	32.37	31.41	32.57	32.14	31.65

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.56	1.34	1.20	1.20	1.49	2.48	1.64	1.45	1.34
7.434	1.56	1.34	1.20	1.23	1.47	2.49	1.64	1.46	1.34
8.650	1.56	1.34	1.21	1.22	1.42	2.46	1.64	1.46	1.35
10.000	1.56	1.34	1.21	1.23	1.46	2.40	1.65	1.46	1.35
12.297	1.55	1.33	1.20	1.23	1.43	2.39	1.66	1.47	1.36
15.946	1.54	1.33	1.20	1.24	1.40	2.30	1.68	1.49	1.38
18.378	1.53	1.32	1.20	1.27	1.39	2.27	1.69	1.50	1.39
20.811	1.52	1.32	1.19	1.25	1.40	2.24	1.71	1.52	1.40
23.243	1.51	1.30	1.18	1.25	1.40	2.22	1.72	1.53	1.43
25.676	1.49	1.29	1.18	1.22	1.43	2.21	1.73	1.55	1.44
28.108	1.48	1.28	1.17	1.20	1.45	2.24	1.75	1.56	1.46
31.757	1.45	1.26	1.15	1.18	1.49	2.26	1.77	1.59	1.49
35.405	1.43	1.25	1.15	1.19	1.52	2.28	1.81	1.63	1.53
37.838	1.41	1.24	1.14	1.19	1.54	2.27	1.84	1.66	1.55
39.054	1.40	1.23	1.14	1.18	1.55	2.30	1.85	1.68	1.57
41.486	1.39	1.23	1.14	1.19	1.55	2.31	1.89	1.70	1.60
45.135	1.36	1.21	1.14	1.21	1.56	2.32	1.95	1.75	1.65
46.351	1.35	1.21	1.15	1.22	1.56	2.32	1.94	1.76	1.67
48.784	1.34	1.21	1.15	1.25	1.57	2.31	1.99	1.81	1.71
50.000	1.34	1.20	1.16	1.26	1.58	2.31	2.02	1.83	1.73

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.010	−951.02	−1.88
.100	−976.20	−3.28
1.000	−978.60	−3.33
3.343	−980.30	−3.40
5.000	−977.30	−3.40
8.342	−972.70	−3.39
10.000	−983.50	−3.50
11.674	−985.10	−3.64
15.007	−1006.10	−3.74
18.339	−1002.70	−3.19
21.672	−1023.00	−3.39
25.005	−1015.60	−3.74
28.337	−1010.00	−4.33
31.670	−1002.70	−4.53
35.002	−1008.70	−5.81
38.335	−1000.30	−6.67
41.668	−1000.50	−7.57
45.000	−993.30	−7.78
48.333	−982.30	−6.82
50.000	−975.30	−6.43

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

broadband high dynamic range

Frequency Mixers

LEVEL 10: (+10dBm LO, up to +5dBm RF)

Models
RMS-5LH
LRMS-5LH
JMS-5LH

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
10.000	40.000	6.19	5.72	5.52	10.000	67.91	67.66	67.05	67.81	66.96	61.29
20.000	50.000	5.96	5.51	5.37	20.000	66.98	65.38	63.71	64.68	62.08	55.74
50.000	80.000	5.72	5.28	5.12	50.000	67.77	62.52	59.92	58.17	56.44	48.86
100.000	70.000	5.66	5.24	5.10	100.000	81.27	60.56	56.90	52.26	50.66	43.46
154.190	124.194	5.68	5.27	5.13	154.190	63.60	57.69	53.49	48.91	46.95	39.45
200.000	170.000	5.64	5.26	5.14	200.000	55.37	53.98	50.86	44.65	43.78	36.46
298.390	268.387	5.83	5.39	5.21	298.390	45.53	46.15	45.38	38.88	37.49	31.95
442.580	412.581	6.36	5.83	5.59	442.580	37.69	38.38	38.14	33.20	30.46	26.40
500.000	470.000	6.53	6.00	5.59	500.000	35.47	36.28	36.34	31.00	28.19	24.71
586.770	556.774	6.76	6.07	5.62	586.770	32.75	33.52	33.72	27.63	24.91	22.18
730.970	700.968	7.69	6.90	6.39	730.970	29.16	30.15	30.59	22.27	20.68	18.69
750.000	720.000	7.35	6.57	6.11	750.000	28.86	29.88	30.41	21.68	20.05	18.29
875.160	845.161	7.75	7.15	6.81	875.160	27.02	28.44	29.28	19.06	16.93	15.36
1000.000	970.000	8.13	7.62	7.23	1000.000	25.85	27.37	28.55	16.88	15.37	13.87
1019.350	989.355	7.41	6.91	6.57	1019.350	25.49	27.03	28.32	16.54	15.01	13.57
1163.550	1133.548	8.22	7.82	7.69	1163.550	24.22	25.69	26.85	13.64	12.77	11.93
1259.680	1229.677	8.28	7.99	7.82	1259.680	23.64	25.02	26.19	12.44	11.85	11.17
1403.870	1373.871	8.44	7.89	7.76	1403.870	22.12	23.59	24.60	10.81	10.74	10.31
1451.940	1421.936	8.80	8.03	7.83	1451.940	21.66	23.18	24.29	10.61	10.63	10.35
1500.000	1470.000	9.07	8.11	7.81	1500.000	21.18	22.62	23.79	10.38	10.48	10.23

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
10.000	1.67	1.65	1.71	1.89	2.80	4.01	10.000	1.10	1.12	1.35	10.000	328.40	0.06
20.000	1.30	1.30	1.33	1.85	2.77	4.01	20.000	1.10	1.13	1.35	20.000	331.20	0.04
50.000	1.06	1.04	1.04	1.96	2.82	4.19	50.000	1.15	1.16	1.37	50.000	339.10	0.09
100.000	1.26	1.21	1.22	1.87	2.67	3.92	100.000	1.27	1.21	1.37	100.000	333.40	0.04
154.190	1.54	1.47	1.50	1.84	2.56	3.67	106.130	1.29	1.22	1.37	106.130	328.80	0.08
200.000	1.80	1.70	1.74	1.78	2.44	3.33	200.000	1.56	1.39	1.40	200.000	325.60	0.18
298.390	2.34	2.15	2.24	1.71	2.24	2.90	202.260	1.56	1.39	1.40	250.320	325.60	0.65
442.580	2.89	2.60	2.74	1.59	1.92	2.32	250.320	1.67	1.45	1.39	394.520	315.40	1.74
500.000	2.91	2.60	2.75	1.54	1.88	2.36	298.390	1.75	1.50	1.39	500.000	306.90	2.80
586.770	2.63	2.43	2.55	1.52	1.88	2.34	394.520	1.83	1.53	1.35	538.710	287.62	2.51
730.970	2.53	2.37	2.48	1.79	2.39	3.07	442.580	1.82	1.51	1.31	682.900	285.75	4.90
750.000	2.51	2.36	2.47	1.97	2.56	3.27	500.000	1.76	1.46	1.25	730.970	293.56	6.73
875.160	3.36	3.20	3.44	2.58	3.36	4.25	538.710	1.68	1.40	1.21	875.160	297.88	9.35
1000.000	4.95	4.75	5.31	3.38	4.08	4.91	586.770	1.56	1.31	1.17	1000.000	295.99	8.51
1019.350	4.62	4.51	5.00	3.45	4.11	4.96	634.840	1.42	1.23	1.18	1019.350	301.91	8.65
1163.550	6.86	6.63	7.80	4.18	4.54	5.23	730.970	1.38	1.45	1.63	1163.550	302.53	7.10
1259.680	6.32	6.05	6.97	5.00	4.67	5.04	779.030	1.28	1.40	1.62	1259.680	289.83	6.81
1403.870	4.48	4.25	4.68	4.62	4.06	4.04	827.100	1.31	1.51	1.78	1403.870	288.72	10.07
1451.940	3.98	3.76	4.09	4.44	3.86	3.70	875.160	1.40	1.64	1.93	1451.940	287.52	13.78
1500.000	3.51	3.33	3.59	4.40	3.66	3.50	900.000	1.48	1.73	2.03	1500.000	277.56	19.02

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
TAK-1H
TFM-1H
TUF-1H
ZAD-1SH
ZFM-1H
ZLW-1SH
ZP-1H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
2.000	32.00	6.99	6.30	5.96	59.73	62.98	64.42	49.91	52.28	53.48
5.000	35.00	6.55	5.95	5.64	58.95	62.06	63.57	50.65	52.79	53.94
10.000	40.00	6.49	5.92	5.61	58.36	60.47	61.17	50.51	52.35	53.27
20.000	50.00	6.50	5.91	5.56	56.65	57.14	56.42	49.94	51.13	51.39
34.130	64.13	6.36	5.81	5.52	54.15	53.27	52.36	49.01	49.30	48.99
50.000	80.00	6.25	5.72	5.45	51.52	50.24	49.08	47.71	47.27	46.43
66.260	96.26	6.18	5.66	5.41	49.53	48.03	46.97	46.55	45.61	44.80
82.325	52.33	6.26	5.71	5.44	47.86	46.33	45.28	45.48	44.27	43.40
100.000	70.00	6.11	5.63	5.41	46.57	44.99	43.58	44.56	43.26	41.99
130.520	100.52	6.17	5.61	5.39	45.09	43.18	41.88	43.49	41.91	40.57
162.650	132.65	6.18	5.61	5.47	43.61	41.46	40.35	42.55	40.45	39.27
200.000	170.00	5.98	5.60	5.49	42.31	40.12	38.78	41.40	39.22	37.84
259.040	229.04	5.65	5.42	5.35	39.68	38.10	36.88	38.80	37.51	36.43
307.240	277.24	5.78	5.62	5.51	39.02	37.54	36.24	37.22	36.13	34.78
355.430	325.43	6.08	5.86	5.65	38.51	37.41	36.33	37.11	36.94	36.74
387.560	357.56	6.14	5.92	5.76	37.04	36.35	35.45	36.53	35.99	35.89
435.760	405.76	6.05	5.81	5.70	36.29	35.35	33.81	34.02	33.91	32.80
467.890	437.89	6.02	5.90	5.85	36.52	36.34	34.94	33.70	33.81	33.32
483.950	453.95	6.15	6.08	6.03	36.00	36.44	35.92	33.21	33.54	33.58
500.000	470.00	6.33	6.27	6.18	35.43	36.27	36.07	32.39	33.21	33.60

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.002	1.28	1.22	1.25	1.27	1.67	2.71	1.51	1.33	1.25
10.000	1.20	1.10	1.14	1.20	1.60	2.58	1.51	1.34	1.25
20.000	1.16	1.03	1.09	1.07	1.63	2.60	1.51	1.33	1.25
35.938	1.14	1.02	1.10	1.08	1.61	2.56	1.50	1.33	1.25
50.000	1.14	1.04	1.12	1.13	1.58	2.55	1.51	1.34	1.26
82.345	1.14	1.06	1.13	1.12	1.57	2.33	1.52	1.36	1.27
100.000	1.15	1.07	1.14	1.11	1.55	2.46	1.55	1.38	1.29
128.750	1.15	1.08	1.15	1.12	1.54	2.30	1.58	1.41	1.32
175.160	1.18	1.09	1.16	1.10	1.57	2.33	1.68	1.49	1.41
200.000	1.18	1.10	1.16	1.08	1.55	2.24	1.73	1.54	1.45
252.500	1.20	1.10	1.16	1.06	1.55	2.23	1.89	1.70	1.60
298.910	1.21	1.08	1.15	1.08	1.60	2.29	2.12	1.85	1.72
329.850	1.21	1.07	1.14	1.11	1.67	2.37	2.30	1.96	1.83
360.790	1.20	1.06	1.13	1.16	1.70	2.33	2.43	2.10	1.91
391.730	1.19	1.05	1.12	1.20	1.76	2.38	2.63	2.24	2.05
422.660	1.17	1.04	1.12	1.21	1.82	2.41	2.86	2.38	2.19
453.600	1.14	1.05	1.13	1.28	1.84	2.51	3.02	2.52	2.28
469.070	1.12	1.06	1.14	1.31	1.85	2.49	3.14	2.61	2.35
484.540	1.10	1.08	1.16	1.38	1.87	2.48	3.22	2.69	2.43
500.000	1.08	1.09	1.17	1.42	1.90	2.52	3.27	2.73	2.44

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
2.000	−896.40	+.84
5.000	−910.70	+.82
10.000	−925.30	+.82
20.000	−928.20	+.82
50.000	−907.30	+.86
70.688	−918.40	+.93
100.000	−923.40	+.89
122.200	−943.50	+.97
156.550	−957.90	+1.21
173.720	−976.00	+1.21
200.000	−989.10	+1.53
242.410	−1025.60	+1.08
276.750	−1017.80	+1.54
300.000	−987.00	+1.77
328.270	−939.20	+2.14
362.610	−883.40	+1.02
400.000	−847.50	+.71
431.300	−861.90	+1.38
465.640	−903.30	+1.34
500.000	−877.00	+1.67

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

plug-in, surface mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
SYM-860
TUF-860
TUF-860SM
ZP-860

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
800.000	830.000	5.54	5.36	5.27	800.000	38.60	41.60	43.70	38.70	41.20	43.40
820.833	850.833	5.62	5.44	5.29	820.833	37.70	40.80	43.10	38.00	40.50	42.80
831.250	861.250	5.71	5.51	5.36	830.000	37.70	40.80	43.00	38.00	40.30	42.70
841.667	871.667	5.72	5.53	5.37	831.250	37.60	40.80	43.00	38.00	40.20	42.50
862.500	892.500	5.71	5.55	5.43	852.083	36.90	40.00	42.40	37.30	39.40	41.40
872.917	902.917	5.69	5.52	5.42	862.500	37.00	40.20	42.50	37.30	39.20	40.90
883.333	913.333	5.66	5.52	5.44	872.917	36.80	39.80	42.40	37.10	38.70	40.30
904.167	934.167	5.62	5.46	5.40	893.750	36.50	39.80	42.40	36.70	38.20	39.20
914.583	944.583	5.65	5.46	5.40	904.167	36.10	39.60	42.20	36.40	37.80	38.60
925.000	955.000	5.71	5.49	5.41	914.583	35.80	39.20	41.80	36.30	37.50	38.10
945.833	975.833	5.85	5.55	5.42	935.417	35.20	38.40	41.20	35.90	36.90	37.40
956.250	986.250	5.89	5.56	5.44	945.833	35.00	38.00	41.00	35.70	36.60	37.30
966.667	996.667	5.98	5.62	5.48	956.250	34.70	37.80	40.60	35.70	36.60	37.00
987.500	1017.500	6.01	5.68	5.52	977.083	34.70	37.50	40.10	35.60	36.50	36.70
997.917	1027.917	6.06	5.72	5.54	987.500	34.60	37.30	39.80	35.60	36.40	36.50
1008.333	1038.333	6.02	5.72	5.54	997.917	34.50	37.10	39.80	35.60	36.30	36.30
1020.000	1050.000	6.07	5.73	5.55	1018.750	34.50	37.20	39.50	35.60	36.40	36.00
1029.167	1999.167	6.07	5.80	5.65	1029.167	34.30	36.90	39.50	35.60	36.20	35.80
1039.583	1009.583	6.13	5.84	5.68	1039.583	34.30	36.80	39.20	35.60	36.10	35.50
1050.000	1020.000	6.21	5.89	5.70	1050.000	34.10	36.60	39.00	35.50	36.10	35.30

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
800.000	1.33	1.46	1.58	2.20	3.06	4.12	2.000	1.01	1.06	1.06	800.000	-209.84	0.05
820.833	1.38	1.50	1.61	2.23	3.06	4.32	5.000	1.02	1.06	1.06	820.833	-215.48	0.50
831.250	1.40	1.53	1.63	2.30	3.21	4.42	10.000	1.04	1.06	1.06	831.250	-225.33	0.55
841.667	1.43	1.55	1.66	2.30	3.21	4.42	20.000	1.07	1.08	1.07	841.667	-223.33	0.63
862.500	1.48	1.59	1.70	2.32	3.26	4.32	60.000	1.21	1.17	1.14	862.500	-216.25	1.03
872.917	1.51	1.61	1.71	2.32	3.16	4.22	80.000	1.28	1.22	1.17	872.917	-197.53	1.30
883.333	1.52	1.63	1.74	2.30	3.11	4.22	100.000	1.34	1.26	1.20	883.333	-190.84	1.48
904.167	1.59	1.69	1.80	2.35	3.06	4.03	126.750	1.43	1.33	1.26	904.167	-183.60	1.97
914.583	1.62	1.71	1.81	2.32	3.06	4.03	189.125	1.63	1.48	1.37	914.583	-186.51	1.84
925.000	1.64	1.74	1.84	2.35	3.11	4.12	251.500	1.84	1.61	1.46	925.000	-192.89	1.57
945.833	1.69	1.78	1.87	2.40	3.11	4.22	376.250	2.49	2.06	1.84	945.833	-201.70	1.64
956.250	1.73	1.81	1.89	2.43	3.21	4.12	438.625	3.01	2.49	2.18	956.250	-209.28	2.09
966.667	1.77	1.85	1.92	2.46	3.26	4.22	500.000	3.50	2.96	2.61	966.667	-216.49	1.64
987.500	1.84	1.91	1.97	2.52	3.32	4.32	501.000	3.57	2.92	2.58	987.500	-228.13	1.85
997.917	1.87	1.94	2.01	2.52	3.26	4.32	625.750	3.95	3.79	3.64	997.917	-224.27	2.02
1008.333	1.91	1.96	2.03	2.58	3.32	4.12	750.500	3.01	3.50	3.79	1008.333	-206.56	2.16
1018.750	1.94	1.99	2.06	2.58	3.26	4.12	812.875	2.40	2.84	3.21	1018.750	-195.34	2.21
1029.167	1.97	2.03	2.08	2.61	3.26	4.12	875.250	1.81	2.12	2.43	1029.167	-180.09	2.65
1039.583	2.03	2.06	2.12	2.61	3.26	4.12	937.625	1.39	1.55	1.73	1039.583	-173.30	3.08
1050.000	2.06	2.10	2.16	2.65	3.26	4.22	1000.000	1.46	1.49	1.59	1050.000	-173.77	3.26

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
TFM-2H
TUF-2H
ZFM-2H
ZP-2H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
5.000	35.00	6.20	5.75	5.56	>74.00	73.03	70.67	67.29	64.57	63.07
35.152	65.15	6.28	5.75	5.54	54.22	53.95	53.39	51.18	50.91	50.42
65.304	95.30	6.51	5.78	5.55	48.20	47.75	46.75	45.62	44.94	44.11
125.610	95.61	6.40	5.83	5.54	46.20	45.94	44.83	43.25	42.85	42.09
185.910	155.91	6.56	5.88	5.63	43.09	41.73	40.19	39.67	38.74	37.98
216.060	186.06	6.55	5.87	5.68	41.78	40.07	38.85	38.01	37.26	36.64
276.370	246.37	6.22	5.70	5.55	38.57	37.49	36.91	35.45	34.59	34.48
336.670	306.67	5.97	5.62	5.52	35.95	35.70	36.13	33.67	32.97	33.08
396.980	366.98	6.09	5.78	5.59	35.04	35.50	35.59	32.50	32.29	32.34
457.280	427.28	6.48	6.15	5.93	33.88	33.92	33.86	30.42	30.55	30.59
517.580	487.58	6.37	5.88	5.61	33.96	34.70	34.90	29.63	29.07	29.34
547.740	517.74	6.24	5.91	5.66	33.82	35.38	35.32	29.51	29.45	29.80
608.040	578.04	6.57	6.36	6.18	32.52	34.75	34.17	28.25	28.29	28.63
668.340	638.34	6.78	6.50	6.10	32.38	34.53	32.34	27.59	27.06	26.63
728.650	698.65	7.19	6.30	5.86	32.32	33.69	32.40	26.83	25.41	24.95
788.950	758.95	8.18	6.43	5.84	32.44	32.39	31.62	26.20	25.21	23.50
849.260	819.26	9.23	7.56	6.21	32.91	32.23	31.42	25.91	24.28	23.11
909.560	879.56	9.88	8.59	7.12	33.24	32.46	31.95	25.89	23.91	22.92
969.860	939.86	9.62	8.55	7.56	32.85	32.66	32.72	25.75	24.30	23.22
1000.000	970.00	9.60	8.57	7.71	32.43	32.20	32.53	25.10	24.05	22.04

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.000	1.37	1.24	1.21	1.27	1.51	2.45	2.28	2.05	1.80
35.121	1.24	1.10	1.03	1.11	1.53	2.39	2.22	2.01	1.77
65.242	1.24	1.10	1.03	1.13	1.52	2.48	2.27	2.04	1.80
95.364	1.23	1.09	1.03	1.16	1.44	2.26	2.28	2.06	1.80
155.610	1.23	1.09	1.04	1.17	1.43	2.30	2.33	2.10	1.83
185.730	1.23	1.10	1.04	1.16	1.39	2.08	2.34	2.10	1.82
245.970	1.24	1.11	1.05	1.21	1.38	2.10	2.47	2.20	1.90
306.210	1.25	1.11	1.06	1.23	1.40	2.16	2.61	2.28	1.95
366.450	1.26	1.12	1.07	1.21	1.37	2.14	2.64	2.30	1.97
426.700	1.27	1.13	1.08	1.21	1.36	2.04	2.68	2.34	2.00
486.940	1.29	1.15	1.09	1.18	1.37	2.00	2.84	2.44	2.07
517.060	1.29	1.15	1.08	1.16	1.39	2.03	2.94	2.51	2.09
577.300	1.30	1.16	1.08	1.17	1.38	2.00	2.93	2.52	2.11
637.550	1.33	1.17	1.10	1.17	1.38	1.93	2.91	2.50	2.13
697.790	1.36	1.20	1.12	1.20	1.36	1.93	2.89	2.48	2.14
758.030	1.38	1.22	1.15	1.13	1.45	1.94	2.69	2.35	2.06
818.270	1.42	1.26	1.20	1.06	1.49	2.01	2.60	2.25	1.99
878.520	1.51	1.34	1.29	1.03	1.52	2.05	2.62	2.25	1.97
938.760	1.64	1.46	1.41	1.06	1.54	2.03	2.69	2.26	1.96
1000.000	1.80	1.62	1.55	1.09	1.53	1.99	2.63	2.22	1.92

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
5.000	−946.00	−.04
35.152	−938.10	−.02
65.304	−949.90	+0.00
95.456	−985.50	+.09
155.760	−936.30	−.06
185.910	−950.60	+.23
246.220	−990.70	+.93
306.520	−1007.30	+.88
366.820	−905.20	+1.17
427.130	−847.70	+2.27
487.430	−867.60	+2.06
517.580	−892.00	+1.26
577.890	−927.80	+1.97
638.190	−867.70	+4.69
698.500	−753.40	+4.48
758.800	−693.90	+5.71
819.100	−667.60	+4.22
879.410	−684.00	+5.20
939.710	−675.30	+6.68
1000.000	−664.10	+7.63

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

surface-mount, plug-in

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
TUF-11A
TUF-11ASM
ZP-11A

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1400.000	1500.000	7.65	6.77	6.75	1400.000	32.60	33.50	33.60	25.00	23.80	22.80
1441.667	1541.667	7.59	6.76	6.59	1441.667	31.70	32.60	33.00	25.30	24.20	23.10
1462.500	1562.500	7.65	6.77	6.73	1462.500	31.30	32.20	32.80	25.50	24.30	23.20
1483.333	1583.333	7.70	6.82	6.78	1483.333	30.80	31.90	32.60	25.70	24.50	23.30
1525.000	1625.000	7.82	7.48	6.66	1504.167	30.50	31.60	32.50	25.90	24.70	23.60
1545.833	1645.833	7.85	7.07	6.80	1525.000	30.30	31.40	32.50	26.20	24.90	23.80
1566.667	1666.667	7.83	6.94	6.75	1545.833	30.10	31.20	32.50	26.50	25.20	23.90
1608.333	1708.333	7.88	6.92	6.75	1587.500	29.70	30.80	32.50	27.30	25.80	24.40
1629.167	1729.167	7.91	7.02	6.73	1608.333	29.40	30.50	32.40	27.70	26.20	24.70
1650.000	1750.000	7.99	7.03	6.71	1629.167	29.10	30.40	32.30	28.20	26.70	25.10
1691.667	1791.667	7.84	6.84	6.71	1670.833	28.80	30.20	32.30	29.40	27.50	25.90
1712.500	1812.500	7.73	6.84	6.71	1691.667	28.80	30.20	32.40	29.90	27.80	26.20
1733.333	1833.333	7.76	6.96	6.68	1712.500	28.80	30.10	32.50	30.50	28.40	26.60
1775.000	1875.000	7.74	6.92	6.64	1754.167	29.10	30.50	33.00	31.90	29.40	27.20
1795.833	1895.833	7.75	6.95	6.65	1775.000	29.30	30.40	33.00	32.80	29.80	27.50
1800.000	1900.000	7.83	6.95	6.66	1795.833	29.00	30.20	32.90	33.70	30.50	28.00
1837.500	1737.500	7.76	6.79	6.70	1837.500	28.70	30.00	32.50	35.70	32.10	29.00
1858.333	1758.333	7.84	6.88	6.80	1858.333	28.80	29.80	32.30	36.60	32.80	29.50
1879.167	1779.167	8.05	7.66	6.86	1879.167	28.50	29.60	32.20	37.60	33.50	29.90
1900.000	1800.000	8.04	7.49	6.78	1900.000	28.50	29.40	31.90	38.10	34.70	30.60

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
1400.000	1.45	1.50	1.56	2.18	1.96	2.14	2.000	8.31	9.18	10.20
1441.667	1.32	1.38	1.45	2.16	1.94	2.12	5.000	4.32	4.32	4.22
1462.500	1.26	1.32	1.40	2.18	1.92	2.10	10.000	2.10	2.01	1.94
1483.333	1.21	1.27	1.36	2.12	1.92	2.12	20.000	1.59	1.49	1.44
1525.000	1.09	1.19	1.29	2.12	1.92	2.10	60.000	1.36	1.21	1.13
1545.833	1.05	1.17	1.28	2.12	1.91	2.10	80.000	1.35	1.20	1.09
1566.667	1.01	1.16	1.27	2.08	1.91	2.10	100.000	1.34	1.19	1.08
1608.333	1.10	1.18	1.28	2.10	1.88	2.06	126.750	1.34	1.18	1.07
1629.167	1.16	1.22	1.31	2.08	1.87	2.04	189.125	1.35	1.20	1.11
1650.000	1.22	1.27	1.35	2.10	1.87	2.03	251.500	1.36	1.23	1.16
1691.667	1.48	1.54	1.61	2.08	1.87	2.03	376.250	1.40	1.31	1.28
1712.500	1.24	1.31	1.40	2.06	1.87	2.06	438.625	1.43	1.37	1.36
1733.333	1.33	1.35	1.41	2.06	1.88	2.04	500.000	1.47	1.43	1.44
1775.000	1.44	1.43	1.48	2.06	1.85	2.04	501.000	1.47	1.43	1.44
1795.833	1.48	1.46	1.51	2.06	1.85	2.03	625.750	1.57	1.61	1.66
1816.667	1.51	1.49	1.51	2.04	1.85	2.04	750.500	1.74	1.89	2.01
1837.500	1.56	1.53	1.54	2.03	1.84	2.06	812.875	1.87	2.08	2.23
1858.333	1.62	1.58	1.59	2.03	1.84	2.06	875.250	1.99	2.30	2.49
1879.167	1.71	1.66	1.66	2.01	1.82	2.06	937.625	2.16	2.52	2.76
1900.000	1.80	1.73	1.73	2.01	1.84	2.04	1000.000	2.30	2.72	3.06

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models

TAK-1WH
ZAD-1WSH
ZLW-1WSH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
5.000	35.00	6.44	5.75	5.40	63.21	63.53	63.16	62.44	62.84	61.66
10.000	40.00	6.71	5.93	5.59	60.61	59.56	58.73	58.61	57.61	56.43
20.000	50.00	6.82	5.97	5.63	53.05	51.08	49.78	50.79	48.85	47.53
50.000	80.00	6.65	5.91	5.58	48.56	46.53	45.24	46.69	44.54	43.10
100.000	70.00	6.42	5.77	5.50	44.90	42.94	41.66	43.39	41.21	39.71
125.840	95.84	6.37	5.75	5.50	42.70	40.60	39.29	41.34	39.07	37.47
175.770	145.77	6.52	5.75	5.62	39.41	37.40	36.36	38.36	36.16	34.68
225.700	195.70	6.23	5.81	5.70	37.49	35.63	34.38	36.43	34.27	32.56
250.670	220.67	6.05	5.69	5.57	36.98	35.33	34.09	35.78	33.54	31.82
300.600	270.60	5.90	5.68	5.62	35.68	34.13	32.77	33.89	32.33	30.98
350.540	320.54	6.35	6.07	5.86	35.68	33.75	32.20	32.12	30.78	28.82
400.470	370.47	6.52	6.22	6.09	36.84	33.94	31.64	30.75	29.35	29.06
450.410	420.41	6.67	6.24	6.03	37.12	33.76	30.28	30.47	28.19	27.53
500.000	470.00	6.57	6.26	6.13	38.12	35.44	30.87	29.58	29.36	28.25
525.310	495.31	6.76	6.57	6.49	34.09	33.37	31.19	27.93	28.37	27.67
550.270	520.27	7.00	6.80	6.59	32.10	31.48	30.06	25.43	26.00	26.48
600.210	570.21	7.76	6.81	6.15	30.58	29.25	28.48	22.32	22.84	23.46
650.140	620.14	8.29	6.95	6.32	33.79	29.21	28.09	24.38	20.68	21.00
700.080	670.08	9.21	7.41	6.49	34.07	32.78	28.16	25.57	22.79	20.71
750.000	720.00	9.92	7.73	6.59	32.38	31.78	29.59	24.04	24.62	22.77

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.25	1.14	1.17	1.32	1.53	2.59	2.14	1.81	1.60
10.000	1.22	1.06	1.11	1.21	1.52	2.59	2.14	1.81	1.60
27.576	1.19	1.03	1.10	1.21	1.41	2.48	2.14	1.80	1.59
50.000	1.16	1.04	1.12	1.12	1.54	2.54	2.15	1.81	1.60
72.727	1.14	1.05	1.13	1.15	1.48	2.42	2.16	1.82	1.62
100.000	1.13	1.05	1.13	1.17	1.48	2.27	2.20	1.85	1.63
140.450	1.12	1.06	1.15	1.19	1.43	2.41	2.27	1.90	1.69
185.610	1.09	1.08	1.16	1.14	1.45	2.30	2.38	1.97	1.72
230.760	1.07	1.10	1.18	1.20	1.40	2.28	2.48	2.08	1.81
275.910	1.04	1.14	1.23	1.10	1.51	2.37	2.60	2.16	1.89
321.060	1.05	1.19	1.27	1.15	1.44	2.28	2.71	2.26	1.96
366.210	1.09	1.24	1.32	1.08	1.56	2.39	2.84	2.39	2.10
411.360	1.14	1.28	1.39	1.09	1.60	2.38	2.92	2.42	2.16
456.520	1.18	1.32	1.42	1.11	1.59	2.39	2.95	2.45	2.20
500.000	1.23	1.35	1.44	1.17	1.68	2.43	2.95	2.42	2.26
524.240	1.25	1.37	1.46	1.22	1.74	2.44	3.05	2.57	2.23
591.970	1.29	1.39	1.47	1.29	1.68	2.37	2.99	2.48	2.23
637.120	1.31	1.38	1.46	1.37	1.89	2.57	3.03	2.49	2.24
682.270	1.32	1.35	1.42	1.38	1.94	2.67	3.02	2.44	2.16
750.000	1.34	1.29	1.36	1.45	1.96	2.78	3.07	2.42	2.07

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
5.000	−934.50	+.56
10.000	−946.60	+.58
29.032	−949.30	+.56
50.000	−936.20	+.54
77.096	−951.20	+.66
101.130	−960.40	+.65
149.190	−1004.00	+.13
197.260	−1025.80	−.05
221.290	−1036.10	−.27
269.350	−1051.70	+.22
317.420	−977.90	+1.56
365.480	−856.90	+1.94
413.540	−832.00	+4.02
461.610	−832.90	+3.98
500.000	−865.80	+3.28
533.700	−839.60	+3.16
581.770	−732.70	+5.11
629.830	−642.50	+7.28
677.900	−567.50	+6.01
750.000	−626.30	+.68

Measurements at RF & LO Power +17 dBm

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Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Model
SYM-11

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1.000	31.000	6.70	6.40	6.20	1.000	67.00	68.00	68.00	58.00	60.00	61.00
5.000	35.000	6.50	6.30	6.10	5.000	66.00	67.00	67.00	57.00	60.00	60.60
10.000	40.000	6.40	6.10	6.00	10.000	65.75	66.89	66.90	56.92	59.19	60.30
20.000	50.000	6.20	5.90	5.90	20.000	65.61	66.40	66.66	56.82	58.44	59.50
50.000	80.000	6.02	5.73	5.59	80.000	60.80	63.88	66.38	54.98	53.42	52.13
100.000	130.000	5.94	5.68	5.56	100.000	59.43	62.97	66.12	54.31	52.21	50.48
194.118	224.118	6.21	5.91	5.74	286.667	49.91	53.44	57.54	43.92	41.55	40.01
482.353	512.353	7.50	6.54	6.33	425.000	45.37	48.24	51.36	38.09	36.56	35.64
500.000	530.000	7.48	6.50	6.35	500.000	43.47	46.35	49.02	35.64	34.52	33.75
914.706	944.706	8.47	7.93	7.59	701.667	40.32	42.55	44.65	31.02	30.52	29.97
1000.000	1030.000	8.44	7.97	7.71	1000.000	37.06	38.96	40.67	28.07	27.74	27.12
1058.824	1088.824	8.41	7.96	7.72	1116.667	35.64	37.68	40.00	27.86	27.44	26.76
1250.000	1280.000	8.56	8.08	7.86	1250.000	36.06	37.80	39.60	26.75	26.59	26.12
1347.059	1377.059	8.65	8.20	7.99	1393.333	35.52	37.25	38.74	25.51	25.51	25.00
1635.294	1665.294	9.24	8.62	8.41	1531.667	34.65	36.02	37.50	24.18	23.96	23.53
2000.000	2030.000	9.76	8.57	8.19	1946.667	34.38	37.44	41.23	41.64	39.22	37.35
2067.647	2097.647	9.73	8.47	8.07	2000.000	35.23	38.87	43.39	44.50	50.34	42.14
2355.882	2385.882	9.81	8.58	8.12	2361.667	36.61	39.98	38.90	36.75	32.54	28.91
2470.000	2500.000	9.91	8.79	8.37	2470.000	34.60	36.58	35.10	33.72	29.89	26.88
2500.000	2470.000	10.16	8.92	8.49	2500.000	34.10	35.35	34.66	32.60	28.76	26.53

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
1.000	1.80	1.68	1.59	1.77	2.55	3.57	1.000	1.29	1.32	1.39
5.000	2.10	1.94	1.80	1.66	2.49	3.57	5.000	1.18	1.09	1.17
10.000	2.14	1.96	1.82	1.67	2.49	3.44	10.000	1.16	1.04	1.14
20.000	2.10	1.94	1.81	1.69	2.46	3.50	20.000	1.15	1.01	1.13
60.000	2.08	1.92	1.80	1.63	2.37	3.38	60.000	1.13	1.02	1.15
100.000	2.12	1.96	1.82	1.61	2.40	3.38	100.000	1.11	1.04	1.16
148.000	2.16	2.01	1.87	1.65	2.32	3.21	148.000	1.10	1.05	1.18
442.000	2.84	2.61	2.46	1.77	2.35	3.01	442.000	1.13	1.30	1.44
500.000	2.96	2.72	2.55	1.84	2.46	3.21	500.000	1.22	1.38	1.54
736.000	3.26	3.06	2.92	2.08	2.58	3.32	736.000	1.73	1.94	2.12
1000.000	3.32	3.11	3.01	2.14	2.55	3.16	1000.000	2.65	2.84	3.06
1030.000	3.38	3.16	3.06	2.08	2.37	2.84	1030.000	2.76	3.01	3.16
1250.000	3.38	3.26	3.21	2.43	2.52	2.92	1250.000	3.57	3.71	3.79
1324.000	3.38	3.26	3.16	2.35	2.35	2.61	1324.000	3.79	3.86	3.95
1618.000	3.26	3.16	3.11	2.80	2.61	2.76	1618.000	3.79	3.79	3.71
1912.000	3.16	3.11	3.01	3.01	2.55	2.52	1912.000	7.60	7.60	7.60
2000.000	3.16	3.06	2.96	2.92	2.46	2.37	2000.000	7.00	7.00	6.73
2206.000	2.68	2.65	2.55	2.92	2.40	2.23	2206.000	4.32	4.32	4.22
2470.000	2.08	2.04	1.99	2.76	2.12	1.82	2470.000	3.21	3.21	3.16
2500.000	2.04	1.99	1.96	2.76	2.08	1.76	2500.000	3.21	3.16	3.16

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
TFM-3H
TUF-3H
ZP-3H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
.100	30.10	5.71	5.43	5.26	64.78	66.42	66.35	68.59	66.28	63.03
5.000	35.00	5.24	4.99	4.92	60.18	61.64	63.09	64.99	64.07	62.71
10.000	40.00	5.17	4.91	4.78	59.08	60.33	61.40	61.56	61.62	60.74
20.000	50.00	5.21	4.94	4.81	60.69	61.22	61.67	60.52	60.51	59.92
34.569	64.57	5.16	4.92	4.80	56.53	57.23	57.15	55.92	56.07	55.64
50.000	80.00	5.17	4.92	4.80	53.58	53.98	54.04	52.40	52.73	52.09
60.420	90.42	5.16	4.92	4.80	51.84	52.33	52.03	50.56	50.92	49.90
69.038	99.04	5.11	4.87	4.77	50.53	51.05	50.49	49.22	49.22	48.53
86.272	56.27	5.03	4.80	4.72	48.43	48.52	47.80	46.65	46.16	46.07
100.000	70.00	5.00	4.79	4.68	46.90	46.72	46.00	44.62	44.44	44.60
103.510	73.51	5.18	4.84	4.72	46.59	46.41	45.79	44.11	44.07	44.42
129.360	99.36	5.17	4.89	4.79	43.56	43.29	43.30	40.81	41.27	42.21
146.590	116.59	5.18	4.91	4.82	41.98	41.82	41.73	39.42	40.17	40.89
155.210	125.21	5.13	4.90	4.83	41.30	41.17	41.39	38.71	39.68	40.93
172.440	142.44	5.21	5.00	4.93	40.29	39.95	39.91	37.82	38.86	39.95
189.680	159.68	5.27	5.08	5.03	39.44	39.60	39.03	36.95	38.24	39.21
224.150	194.15	5.40	5.21	5.10	36.93	37.56	37.61	35.74	36.93	38.22
232.760	202.76	5.45	5.26	5.14	36.40	36.71	36.55	35.59	36.82	37.49
241.380	211.38	5.44	5.24	5.13	36.06	35.87	35.81	35.28	36.43	37.36
250.000	220.00	5.45	5.23	5.11	35.77	35.64	35.46	34.98	36.00	37.11

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm	freq. (MHz)	max. DC output mV	DC offset mv
5.001	1.66	1.40	1.24	1.32	1.51	2.55	1.78	1.56	1.47	.100	−950.35	+.18
26.618	1.66	1.40	1.25	1.21	1.46	2.33	1.77	1.55	1.46	25.952	−979.20	+.49
33.824	1.64	1.38	1.24	1.14	1.52	2.43	1.75	1.55	1.46	34.569	−971.30	+.48
41.029	1.64	1.39	1.24	1.12	1.51	2.39	1.75	1.54	1.46	43.186	−970.40	+.47
50.000	1.64	1.39	1.24	1.15	1.52	2.41	1.77	1.55	1.46	51.803	−975.40	+.49
69.853	1.66	1.39	1.23	1.21	1.48	2.46	1.81	1.59	1.50	69.038	−988.00	+.42
77.059	1.65	1.38	1.23	1.24	1.45	2.43	1.82	1.60	1.50	77.655	−992.80	+.37
84.265	1.65	1.38	1.22	1.24	1.47	2.38	1.83	1.61	1.51	86.272	−1001.90	+.26
98.676	1.60	1.35	1.20	1.22	1.43	2.21	1.81	1.60	1.50	94.889	−1013.60	+.26
100.000	1.60	1.35	1.20	1.23	1.41	2.22	1.82	1.60	1.50	100.000	−1026.60	+.14
113.090	1.58	1.33	1.19	1.22	1.44	2.24	1.83	1.61	1.51	112.120	−991.10	+.10
127.500	1.56	1.31	1.17	1.23	1.45	2.29	1.84	1.63	1.53	129.360	−996.80	−.04
149.120	1.56	1.30	1.16	1.23	1.50	2.37	1.93	1.70	1.59	146.590	−981.40	+.19
163.530	1.53	1.29	1.15	1.23	1.46	2.27	1.95	1.72	1.62	163.830	−994.90	+.45
185.150	1.46	1.24	1.11	1.23	1.46	2.15	1.97	1.74	1.64	181.060	−993.70	+.36
199.560	1.44	1.22	1.10	1.25	1.45	2.18	2.01	1.77	1.68	198.300	−1000.70	+.65
206.760	1.43	1.21	1.09	1.28	1.47	2.24	2.04	1.80	1.69	206.910	−1008.60	+.66
228.380	1.40	1.18	1.06	1.29	1.52	2.28	2.16	1.91	1.79	224.150	−1013.10	+1.34
242.790	1.37	1.16	1.04	1.28	1.53	2.19	2.22	1.94	1.82	241.380	−996.10	+2.09
250.000	1.34	1.14	1.03	1.27	1.52	2.22	2.22	1.95	1.83	250.000	−979.20	+2.54

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-860
LRMS-860

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
800.000	830.000	6.06	5.73	5.48	800.000	32.50	34.10	35.20	24.10	26.50	28.20
820.833	850.833	6.08	5.76	5.54	820.833	32.90	34.40	35.60	23.50	25.70	27.70
831.250	861.250	6.03	5.74	5.53	831.250	33.50	35.00	36.10	23.50	25.60	27.30
841.667	871.667	6.10	5.79	5.57	841.667	33.70	35.20	36.40	23.30	25.30	27.10
862.500	892.500	6.17	5.84	5.62	862.500	34.50	36.10	37.30	22.80	24.80	26.40
872.917	902.917	6.25	5.89	5.66	872.917	34.70	36.50	37.60	22.50	24.60	26.10
883.333	913.333	6.24	5.87	5.64	883.333	35.40	37.00	38.20	22.50	24.20	25.80
904.167	934.167	6.31	5.92	5.68	904.167	36.10	38.00	39.30	22.00	23.80	25.40
914.583	944.583	6.33	5.92	5.70	914.583	36.90	38.70	40.00	21.90	23.60	25.10
925.000	955.000	6.32	5.92	5.70	925.000	37.20	39.10	40.30	21.80	23.40	24.90
945.833	975.833	6.39	5.96	5.73	945.833	38.30	40.20	41.20	21.30	22.90	24.40
956.250	986.250	6.34	5.95	5.73	956.250	38.90	40.90	41.50	21.30	22.90	24.20
966.667	996.667	6.44	6.03	5.77	966.667	39.30	41.40	41.90	21.00	22.60	23.90
987.500	1017.500	6.48	6.05	5.79	987.500	40.00	41.90	41.90	20.70	22.20	23.50
997.917	1027.917	6.57	6.10	5.86	997.917	40.50	41.90	41.70	20.40	22.00	23.20
1008.333	1038.333	6.67	6.20	5.92	1008.333	40.60	41.70	41.30	20.50	21.80	23.10
1018.750	1048.750	6.72	6.26	5.90	1018.750	40.60	41.50	41.00	20.50	21.60	23.00
1029.167	999.167	7.01	6.73	6.20	1029.167	40.50	40.80	40.30	20.40	21.60	22.80
1039.583	1009.583	7.27	6.65	6.25	1039.583	40.10	40.10	39.70	20.30	21.60	22.60
1050.000	1020.000	7.22	6.68	6.26	1050.000	39.50	39.20	38.90	20.20	21.20	22.40

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
800.000	1.29	1.21	1.16	2.03	2.49	3.11	2.000	1.96	1.67	1.50	800.000	216.14	-4.10
820.833	1.34	1.26	1.22	2.16	2.68	3.38	5.000	1.99	1.70	1.52	820.833	227.22	-4.64
831.250	1.37	1.29	1.25	2.23	2.84	3.79	10.000	1.99	1.70	1.51	831.250	226.54	-4.74
841.667	1.40	1.32	1.28	2.25	2.88	3.79	20.000	1.99	1.70	1.52	841.667	228.67	-5.09
862.500	1.46	1.39	1.35	2.18	2.65	3.32	60.000	2.01	1.73	1.54	862.500	205.20	-5.77
872.917	1.50	1.42	1.39	2.12	2.58	3.26	80.000	2.04	1.75	1.56	872.917	200.47	-6.31
883.333	1.54	1.46	1.43	2.14	2.58	3.32	100.000	2.04	1.75	1.57	883.333	194.57	-6.46
904.167	1.63	1.54	1.51	2.32	2.88	3.79	126.750	2.06	1.77	1.60	904.167	200.57	-6.95
914.583	1.67	1.59	1.54	2.35	2.92	3.79	189.125	2.10	1.82	1.66	914.583	194.65	-7.04
925.000	1.73	1.64	1.59	2.27	2.72	3.50	251.500	2.16	1.89	1.75	925.000	191.69	-7.15
945.833	1.84	1.75	1.70	2.18	2.61	3.26	376.250	2.32	2.06	1.94	945.833	200.39	-7.69
956.250	1.88	1.80	1.75	2.25	2.72	3.44	438.625	2.40	2.18	2.06	956.250	201.50	-7.76
966.667	1.96	1.87	1.81	2.35	2.84	3.71	500.000	2.43	2.23	2.16	966.667	201.64	-7.98
987.500	2.08	1.99	1.94	2.30	2.76	3.38	563.375	2.52	2.32	2.25	987.500	197.48	-8.25
997.917	2.14	2.06	1.99	2.20	2.58	3.21	688.125	2.52	2.43	2.46	997.917	196.21	-7.95
1008.333	2.20	2.10	2.04	2.20	2.55	3.16	750.500	2.43	2.43	2.55	1008.333	193.32	-7.42
1018.750	2.27	2.16	2.12	2.27	2.65	3.44	812.875	2.37	2.46	2.65	1018.750	189.70	-6.77
1029.167	2.32	2.23	2.16	2.35	2.76	3.44	875.250	2.18	2.32	2.58	1029.167	185.75	-6.17
1039.583	2.37	2.27	2.23	2.37	2.76	3.50	937.625	1.89	2.04	2.32	1039.583	186.77	-5.92
1050.000	2.43	2.35	2.27	2.32	2.65	3.32	1000.000	1.59	1.71	1.96	1050.000	186.62	-5.36

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models

TAK-3H
ZAD-3SH
ZFM-3H
ZLW-3SH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
.050	30.05	6.39	5.81	5.56	63.69	65.01	66.59	58.11	59.81	61.05
1.000	31.00	5.32	4.70	4.51	61.00	61.51	62.33	54.94	56.17	57.68
2.000	32.00	5.23	4.63	4.45	61.43	62.05	62.47	54.78	56.05	57.65
10.000	40.00	5.24	4.79	4.59	63.25	64.41	64.74	54.73	56.12	57.68
20.000	50.00	5.50	5.00	4.75	58.64	57.00	56.32	52.32	52.66	53.50
29.936	59.94	5.19	4.75	4.57	52.39	51.03	48.68	48.80	48.60	48.00
49.226	79.23	5.04	4.69	4.55	50.05	47.42	45.05	47.16	46.33	45.28
68.516	98.52	5.02	4.67	4.52	44.61	42.12	40.93	43.48	42.25	41.79
87.807	57.81	5.03	4.57	4.42	40.31	38.18	37.95	39.98	38.54	38.70
100.000	70.00	4.92	4.50	4.40	38.58	36.56	35.82	39.01	37.81	37.67
136.030	106.03	4.75	4.45	4.42	35.94	35.70	36.46	36.10	36.26	37.11
155.320	125.32	4.90	4.61	4.58	33.80	33.06	33.18	34.36	33.98	34.30
174.610	144.61	5.11	4.84	4.76	32.08	32.15	32.32	32.95	32.92	33.04
193.900	163.90	5.14	4.96	4.89	30.94	31.48	32.05	32.66	32.48	32.87
213.190	183.19	5.17	4.98	4.91	29.34	29.23	29.75	32.48	30.80	30.26
232.480	202.48	5.45	5.17	5.12	28.86	27.78	29.33	32.59	29.94	29.36
242.130	212.13	5.62	5.27	5.15	31.05	28.94	29.46	33.54	32.37	30.09
261.420	231.42	6.11	5.60	5.23	32.89	31.41	29.46	33.17	33.19	32.56
280.710	250.71	6.22	6.03	5.47	36.46	34.81	32.12	33.23	33.60	33.61
300.000	270.00	6.77	6.64	6.40	38.55	36.67	33.19	31.17	31.62	31.71

mixer VSWR

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm
5.001	1.90	1.63	1.53	1.20	1.53	2.48	1.70	1.54	1.61
10.000	1.91	1.64	1.55	1.15	1.52	2.46	1.72	1.54	1.62
20.000	1.90	1.64	1.55	1.30	1.39	2.33	1.73	1.56	1.64
31.029	1.88	1.61	1.53	1.23	1.53	2.40	1.74	1.57	1.67
48.382	1.87	1.61	1.53	1.22	1.46	2.43	1.79	1.63	1.75
57.059	1.86	1.60	1.52	1.20	1.56	2.57	1.84	1.67	1.80
83.088	1.79	1.56	1.50	1.30	1.51	2.37	1.96	1.78	2.03
100.000	1.75	1.53	1.48	1.37	1.51	2.35	2.12	1.91	2.26
109.120	1.73	1.51	1.46	1.36	1.54	2.33	2.23	1.99	2.40
126.470	1.66	1.46	1.40	1.40	1.59	2.30	2.40	2.16	2.69
143.820	1.59	1.40	1.33	1.46	1.60	2.28	2.55	2.32	3.02
169.850	1.49	1.31	1.23	1.52	1.59	2.35	2.91	2.63	3.73
178.530	1.46	1.28	1.19	1.59	1.59	2.27	3.00	2.73	4.06
195.880	1.39	1.22	1.12	1.70	1.65	2.21	3.17	2.91	4.56
213.240	1.32	1.17	1.07	1.77	1.75	2.27	3.38	3.15	5.17
230.590	1.27	1.11	1.09	1.68	1.87	2.44	3.57	3.29	6.11
256.620	1.19	1.05	1.17	1.56	1.81	2.43	3.60	3.36	6.53
273.970	1.16	1.03	1.20	1.58	1.76	2.39	3.67	3.43	6.66
282.650	1.14	1.02	1.21	1.59	1.78	2.43	3.76	3.50	7.05
300.000	1.13	1.02	1.22	1.61	1.72	2.28	3.71	3.45	7.11

ϕ detection

max. output/DC offset vs. freq. freq. (MHz)	max. DC output mV	DC offset mv
.500	−1124.00	+.27
1.000	−1014.90	+.16
8.868	−986.30	+.19
32.474	−970.10	+.10
48.210	−976.90	+.02
56.079	−983.60	−.06
79.684	−1003.20	−.16
95.421	−997.20	+.55
111.160	−1008.40	−.04
126.890	−1015.40	+.75
142.630	−1016.00	+2.82
166.240	−1011.80	+3.13
181.970	−988.40	+1.39
197.710	−930.00	−.04
213.450	−859.60	−.91
229.180	−809.40	+.53
252.790	−752.40	+1.47
268.530	−740.00	+1.74
284.260	−728.90	+.94
300.000	−716.90	+4.87

Measurements at RF & LO Power +17 dBm

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-2D
LRMS-2D

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

R	LO	Conversion Loss (dB)				Isolation L-R (dB)			Isolation L-I (dB)		
MHz	MHz	LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	LO +4 dBm	LO +7 dBm	LO +10 dBm	LO +4 dBm	LO +7 dBm	LO +10 dBm
5.000	35.000	7.57	7.12	6.85	5.000	75.52	75.17	72.21	66.42	69.37	72.91
10.000	40.000	7.41	7.00	6.73	10.000	68.33	69.29	68.74	66.13	68.39	69.44
20.000	50.000	7.47	7.00	6.76	20.000	62.08	62.94	63.81	64.48	64.44	64.11
50.000	80.000	7.49	7.04	6.77	50.000	54.62	55.85	56.74	59.32	57.67	56.43
95.450	65.454	7.47	7.03	6.77	95.450	49.13	50.26	51.30	54.08	52.12	50.87
100.000	70.000	7.43	7.00	6.77	100.000	48.68	49.77	50.89	53.59	51.68	50.50
185.910	155.909	7.38	6.96	6.74	185.910	43.74	44.92	45.78	49.15	47.38	46.16
200.000	170.000	7.36	6.95	6.73	200.000	43.19	44.30	45.16	48.60	46.93	45.62
276.360	246.364	7.30	6.93	6.71	276.360	40.71	41.76	42.47	46.12	44.24	43.04
366.820	336.818	7.28	6.92	6.71	366.820	38.50	39.46	40.12	42.80	41.10	40.13
457.270	427.273	7.22	6.84	6.63	457.270	37.24	38.05	38.54	39.29	38.81	38.35
487.420	457.424	7.23	6.90	6.65	487.420	36.81	37.64	38.08	38.11	37.61	37.22
500.000	470.000	7.21	6.87	6.65	500.000	36.76	37.67	38.17	37.99	37.54	37.12
547.730	517.727	7.23	6.89	6.67	547.730	36.32	37.15	37.61	37.19	36.85	36.06
638.180	608.182	7.28	6.96	6.75	638.180	35.02	35.79	36.05	34.64	35.08	35.39
728.640	698.636	7.45	7.11	6.91	728.640	33.75	34.44	35.04	33.29	33.63	33.23
819.090	789.091	7.90	7.48	7.20	819.090	33.28	33.73	34.29	31.03	32.36	33.06
909.550	879.546	8.32	7.84	7.54	909.550	33.67	34.09	34.40	29.33	30.24	31.10
969.850	939.849	8.79	8.11	7.79	969.850	33.27	33.57	33.58	27.75	28.96	29.97
1000.000	970.000	8.94	8.28	7.93	1000.000	33.51	34.04	34.27	27.65	28.80	30.03

mixer VSWR

ϕ detection

FREQ.	VSWR RF port			VSWR LO port			VSWR IF port						
(MHz)	LO +4 dBm	LO +7 dBm	LO +10 dBm	LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.38	1.43	1.48	2.09	2.92	3.99	5.000	1.29	1.14	1.04	5.000	223.48	-0.04
9.980	1.25	1.32	1.37	1.95	2.76	3.81	9.980	1.30	1.14	1.04	10.000	220.86	-0.05
49.770	1.20	1.28	1.34	1.94	2.74	3.77	49.770	1.30	1.15	1.05	20.000	221.95	-0.08
99.520	1.20	1.28	1.33	1.90	2.69	3.70	99.520	1.32	1.18	1.09	50.000	229.96	-0.07
199.020	1.22	1.29	1.34	1.87	2.57	3.51	199.020	1.37	1.23	1.16	95.450	226.75	-0.17
248.770	1.27	1.31	1.37	1.86	2.52	3.43	248.770	1.43	1.27	1.20	100.000	225.04	-0.22
266.190	1.27	1.33	1.38	1.87	2.53	3.42	266.190	1.43	1.31	1.23	185.910	231.28	-0.50
345.790	1.33	1.38	1.42	1.93	2.57	3.46	345.790	1.52	1.38	1.32	200.000	233.82	-0.55
422.900	1.40	1.46	1.49	1.99	2.60	3.48	422.900	1.59	1.47	1.40	276.360	221.21	-0.88
475.140	1.46	1.50	1.54	2.02	2.60	3.45	475.140	1.65	1.53	1.47	366.820	245.81	-1.18
500.010	1.49	1.53	1.57	2.06	2.61	3.45	500.010	1.57	1.44	1.36	457.270	235.91	-1.44
529.860	1.53	1.57	1.60	2.07	2.60	3.42	529.860	1.69	1.56	1.48	487.420	228.58	-1.74
606.970	1.63	1.67	1.70	2.17	2.69	3.49	606.970	1.76	1.63	1.55	500.000	225.33	-1.93
686.570	1.75	1.78	1.81	2.23	2.67	3.42	686.570	1.80	1.68	1.62	547.730	204.71	-1.87
738.810	1.83	1.87	1.89	2.26	2.67	3.37	738.810	1.84	1.72	1.65	638.180	211.10	-2.28
763.690	1.87	1.91	1.93	2.26	2.65	3.34	763.690	1.84	1.75	1.68	728.640	216.27	-2.95
843.290	2.01	2.03	2.06	2.41	2.77	3.45	843.290	1.87	1.75	1.70	819.090	208.57	-3.50
920.400	2.13	2.16	2.18	2.52	2.86	3.50	920.400	1.86	1.76	1.69	909.550	196.48	-4.04
972.640	2.23	2.26	2.27	2.57	2.89	3.52	972.640	1.86	1.76	1.71	969.850	173.79	-4.08
1000.000	2.28	2.30	2.31	2.57	2.88	3.50	1000.000	1.85	1.76	1.71	1000.000	181.46	-3.70

very low distortion

Frequency Mixers

LEVEL 17S (+17dBm LO, up to +14dBm RF)

Models
TFM-4H
ZFM-4H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–R (dB) LO +14dBm	LO +17dBm	LO +20dBm	Isolation L–I (dB) LO +14dBm	LO +17dBm	LO +20dBm
5.000	35.00	8.06	7.19	6.80	68.63	65.11	62.26	63.08	62.77	59.58
10.000	40.00	8.27	7.34	6.84	52.02	49.72	47.88	49.04	47.93	45.88
20.000	50.00	8.25	7.32	6.79	51.05	48.38	46.32	47.83	46.60	44.47
50.000	80.00	8.03	7.13	6.72	47.24	44.27	43.43	43.95	42.64	41.20
154.380	124.38	7.64	6.85	6.49	42.29	40.79	39.71	40.95	39.44	38.24
191.720	161.72	7.73	6.90	6.50	39.82	38.36	37.03	38.68	37.21	35.58
229.060	199.06	7.86	6.87	6.51	37.84	36.06	34.45	36.88	35.14	33.13
341.100	311.10	7.12	6.47	6.28	33.49	32.01	30.69	32.68	30.52	29.33
415.780	385.78	7.11	6.56	6.34	31.45	29.63	28.54	30.17	28.83	28.04
490.470	460.47	7.52	6.83	6.58	30.48	28.12	26.51	28.42	27.66	26.78
527.820	497.82	7.38	6.71	6.44	30.41	28.92	27.09	27.56	27.02	27.57
602.500	572.50	7.11	6.70	6.46	30.75	28.97	26.77	26.64	26.56	25.89
677.190	647.19	7.39	6.93	6.70	31.64	29.95	27.57	24.97	26.49	26.14
751.880	721.88	8.09	7.28	6.84	30.06	28.70	25.66	25.73	28.04	27.37
826.570	796.57	8.85	7.85	7.11	29.06	27.71	25.25	28.36	29.57	27.42
901.260	871.26	9.77	8.86	7.63	28.40	28.43	26.42	28.85	30.98	27.89
975.940	945.94	9.25	7.94	6.20	27.82	27.50	26.58	26.15	26.48	25.48
1050.600	1020.60	10.52	9.15	8.07	27.31	26.59	25.44	24.18	22.84	21.76
1088.000	1058.00	10.42	8.97	7.81	26.86	25.61	24.18	21.02	21.90	19.82
1200.000	1170.00	9.67	8.13	7.03	25.93	24.40	23.17	19.92	21.18	17.96

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, LO port LO +14dBm	LO +17dBm	LO +20dBm	VSWR, IF port LO +14dBm	LO +17dBm	LO +20dBm	freq. (MHz)	max. DC output mV	DC offset mv
5.002	1.29	1.36	1.45	1.32	1.55	2.55	1.93	1.55	1.27	5.000	+862.70	+.98
42.344	1.04	1.15	1.25	1.07	1.50	2.37	1.92	1.54	1.27	43.548	+873.80	+.96
50.000	1.03	1.14	1.25	1.07	1.52	2.44	1.92	1.54	1.27	50.000	+862.90	+.94
79.688	1.02	1.13	1.24	1.15	1.41	2.22	1.93	1.55	1.28	82.096	+872.90	+.95
117.030	1.03	1.12	1.23	1.17	1.40	2.22	1.96	1.56	1.29	120.640	+866.80	+1.14
154.380	1.05	1.11	1.22	1.15	1.34	2.04	1.98	1.58	1.31	159.190	+892.40	+1.15
191.720	1.06	1.10	1.21	1.15	1.36	1.94	2.01	1.60	1.33	197.740	+896.30	+1.20
303.750	1.10	1.08	1.18	1.26	1.23	1.85	2.16	1.72	1.41	313.380	+1011.70	+.35
378.440	1.13	1.07	1.16	1.32	1.24	1.83	2.31	1.81	1.49	390.480	+899.10	+.75
453.130	1.15	1.04	1.13	1.35	1.22	1.81	2.48	1.92	1.58	467.580	+861.20	−3.01
500.000	1.16	1.03	1.12	1.38	1.17	1.69	2.56	1.99	1.63	500.000	+866.50	−2.85
602.500	1.18	1.01	1.10	1.48	1.13	1.60	2.70	2.11	1.75	583.220	+943.90	−3.59
639.840	1.18	1.03	1.10	1.46	1.08	1.57	2.70	2.11	1.75	621.770	+936.90	−.37
751.880	1.19	1.10	1.14	1.42	1.04	1.45	2.82	2.21	1.90	737.410	+753.50	−2.26
826.560	1.19	1.14	1.19	1.31	1.09	1.46	2.84	2.23	1.92	814.510	+693.50	−1.41
863.910	1.21	1.17	1.21	1.33	1.13	1.47	2.86	2.25	1.94	853.060	+709.20	−1.65
938.590	1.22	1.22	1.24	1.32	1.24	1.56	2.83	2.22	1.93	930.150	+685.80	−2.43
1000.000	1.24	1.24	1.25	1.36	1.33	1.61	2.80	2.19	1.89	1000.000	+632.60	−3.22
1125.300	1.21	1.22	1.22	1.36	1.52	1.75	2.62	2.03	1.74	1122.900	+641.30	−.21
1200.000	1.15	1.18	1.21	1.40	1.61	1.86	2.50	1.94	1.66	1200.000	+711.10	−4.22

Measurements at RF & LO Power +17 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-1W
LRMS-1W
RMS-1BM

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 4 dBm	LO + 7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO + 4 dBm	LO + 7 dBm	LO +10 dBm	Isolation L-I (dB) LO + 4 dBm	LO + 7 dBm	LO +10 dBm
2.000	32.000	6.44	6.15	6.06	2.000	76.36	77.45	78.57	61.46	62.05	62.37
4.000	34.000	6.24	5.93	5.84	4.000	76.01	77.30	78.72	61.31	61.60	61.92
5.000	35.000	6.20	5.89	5.82	5.000	75.18	76.89	78.20	61.28	61.49	61.60
10.000	40.000	6.24	5.90	5.79	10.000	71.36	74.36	77.17	60.46	60.26	59.90
20.000	50.000	6.17	5.87	5.77	20.000	66.06	69.48	73.30	57.66	56.77	56.07
50.000	80.000	6.26	5.90	5.81	50.000	58.75	62.05	65.98	51.88	50.51	49.44
100.000	70.000	6.19	5.85	5.77	100.000	51.91	55.01	58.44	46.87	45.08	44.04
101.730	71.733	6.21	5.87	5.79	101.730	51.82	55.00	58.41	46.80	44.99	43.91
200.000	170.000	6.12	5.82	5.76	200.000	44.72	46.91	49.09	41.98	40.52	39.41
201.470	171.467	6.12	5.83	5.77	201.470	44.65	46.83	48.96	41.78	40.31	39.24
301.200	271.200	6.22	5.81	5.76	301.200	40.17	42.24	43.95	37.77	36.71	35.57
351.070	321.067	6.18	5.79	5.74	351.070	38.48	40.24	41.71	35.63	34.89	33.94
375.000	345.000	6.19	5.79	5.73	375.000	38.02	39.86	41.46	34.69	34.22	33.37
400.930	370.933	6.11	5.74	5.69	400.930	37.46	39.23	40.69	34.11	33.67	32.76
500.000	470.000	6.24	5.85	5.75	500.000	35.94	37.51	38.57	30.47	30.15	29.95
500.670	470.667	6.24	5.84	5.76	500.670	35.90	37.49	38.55	30.49	30.16	29.93
600.400	570.400	6.24	5.98	5.92	600.400	34.35	36.08	37.07	28.72	29.20	28.65
700.130	670.133	6.66	6.31	6.15	700.130	32.13	33.78	34.96	25.77	27.21	28.17
725.070	695.067	6.78	6.49	6.24	725.070	31.86	33.46	34.58	25.18	26.43	27.38
750.000	720.000	6.88	6.55	6.29	750.000	31.63	33.11	34.29	24.61	25.85	27.10

mixer VSWR

FREQ. (MHz)	VSWR RF port LO + 4 dBm	LO + 7 dBm	LO +10 dBm	VSWR LO port LO + 4 dBm	LO + 7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO + 4 dBm	LO + 7 dBm	LO +10 dBm
5.000	1.14	1.16	1.20	1.68	2.41	3.33	5.000	1.39	1.24	1.14
10.000	1.06	1.10	1.15	1.64	2.36	3.28	10.000	1.40	1.25	1.15
20.000	1.01	1.08	1.14	1.70	2.47	3.42	20.000	1.40	1.25	1.15
50.000	1.03	1.09	1.14	1.64	2.39	3.32	50.000	1.40	1.25	1.15
74.840	1.06	1.10	1.15	1.66	2.40	3.30	74.840	1.41	1.26	1.17
100.000	1.08	1.11	1.16	1.65	2.40	3.29	100.000	1.43	1.28	1.18
144.690	1.14	1.15	1.19	1.66	2.41	3.26	144.690	1.47	1.32	1.23
200.000	1.20	1.21	1.24	1.70	2.41	3.29	200.000	1.52	1.38	1.29
214.530	1.22	1.23	1.25	1.68	2.36	3.19	214.530	1.54	1.39	1.31
284.370	1.31	1.31	1.33	1.74	2.37	3.19	284.370	1.64	1.49	1.40
354.220	1.40	1.39	1.41	1.78	2.32	3.06	354.220	1.72	1.58	1.50
375.000	1.43	1.42	1.43	1.81	2.34	3.08	375.000	1.76	1.61	1.54
424.060	1.49	1.49	1.49	1.90	2.46	3.27	424.060	1.81	1.67	1.58
493.910	1.60	1.58	1.59	1.98	2.54	3.27	493.910	1.92	1.77	1.68
500.000	1.61	1.59	1.60	2.00	2.56	3.32	500.000	1.93	1.78	1.69
563.750	1.73	1.70	1.69	2.09	2.57	3.28	563.750	2.01	1.87	1.78
633.590	1.87	1.83	1.84	2.34	2.92	3.83	633.590	2.08	1.95	1.86
703.440	2.04	2.01	2.01	2.57	3.30	4.26	703.440	2.14	2.03	1.96
726.720	2.10	2.07	2.07	2.62	3.35	4.39	726.720	2.15	2.04	1.98
750.000	2.17	2.13	2.14	2.69	3.43	4.51	750.000	2.17	2.07	2.00

ϕ detection

FREQ. (MHz)	max DC output mV	DC offset mV
2.000	242.34	0.03
4.000	242.36	0.03
5.000	241.55	0.03
10.000	244.73	0.03
20.000	241.66	0.02
50.000	233.71	-0.03
79.380	231.96	-0.10
100.000	239.28	-0.17
182.550	241.57	-0.67
200.000	243.93	-0.77
285.720	238.36	-1.65
337.310	253.06	-2.09
375.000	259.54	-2.94
388.900	257.48	-3.25
492.070	231.45	-5.24
500.000	227.96	-5.37
595.240	215.31	-6.99
698.410	211.97	-9.04
724.210	216.32	-10.11
750.000	208.56	-10.96

ultra low distortion

Frequency Mixers

LEVEL 23 (+23dBm LO, up to +15dBm RF)

Models

RAY-1
ZAY-1
ZMY-1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
5.000	35.00	6.50	6.52	6.53	61.85	57.02	53.70	79.05	82.02	>86.00
10.000	40.00	6.43	6.40	6.48	60.36	56.72	53.82	79.25	82.32	>86.00
20.000	50.00	6.40	6.40	6.49	56.74	54.48	52.00	79.36	81.28	81.01
35.938	65.94	6.43	6.43	6.53	52.88	51.51	49.99	76.65	75.99	75.33
50.000	80.00	6.38	6.40	6.51	50.10	48.82	47.85	72.70	72.57	68.82
82.345	52.35	6.37	6.39	6.59	45.91	45.62	45.16	66.35	62.91	60.22
100.000	70.00	6.33	6.36	6.56	44.28	44.05	43.27	61.72	58.66	56.52
144.220	114.22	6.45	6.53	6.64	41.58	41.60	41.21	54.43	53.71	54.55
175.160	145.16	6.63	6.68	6.77	39.88	40.04	39.24	51.26	51.38	50.90
200.000	170.00	6.68	6.69	6.76	39.60	39.45	38.48	50.04	50.73	50.65
221.570	191.57	6.49	6.52	6.62	36.79	36.41	37.51	45.90	46.45	49.56
252.500	222.50	6.51	6.52	6.61	36.84	36.33	36.92	47.05	47.23	49.54
283.440	253.44	6.62	6.64	6.77	37.32	36.36	36.25	47.30	47.98	49.23
314.380	284.38	6.70	6.74	6.84	37.11	36.35	36.04	46.09	46.73	48.01
345.320	315.32	6.67	6.62	6.75	34.44	33.85	34.16	42.98	44.99	48.25
376.260	346.26	6.57	6.50	6.57	30.62	30.50	31.71	40.13	41.75	42.64
407.190	377.19	6.63	6.43	6.39	32.30	32.89	32.68	41.52	42.28	41.96
438.130	408.13	6.83	6.50	6.32	34.18	33.81	34.16	42.37	42.66	43.08
469.070	439.07	7.31	6.81	6.64	34.59	33.63	34.33	42.39	41.41	40.68
500.000	470.00	7.15	6.62	6.62	34.79	34.24	34.04	40.74	40.42	39.86

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	VSWR, LO port LO +20dBm	LO +23dBm	VSWR, IF port LO +20dBm	LO +23dBm
5.001	1.26	1.29	1.88	2.50	1.47	1.33
10.000	1.12	1.14	1.80	2.37	1.47	1.33
20.000	1.03	1.06	1.85	2.33	1.48	1.33
35.938	1.01	1.05	1.82	2.31	1.48	1.33
50.000	1.03	1.07	1.85	2.37	1.47	1.34
82.345	1.06	1.08	1.76	2.20	1.51	1.36
100.000	1.07	1.10	1.77	2.25	1.53	1.39
144.220	1.11	1.12	1.72	2.11	1.62	1.45
175.160	1.13	1.14	1.80	2.25	1.66	1.51
200.000	1.15	1.16	1.68	2.06	1.74	1.56
221.570	1.17	1.18	1.76	2.17	1.78	1.61
252.500	1.19	1.20	1.67	2.04	1.87	1.67
283.440	1.21	1.22	1.74	2.10	1.82	1.66
314.380	1.24	1.24	1.68	1.96	1.98	1.79
345.320	1.26	1.26	1.75	2.04	2.06	1.87
376.260	1.29	1.29	1.70	1.96	2.13	1.91
407.190	1.31	1.31	1.69	1.95	2.18	1.96
438.130	1.34	1.35	1.67	1.90	2.23	2.01
469.070	1.37	1.38	1.63	1.87	2.25	2.04
500.000	1.43	1.44	1.60	1.83	2.26	2.05

ϕ detection

Freq. (MHz)	max. DC output mV	DC offset mV
5.000	−1385.80	−1.23
10.000	−1409.30	−1.23
20.000	−1383.10	−1.25
36.344	−1343.30	−1.31
50.000	−1331.10	−1.34
70.688	−1336.80	−1.35
87.860	−1376.40	−1.51
100.000	−1386.40	−1.35
139.380	−1311.20	−1.32
173.720	−1328.90	−1.90
200.000	−1376.10	−1.77
242.410	−1327.70	−1.60
276.750	−1361.20	−2.85
300.000	−1342.10	−2.44
345.440	−1273.10	−3.00
379.780	−1214.40	−.53
400.000	−1216.90	−1.82
431.300	−1282.30	+.07
465.640	−1220.50	+.70
500.000	−1228.50	−2.86

Measurements at RF & LO Power +23 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

active, load insensitive

Frequency Mixers

(+7dBm LO, up to +1dBm RF)

Model
UNCL-X1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion gain and isolation

RF MHz	LO MHz	Conversion Gain (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1.000	31.000	0.09	0.39	0.54	1.000	81.05	78.82	78.70	68.45	69.42	70.10
2.000	32.000	0.75	1.03	1.16	2.000	76.35	75.82	74.88	67.75	67.62	67.68
5.000	35.000	1.16	1.47	1.57	5.000	69.55	69.01	68.48	65.65	63.91	62.88
10.000	40.000	1.28	1.56	1.64	10.000	63.85	63.44	63.11	61.15	59.14	57.66
20.000	50.000	1.25	1.55	1.63	20.000	58.72	58.30	58.09	56.72	54.05	52.43
49.290	79.290	1.22	1.50	1.59	49.290	50.72	50.42	50.03	48.78	46.06	44.54
50.000	80.000	1.22	1.51	1.58	50.000	50.59	50.30	49.93	48.68	45.99	44.44
97.580	67.581	1.24	1.53	1.60	97.580	44.67	44.42	44.20	43.12	41.15	39.83
100.000	70.000	1.26	1.54	1.60	100.000	44.54	44.31	44.10	43.09	41.11	39.78
145.870	115.871	1.34	1.59	1.63	145.870	41.67	41.37	41.05	41.24	39.17	37.66
194.160	164.161	1.43	1.64	1.67	194.160	39.25	38.80	38.51	39.33	37.41	35.66
200.000	170.000	1.43	1.63	1.67	200.000	38.88	38.58	38.28	38.93	37.17	35.55
242.450	212.452	1.47	1.66	1.69	242.450	37.45	37.16	36.89	36.51	35.54	34.34
250.000	220.000	1.45	1.65	1.68	250.000	37.23	36.95	36.80	36.20	35.36	34.30
290.740	260.742	1.46	1.66	1.68	290.740	36.01	35.68	35.33	34.02	33.50	32.53
339.030	309.032	1.42	1.62	1.66	339.030	35.08	34.78	34.64	31.46	31.73	31.54
387.320	357.323	1.39	1.59	1.63	387.320	34.17	33.69	33.22	29.16	29.47	29.02
435.610	405.613	1.31	1.52	1.57	435.610	33.53	33.06	32.74	27.79	28.42	28.41
483.900	453.903	1.18	1.42	1.48	483.900	32.95	32.50	32.12	26.45	27.25	27.54
500.000	470.000	1.16	1.39	1.47	500.000	33.03	32.58	32.23	26.11	27.02	27.40

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
5.000	1.20	1.21	1.23	2.21	2.96	3.93	5.000	1.21	1.19	1.18
10.000	1.11	1.12	1.14	2.09	2.86	3.84	10.000	1.19	1.16	1.15
20.000	1.06	1.06	1.09	1.97	2.77	3.74	20.000	1.18	1.16	1.14
50.000	1.03	1.05	1.09	1.83	2.61	3.58	50.000	1.19	1.16	1.15
57.500	1.03	1.05	1.09	1.86	2.65	3.62	57.500	1.19	1.16	1.15
95.000	1.03	1.05	1.09	1.82	2.59	3.54	95.000	1.18	1.16	1.15
100.000	1.03	1.05	1.09	1.76	2.50	3.40	100.000	1.18	1.16	1.15
140.000	1.02	1.05	1.09	1.76	2.49	3.40	140.000	1.18	1.16	1.15
185.000	1.01	1.06	1.11	1.77	2.52	3.44	185.000	1.18	1.16	1.15
200.000	1.01	1.07	1.11	1.74	2.46	3.32	200.000	1.18	1.16	1.15
230.000	1.03	1.08	1.13	1.74	2.46	3.33	230.000	1.18	1.16	1.15
245.000	1.05	1.10	1.14	1.79	2.54	3.43	245.000	1.17	1.16	1.15
250.000	1.09	1.12	1.15	1.83	2.58	3.47	250.000	1.17	1.15	1.14
275.000	1.07	1.11	1.16	1.82	2.54	3.40	275.000	1.18	1.16	1.16
320.000	1.09	1.15	1.19	1.85	2.56	3.42	320.000	1.17	1.16	1.16
365.000	1.13	1.19	1.24	1.92	2.65	3.52	365.000	1.16	1.16	1.16
410.000	1.18	1.24	1.28	1.95	2.66	3.52	410.000	1.15	1.15	1.15
455.000	1.23	1.29	1.34	2.01	2.72	3.56	455.000	1.14	1.15	1.15
485.000	1.27	1.33	1.38	2.10	2.82	3.66	485.000	1.14	1.15	1.15
500.000	1.30	1.36	1.41	2.11	2.82	3.67	500.000	1.13	1.15	1.16

ultra low distortion

Frequency Mixers

LEVEL 23 (+23dBm LO, up to +15dBm RF)

Models

RAY-2
ZAY-2
ZMY-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
10.000	40.00	7.40	7.24	7.29	63.84	62.69	60.07	65.23	65.25	62.53
39.118	69.12	7.44	7.31	7.49	60.69	59.37	57.65	64.08	63.70	61.39
68.236	98.24	7.35	7.27	7.51	57.59	56.74	55.77	61.64	61.14	58.79
126.470	96.47	7.23	7.14	7.44	55.15	53.84	52.39	58.67	56.28	54.98
184.710	154.71	7.27	7.22	7.53	50.42	48.58	48.05	51.41	50.62	50.74
213.830	183.83	7.31	7.24	7.53	46.32	45.40	45.35	47.53	47.73	48.43
272.060	242.06	7.25	7.23	7.50	42.98	42.61	42.86	44.87	45.47	46.34
330.300	300.30	7.35	7.29	7.61	41.59	41.54	42.10	43.35	44.13	44.42
388.530	358.53	7.44	7.36	7.69	40.33	40.25	40.28	42.03	42.56	42.73
446.770	416.77	7.87	7.64	7.75	38.11	38.45	39.55	40.69	40.78	42.04
505.010	475.01	8.06	7.63	7.76	35.94	36.69	37.98	38.96	39.32	39.20
534.120	504.12	8.28	7.90	7.90	35.19	35.83	37.50	38.08	37.92	38.06
592.360	562.36	8.76	8.08	7.97	34.72	35.57	37.25	36.54	36.44	35.82
650.600	620.60	8.41	7.76	7.67	35.09	36.21	37.77	34.73	34.53	34.35
708.830	678.83	8.35	7.65	7.59	35.95	36.58	37.86	34.84	34.06	34.28
767.070	737.07	8.18	7.45	7.52	37.16	36.95	37.46	33.96	33.05	33.07
825.300	795.30	8.19	7.70	7.81	36.30	36.19	36.58	32.59	31.58	30.83
883.540	853.54	9.07	8.40	8.34	35.40	35.85	37.02	31.59	30.60	30.85
941.780	911.78	10.02	9.21	9.08	35.05	34.74	36.39	30.53	29.37	29.56
1000.000	970.00	10.52	9.87	9.86	34.37	34.25	34.54	30.87	29.56	29.15

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
10.000	1.11	1.14	1.17	1.76	2.22	2.89	1.82	1.60	1.40
39.088	1.07	1.12	1.13	1.57	1.91	2.25	1.81	1.59	1.35
68.176	1.09	1.14	1.18	1.74	2.24	2.94	1.83	1.61	1.45
100.000	1.12	1.16	1.15	1.49	1.80	2.15	1.87	1.64	1.39
155.440	1.16	1.19	1.18	1.54	1.90	2.46	1.96	1.73	1.53
200.000	1.19	1.21	1.19	1.47	1.80	2.84	2.03	1.81	1.61
242.710	1.21	1.22	1.15	1.46	1.75	2.15	2.13	1.90	1.60
300.880	1.23	1.23	1.14	1.64	1.97	2.27	2.27	2.04	1.84
359.060	1.22	1.21	1.11	1.77	2.16	2.43	2.37	2.13	2.09
417.240	1.19	1.18	1.09	1.81	2.17	2.34	2.44	2.20	2.19
475.410	1.16	1.14	1.10	1.94	2.27	2.25	2.51	2.27	2.16
504.500	1.16	1.13	1.12	1.96	2.34	2.19	2.53	2.30	2.20
562.680	1.18	1.15	1.15	1.88	2.20	2.14	2.62	2.40	2.28
620.850	1.27	1.24	1.16	1.80	2.02	2.04	2.67	2.47	2.29
679.030	1.43	1.39	1.17	1.62	1.77	1.96	2.79	2.63	2.33
737.210	1.61	1.57	1.24	1.40	1.52	2.04	2.90	2.84	2.63
795.380	1.83	1.77	1.41	1.33	1.46	2.08	3.07	3.15	3.17
853.560	2.11	1.99	1.64	1.44	1.64	2.08	3.33	3.57	3.72
911.740	2.42	2.23	1.87	1.79	2.13	2.06	3.49	3.91	3.92
1000.000	2.96	2.65	2.40	3.35	4.88	2.26	3.89	4.59	4.52

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
10.000	−1425.30	+2.54
39.970	−1373.80	+2.65
69.940	−1401.00	+2.91
100.000	−1397.40	+3.15
159.850	−1430.40	+3.67
200.000	−1394.60	+3.29
249.760	−1458.90	+3.27
309.700	−1395.70	+3.32
369.640	−1261.90	+3.03
429.580	−1207.40	+3.43
489.520	−1225.40	+3.72
519.490	−1250.90	+4.19
579.430	−1184.50	+4.97
639.370	−1096.40	+4.26
669.340	−1113.20	+5.74
729.280	−1035.70	+5.99
789.220	−983.40	+5.57
849.160	−949.00	+9.12
939.070	−915.30	10.77
1000.000	−816.10	+7.84

Measurements at RF & LO Power +23 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

active, low LO drive

Frequency Mixers

Model
UNCL-L1

(-4dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO -7 dBm	LO -4 dBm	LO -1 dBm	FREQ. (MHz)	Isolation L-R (dB) LO -7 dBm	LO -4 dBm	LO -1 dBm	Isolation L-I (dB) LO -7 dBm	LO -4 dBm	LO -1 dBm
10.000	40.000	5.94	5.70	5.59	10.000	61.95	62.39	61.41	45.95	50.19	54.81
20.000	50.000	5.95	5.67	5.57	20.000	56.83	57.15	55.87	40.27	44.63	49.97
50.000	80.000	5.95	5.70	5.58	50.000	49.01	49.25	48.20	32.14	36.60	42.63
53.240	83.235	5.96	5.70	5.58	53.240	48.39	48.94	47.64	31.61	36.12	42.31
96.470	66.471	5.94	5.69	5.57	96.470	43.97	44.45	43.14	27.01	31.86	37.72
100.000	70.000	5.96	5.69	5.58	100.000	43.73	44.16	42.80	26.80	31.79	37.33
139.710	109.706	5.94	5.68	5.58	139.710	41.86	42.08	39.99	24.47	29.24	34.58
182.940	152.941	5.91	5.68	5.59	182.940	40.21	39.66	37.14	22.54	26.97	32.12
200.000	170.000	5.93	5.70	5.61	200.000	39.78	38.64	35.16	21.86	26.20	31.27
226.180	196.177	5.91	5.69	5.60	226.180	38.86	37.39	33.65	20.81	25.18	30.06
240.590	210.588	5.92	5.70	5.62	240.590	39.24	37.10	32.26	20.37	24.79	29.78
250.000	220.000	5.91	5.70	5.60	250.000	38.52	36.64	31.91	20.01	24.38	29.26
269.410	239.412	5.90	5.69	5.60	269.410	37.74	35.64	31.10	19.52	23.95	28.83
312.650	282.647	5.92	5.71	5.61	312.650	36.62	34.48	29.56	18.54	23.15	27.91
355.880	325.882	5.92	5.70	5.59	355.880	34.96	33.01	28.51	17.84	22.80	27.34
399.120	369.118	5.96	5.74	5.62	399.120	35.84	32.87	28.18	17.65	23.17	27.44
442.350	412.353	5.96	5.72	5.60	442.350	34.82	32.64	28.53	17.76	23.55	27.86
471.180	441.177	6.01	5.77	5.65	471.180	32.45	30.96	27.56	18.50	25.05	27.73
485.590	455.588	6.00	5.77	5.64	485.590	31.49	30.40	27.51	18.39	25.57	27.28
500.000	470.000	6.01	5.77	5.65	500.000	30.14	29.18	26.15	18.87	26.74	26.51

mixer VSWR

FREQ. (MHz)	VSWR RF port LO -7 dBm	LO -4 dBm	LO -1 dBm	VSWR LO port LO -7 dBm	LO -4 dBm	LO -1 dBm	FREQ. (MHz)	VSWR IF port LO -7 dBm	LO -4 dBm	LO -1 dBm
10.000	1.09	1.11	1.13	1.04	1.43	1.61	10.000	1.32	1.20	1.11
20.000	1.04	1.07	1.10	1.03	1.34	1.54	20.000	1.33	1.20	1.12
50.000	1.01	1.06	1.10	1.03	1.39	1.58	50.000	1.32	1.19	1.11
53.240	1.01	1.06	1.09	1.03	1.39	1.58	53.240	1.32	1.19	1.11
96.470	1.02	1.05	1.09	1.04	1.49	1.69	96.470	1.31	1.19	1.11
100.000	1.02	1.06	1.09	1.04	1.50	1.70	100.000	1.31	1.19	1.11
139.710	1.04	1.07	1.10	1.05	1.62	1.85	139.710	1.31	1.19	1.12
182.940	1.07	1.09	1.12	1.53	1.81	2.03	182.940	1.31	1.19	1.13
200.000	1.08	1.10	1.13	1.57	1.87	2.12	200.000	1.31	1.19	1.12
226.180	1.10	1.11	1.14	1.63	1.97	2.23	226.180	1.32	1.20	1.13
240.590	1.10	1.13	1.15	1.67	2.03	2.30	240.590	1.32	1.20	1.14
250.000	1.11	1.13	1.15	1.69	2.06	2.33	250.000	1.32	1.20	1.14
269.410	1.12	1.14	1.16	1.75	2.15	2.42	269.410	1.30	1.18	1.12
312.650	1.16	1.17	1.19	1.85	2.26	2.60	312.650	1.32	1.21	1.15
355.880	1.19	1.21	1.22	1.94	2.36	2.74	355.880	1.33	1.22	1.17
399.120	1.24	1.25	1.27	2.03	2.43	2.82	399.120	1.35	1.24	1.19
442.350	1.29	1.30	1.31	2.10	2.46	2.83	442.350	1.37	1.26	1.22
471.180	1.33	1.34	1.35	2.13	2.48	2.78	471.180	1.38	1.28	1.23
485.590	1.35	1.36	1.36	2.14	2.48	2.79	485.590	1.39	1.29	1.24
500.000	1.36	1.38	1.39	2.17	2.48	2.78	500.000	1.39	1.29	1.25

ultra low distortion

Frequency Mixers

LEVEL 23 (+23dBm LO, up to +15dBm RF)

Models
RAY-3
ZAY-3
ZMY-3

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz.	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
.070	30.07	5.89	5.77	5.83	55.50	55.55	56.16	56.70	56.68	56.98
.200	30.20	5.65	5.58	5.67	53.87	53.15	52.66	56.88	57.09	57.21
1.000	31.00	5.40	5.29	5.40	53.43	52.74	52.25	56.80	57.07	57.32
5.000	35.00	5.13	5.23	5.19	53.20	52.57	51.95	56.66	56.88	57.11
20.000	50.00	5.33	5.27	5.40	52.95	52.28	51.68	56.46	56.59	56.74
34.541	64.54	5.30	5.24	5.39	51.98	51.27	50.53	54.99	54.69	54.37
48.329	78.33	5.34	5.26	5.41	49.40	48.91	48.22	51.20	51.06	50.65
62.117	92.12	5.31	5.28	5.37	46.32	46.28	46.09	47.64	47.85	48.12
69.011	99.01	5.32	5.29	5.39	44.36	44.38	44.13	45.53	45.65	45.21
82.799	52.80	5.29	5.28	5.38	42.44	42.67	42.34	43.68	43.88	42.27
96.587	66.59	5.32	5.28	5.42	40.76	41.29	40.93	41.18	41.90	41.18
103.480	73.48	5.26	5.25	5.40	39.57	39.95	39.53	40.65	40.89	39.21
117.270	87.27	5.30	5.28	5.36	38.97	39.22	39.59	40.47	39.90	39.33
131.060	101.06	5.32	5.29	5.44	38.64	39.37	40.10	40.71	39.78	37.65
144.850	114.85	5.40	5.34	5.48	36.94	38.04	39.29	38.19	37.10	35.27
158.630	128.63	5.49	5.43	5.51	35.34	36.70	37.68	35.06	33.79	31.67
165.530	135.53	5.51	5.47	5.56	34.47	36.49	37.97	32.66	31.41	29.74
179.320	149.32	5.54	5.47	5.59	34.00	36.22	37.89	31.97	30.50	28.81
193.100	163.10	5.56	5.54	5.64	33.89	36.47	36.66	31.76	29.43	27.79
200.000	170.00	5.56	5.51	5.61	34.35	36.43	35.76	31.75	29.00	27.46

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
5.001	1.25	1.17	1.15	1.79	2.42	3.01	1.49	1.40	1.32
10.000	1.25	1.18	1.15	1.79	2.40	3.09	1.49	1.41	1.33
20.000	1.25	1.18	1.15	1.69	2.23	2.58	1.51	1.42	1.34
27.286	1.24	1.17	1.15	1.73	2.21	2.38	1.51	1.42	1.35
32.857	1.23	1.17	1.15	1.73	2.19	2.31	1.51	1.43	1.36
44.000	1.23	1.16	1.14	1.74	2.20	2.36	1.53	1.45	1.37
50.000	1.22	1.15	1.13	1.74	2.20	2.46	1.54	1.46	1.39
60.714	1.21	1.15	1.13	1.75	2.27	2.74	1.58	1.50	1.42
66.286	1.21	1.14	1.13	1.76	2.27	2.89	1.60	1.52	1.44
83.000	1.20	1.13	1.11	1.78	2.28	2.67	1.67	1.58	1.50
88.571	1.19	1.13	1.11	1.76	2.25	2.48	1.70	1.61	1.52
100.000	1.19	1.13	1.11	1.72	2.14	2.21	1.74	1.65	1.57
110.860	1.18	1.12	1.11	1.68	2.10	2.11	1.77	1.67	1.57
127.570	1.17	1.12	1.11	1.74	2.17	2.35	1.89	1.79	1.69
138.710	1.17	1.12	1.11	1.79	2.25	2.57	1.96	1.85	1.74
149.860	1.17	1.12	1.12	1.80	2.29	2.56	2.02	1.91	1.79
161.000	1.17	1.13	1.13	1.78	2.22	2.38	2.09	1.98	1.85
177.710	1.18	1.14	1.14	1.75	2.16	2.15	2.19	2.06	1.94
194.430	1.19	1.16	1.16	1.74	2.18	2.28	2.30	2.16	2.03
200.000	1.19	1.16	1.17	1.77	2.21	2.41	2.35	2.20	2.06

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.070	−1448.00	−4.44
.200	−1471.50	−7.26
1.000	−1503.30	−7.40
5.000	−1446.10	−7.35
10.000	−1472.00	−7.56
20.000	−1446.20	−7.34
35.000	−1433.90	−7.13
50.000	−1418.30	−6.85
65.000	−1419.40	−6.82
80.000	−1422.70	−6.49
87.500	−1422.10	−6.46
100.000	−1416.90	−5.75
110.000	−1408.10	−5.96
125.000	−1381.90	−5.08
140.000	−1377.90	−3.26
147.500	−1390.00	−3.09
162.500	−1398.60	−3.92
177.500	−1390.50	−3.70
192.500	−1366.50	−1.40
200.000	−1339.30	+.58

Measurements at RF & LO Power +23 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

active, load insensitive

Frequency Mixers

Model
UNCL-X1MH

UNCL-X1MH (+13 dBm LO, up to +9 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion gain and isolation

RF MHz	LO MHz	Conversion Gain (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
1.000	31.000	0.98	1.40	1.66	79.91	78.21	77.14	45.37	42.19	42.17
2.000	32.000	1.50	1.90	2.13	77.02	75.39	74.33	45.07	42.84	42.87
5.000	35.000	1.89	2.23	2.47	69.76	68.33	67.42	45.56	43.38	43.44
10.000	40.000	1.98	2.31	2.55	64.70	63.00	61.99	45.51	43.25	43.19
20.000	50.000	1.99	2.33	2.55	58.76	57.49	56.45	44.22	42.06	41.74
49.290	79.290	1.99	2.34	2.56	52.53	51.34	50.41	41.98	39.86	39.01
50.000	80.000	1.99	2.33	2.56	52.42	51.23	50.30	41.90	39.78	38.93
97.580	67.581	1.97	2.28	2.53	47.06	46.25	45.49	38.52	36.14	35.04
100.000	70.000	1.99	2.29	2.54	46.84	46.06	45.30	38.41	35.99	34.89
145.870	115.871	2.03	2.36	2.55	44.56	43.51	42.24	36.31	34.10	32.60
194.160	164.161	2.05	2.32	2.49	42.73	41.46	40.30	34.92	32.58	31.14
200.000	170.000	2.05	2.33	2.50	42.47	41.16	39.92	34.76	32.28	30.77
242.450	212.452	2.04	2.28	2.46	40.57	39.33	38.14	32.42	30.88	29.36
250.000	220.000	2.09	2.30	2.49	40.21	39.00	37.82	32.06	30.57	29.17
290.740	260.742	1.98	2.23	2.43	38.61	37.30	36.15	29.52	28.88	27.94
339.030	309.032	1.95	2.20	2.40	37.10	35.93	34.80	27.11	27.10	26.60
387.320	357.323	1.88	2.15	2.38	35.56	34.50	33.47	25.51	25.78	25.66
435.610	405.613	1.76	2.06	2.29	33.68	32.60	31.83	23.60	24.57	24.69
483.900	453.903	1.69	2.01	2.27	32.86	32.13	31.45	22.37	23.77	24.28
500.000	470.000	1.74	2.04	2.28	32.70	31.94	31.20	21.96	23.28	23.61

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
5.000	1.15	1.17	1.20	1.69	2.34	3.14	1.24	1.22	1.19
10.000	1.08	1.10	1.14	1.62	2.28	3.05	1.23	1.20	1.17
20.000	1.05	1.07	1.12	1.68	2.37	3.17	1.19	1.16	1.14
50.000	1.03	1.06	1.12	1.61	2.30	3.08	1.16	1.13	1.11
57.500	1.03	1.06	1.12	1.59	2.28	3.06	1.16	1.13	1.10
95.000	1.03	1.06	1.12	1.57	2.24	2.93	1.15	1.12	1.09
100.000	1.03	1.06	1.12	1.59	2.23	2.95	1.15	1.12	1.09
140.000	1.03	1.06	1.12	1.58	2.22	2.95	1.14	1.11	1.09
185.000	1.03	1.06	1.12	1.55	2.15	2.80	1.13	1.11	1.10
200.000	1.03	1.06	1.12	1.56	2.11	2.81	1.13	1.11	1.10
230.000	1.04	1.05	1.11	1.56	2.12	2.76	1.12	1.10	1.10
245.000	1.08	1.05	1.09	1.55	2.10	2.69	1.11	1.10	1.10
250.000	1.12	1.09	1.10	1.55	2.08	2.67	1.11	1.10	1.10
275.000	1.12	1.11	1.14	1.53	2.03	2.60	1.11	1.10	1.11
320.000	1.09	1.11	1.15	1.51	1.97	2.50	1.10	1.10	1.11
365.000	1.10	1.12	1.17	1.51	1.93	2.38	1.09	1.10	1.12
410.000	1.11	1.14	1.18	1.49	1.87	2.30	1.08	1.11	1.13
455.000	1.13	1.16	1.20	1.45	1.79	2.19	1.08	1.11	1.14
485.000	1.15	1.17	1.22	1.44	1.79	2.18	1.09	1.12	1.15
500.000	1.16	1.18	1.22	1.44	1.79	2.17	1.09	1.13	1.15

ultra low distortion

Frequency Mixers Model RAY-6

LEVEL 23 (+23dBm LO, up to +15dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
.010	10.01	6.00	6.00	5.98	60.88	56.94	56.57	57.28	56.32	56.05
.050	10.05	4.80	4.76	4.73	59.08	55.89	53.94	56.52	52.80	50.68
.200	10.20	4.59	4.58	4.53	60.44	56.55	53.59	57.32	52.97	50.17
1.000	11.00	4.54	4.60	4.66	61.74	57.41	53.98	58.45	53.59	50.84
2.000	12.00	4.74	4.76	4.83	62.28	58.18	54.57	59.79	54.59	51.44
5.000	15.00	4.74	4.78	4.85	58.99	57.29	54.86	57.30	54.20	52.27
8.629	18.63	4.84	4.82	4.92	50.26	50.26	49.44	48.24	46.35	44.99
10.000	20.00	4.78	4.82	4.85	46.67	45.31	44.07	46.40	44.58	42.73
12.077	22.08	4.88	4.88	4.92	44.39	42.42	40.16	44.20	41.76	39.35
15.524	25.52	4.80	4.81	4.88	40.51	39.77	40.47	42.76	40.39	36.55
20.000	30.00	4.51	4.50	4.56	40.90	41.36	42.40	43.14	41.11	36.97
22.419	32.42	4.89	4.87	4.98	41.52	42.26	42.14	43.53	41.73	38.57
24.143	34.14	4.90	4.91	4.99	39.04	39.78	41.84	41.73	39.46	36.87
29.315	19.32	4.85	4.86	4.92	40.26	38.11	34.34	40.42	37.99	35.70
32.762	22.76	4.84	4.82	4.90	38.52	36.32	33.36	39.55	37.00	34.56
37.934	27.93	4.85	4.84	4.94	37.02	34.95	33.22	37.69	35.33	33.54
41.381	31.38	4.89	4.84	4.97	32.88	31.36	31.03	36.04	34.43	33.15
44.829	34.83	4.88	4.88	4.98	34.76	33.56	34.32	36.37	33.46	30.10
48.276	38.28	4.89	4.92	5.00	30.01	28.56	28.80	33.07	30.10	26.02
50.000	40.00	4.91	4.89	5.01	28.52	27.47	27.69	32.60	30.74	26.67

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
5.001	1.37	1.32	1.28	1.84	2.47	3.12	1.47	1.42	1.39
6.217	1.37	1.32	1.28	1.83	2.48	3.17	1.47	1.41	1.39
7.434	1.37	1.32	1.28	1.82	2.48	3.21	1.47	1.42	1.40
10.000	1.39	1.33	1.29	1.80	2.43	3.14	1.51	1.44	1.40
12.297	1.39	1.33	1.29	1.79	2.39	3.03	1.52	1.45	1.41
15.946	1.39	1.32	1.29	1.76	2.32	2.84	1.53	1.46	1.42
19.595	1.38	1.31	1.28	1.73	2.26	2.63	1.52	1.46	1.42
20.000	1.38	1.31	1.28	1.76	2.25	2.62	1.52	1.46	1.43
22.027	1.38	1.31	1.27	1.74	2.24	2.53	1.54	1.47	1.43
24.459	1.36	1.30	1.26	1.73	2.23	2.45	1.53	1.47	1.43
26.892	1.36	1.30	1.26	1.76	2.20	2.41	1.54	1.48	1.44
29.324	1.35	1.29	1.25	1.75	2.22	2.36	1.54	1.48	1.45
32.973	1.33	1.27	1.23	1.76	2.20	2.33	1.56	1.49	1.46
36.622	1.32	1.26	1.23	1.77	2.21	2.34	1.58	1.52	1.48
39.054	1.31	1.25	1.22	1.77	2.20	2.36	1.59	1.53	1.49
41.486	1.30	1.24	1.21	1.78	2.20	2.39	1.60	1.53	1.50
43.919	1.29	1.23	1.20	1.78	2.21	2.41	1.61	1.55	1.51
46.351	1.28	1.22	1.19	1.79	2.22	2.45	1.63	1.56	1.52
48.784	1.28	1.21	1.19	1.78	2.22	2.48	1.65	1.58	1.54
50.000	1.27	1.21	1.18	1.78	2.23	2.51	1.65	1.59	1.55

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.020	−1477.00	−4.10
.050	−1408.00	−4.17
.200	−1477.00	−4.10
1.000	−1476.80	−3.86
2.000	−1479.00	−3.70
5.000	−1484.60	−5.90
10.000	−1487.00	−6.11
12.286	−1490.20	−6.37
15.714	−1487.10	−6.48
19.143	−1483.10	−6.31
20.000	−1477.30	−6.23
22.572	−1470.30	−5.95
26.000	−1471.00	−5.36
29.429	−1462.10	−4.70
32.857	−1451.90	−4.29
36.286	−1438.30	−3.88
39.715	−1432.70	−3.92
43.143	−1416.10	−3.24
46.572	−1404.60	−2.13
50.000	−1407.60	−2.66

Measurements at RF & LO Power +23 dBm

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

active, low noise

Frequency Mixers

Model
UNCL-R1H

UNCL-R1H (+17 dBm LO, up to +1 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion gain and isolation

RF MHz	LO MHz	Conversion Gain (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
10.000	40.000	5.58	6.33	6.58	72.44	71.50	70.35	57.77	57.52	56.95
20.000	50.000	5.54	6.22	6.50	70.03	69.22	68.35	56.30	54.07	52.18
50.000	80.000	5.52	6.18	6.48	65.16	64.69	64.55	51.96	48.29	46.04
53.240	83.235	5.49	6.17	6.47	64.56	64.24	64.15	51.60	47.86	45.57
96.470	66.471	5.48	6.12	6.41	59.34	59.19	58.65	47.75	43.67	40.75
100.000	70.000	5.49	6.13	6.41	58.96	58.66	58.27	47.58	43.42	40.47
139.710	109.706	5.39	6.09	6.41	56.06	55.56	55.47	45.86	41.18	38.85
182.940	152.941	5.28	6.06	6.39	53.36	53.10	53.16	44.31	40.77	38.10
200.000	170.000	5.43	6.16	6.40	52.62	52.49	52.67	42.61	39.69	36.99
226.180	196.177	5.35	6.09	6.37	51.44	51.44	51.70	41.51	39.10	36.45
240.590	210.588	5.35	6.11	6.34	50.98	51.08	51.41	39.98	38.11	35.78
250.000	220.000	5.16	6.01	6.32	50.74	50.87	51.23	39.23	37.62	35.50
269.410	239.412	5.50	6.11	6.32	50.15	50.21	50.37	37.59	36.75	35.25
312.650	282.647	5.43	5.99	6.17	49.19	49.32	49.26	33.47	34.04	33.41
355.880	325.882	5.24	5.83	5.97	48.40	48.66	48.59	30.83	31.86	32.37
399.120	369.118	5.10	5.73	5.91	47.64	47.79	47.69	28.85	30.03	30.87
442.350	412.353	5.08	5.49	5.77	47.09	46.94	46.68	26.91	28.23	29.32
471.180	441.177	5.08	5.46	5.62	46.92	46.83	46.62	25.67	27.18	28.25
485.590	455.588	4.83	5.33	5.53	46.87	46.88	46.72	25.46	27.21	28.61
500.000	470.000	4.86	5.31	5.54	46.79	46.71	46.34	25.23	27.14	28.44

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm
10.000	1.57	1.49	1.45	1.15	1.80	2.68	1.47	1.19	1.04
20.000	1.39	1.30	1.25	1.22	1.87	2.78	1.47	1.19	1.04
50.000	1.35	1.24	1.18	1.17	1.81	2.73	1.46	1.19	1.06
53.240	1.35	1.24	1.17	1.16	1.80	2.72	1.46	1.19	1.06
96.470	1.34	1.24	1.18	1.14	1.75	2.61	1.48	1.20	1.08
100.000	1.34	1.24	1.18	1.16	1.74	2.63	1.48	1.21	1.08
139.710	1.33	1.24	1.20	1.16	1.73	2.57	1.49	1.23	1.11
182.940	1.31	1.25	1.22	1.19	1.65	2.42	1.53	1.27	1.14
200.000	1.31	1.25	1.23	1.21	1.63	2.39	1.55	1.28	1.15
226.180	1.30	1.25	1.25	1.21	1.60	2.34	1.57	1.31	1.17
240.590	1.29	1.26	1.27	1.20	1.57	2.34	1.59	1.32	1.19
250.000	1.29	1.26	1.28	1.21	1.56	2.34	1.62	1.35	1.21
269.410	1.28	1.27	1.29	1.21	1.50	2.25	1.61	1.33	1.16
312.650	1.27	1.29	1.33	1.24	1.42	2.08	1.67	1.39	1.21
355.880	1.26	1.31	1.37	1.29	1.39	1.93	1.73	1.43	1.23
399.120	1.26	1.34	1.42	1.30	1.31	1.85	1.79	1.47	1.26
442.350	1.28	1.38	1.48	1.31	1.27	1.78	1.84	1.51	1.26
471.180	1.29	1.40	1.51	1.30	1.22	1.73	1.88	1.54	1.27
485.590	1.30	1.42	1.53	1.32	1.22	1.69	1.89	1.54	1.27
500.000	1.31	1.43	1.55	1.31	1.22	1.68	1.87	1.53	1.26

super-low distortion

Frequency Mixers

Models
SAY-1
ZFY-1

LEVEL 23S (+23dBm LO, up to +20dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
.100	30.10	6.28	5.89	5.76	22.66	25.02	26.96	23.83	25.81	26.67
1.000	31.00	6.16	5.82	5.76	43.67	46.68	49.99	43.91	47.33	50.38
10.000	40.00	5.92	5.59	5.69	43.93	47.08	50.18	44.24	47.94	50.52
20.000	50.00	5.96	5.60	5.70	43.87	46.71	49.57	44.41	47.64	49.53
34.576	64.58	5.93	5.59	5.70	43.35	45.97	48.44	44.21	46.92	48.10
69.052	99.05	5.89	5.57	5.69	42.78	45.02	46.84	43.90	46.05	46.59
100.000	70.00	5.83	5.52	5.64	42.07	43.63	44.27	43.31	44.10	43.58
120.770	90.77	5.86	5.58	5.71	41.19	42.68	43.09	42.55	43.10	42.49
155.240	125.24	5.99	5.68	5.71	39.81	40.68	41.13	41.13	41.09	39.43
189.720	159.72	6.22	5.73	5.82	38.49	39.25	40.38	40.04	39.09	38.16
224.190	194.19	6.43	5.85	5.87	38.26	39.09	40.58	39.65	38.89	38.15
241.430	211.43	6.58	5.95	5.93	37.51	38.42	40.04	38.32	38.05	37.91
258.670	228.67	6.59	6.00	6.01	35.85	37.01	38.48	36.00	36.93	36.61
293.150	263.15	6.45	5.91	6.01	35.24	36.97	37.82	34.03	35.23	34.94
327.620	297.62	6.31	5.81	5.90	35.25	37.56	37.85	32.69	34.01	33.27
362.100	332.10	6.32	5.87	5.94	37.64	40.25	39.64	32.79	33.42	32.92
396.570	366.57	6.50	5.96	6.00	38.48	41.18	40.23	33.96	33.85	33.56
431.050	401.05	6.80	6.22	6.21	38.46	41.74	40.20	35.73	36.25	34.92
465.530	435.53	7.10	6.39	6.79	39.62	43.60	42.81	38.44	37.76	36.93
500.000	470.00	7.31	6.56	6.95	39.64	42.79	41.46	37.31	37.30	36.50

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
5.003	1.70	1.35	1.14	1.31	1.41	2.36	1.63	1.29	1.08
10.000	1.72	1.37	1.14	1.28	1.45	2.43	1.65	1.30	1.08
20.000	1.75	1.37	1.15	1.32	1.35	2.10	1.65	1.31	1.09
34.118	1.74	1.37	1.16	1.21	1.42	1.96	1.63	1.30	1.08
50.000	1.73	1.37	1.16	1.21	1.46	2.05	1.63	1.30	1.09
63.235	1.75	1.38	1.18	1.29	1.42	2.38	1.64	1.30	1.09
100.000	1.78	1.42	1.21	1.38	1.37	1.82	1.64	1.30	1.11
121.470	1.83	1.45	1.24	1.39	1.34	1.79	1.65	1.32	1.13
150.590	1.90	1.50	1.29	1.53	1.37	1.97	1.67	1.33	1.15
194.260	2.00	1.57	1.35	1.56	1.32	1.63	1.71	1.37	1.18
200.000	2.03	1.58	1.35	1.56	1.30	1.69	1.72	1.37	1.18
223.380	2.11	1.64	1.40	1.61	1.31	1.78	1.75	1.40	1.20
252.500	2.17	1.68	1.43	1.71	1.25	1.57	1.78	1.43	1.22
296.180	2.32	1.76	1.50	1.93	1.25	1.67	1.86	1.49	1.27
325.290	2.43	1.81	1.55	1.97	1.30	1.60	1.93	1.55	1.32
354.410	2.53	1.89	1.61	2.18	1.34	1.60	2.01	1.64	1.39
398.090	2.62	1.95	1.67	2.37	1.37	1.55	2.12	1.71	1.45
427.210	2.67	1.99	1.70	2.55	1.42	1.48	2.21	1.78	1.51
470.880	2.73	2.05	1.78	2.83	1.53	1.35	2.36	1.88	1.60
500.000	2.62	2.02	1.81	2.84	1.55	1.25	2.34	1.89	1.65

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.100	+656.40	−5.40
1.000	+874.50	+4.90
10.000	+1023.10	+.85
20.000	+999.80	+.95
50.000	+965.70	+.66
62.114	+954.20	+.92
100.000	+971.40	+1.53
119.230	+964.80	+1.92
157.300	+971.70	+2.28
195.380	+995.60	+2.50
200.000	+997.80	+2.10
233.460	+959.80	+1.38
252.490	+952.70	+2.42
290.570	+965.50	+2.50
328.650	+971.70	+1.52
366.720	+928.50	+2.39
404.800	+839.20	+5.63
442.870	+747.20	+6.19
461.910	+720.90	+7.41
500.000	+681.50	+6.95

Measurements at RF & LO Power +23 dBm

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

active, low noise

Frequency Mixers

Model
UNCL-R1

UNCL-R1 (+7 dBm LO, up to -10 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion gain and isolation

RF MHz	LO MHz	Conversion Gain (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
10.000	40.000	5.36	5.61	5.76	77.58	77.62	76.77	59.38	57.99	57.05
20.000	50.000	5.21	5.49	5.63	72.82	72.32	72.13	53.58	52.25	51.33
50.000	80.000	5.10	5.36	5.59	66.45	66.36	66.15	46.88	45.67	44.91
53.240	83.235	5.13	5.37	5.60	66.08	65.76	65.65	46.42	45.21	44.46
96.470	66.471	5.03	5.30	5.51	60.90	60.66	60.16	41.72	40.46	39.45
100.000	70.000	5.07	5.32	5.52	60.52	60.05	59.85	41.40	40.13	39.11
139.710	109.706	5.10	5.35	5.48	57.65	57.13	56.98	39.07	37.51	36.30
182.940	152.941	5.09	5.31	5.49	55.49	55.10	54.95	37.48	35.92	34.76
200.000	170.000	5.14	5.34	5.51	54.79	54.43	54.09	36.40	35.12	34.06
226.180	196.177	5.11	5.30	5.49	53.60	53.30	53.03	35.45	34.24	33.08
240.590	210.588	5.08	5.28	5.46	53.08	52.81	52.45	34.80	33.69	32.57
250.000	220.000	5.11	5.29	5.46	52.72	52.43	52.12	34.50	33.48	32.36
269.410	239.412	5.08	5.27	5.45	51.99	51.67	51.32	33.83	33.07	32.02
312.650	282.647	5.03	5.22	5.40	50.57	50.11	49.82	31.85	31.62	30.90
355.880	325.882	4.97	5.17	5.36	49.43	48.93	48.67	30.05	30.30	30.14
399.120	369.118	4.92	5.12	5.33	48.44	47.95	47.66	28.75	29.10	29.20
442.350	412.353	4.86	5.02	5.28	47.07	46.61	46.33	27.57	27.98	28.06
471.180	441.177	4.83	4.99	5.25	46.68	46.28	46.09	26.61	27.35	27.63
485.590	455.588	4.73	4.94	5.13	46.61	46.20	46.00	26.80	27.50	27.87
500.000	470.000	4.70	4.93	5.13	46.15	45.76	45.58	26.20	26.91	27.26

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
10.000	1.52	1.56	1.59	1.88	2.78	3.94	1.20	1.06	1.03
20.000	1.39	1.44	1.47	1.92	2.84	4.01	1.20	1.06	1.02
50.000	1.34	1.39	1.42	1.85	2.73	3.86	1.19	1.06	1.03
53.240	1.34	1.39	1.42	1.82	2.69	3.78	1.19	1.06	1.03
96.470	1.34	1.39	1.42	1.81	2.67	3.75	1.20	1.07	1.03
100.000	1.34	1.39	1.42	1.81	2.68	3.76	1.20	1.07	1.03
139.710	1.35	1.40	1.43	1.80	2.63	3.68	1.21	1.08	1.03
182.940	1.36	1.41	1.44	1.77	2.57	3.58	1.23	1.10	1.04
200.000	1.38	1.42	1.45	1.80	2.62	3.63	1.23	1.11	1.05
226.180	1.39	1.44	1.47	1.85	2.69	3.73	1.25	1.12	1.06
240.590	1.40	1.45	1.48	1.84	2.67	3.69	1.26	1.13	1.07
250.000	1.41	1.45	1.48	1.84	2.65	3.65	1.27	1.15	1.08
269.410	1.42	1.46	1.49	1.83	2.60	3.55	1.29	1.15	1.06
312.650	1.46	1.51	1.55	1.87	2.64	3.60	1.31	1.18	1.09
355.880	1.51	1.55	1.58	1.92	2.70	3.65	1.35	1.21	1.11
399.120	1.56	1.60	1.63	1.94	2.68	3.60	1.40	1.25	1.15
442.350	1.61	1.66	1.68	1.98	2.71	3.61	1.44	1.29	1.20
471.180	1.66	1.70	1.73	2.02	2.75	3.65	1.48	1.33	1.23
485.590	1.68	1.72	1.75	2.04	2.77	3.66	1.50	1.34	1.24
500.000	1.70	1.73	1.76	2.04	2.77	3.65	1.51	1.35	1.25

super-low distortion

Frequency Mixers

Models
SAY-2
ZFY-2

LEVEL 23S (+23dBm LO, up to +20dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L–I (dB) LO +20dBm	LO +23dBm	LO +26dBm
.100	30.10	6.43	6.00	5.73	22.68	24.85	27.10	22.66	23.85	24.69
.500	30.50	6.48	6.04	5.80	33.97	36.68	39.29	33.35	35.77	37.61
5.000	35.00	6.24	5.85	5.72	39.61	41.65	44.65	39.03	42.30	45.57
20.000	50.00	6.12	5.68	5.58	42.60	44.97	47.41	42.20	46.33	51.35
50.000	80.00	6.08	5.70	5.59	43.67	45.99	48.16	42.93	47.10	52.03
100.000	70.00	5.99	5.65	5.57	43.59	45.52	46.71	42.36	45.79	48.00
142.940	112.94	5.99	5.66	5.58	42.99	44.24	44.70	41.66	44.02	44.50
214.370	184.37	6.39	5.79	5.68	40.65	40.93	41.24	39.73	39.85	39.81
250.080	220.08	6.40	5.86	5.76	39.08	39.52	40.83	38.70	38.88	40.02
321.500	291.50	6.19	5.81	5.73	36.98	37.74	38.78	34.43	35.22	36.15
392.920	362.92	6.38	5.91	5.81	37.27	38.90	38.49	32.68	33.06	33.70
464.340	434.34	7.11	6.50	6.34	41.43	42.47	38.21	34.90	34.07	33.94
535.770	505.77	7.83	7.03	6.82	41.41	40.44	37.24	39.49	35.52	33.05
571.480	541.48	8.28	7.34	7.19	40.02	39.42	36.86	37.60	34.94	32.37
642.900	612.90	8.88	7.88	7.48	36.96	36.98	34.29	31.92	31.33	29.44
714.320	684.32	9.67	8.27	7.70	33.82	34.35	33.56	28.97	29.91	29.10
785.740	755.74	9.90	8.37	7.68	31.59	32.57	32.28	27.23	29.06	28.95
857.160	827.16	9.75	8.53	8.01	28.78	30.10	30.63	24.92	26.12	26.78
928.590	898.59	10.17	9.10	8.58	26.70	27.93	29.25	23.20	23.81	24.21
1000.000	970.00	10.62	9.35	8.68	24.38	25.45	26.82	21.56	21.46	20.95

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
5.001	1.57	1.20	1.17	1.43	1.25	2.31	1.61	1.20	1.07
10.000	1.58	1.21	1.17	1.41	1.28	2.24	1.61	1.21	1.06
20.000	1.59	1.22	1.17	1.39	1.21	1.87	1.62	1.21	1.05
35.121	1.57	1.21	1.16	1.29	1.25	1.87	1.62	1.21	1.04
50.000	1.59	1.22	1.18	1.33	1.30	2.00	1.62	1.21	1.05
95.364	1.63	1.26	1.22	1.49	1.22	1.69	1.68	1.26	1.04
125.480	1.69	1.30	1.27	1.66	1.23	2.01	1.73	1.29	1.07
155.610	1.75	1.35	1.34	1.73	1.19	1.73	1.79	1.34	1.08
200.000	1.86	1.43	1.43	1.79	1.14	1.76	1.91	1.43	1.13
276.090	2.06	1.60	1.68	1.75	1.11	1.49	2.13	1.60	1.26
366.450	2.32	1.83	1.95	2.16	1.31	1.27	2.46	1.86	1.47
456.820	2.51	2.10	2.16	2.72	1.51	1.07	2.78	2.13	1.68
500.000	2.57	2.21	2.37	2.94	1.70	1.15	2.87	2.24	1.92
517.060	2.60	2.26	2.34	3.15	1.73	1.19	2.89	2.26	1.92
607.420	2.73	2.49	2.30	3.62	2.06	1.44	2.90	2.40	2.13
667.670	2.81	2.62	2.25	3.54	2.20	1.51	2.88	2.45	2.24
758.030	2.89	2.73	2.05	2.73	1.95	1.57	2.77	2.39	2.03
848.390	2.87	2.72	2.03	1.86	1.37	1.57	2.62	2.27	1.94
938.760	2.75	2.59	2.03	2.05	1.19	1.48	2.55	2.11	1.60
1000.000	2.55	2.40	2.03	2.74	1.57	2.44	1.97	1.41	1.40

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mv
.100	+700.50	+1.60
.500	+772.40	18.40
2.000	+914.80	+5.40
10.000	+1040.80	+.10
49.560	+993.30	−.33
89.120	+1008.60	−.64
128.680	+1006.40	−1.10
168.240	+1030.80	−3.68
207.800	+1004.70	−4.93
286.920	+1000.50	−5.44
366.040	+956.70	-4.94
445.160	+758.00	15.46
500.000	+663.90	13.91
524.280	+685.50	12.14
603.400	+839.20	10.41
682.520	+829.10	10.67
761.640	+666.30	−4.57
840.760	+579.70	15.09
880.320	+601.70	18.82
1000.000	+548.90	11.33

Measurements at RF & LO Power +23 dBm

Mini-Circuits™
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
EUROPE 44-252-835094 Fax 44-252-837010

active, low LO drive

Frequency Mixers

Model
UNCL-L1H

UNCL-L1H (+6 dBm LO, up to +14 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Gain (dB) LO +3 dBm	LO +6 dBm	LO +9 dBm	Isolation L-R (dB) LO +3 dBm	LO +6 dBm	LO +9 dBm	Isolation L-I (dB) LO +3 dBm	LO +6 dBm	LO +9 dBm
10.000	40.000	6.57	6.14	5.97	44.39	44.45	45.36	37.16	37.68	39.06
20.000	50.000	6.48	6.09	5.94	44.82	44.60	44.98	34.75	36.60	38.51
50.000	80.000	6.58	6.15	5.96	43.96	42.60	41.22	28.24	31.75	34.83
53.240	83.235	6.64	6.19	6.00	43.93	42.54	41.01	27.73	31.32	34.51
96.470	66.471	6.51	6.09	5.94	41.95	39.39	36.79	22.88	27.03	30.89
100.000	70.000	6.56	6.12	5.95	41.74	38.82	36.30	22.61	26.75	30.66
139.710	109.706	6.56	6.08	5.90	39.80	36.47	33.50	19.94	24.55	28.41
182.940	152.941	6.57	6.04	5.91	37.55	33.97	30.54	17.94	22.60	26.77
200.000	170.000	6.46	6.01	5.89	36.69	32.86	29.41	17.28	22.00	26.13
226.180	196.177	6.45	6.05	5.92	35.98	31.55	27.51	16.25	21.33	25.17
240.590	210.588	6.33	6.01	5.90	35.47	31.07	27.11	15.82	20.98	24.77
250.000	220.000	6.32	5.99	5.88	34.86	31.07	26.60	15.51	20.64	24.42
269.410	239.412	6.29	6.03	5.90	33.70	29.74	25.65	15.07	20.00	24.05
312.650	282.647	6.29	6.06	5.93	32.81	29.04	25.42	13.96	18.97	23.44
355.880	325.882	6.31	6.07	5.91	32.10	29.44	25.99	13.02	17.86	23.05
399.120	369.118	6.34	6.05	5.89	31.65	28.97	26.12	12.34	17.51	23.67
442.350	412.353	6.43	6.13	5.95	30.69	28.43	26.21	11.60	16.75	23.67
471.180	441.177	6.54	6.22	6.04	29.65	27.40	26.05	11.64	16.76	23.93
485.590	455.588	6.61	6.26	6.07	28.77	26.90	26.47	11.61	16.94	24.01
500.000	470.000	6.62	6.26	6.07	28.19	26.42	26.36	11.65	17.47	24.45

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +3 dBm	LO +6 dBm	LO +9 dBm	VSWR LO port LO +3 dBm	LO +6 dBm	LO +9 dBm	VSWR IF port LO +3 dBm	LO +6 dBm	LO +9 dBm
10.000	1.10	1.08	1.10	1.28	1.39	1.61	1.45	1.32	1.21
20.000	1.08	1.04	1.07	1.18	1.29	1.54	1.45	1.32	1.21
50.000	1.07	1.02	1.07	1.15	1.32	1.58	1.44	1.31	1.21
53.240	1.07	1.02	1.07	1.15	1.32	1.58	1.44	1.31	1.21
96.470	1.07	1.01	1.06	1.21	1.38	1.66	1.46	1.32	1.21
100.000	1.07	1.01	1.06	1.22	1.39	1.67	1.46	1.32	1.21
139.710	1.07	1.01	1.06	1.29	1.49	1.78	1.46	1.33	1.22
182.940	1.07	1.02	1.06	1.37	1.61	1.91	1.47	1.34	1.22
200.000	1.07	1.02	1.07	1.39	1.65	1.95	1.48	1.34	1.22
226.180	1.07	1.03	1.07	1.41	1.72	2.03	1.48	1.34	1.23
240.590	1.07	1.03	1.08	1.42	1.76	2.06	1.48	1.34	1.23
250.000	1.07	1.04	1.08	1.43	1.78	2.08	1.48	1.34	1.23
269.410	1.07	1.04	1.09	1.45	1.82	2.15	1.49	1.35	1.23
312.650	1.08	1.06	1.10	1.50	1.93	2.29	1.50	1.36	1.24
355.880	1.09	1.08	1.11	1.58	2.04	2.48	1.52	1.37	1.26
399.120	1.11	1.09	1.13	1.65	2.14	2.69	1.52	1.37	1.26
442.350	1.14	1.12	1.15	1.74	2.25	2.89	1.53	1.38	1.27
471.180	1.15	1.14	1.17	1.81	2.33	2.97	1.54	1.39	1.28
485.590	1.16	1.15	1.18	1.83	2.32	2.95	1.54	1.39	1.28
500.000	1.18	1.16	1.19	1.86	2.35	3.00	1.54	1.39	1.29

ultra-low distortion

Frequency Mixers

LEVEL 23S (+23dBm LO, up to +20dBm RF)

Models
SAY-11
ZFY-11

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	freq. (MHz)	Isolation L-R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L-I (dB) LO +20dBm	LO +23dBm	LO +26dBm
10.000	40.000	8.13	7.46	7.12	10.000	37.80	41.65	47.32	26.90	30.72	34.62
20.000	50.000	8.26	7.51	7.25	20.000	39.88	43.95	49.92	27.09	31.06	35.15
50.000	80.000	8.51	7.74	7.36	50.000	40.17	44.45	50.10	27.03	30.74	34.46
87.097	57.097	8.63	7.81	7.37	87.097	40.41	44.86	49.18	26.49	29.91	33.48
100.000	70.000	8.43	7.66	7.34	100.000	40.09	44.68	48.76	26.28	29.62	33.14
200.000	170.000	8.39	7.59	7.33	200.000	41.85	46.21	43.14	25.41	28.67	32.24
318.387	288.387	8.86	8.03	7.71	318.387	45.76	41.22	37.41	24.96	28.91	31.61
500.000	470.000	8.40	7.47	7.61	500.000	46.38	37.07	35.32	26.20	29.62	31.27
626.774	596.774	8.87	7.57	7.58	626.774	39.83	33.58	31.89	26.57	30.05	31.22
780.968	750.968	8.64	7.27	7.41	780.968	36.31	33.54	31.90	28.57	31.66	31.47
1000.000	970.000	7.93	7.77	7.43	1000.000	35.39	33.08	31.41	32.23	33.53	30.92
1089.355	1059.355	8.15	7.84	7.47	1089.355	34.21	33.62	31.86	34.60	34.45	30.41
1243.548	1213.548	8.71	8.04	7.73	1243.548	34.01	34.16	33.36	35.83	36.92	31.46
1397.742	1367.742	8.60	8.31	7.91	1397.742	34.55	33.51	31.91	37.62	37.46	30.44
1500.000	1470.000	8.95	8.18	7.89	1500.000	35.54	34.49	32.28	38.92	39.38	31.51
1706.129	1676.129	9.51	8.31	7.72	1706.129	36.23	34.41	32.30	36.16	45.70	33.84
2000.000	1970.000	9.66	8.17	7.69	2000.000	38.87	37.07	36.45	34.19	38.82	36.82
2091.613	2061.613	9.79	8.07	7.49	2091.613	40.04	37.89	37.23	33.22	36.35	35.13
2245.807	2215.807	9.22	7.59	7.36	2245.807	43.18	37.54	36.60	32.57	34.57	33.18
2400.000	2370.000	8.54	7.11	6.63	2400.000	37.57	35.91	36.18	31.78	33.44	31.57

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	freq. (MHz)	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
10.000	1.67	1.55	1.46	1.30	1.24	1.76	5.000	1.47	1.25	1.16
20.000	1.65	1.54	1.45	1.28	1.22	1.75	10.000	1.49	1.25	1.14
50.000	1.63	1.51	1.42	1.23	1.31	1.79	20.000	1.51	1.25	1.13
84.688	1.61	1.50	1.41	1.25	1.26	1.77	35.152	1.48	1.23	1.12
100.000	1.60	1.49	1.41	1.27	1.25	1.77	50.000	1.46	1.22	1.11
200.000	1.59	1.47	1.39	1.30	1.22	1.79	65.303	1.47	1.23	1.11
308.750	1.56	1.45	1.36	1.29	1.23	1.73	100.000	1.47	1.22	1.11
383.438	1.55	1.43	1.34	1.28	1.28	1.72	155.758	1.46	1.21	1.10
500.000	1.51	1.38	1.30	1.25	1.34	1.77	200.000	1.45	1.21	1.10
607.500	1.47	1.34	1.27	1.24	1.29	1.73	246.212	1.44	1.20	1.10
756.875	1.50	1.38	1.32	1.32	1.23	1.73	306.515	1.39	1.17	1.09
906.250	1.62	1.49	1.44	1.50	1.33	1.64	366.818	1.39	1.16	1.09
1000.000	1.73	1.59	1.53	1.70	1.35	1.60	427.121	1.33	1.12	1.09
1205.000	2.02	1.82	1.72	2.40	1.48	1.49	500.000	1.30	1.10	1.12
1354.375	2.22	1.99	1.86	2.98	1.58	1.46	547.727	1.26	1.10	1.15
1503.750	2.45	2.18	2.03	3.35	1.69	1.51	608.030	1.20	1.11	1.21
1727.812	2.65	2.32	2.16	3.43	1.71	1.56	758.788	1.13	1.21	1.35
2000.000	2.62	2.32	2.15	3.29	1.68	1.44	819.091	1.09	1.27	1.42
2175.938	2.55	2.28	2.13	2.94	1.74	1.78	909.545	1.10	1.34	1.51
2400.000	2.34	2.15	2.01	2.61	1.77	1.72	1000.000	1.12	1.40	1.58

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plug-in

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
TFM-5
TSM-5

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
5.000	35.000	7.34	6.85	6.66	64.17	64.43	64.40	68.87	68.03	67.20
10.000	40.000	7.18	6.72	6.54	62.80	62.97	62.64	64.30	63.27	62.24
20.000	50.000	7.21	6.72	6.56	61.05	61.20	60.90	60.45	59.10	57.87
50.000	80.000	7.26	6.78	6.59	56.25	56.26	56.27	53.37	52.02	50.94
100.000	70.000	7.19	6.73	6.55	51.44	51.61	51.66	47.98	46.56	45.40
149.677	119.677	7.13	6.66	6.48	48.59	48.85	48.96	45.14	43.67	42.84
200.000	170.000	6.97	6.55	6.44	46.18	46.50	46.66	42.63	41.59	40.88
294.355	264.355	6.79	6.45	6.36	43.36	43.79	43.77	40.03	39.07	38.18
439.032	409.032	6.67	6.37	6.28	40.49	40.94	40.99	36.09	35.50	34.82
500.000	470.000	6.67	6.37	6.29	39.43	39.83	39.78	34.67	34.23	33.50
583.710	553.710	6.66	6.39	6.31	37.97	38.25	38.66	32.62	32.42	32.40
728.387	698.387	6.90	6.62	6.55	37.93	38.35	38.55	29.85	30.32	30.37
750.000	720.000	6.99	6.71	6.62	37.93	38.31	38.41	29.42	30.01	30.25
873.065	843.065	7.63	7.17	6.90	36.59	36.81	36.75	27.49	27.56	27.60
1000.000	970.000	7.94	7.24	6.78	35.14	35.43	35.15	25.91	26.60	27.07
1017.742	987.742	7.99	7.30	6.79	34.96	35.41	35.28	25.52	26.40	26.98
1162.419	1132.419	8.56	7.47	6.96	33.03	33.52	33.88	23.46	24.70	26.08
1307.097	1277.097	8.89	7.96	7.35	32.61	33.37	34.03	21.91	23.40	25.14
1451.774	1421.774	9.23	8.45	7.93	32.56	33.96	34.75	22.49	24.78	26.81
1500.000	1470.000	9.22	8.50	7.98	32.87	34.28	35.09	23.23	25.75	27.73

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.49	1.58	1.65	1.86	2.54	3.50	1.50	1.31	1.17	5.000	-222.66	0.28
10.000	1.42	1.53	1.60	1.74	2.45	3.32	1.51	1.31	1.18	10.000	-222.67	0.28
20.000	1.40	1.51	1.58	1.77	2.54	3.44	1.51	1.31	1.18	20.000	-220.72	0.28
50.000	1.41	1.51	1.58	1.72	2.42	3.26	1.51	1.32	1.19	50.000	-232.00	0.31
100.000	1.40	1.49	1.57	1.73	2.39	3.21	1.56	1.37	1.24	100.000	-224.70	0.33
149.677	1.39	1.47	1.54	1.73	2.39	3.22	1.63	1.43	1.31	149.677	-227.68	0.34
200.000	1.37	1.45	1.52	1.69	2.36	3.14	1.72	1.52	1.39	200.000	-247.26	0.34
294.355	1.35	1.41	1.47	1.68	2.33	3.06	1.92	1.71	1.57	294.355	-244.77	0.38
439.032	1.35	1.36	1.39	1.71	2.23	2.78	2.22	1.99	1.85	439.032	-255.70	0.85
500.000	1.35	1.34	1.36	1.79	2.25	2.80	2.34	2.11	1.96	500.000	-224.65	0.82
583.710	1.35	1.32	1.32	1.90	2.25	2.79	2.50	2.25	2.10	583.710	-223.35	1.09
728.387	1.33	1.27	1.26	1.94	2.40	3.00	2.72	2.43	2.25	728.387	-227.74	1.44
750.000	1.33	1.26	1.25	1.97	2.43	3.02	2.77	2.47	2.28	750.000	-219.12	1.33
873.065	1.33	1.23	1.21	2.01	2.32	2.75	2.86	2.54	2.31	873.065	-203.66	1.40
1000.000	1.42	1.29	1.28	2.04	2.25	2.55	2.91	2.57	2.33	1000.000	-178.88	1.53
1017.742	1.44	1.30	1.30	2.03	2.23	2.53	2.91	2.57	2.32	1017.742	-177.35	1.90
1162.419	1.73	1.46	1.47	2.09	2.24	2.48	2.75	2.44	2.24	1162.419	-174.30	1.73
1307.097	1.99	1.60	1.60	1.87	1.91	2.06	2.50	2.24	2.08	1307.097	-178.51	2.27
1451.774	2.23	1.67	1.72	1.55	1.54	1.68	2.27	2.05	1.92	1451.774	-181.34	0.69
1500.000	2.33	1.73	1.78	1.56	1.55	1.69	2.19	2.00	1.89	1500.000	-190.31	-1.72

lowest distortion available

Frequency Mixers Model VAY-1

LEVEL 27 (+27dBm LO, up to +24dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +23dBm	LO +27dBm	LO +30dBm	Isolation L–R (dB) LO +23dBm	LO +27dBm	LO +30dBm	Isolation L–I (dB) LO +23dBm	LO +27dBm	LO +30dBm
.050	30.05	7.65	6.73	6.43	43.01	45.06	48.21	41.02	44.77	47.90
.100	30.10	6.76	5.90	5.71	44.26	46.53	49.77	42.32	46.31	49.47
.200	30.20	6.63	5.71	5.53	44.70	46.84	50.03	42.42	46.41	49.42
.500	30.50	6.42	5.47	5.15	44.77	46.89	49.86	42.45	46.31	49.14
1.000	31.00	6.45	5.47	5.01	44.52	46.31	48.58	42.20	45.50	47.93
17.905	47.91	5.87	5.34	5.23	43.81	45.35	46.91	41.27	44.81	46.67
35.760	65.76	5.86	5.35	5.34	43.18	44.40	44.78	41.06	44.31	44.93
53.615	83.62	5.84	5.37	5.34	42.40	43.31	43.54	40.94	43.11	42.67
125.040	95.04	6.48	6.02	5.90	41.94	42.44	42.46	40.54	41.42	41.53
142.890	112.89	6.51	6.06	5.94	40.76	40.80	40.64	38.88	39.25	39.31
196.460	166.46	6.72	6.19	6.10	39.84	39.78	40.08	37.83	38.66	38.73
232.170	202.17	6.83	6.31	6.09	40.02	40.08	40.09	37.43	38.07	38.43
250.020	220.02	6.95	6.42	6.14	41.14	40.67	39.70	37.23	37.72	38.04
285.730	255.73	6.94	6.42	6.22	42.09	40.68	39.68	36.81	36.54	35.61
321.440	291.44	6.79	6.30	6.19	40.95	41.05	39.67	35.95	34.78	34.56
357.150	327.15	6.79	6.37	6.20	39.34	41.32	39.35	35.79	34.37	33.14
392.860	362.86	6.83	6.31	6.18	36.75	38.74	38.90	37.43	35.82	33.51
446.430	416.43	7.29	6.72	6.52	34.41	35.92	36.07	39.92	36.76	34.66
464.280	434.28	7.45	6.85	6.62	32.47	34.39	35.61	40.51	38.34	34.54
500.000	470.00	7.74	7.04	6.83	31.98	33.75	35.07	38.55	35.90	33.07

mixer VSWR

freq. MHz	VSWR, RF port LO +23dBm	LO +27dBm	LO +30dBm	VSWR, LO port LO +23dBm	LO +27dBm	LO +30dBm	VSWR, IF port LO +23dBm	LO +27dBm	LO +30dBm
5.001	1.87	1.46	1.22	1.63	1.14	2.06	1.78	1.37	1.13
10.000	1.87	1.46	1.24	1.60	1.14	2.23	1.78	1.38	1.14
20.000	1.88	1.47	1.24	1.56	1.11	2.19	1.79	1.38	1.15
48.676	1.87	1.47	1.25	1.46	1.19	1.96	1.76	1.37	1.14
63.235	1.88	1.48	1.26	1.67	1.23	1.78	1.77	1.37	1.14
77.794	1.90	1.49	1.27	1.76	1.22	1.72	1.77	1.36	1.13
100.000	1.92	1.51	1.27	1.66	1.18	1.66	1.77	1.37	1.13
121.470	1.96	1.54	1.29	1.71	1.20	1.61	1.78	1.37	1.14
150.590	2.04	1.59	1.36	1.95	1.23	1.73	1.81	1.38	1.16
194.260	2.13	1.65	1.57	1.85	1.18	1.81	1.82	1.39	1.18
208.820	2.16	1.68	1.64	2.03	1.25	1.71	1.84	1.40	1.19
237.940	2.25	1.75	1.71	2.00	1.22	1.53	1.88	1.43	1.18
252.500	2.29	1.77	1.70	1.89	1.21	1.51	1.89	1.43	1.18
296.180	2.44	1.86	1.60	2.12	1.25	1.31	1.97	1.48	1.19
325.290	2.52	1.92	1.73	2.08	1.29	1.30	2.04	1.53	1.23
368.970	2.68	2.02	2.02	2.47	1.47	1.23	2.11	1.61	1.30
398.090	2.72	2.09	2.02	2.53	1.52	1.16	2.17	1.66	1.34
441.760	2.82	2.17	2.16	2.80	1.70	1.13	2.26	1.76	1.47
485.440	2.90	2.27	2.35	3.40	1.96	1.08	2.36	1.86	1.65
500.000	2.88	2.27	2.21	3.17	1.95	1.11	2.36	1.87	1.64

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surface mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
SCM-2500
SRA-2400
TFM-2400

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
500.000	530.000	6.00	5.45	5.04	49.21	54.10	55.53	25.07	25.42	25.56
650.000	680.000	5.66	5.24	4.95	64.22	46.72	42.65	23.93	24.17	24.06
800.000	830.000	5.99	5.18	4.77	44.60	50.53	48.39	23.74	24.04	24.22
950.000	980.000	6.52	5.34	4.76	36.03	39.92	44.68	23.09	22.92	22.65
1000.000	1030.000	6.81	5.61	4.88	35.03	38.68	42.76	22.19	21.93	21.78
1100.000	1070.000	7.24	6.52	5.96	33.19	35.67	38.72	19.42	19.02	18.65
1150.000	1120.000	7.18	6.54	6.04	33.02	35.25	37.71	18.27	17.69	17.18
1250.000	1220.000	6.82	6.21	5.74	33.03	35.47	37.46	16.86	16.09	15.42
1350.000	1320.000	6.73	6.10	5.72	34.35	38.09	41.06	15.58	15.24	14.81
1500.000	1470.000	6.69	6.10	5.77	35.63	40.51	44.16	16.76	17.24	17.45
1650.000	1620.000	7.85	6.97	6.57	35.05	39.61	44.83	18.61	20.00	21.30
1750.000	1720.000	8.54	7.73	7.30	35.48	40.56	44.31	19.47	21.79	24.24
1800.000	1770.000	8.62	7.87	7.44	37.40	41.20	42.00	20.74	23.27	25.98
1950.000	1920.000	8.54	7.91	7.51	37.18	37.08	36.46	25.05	25.63	25.24
2000.000	1970.000	8.42	7.83	7.45	36.34	36.28	35.82	25.43	24.82	23.85
2150.000	2120.000	8.47	7.95	7.54	34.39	34.61	34.62	22.93	21.63	20.76
2300.000	2270.000	8.54	8.12	7.71	33.49	34.07	34.05	19.89	19.31	18.98
2400.000	2370.000	8.80	8.32	8.05	33.16	33.85	33.96	18.43	18.30	18.27
2450.000	2420.000	8.46	7.93	7.63	32.94	33.63	33.72	17.72	17.81	17.79
2500.000	2470.000	8.55	7.98	7.65	34.48	34.92	35.16	18.77	18.95	19.01

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
500.000	2.28	1.90	1.74	1.87	2.44	3.12	0.300	1.32	1.05	1.09	500.000	167.74	8.15
655.000	1.41	1.19	1.12	1.95	2.42	3.01	12.793	1.34	1.06	1.09	650.000	184.27	8.20
800.000	1.30	1.21	1.24	2.32	2.60	3.06	26.534	1.34	1.08	1.09	800.000	134.66	8.17
910.000	1.60	1.56	1.63	2.71	2.84	3.16	64.012	1.35	1.11	1.13	950.000	117.18	8.19
960.000	1.79	1.74	1.83	2.84	2.92	3.18	102.739	1.37	1.17	1.19	1000.000	126.83	8.21
1000.000	1.98	1.90	1.99	2.93	2.94	3.16	128.973	1.37	1.21	1.24	1100.000	128.25	8.13
1165.000	2.94	2.78	2.74	3.30	2.95	2.93	141.465	1.37	1.22	1.25	1150.000	145.00	8.12
1270.000	3.36	3.17	3.08	3.50	2.82	2.62	180.192	1.38	1.28	1.31	1250.000	142.86	8.22
1370.000	3.45	3.20	3.01	3.77	2.88	2.48	217.670	1.38	1.32	1.38	1350.000	127.85	8.16
1475.000	3.93	3.59	3.36	4.26	3.05	2.40	243.904	1.39	1.35	1.40	1500.000	135.60	8.18
1500.000	4.19	3.82	3.61	4.18	3.00	2.34	256.396	1.38	1.36	1.41	1650.000	109.05	8.20
1680.000	5.77	4.92	5.12	3.80	2.60	1.91	268.889	1.38	1.38	1.44	1750.000	87.01	8.14
1835.000	6.21	5.75	5.81	2.86	2.00	1.53	307.615	1.38	1.41	1.48	1800.000	91.37	8.11
1935.000	6.61	6.73	6.01	2.31	1.71	1.48	346.342	1.36	1.41	1.51	1950.000	55.13	8.18
2000.000	7.80	6.63	6.39	1.96	1.59	1.54	371.327	1.38	1.45	1.52	2000.000	20.20	8.18
2040.000	7.87	7.22	6.71	1.77	1.54	1.60	385.069	1.38	1.46	1.55	2150.000	-17.99	8.22
2200.000	8.35	7.66	7.17	1.40	1.68	2.00	422.546	1.37	1.50	1.61	2300.000	-38.56	8.14
2345.000	9.33	8.43	7.73	1.69	2.03	2.40	461.273	1.36	1.51	1.64	2400.000	-56.65	8.12
2450.000	8.81	8.60	7.70	2.19	2.45	2.78	487.507	1.38	1.55	1.68	2450.000	-41.33	8.12
2500.000	9.28	8.16	7.34	2.48	2.65	2.94	500.000	1.36	1.53	1.67	2500.000	-48.78	8.23

plug-in, surface-mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
TUF-1
TUF-1SM
ZP-1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
2.000	32.000	7.09	6.81	6.58	87.30	81.85	77.21	68.80	72.15	73.61
4.000	34.000	6.68	6.40	6.19	78.00	76.35	73.81	66.70	68.25	68.21
5.000	35.000	6.62	6.34	6.12	75.70	74.35	72.61	65.80	66.65	66.71
10.000	40.000	6.54	6.25	6.02	69.63	69.58	68.44	62.53	62.18	61.74
20.000	50.000	6.46	6.21	5.98	64.30	64.25	64.03	58.40	57.65	56.43
50.000	80.000	6.36	6.13	5.95	57.56	57.73	57.67	52.41	50.60	49.26
81.733	51.733	6.44	6.16	5.95	53.47	53.89	54.19	48.78	46.89	45.69
100.000	70.000	6.48	6.18	5.96	51.89	52.31	52.63	47.30	45.35	44.00
161.467	131.467	6.34	6.08	5.91	48.63	49.28	49.54	43.72	42.03	40.89
200.000	170.000	6.15	6.03	5.89	47.02	47.46	47.65	41.84	40.24	39.02
241.200	211.200	6.17	6.04	5.90	46.01	46.41	46.63	40.25	38.76	37.49
281.067	251.067	6.18	6.04	5.90	44.63	45.16	45.38	38.53	37.18	36.02
300.000	270.000	6.35	6.09	5.92	44.31	44.55	44.64	38.08	36.84	35.72
320.933	290.933	6.31	6.08	5.92	43.71	44.04	43.87	37.13	35.94	34.79
400.667	370.667	6.18	5.99	5.86	42.32	42.93	42.99	33.91	33.45	32.72
480.400	450.400	6.28	6.06	5.90	40.18	40.46	40.80	31.33	30.91	30.51
500.000	470.000	6.33	6.11	5.95	39.89	40.16	40.42	31.07	30.63	30.27
560.133	530.133	6.35	6.15	5.99	39.63	39.99	40.02	29.59	29.30	28.68
580.067	550.067	6.41	6.19	6.02	39.64	40.02	40.17	29.36	29.24	28.71
600.000	570.000	6.45	6.26	6.10	39.55	39.76	39.73	28.83	28.69	28.09

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
2.000	1.53	1.56	1.58	1.90	2.71	3.80	1.34	1.19	1.09	2.000	-230.82	-0.05
4.000	1.28	1.31	1.34	1.82	2.64	3.73	1.34	1.19	1.10	4.000	-231.66	-0.01
5.000	1.22	1.25	1.29	1.81	2.62	3.70	1.34	1.19	1.09	5.000	-230.98	-0.07
10.000	1.10	1.15	1.20	1.67	2.47	3.54	1.35	1.19	1.10	10.000	-230.48	0.02
20.000	1.04	1.11	1.17	1.71	2.51	3.57	1.35	1.19	1.10	20.000	-225.17	0.02
50.000	1.02	1.10	1.16	1.67	2.46	3.50	1.36	1.20	1.12	50.000	-238.30	0.02
100.000	1.09	1.13	1.17	1.64	2.41	3.42	1.39	1.24	1.16	81.733	-244.03	-0.01
109.640	1.11	1.14	1.18	1.62	2.37	3.36	1.39	1.25	1.17	100.000	-251.23	0.04
169.440	1.19	1.20	1.24	1.61	2.31	3.24	1.44	1.31	1.24	161.467	-233.45	0.06
217.280	1.25	1.27	1.29	1.60	2.29	3.19	1.49	1.36	1.30	200.000	-234.93	0.03
265.120	1.32	1.33	1.36	1.61	2.26	3.14	1.55	1.43	1.37	241.200	-250.57	0.14
300.000	1.38	1.38	1.40	1.63	2.28	3.16	1.63	1.52	1.46	281.067	-248.51	0.07
324.920	1.41	1.42	1.44	1.65	2.30	3.17	1.62	1.48	1.42	300.000	-239.16	0.10
372.760	1.49	1.50	1.51	1.68	2.31	3.19	1.71	1.57	1.51	320.933	-239.97	0.14
420.600	1.58	1.58	1.59	1.71	2.32	3.16	1.80	1.66	1.59	400.667	-252.65	0.37
468.440	1.66	1.66	1.67	1.78	2.33	3.12	1.89	1.74	1.68	480.400	-232.77	0.59
500.000	1.72	1.71	1.72	1.79	2.33	3.11	1.95	1.80	1.73	500.000	-226.52	0.58
540.200	1.79	1.77	1.78	1.84	2.35	3.10	2.03	1.88	1.80	560.133	-225.65	0.94
588.040	1.88	1.86	1.86	1.86	2.36	3.12	2.12	1.97	1.89	580.067	-227.84	0.87
600.000	1.90	1.88	1.88	1.88	2.38	3.14	2.14	1.99	1.91	600.000	-231.92	0.89

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broadband, high dynamic range

Frequency Mixers

Model
SBL-3LH

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
0.070	30.070	5.39	5.17	5.00	69.51	63.65	64.89	67.21	61.05	61.21
0.100	30.100	5.19	4.97	4.83	66.52	62.95	64.78	64.62	60.16	61.05
0.140	30.140	5.09	4.87	4.74	65.02	62.75	64.47	63.02	59.80	60.95
0.200	30.200	5.03	4.81	4.68	64.07	62.58	64.50	62.27	59.57	60.90
0.500	30.500	4.95	4.75	4.59	63.42	62.45	64.37	61.42	59.40	60.82
0.700	30.700	4.92	4.70	4.56	63.12	62.25	64.29	61.32	59.30	60.80
1.000	31.000	4.90	4.69	4.53	62.82	62.23	64.36	60.92	59.23	60.83
2.000	32.000	4.90	4.65	4.48	62.62	62.11	64.23	60.82	59.10	60.74
5.000	35.000	4.98	4.67	4.48	62.57	62.06	64.19	60.57	59.04	60.61
10.000	40.000	4.77	4.59	4.47	62.36	62.16	64.39	59.66	58.62	60.22
20.000	50.000	4.81	4.59	4.50	62.30	62.19	64.12	57.00	56.98	58.81
50.000	80.000	4.80	4.63	4.54	60.57	62.43	64.50	51.32	52.55	54.82
56.870	86.872	4.79	4.59	4.49	60.24	62.48	64.54	50.33	51.76	53.87
100.000	70.000	4.72	4.59	4.54	59.42	61.09	62.81	45.76	47.12	49.54
113.670	83.674	4.80	4.66	4.56	59.15	61.20	63.52	44.80	45.91	48.77
125.000	95.000	4.74	4.64	4.59	58.81	60.48	66.36	44.06	45.00	48.08
170.480	140.477	5.07	4.98	4.87	56.29	54.87	58.41	42.58	43.50	45.66
200.000	170.000	5.16	5.06	4.96	55.37	54.73	53.64	42.40	48.86	48.09
238.640	208.640	5.44	5.25	5.13	57.78	61.90	62.52	41.28	43.43	45.52
250.000	220.000	5.75	5.40	5.22	58.04	64.06	72.95	40.83	41.51	42.53

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
0.300	1.31	1.25	1.21	1.81	2.63	3.74	1.83	1.74	1.62	0.070	-286.89	-0.16
1.000	1.29	1.21	1.14	1.74	2.57	3.66	1.83	1.74	1.62	0.100	-370.80	-0.22
2.000	1.31	1.22	1.14	1.70	2.53	3.60	1.83	1.75	1.62	0.140	-370.90	-0.25
5.000	1.32	1.23	1.15	1.66	2.48	3.52	1.84	1.75	1.63	0.200	-372.80	-0.24
10.000	1.33	1.23	1.15	1.53	2.31	3.32	1.85	1.77	1.64	0.500	-372.40	-0.25
20.000	1.32	1.23	1.15	1.57	2.35	3.36	1.87	1.78	1.66	1.000	-373.80	-0.25
40.680	1.30	1.22	1.14	1.52	2.28	3.22	1.93	1.84	1.71	2.000	-373.60	-0.24
50.000	1.29	1.21	1.13	1.51	2.26	3.20	1.94	1.86	1.73	5.000	-375.40	-0.24
65.920	1.26	1.18	1.10	1.50	2.21	3.09	2.09	1.99	1.86	10.000	-374.60	-0.24
86.110	1.22	1.15	1.08	1.54	2.24	3.13	2.16	2.07	1.93	20.000	-371.00	-0.23
100.000	1.19	1.12	1.06	1.57	2.27	3.15	2.25	2.17	2.03	46.350	-376.80	-0.21
116.390	1.15	1.08	1.04	1.57	2.26	3.13	2.33	2.24	2.09	50.000	-377.60	-0.17
125.000	1.13	1.07	1.04	1.62	2.27	3.12	2.40	2.31	2.15	92.640	-380.80	0.15
141.630	1.10	1.06	1.08	1.65	2.30	3.12	2.43	2.34	2.20	100.000	-378.50	0.20
161.820	1.08	1.09	1.13	1.64	2.27	3.07	2.59	2.50	2.35	120.410	-368.10	0.13
182.010	1.10	1.14	1.19	1.72	2.29	3.08	2.63	2.56	2.44	148.180	-372.10	0.38
202.200	1.15	1.20	1.25	1.77	2.32	3.10	2.65	2.57	2.46	194.460	-367.80	1.20
222.390	1.19	1.25	1.31	1.97	2.61	3.36	2.73	2.66	2.56	200.000	-365.10	1.44
242.580	1.24	1.29	1.34	1.96	2.64	3.38	2.73	2.67	2.57	240.740	-302.49	2.04
250.000	1.25	1.30	1.36	1.95	2.63	3.41	2.71	2.65	2.56	250.000	-289.82	2.56

plug-in, surface-mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
TUF-2
TUF-2SM
ZP-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
50.000	80.000	6.51	6.03	5.83	60.07	61.24	61.91	62.57	62.94	62.41
100.000	70.000	6.66	6.12	5.88	54.20	55.20	55.87	59.27	58.22	56.88
129.167	99.167	6.55	6.03	5.82	52.12	53.19	53.99	58.02	56.36	55.21
200.000	170.000	6.34	5.94	5.79	48.54	49.63	50.34	55.06	53.04	51.66
208.333	178.333	6.44	5.97	5.80	48.33	49.40	50.10	55.05	52.95	51.62
287.500	257.500	6.40	5.98	5.81	45.90	46.76	47.52	51.28	49.61	48.05
340.278	310.278	6.33	5.94	5.79	44.50	45.51	46.16	48.97	47.70	46.65
366.667	336.667	6.30	5.91	5.76	44.03	45.07	45.72	47.78	46.56	45.82
445.833	415.833	6.23	5.88	5.72	42.62	43.51	44.19	44.52	43.99	43.72
498.611	468.611	6.35	5.96	5.81	42.00	42.80	43.42	43.31	42.71	42.05
500.000	470.000	6.37	5.98	5.82	42.01	42.81	43.43	43.31	42.75	42.09
551.389	521.389	6.41	6.04	5.87	41.60	42.43	42.87	42.09	42.00	41.59
630.556	600.556	6.56	6.27	6.00	41.07	41.96	42.40	39.80	39.82	39.98
683.333	653.333	6.75	6.36	6.13	40.40	41.15	41.84	38.94	38.97	38.72
709.722	679.722	6.82	6.45	6.21	39.93	40.66	41.36	38.17	38.42	38.14
788.889	758.889	6.92	6.59	6.41	39.16	39.89	40.44	36.74	37.39	37.67
868.056	838.056	7.28	6.81	6.62	38.76	39.69	40.25	35.45	36.49	37.33
947.222	917.222	7.54	7.04	6.85	38.55	39.66	40.23	34.36	34.99	35.77
973.611	943.611	7.88	7.23	6.99	38.69	39.91	40.57	34.48	34.80	35.50
1000.000	970.000	8.07	7.37	7.03	38.50	39.73	40.41	34.50	34.65	35.19

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
50.000	1.02	1.08	1.16	1.76	2.52	3.54	1.69	1.49	1.28	50.000	-235.28	-0.11
100.000	1.06	1.10	1.17	1.72	2.47	3.47	1.70	1.51	1.32	100.000	-246.85	0.00
145.000	1.09	1.12	1.19	1.70	2.42	3.38	1.73	1.55	1.36	129.167	-229.93	-0.02
200.000	1.14	1.17	1.23	1.68	2.35	3.27	1.77	1.61	1.44	200.000	-230.78	-0.04
259.000	1.19	1.22	1.27	1.66	2.31	3.17	1.83	1.68	1.53	208.333	-237.03	-0.04
316.000	1.25	1.27	1.32	1.68	2.32	3.19	1.90	1.76	1.62	287.500	-241.18	0.17
373.000	1.30	1.33	1.37	1.72	2.34	3.19	1.94	1.82	1.71	340.278	-229.30	0.17
400.000	1.34	1.36	1.40	1.72	2.32	3.14	1.96	1.85	1.74	366.667	-233.22	0.23
468.000	1.41	1.43	1.47	1.76	2.32	3.10	2.03	1.92	1.83	445.833	-244.79	0.44
500.000	1.45	1.47	1.50	1.80	2.34	3.10	2.06	1.95	1.86	498.611	-217.91	0.63
525.000	1.48	1.50	1.53	1.82	2.33	3.06	2.09	1.98	1.89	500.000	-217.41	0.68
601.000	1.58	1.58	1.61	1.90	2.37	3.07	2.13	2.02	1.95	551.389	-212.58	0.75
677.000	1.69	1.68	1.69	1.96	2.38	3.01	2.15	2.03	1.96	630.556	-215.80	1.06
734.000	1.79	1.76	1.77	1.99	2.35	2.94	2.23	2.08	2.02	683.333	-193.57	1.04
753.000	1.83	1.79	1.80	1.99	2.33	2.89	2.17	2.00	1.92	709.722	-200.21	1.09
829.000	1.99	1.94	1.93	2.06	2.34	2.86	2.20	2.02	1.93	788.889	-217.86	1.21
905.000	2.18	2.11	2.10	2.13	2.38	2.84	2.19	1.99	1.89	868.056	-168.57	1.41
962.000	2.39	2.31	2.28	2.17	2.42	2.84	2.20	1.97	1.86	947.222	-190.84	1.45
981.000	2.45	2.37	2.34	2.17	2.42	2.84	2.20	1.97	1.85	973.611	-183.66	1.49
000.000	2.52	2.44	2.40	2.17	2.41	2.83	2.20	1.97	1.83	1000.000	-175.78	1.32

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Models
SBL-2LH
TFM-2LH
TUF-2LH
ZP-2LH

computer-automated performance data
typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
5.000	35.000	6.35	5.97	5.79	50.42	52.74	55.33	92.39	87.33	84.57
10.000	40.000	6.27	5.89	5.71	50.26	52.59	55.18	88.15	81.78	79.01
20.000	50.000	6.25	5.90	5.72	50.09	52.51	55.01	82.91	76.47	73.93
50.000	80.000	6.35	5.96	5.78	50.26	52.73	55.34	75.29	68.83	65.98
95.450	65.454	6.45	6.01	5.81	50.20	52.59	55.11	76.31	68.37	65.72
100.000	70.000	6.47	6.04	5.81	49.96	52.35	55.06	76.24	67.59	63.42
185.910	155.909	6.23	5.82	5.71	49.37	52.03	55.00	64.85	63.99	60.35
200.000	170.000	6.06	5.77	5.70	48.99	52.24	55.94	56.89	62.23	57.60
276.360	246.364	5.99	5.75	5.69	48.39	51.93	56.47	53.30	58.87	57.65
366.820	336.818	6.00	5.81	5.75	48.15	52.59	58.42	50.00	53.25	55.12
457.270	427.273	6.15	5.88	5.79	45.89	47.42	48.34	53.50	55.40	52.82
487.420	457.424	6.12	5.91	5.82	43.82	45.90	47.93	48.88	49.79	48.91
500.000	470.000	6.15	5.94	5.88	45.19	48.30	51.48	45.61	46.54	46.57
547.730	517.727	6.24	6.07	6.00	54.75	57.22	57.14	39.24	40.10	40.86
638.180	608.182	6.79	6.63	6.52	49.32	48.69	47.24	37.98	37.95	38.10
728.640	698.636	7.42	7.20	6.92	42.97	42.92	42.20	37.56	36.76	35.98
819.090	789.091	7.81	7.24	6.94	39.80	41.04	42.19	32.89	32.27	31.54
909.550	879.546	8.19	7.27	6.94	39.91	41.87	45.54	30.39	29.47	28.88
969.850	939.849	8.82	7.69	7.15	41.20	44.77	52.60	29.06	28.21	27.71
1000.000	970.000	8.86	7.81	7.32	42.93	50.08	45.94	28.12	26.90	26.19

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.19	1.25	1.36	2.01	2.82	3.90	1.73	1.46	1.19	5.000	-332.70	-2.03
10.000	1.10	1.18	1.30	1.82	2.63	3.70	1.74	1.47	1.19	10.000	-332.60	-1.99
20.000	1.06	1.16	1.28	1.85	2.68	3.75	1.73	1.46	1.19	20.000	-329.10	-1.95
50.000	1.08	1.18	1.30	1.81	2.62	3.65	1.76	1.48	1.21	50.000	-343.10	-2.00
100.000	1.10	1.19	1.31	1.74	2.50	3.48	1.82	1.54	1.25	95.450	-338.30	-2.06
165.130	1.12	1.21	1.32	1.73	2.50	3.48	1.91	1.63	1.35	100.000	-331.90	-2.02
200.000	1.13	1.22	1.33	1.68	2.40	3.31	1.97	1.69	1.42	185.910	-357.00	-1.98
265.220	1.13	1.23	1.33	1.72	2.48	3.42	2.12	1.84	1.56	200.000	-356.20	-1.92
345.280	1.14	1.23	1.32	1.68	2.38	3.24	2.38	2.08	1.78	276.360	-342.60	-1.81
425.350	1.13	1.22	1.30	1.72	2.39	3.21	2.62	2.33	2.02	366.820	-332.00	-1.45
500.000	1.12	1.21	1.28	1.77	2.42	3.21	2.86	2.55	2.23	457.270	-287.51	-1.36
525.430	1.12	1.20	1.26	1.77	2.42	3.20	2.92	2.61	2.30	487.420	-273.52	-1.14
552.120	1.12	1.19	1.25	1.80	2.43	3.18	3.01	2.68	2.36	500.000	-271.37	-1.18
605.500	1.11	1.18	1.23	1.84	2.44	3.16	3.12	2.79	2.46	547.730	-272.60	-1.49
685.570	1.10	1.15	1.17	1.90	2.49	3.19	3.15	2.80	2.48	638.180	-282.98	-1.28
765.640	1.08	1.11	1.14	1.93	2.47	3.13	3.13	2.76	2.44	728.640	-235.17	-0.97
845.700	1.02	1.05	1.12	1.99	2.47	3.05	3.06	2.67	2.31	819.090	-205.55	-0.81
919.100	1.13	1.15	1.24	2.10	2.57	3.11	2.95	2.53	2.15	909.550	-207.63	-0.31
972.470	1.28	1.30	1.39	2.13	2.60	3.12	2.88	2.45	2.04	969.850	-209.87	-0.06
1000.000	1.35	1.38	1.47	2.12	2.59	3.12	2.86	2.42	1.99	1000.000	-204.55	0.27

surface-mount

Frequency Mixers

Model
SCM-5

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1250.000	1280.000	7.07	6.32	5.90	24.73	24.82	25.00	17.29	18.89	19.99
1298.529	1328.529	6.96	6.19	5.82	24.46	24.60	24.78	16.69	18.27	19.16
1330.882	1300.882	6.34	5.58	5.17	25.05	25.12	25.23	15.81	17.54	18.54
1347.059	1317.059	6.36	5.60	5.14	25.33	25.48	25.50	15.35	17.09	18.06
1379.412	1349.412	6.12	5.45	5.33	25.38	25.75	25.93	14.87	16.59	17.71
1411.765	1381.765	5.91	5.33	5.36	25.11	25.62	25.92	14.46	15.98	16.91
1444.118	1414.118	5.86	5.31	5.67	25.58	26.16	26.43	14.18	15.43	16.17
1460.294	1430.294	5.81	5.31	5.86	26.17	26.70	27.07	14.00	15.15	15.85
1500.000	1470.000	5.87	5.26	5.76	26.80	27.09	26.85	13.22	14.04	14.70
1541.177	1511.177	5.85	5.26	5.77	27.11	27.63	27.24	13.61	13.76	14.08
1557.353	1527.353	6.01	5.31	5.73	27.16	27.57	26.81	13.41	13.24	13.45
1589.706	1559.706	6.04	5.36	5.92	27.56	28.19	27.27	13.70	13.05	12.95
1622.059	1592.059	6.23	5.54	5.94	27.61	28.01	26.74	13.26	12.44	12.01
1654.412	1624.412	6.32	5.70	6.08	27.21	27.36	26.20	13.10	12.21	11.64
1670.588	1640.588	6.37	5.76	6.05	27.01	27.10	26.22	13.39	12.39	11.68
1702.941	1672.941	6.59	5.96	6.01	25.95	25.84	24.95	12.75	11.54	10.75
1751.471	1721.471	6.61	6.00	5.96	26.00	25.71	24.84	12.80	11.30	10.18
1767.647	1737.647	6.55	5.95	5.91	26.11	25.76	24.78	12.87	11.27	10.11
1783.824	1753.824	6.61	5.97	5.87	25.53	25.07	23.95	12.39	10.72	9.68
1800.000	1770.000	6.63	5.94	5.84	25.20	24.75	23.76	12.43	10.73	9.67

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
1250.000	3.60	2.97	2.47	8.72	10.89	12.80	5.000	2.29	1.92	1.68	1250.000	-106.06	10.73
1298.529	3.14	2.57	2.16	8.95	10.62	12.09	10.000	2.32	1.94	1.69	1298.529	-96.80	10.24
1330.882	2.80	2.31	1.93	9.23	10.69	12.09	20.000	2.34	1.95	1.70	1330.882	-90.34	10.32
1347.059	2.71	2.24	1.86	9.63	11.03	12.52	50.000	2.35	1.95	1.70	1347.059	-89.28	10.73
1379.412	2.47	2.00	1.67	10.69	11.77	13.09	52.903	2.36	1.95	1.70	1379.412	-79.96	10.62
1411.765	2.25	1.84	1.51	11.24	11.85	13.09	100.000	2.39	1.97	1.71	1411.765	-72.91	11.49
1444.118	2.09	1.69	1.38	11.24	11.69	12.52	100.807	2.39	1.97	1.71	1444.118	-65.61	12.83
1460.294	2.02	1.61	1.31	11.53	11.77	12.52	148.710	2.43	1.99	1.73	1460.294	-65.12	14.16
1500.000	1.88	1.51	1.21	12.44	12.44	12.80	196.613	2.43	1.98	1.72	1500.000	-59.72	16.09
1541.177	1.74	1.43	1.16	12.61	12.71	12.61	200.000	2.43	1.98	1.72	1541.177	-45.03	17.30
1557.353	1.72	1.42	1.16	12.35	12.52	12.44	244.516	2.41	1.97	1.71	1557.353	-41.41	17.69
1589.706	1.67	1.43	1.22	12.35	12.52	12.18	250.000	2.41	1.96	1.71	1589.706	-38.21	18.47
1622.059	1.67	1.47	1.30	12.35	12.52	12.09	260.484	2.39	1.96	1.71	1622.059	-33.29	18.99
1654.412	1.68	1.52	1.39	12.26	12.44	11.85	292.419	2.36	1.95	1.70	1654.412	-29.68	18.70
1670.588	1.70	1.56	1.44	12.18	12.26	11.77	324.355	2.32	1.92	1.68	1670.588	-32.21	19.75
1702.941	1.74	1.64	1.54	11.93	11.85	11.53	372.258	2.23	1.88	1.66	1702.941	-35.58	20.08
1751.471	1.85	1.78	1.71	11.61	11.31	11.09	404.194	2.18	1.87	1.64	1751.471	-34.03	17.75
1767.647	1.88	1.85	1.77	11.53	11.31	10.89	452.097	2.12	1.85	1.63	1767.647	-33.43	16.69
1783.824	1.93	1.90	1.82	11.46	11.17	10.19	484.032	2.08	1.83	1.63	1783.824	-34.51	16.04
1800.000	1.97	1.97	1.90	11.61	11.03	10.50	500.000	2.08	1.83	1.63	1800.000	-38.13	15.67

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broadband, high dynamic range

Frequency Mixers

Model
SBL-1ZMH

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
2.000	32.000	7.97	7.47	7.16	69.98	70.78	73.30	63.48	65.58	66.90
4.000	34.000	7.33	6.83	6.51	69.28	70.28	73.22	58.22	59.74	60.82
5.000	35.000	7.20	6.65	6.34	69.38	70.18	72.99	56.42	57.88	59.08
10.000	40.000	6.84	6.27	5.98	69.20	70.01	72.74	50.76	52.36	53.57
20.000	50.000	6.73	6.18	5.87	68.66	69.85	72.60	44.64	46.22	47.65
50.000	80.000	6.64	6.15	5.89	68.34	69.63	73.30	37.42	39.08	40.28
100.000	70.000	6.63	6.15	5.91	66.42	67.71	73.85	31.64	33.80	35.87
119.640	89.643	6.43	6.08	5.84	64.26	67.73	75.30	30.50	32.85	34.65
200.000	170.000	6.86	6.34	6.10	63.39	74.27	61.33	27.21	29.38	30.91
276.500	246.500	7.15	6.71	6.50	69.84	67.53	51.69	26.05	27.35	28.56
433.360	403.357	7.68	6.85	6.14	52.91	51.02	47.32	24.31	25.68	26.93
500.000	470.000	6.54	6.21	5.95	48.26	49.19	46.80	24.67	26.25	27.35
550.000	520.000	6.28	5.99	5.85	52.20	53.13	48.53	25.06	26.35	26.94
590.210	560.214	6.08	5.95	5.95	55.02	51.95	44.26	25.41	27.35	27.83
747.070	717.071	7.05	6.91	6.77	45.33	45.36	39.98	29.35	31.35	29.04
903.930	873.929	8.95	7.63	7.05	47.76	45.31	44.35	36.55	33.05	30.37
1000.000	970.000	8.38	7.69	7.24	43.61	42.04	42.61	31.70	30.24	28.96
1021.570	991.571	8.53	7.87	7.42	41.84	40.76	41.67	31.51	30.36	29.27
1060.790	1030.786	8.79	8.11	7.73	36.61	35.87	36.58	31.09	30.40	29.57
1100.000	1070.000	9.10	8.49	8.09	32.15	31.32	31.45	34.18	34.03	33.76

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
2.000	1.78	1.79	1.79	1.72	2.25	3.01	2.000	1.49	1.39	1.29	2.000	-487.70	0.32
4.000	1.72	1.74	1.75	1.56	2.13	2.91	4.000	1.50	1.41	1.29	4.000	-506.80	0.32
5.000	1.71	1.74	1.75	1.52	2.10	2.88	5.000	1.51	1.41	1.30	5.000	-514.40	0.32
10.000	1.79	1.81	1.81	1.35	1.95	2.72	10.000	1.60	1.47	1.34	10.000	-516.40	0.32
20.000	1.73	1.76	1.78	1.36	1.97	2.78	20.000	1.58	1.45	1.33	20.000	-513.90	0.30
50.000	1.74	1.77	1.78	1.33	1.93	2.69	50.000	1.61	1.48	1.36	50.000	-535.20	0.31
100.000	1.73	1.75	1.75	1.28	1.86	2.61	83.000	1.65	1.51	1.38	100.000	-510.90	0.18
200.000	1.57	1.59	1.59	1.27	1.84	2.56	100.000	1.66	1.52	1.40	153.450	-516.40	0.24
246.000	1.51	1.53	1.55	1.31	1.91	2.65	137.000	1.69	1.55	1.42	200.000	-533.70	0.34
368.000	1.41	1.50	1.58	1.39	1.97	2.69	177.000	1.71	1.57	1.45	304.900	-490.70	1.38
490.000	1.51	1.68	1.84	1.51	2.06	2.79	200.000	1.73	1.58	1.46	456.340	-445.50	-0.09
550.000	1.63	1.83	2.03	1.61	2.12	2.83	231.000	1.73	1.58	1.46	500.000	-446.00	-0.38
581.000	1.69	1.90	2.10	1.66	2.16	2.86	250.000	1.73	1.58	1.46	550.000	-496.40	-1.31
642.000	1.76	1.95	2.13	1.76	2.29	2.98	285.000	1.72	1.57	1.45	607.790	-535.90	-3.43
764.000	1.71	1.82	1.93	1.85	2.36	3.04	325.000	1.66	1.54	1.43	759.240	-381.30	-4.07
886.000	1.49	1.52	1.58	1.78	2.24	2.91	365.000	1.60	1.49	1.41	910.690	-385.60	-5.84
1000.000	1.87	1.80	1.77	1.91	2.24	2.83	406.000	1.58	1.53	1.46	1000.000	-410.40	-6.53
1039.000	2.14	2.02	1.95	2.01	2.28	2.81	446.000	1.62	1.58	1.58	1024.280	-395.10	-5.62
1069.000	2.37	2.24	2.13	2.07	2.25	2.71	487.000	1.76	1.78	1.84	1062.140	-428.60	-6.27
1100.000	2.72	2.55	2.43	2.10	2.16	2.53	500.000	1.82	1.87	1.96	1100.000	-427.40	-11.09

most widely-used

Frequency Mixers

Model
SIMA-5

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
2.000	32.000	7.47	7.18	7.04	66.17	71.44	80.12	71.67	75.64	80.12
4.000	34.000	7.12	6.83	6.69	65.57	70.85	78.74	71.47	75.65	79.24
5.000	35.000	7.06	6.76	6.63	65.37	70.64	77.71	71.67	75.44	78.61
10.000	40.000	6.90	6.63	6.51	64.98	69.77	74.75	71.48	74.07	74.55
20.000	50.000	6.91	6.62	6.49	64.75	68.32	70.51	70.25	70.32	69.91
50.000	80.000	6.98	6.68	6.54	62.25	63.23	62.82	64.95	63.43	62.22
100.000	70.000	6.97	6.70	6.58	58.40	57.80	57.24	59.50	57.80	56.70
162.500	132.500	7.03	6.76	6.63	54.96	54.25	53.71	55.46	53.86	52.75
200.000	170.000	7.14	6.84	6.67	53.68	52.95	52.32	53.40	52.03	50.71
376.500	346.500	7.34	6.93	6.70	49.55	48.36	47.12	44.47	43.30	41.84
500.000	470.000	7.55	7.09	6.84	47.88	47.44	46.23	40.03	38.45	37.16
590.500	560.500	7.89	7.36	6.90	44.62	44.40	43.91	36.97	35.71	34.52
750.000	720.000	7.05	6.59	6.41	41.04	40.26	39.47	31.68	30.46	29.45
804.500	774.500	6.92	6.51	6.34	40.14	39.27	38.37	29.99	28.96	28.23
1000.000	970.000	6.82	6.55	6.51	37.81	36.88	35.60	25.61	24.67	24.06
1018.500	988.500	6.82	6.54	6.49	37.64	36.77	35.51	25.30	24.36	23.77
1232.500	1202.500	7.15	6.91	6.86	35.73	34.61	33.46	22.68	22.20	21.67
1393.000	1363.000	7.57	7.31	7.25	34.85	33.73	32.62	23.08	22.25	21.58
1446.500	1416.500	7.62	7.31	7.21	34.32	33.18	32.06	23.09	22.20	21.48
1500.000	1470.000	7.90	7.48	7.30	34.36	33.10	31.93	23.66	22.45	21.60

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.27	1.31	1.34	1.62	2.40	3.37	1.32	1.16	1.07	2.000	-232.95	-0.29
10.000	1.15	1.20	1.23	1.57	2.35	3.29	1.33	1.17	1.07	4.000	-234.52	-0.28
20.000	1.09	1.15	1.19	1.66	2.43	3.45	1.33	1.17	1.07	5.000	-233.65	-0.28
50.000	1.08	1.14	1.19	1.56	2.31	3.24	1.33	1.16	1.07	10.000	-233.60	-0.27
100.000	1.06	1.12	1.17	1.62	2.37	3.27	1.34	1.17	1.08	20.000	-230.71	-0.27
149.677	1.04	1.10	1.14	1.64	2.34	3.20	1.35	1.18	1.09	50.000	-249.38	-0.26
200.000	1.02	1.07	1.11	1.63	2.34	3.19	1.36	1.20	1.10	100.000	-237.65	-0.25
294.355	1.09	1.07	1.08	1.69	2.30	3.09	1.39	1.22	1.12	200.000	-250.36	-0.20
439.032	1.33	1.29	1.28	1.77	2.38	3.17	1.39	1.22	1.12	208.621	-246.95	-0.21
500.000	1.45	1.41	1.40	1.72	2.19	2.77	1.37	1.21	1.11	415.241	-221.16	0.09
583.710	1.63	1.59	1.59	1.78	2.25	2.83	1.31	1.16	1.07	500.000	-216.29	0.15
728.387	1.92	1.90	1.91	1.80	2.20	2.80	1.15	1.09	1.14	621.862	-211.78	0.40
750.000	1.96	1.96	1.95	1.85	2.32	3.03	1.11	1.08	1.16	750.000	-209.23	1.70
873.065	2.14	2.15	2.15	1.92	2.23	2.79	1.20	1.32	1.44	828.483	-205.28	2.97
1000.000	2.34	2.36	2.36	1.98	2.17	2.65	1.65	1.82	1.94	1000.000	-230.69	5.27
1017.742	2.38	2.40	2.40	1.99	2.16	2.62	1.74	1.92	2.05	1035.103	-220.81	5.94
1162.419	2.56	2.60	2.63	2.14	2.09	2.43	3.01	3.22	3.34	1241.724	-233.23	9.04
1307.097	2.60	2.64	2.68	2.15	1.95	2.16	5.07	5.22	5.36	1396.690	-214.06	10.27
1451.774	2.60	2.63	2.68	2.04	1.78	1.92	6.97	6.97	6.89	1448.345	-205.44	10.02
1500.000	2.65	2.64	2.69	1.95	1.71	1.89	7.31	7.25	7.17	1500.000	-218.56	9.39

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
SBL-1XLH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
10.000	40.000	6.35	5.85	5.56	60.73	60.92	60.58	64.53	69.32	78.42
20.000	50.000	6.33	5.87	5.62	60.20	59.64	59.04	64.10	68.52	74.90
50.000	80.000	6.33	5.85	5.60	57.72	55.05	53.35	64.62	69.14	71.80
97.350	67.353	6.62	6.04	5.76	56.12	53.39	51.55	63.95	67.92	68.38
100.000	70.000	6.54	5.99	5.72	55.74	52.17	49.84	63.83	67.58	66.04
184.710	154.706	6.63	5.97	5.68	55.57	51.00	47.48	62.03	63.99	60.28
200.000	170.000	6.50	5.87	5.62	57.94	49.50	45.90	60.84	61.64	57.15
272.060	242.059	6.35	5.80	5.60	59.80	49.51	44.55	58.40	58.13	53.55
359.410	329.412	6.39	5.84	5.61	51.29	48.18	44.62	58.35	58.17	54.40
446.760	416.765	6.72	6.15	5.93	43.83	42.66	41.63	53.41	55.71	58.55
475.880	445.882	6.83	6.35	6.07	42.34	41.14	39.67	52.89	54.61	57.62
500.000	470.000	6.80	6.42	6.17	40.40	40.14	38.94	53.02	54.24	56.22
534.120	504.118	6.78	6.41	6.19	38.39	38.47	38.23	52.34	52.89	52.78
621.470	591.471	6.30	5.84	5.58	35.93	35.48	34.82	53.33	54.95	55.92
708.820	678.824	5.93	5.49	5.30	34.22	34.84	34.09	69.33	58.37	57.76
796.180	766.177	6.17	5.70	5.38	32.27	33.30	34.42	63.55	60.05	57.05
883.530	853.529	6.14	5.56	5.28	32.43	33.02	33.44	52.29	50.50	49.19
941.760	911.765	5.96	5.51	5.25	33.25	33.99	34.56	48.98	48.29	48.98
970.880	940.882	6.14	5.67	5.35	33.71	34.84	35.71	47.84	47.00	48.00
1000.000	970.000	6.12	5.70	5.43	34.19	35.36	36.19	47.33	45.65	45.87

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
10.000	2.56	2.25	1.89	2.29	2.96	4.01	10.000	1.15	1.19	1.26
20.000	2.55	2.25	1.89	1.72	2.54	3.65	20.000	1.09	1.15	1.23
50.000	2.57	2.26	1.90	1.68	2.48	3.54	50.000	1.09	1.15	1.23
100.000	2.61	2.31	1.95	1.61	2.38	3.38	100.000	1.12	1.18	1.25
165.130	2.65	2.37	2.04	1.59	2.34	3.32	165.130	1.16	1.22	1.29
200.000	2.68	2.40	2.09	1.57	2.29	3.24	200.000	1.19	1.24	1.32
265.220	2.72	2.47	2.18	1.61	2.36	3.31	265.220	1.23	1.29	1.36
338.610	2.78	2.54	2.26	1.64	2.37	3.27	338.610	1.25	1.32	1.40
418.680	2.78	2.56	2.30	1.70	2.40	3.26	418.680	1.28	1.35	1.41
500.000	2.73	2.50	2.25	1.80	2.47	3.27	500.000	1.27	1.32	1.36
518.760	2.72	2.48	2.24	1.82	2.48	3.27	518.760	1.26	1.31	1.34
545.450	2.71	2.46	2.20	1.86	2.55	3.34	545.450	1.24	1.29	1.32
592.160	2.65	2.39	2.13	1.90	2.57	3.34	592.160	1.20	1.24	1.27
672.220	2.50	2.22	1.94	2.00	2.61	3.34	672.220	1.14	1.19	1.26
745.620	2.40	2.10	1.81	2.12	2.69	3.39	745.620	1.28	1.32	1.41
819.010	2.30	1.99	1.69	2.29	2.88	3.51	819.010	1.61	1.63	1.70
899.080	2.23	1.92	1.62	2.41	3.00	3.63	899.080	2.14	2.13	2.16
952.460	2.17	1.89	1.61	2.51	3.08	3.71	952.460	2.55	2.52	2.51
972.470	2.13	1.87	1.61	2.52	3.07	3.68	972.470	2.71	2.66	2.63
1000.000	2.11	1.87	1.63	2.53	3.06	3.67	1000.000	2.92	2.86	2.81

plug-in, surface-mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
TUF-3
TUF-3SM
ZP-3

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
0.150	30.150	5.84	5.60	5.46	82.59	77.37	74.58	60.69	63.67	66.98
0.200	30.200	5.75	5.52	5.39	83.04	77.64	74.35	60.44	63.64	66.75
0.300	30.300	5.69	5.47	5.33	82.49	77.00	74.12	60.19	63.40	66.52
0.500	30.500	5.64	5.41	5.28	81.86	76.78	74.01	60.36	63.48	66.51
1.000	31.000	5.54	5.31	5.20	80.26	76.45	73.66	60.46	63.55	66.86
1.500	31.500	5.47	5.25	5.14	80.37	75.88	73.40	60.37	63.58	66.40
2.000	32.000	5.44	5.22	5.10	79.14	75.76	73.07	60.34	63.46	66.57
5.000	35.000	5.44	5.19	5.06	77.84	74.18	72.40	60.54	63.18	65.20
10.000	40.000	5.46	5.21	5.07	74.42	72.35	70.36	59.32	61.65	63.66
20.000	50.000	5.44	5.19	5.07	69.83	68.26	67.08	59.13	60.76	61.68
50.000	80.000	5.39	5.19	5.08	62.13	60.65	59.84	54.30	54.03	53.94
77.044	107.044	5.40	5.20	5.10	58.01	56.86	55.86	49.93	50.29	50.76
100.000	70.000	5.52	5.26	5.13	56.31	54.74	53.67	47.96	48.45	48.86
153.939	123.939	5.44	5.27	5.18	53.29	50.70	49.21	44.86	45.02	44.64
200.000	170.000	5.50	5.33	5.24	46.94	45.62	45.07	44.33	43.77	42.57
230.833	200.833	5.58	5.38	5.26	47.41	46.53	47.19	42.19	41.53	40.76
300.000	270.000	5.79	5.57	5.45	50.32	49.67	45.53	41.24	37.33	34.73
369.242	339.242	6.25	5.94	5.74	50.19	48.35	38.52	45.32	36.42	32.36
384.621	354.621	6.31	5.93	5.68	44.96	48.35	42.68	39.40	33.54	29.97
400.000	370.000	6.44	5.93	5.62	45.50	56.18	47.40	36.15	32.89	29.89

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
5.000	1.27	1.21	1.22	1.81	2.60	3.64	1.67	1.41	1.23
10.000	1.19	1.09	1.07	1.71	2.50	3.52	1.68	1.41	1.23
20.000	1.20	1.07	1.03	1.57	2.32	3.27	1.69	1.43	1.24
50.000	1.21	1.08	1.02	1.52	2.26	3.18	1.71	1.45	1.27
65.557	1.21	1.08	1.02	1.51	2.24	3.17	1.73	1.46	1.29
90.029	1.21	1.09	1.02	1.51	2.22	3.13	1.76	1.49	1.32
100.000	1.21	1.09	1.02	1.50	2.21	3.10	1.77	1.51	1.34
130.814	1.20	1.08	1.03	1.51	2.19	3.05	1.82	1.56	1.40
163.443	1.20	1.08	1.02	1.52	2.17	2.98	1.88	1.63	1.48
200.000	1.19	1.07	1.04	1.56	2.18	2.97	1.96	1.72	1.57
204.229	1.19	1.07	1.04	1.57	2.18	2.97	1.98	1.73	1.57
212.386	1.19	1.07	1.03	1.57	2.19	2.97	2.00	1.74	1.59
236.857	1.17	1.06	1.03	1.60	2.20	2.96	2.06	1.80	1.65
269.486	1.19	1.09	1.03	1.67	2.26	3.00	2.11	1.87	1.72
300.000	1.18	1.09	1.03	1.71	2.33	3.12	2.18	1.93	1.76
326.586	1.22	1.14	1.08	1.76	2.35	3.13	2.20	1.96	1.80
359.214	1.27	1.19	1.14	1.84	2.39	3.14	2.24	2.02	1.85
375.529	1.32	1.25	1.21	1.89	2.41	3.14	2.15	1.94	1.78
391.843	1.39	1.31	1.28	1.95	2.45	3.15	2.20	1.99	1.82
400.000	1.40	1.32	1.29	1.98	2.49	3.18	2.21	2.01	1.83

ϕ detection

FREQ. (MHz)	max DC output mV	DC offset mV
0.150	243.74	-0.02
0.200	244.51	-0.02
0.300	245.19	-0.03
0.500	245.83	-0.03
1.000	247.57	-0.01
1.500	247.54	-0.02
2.000	247.08	-0.04
5.000	246.13	-0.03
10.000	243.89	-0.03
20.000	242.18	-0.01
50.000	256.04	-0.01
77.044	258.28	0.01
100.000	262.95	0.06
153.939	244.26	0.13
200.000	245.72	0.27
230.833	258.58	0.10
300.000	237.32	0.09
369.242	224.13	-0.05
384.621	226.89	0.29
400.000	227.14	0.78

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broadband, high dynamic range

Frequency Mixers

Model
SBL-1-1LH

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
0.200	30.200	5.41	5.14	5.02	62.99	63.24	63.23	56.72	56.21	55.79
0.400	30.400	5.30	5.04	4.93	63.07	62.95	62.65	56.39	55.99	55.49
0.500	30.500	5.29	5.03	4.93	63.12	62.91	62.56	56.36	55.96	55.42
1.000	31.000	5.21	4.96	4.85	62.80	62.77	62.50	56.22	55.82	55.32
2.000	32.000	5.10	4.83	4.73	62.73	62.68	62.43	56.21	55.70	55.30
5.000	35.000	5.14	4.81	4.68	63.11	62.88	62.54	56.73	56.04	55.51
10.000	40.000	5.06	4.75	4.66	62.85	63.10	62.85	56.90	56.40	55.89
20.000	50.000	5.14	4.80	4.68	62.28	62.46	62.41	56.51	55.88	55.36
43.040	73.036	4.97	4.78	4.70	60.66	60.74	60.33	53.66	52.44	51.71
50.000	80.000	5.10	4.82	4.72	60.37	60.54	60.05	53.68	52.16	51.47
100.000	70.000	4.92	4.74	4.70	56.18	56.37	56.44	47.81	48.05	47.63
100.150	70.150	4.92	4.75	4.71	56.20	56.27	56.42	47.82	48.06	47.63
157.260	127.264	5.00	4.85	4.81	53.20	53.73	54.43	46.03	46.11	44.44
200.000	170.000	5.18	5.04	4.97	54.16	53.86	54.67	42.56	42.06	41.13
214.380	184.379	5.28	5.12	5.02	55.80	56.47	58.16	40.19	40.53	39.50
271.490	241.493	5.48	5.37	5.42	47.03	47.24	47.04	34.56	34.08	33.16
328.610	298.607	5.80	5.46	5.41	47.37	46.10	43.10	36.30	31.84	30.14
371.440	341.443	6.73	5.88	5.29	46.03	43.35	40.46	34.41	33.03	29.13
385.720	355.721	7.04	6.06	5.36	48.02	46.26	45.69	32.83	32.39	30.57
400.000	370.000	7.47	6.80	5.95	51.42	51.85	53.36	31.30	31.17	29.78

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
0.300	1.42	1.36	1.33	1.83	2.66	3.77	1.97	1.72	1.47	0.200	-371.60	-0.51
0.400	1.34	1.28	1.25	1.79	2.62	3.73	1.97	1.72	1.47	0.410	-377.40	-0.51
1.000	1.27	1.19	1.14	1.74	2.58	3.68	1.98	1.72	1.47	0.500	-377.40	-0.51
2.000	1.29	1.19	1.11	1.71	2.53	3.62	1.98	1.72	1.47	2.000	-373.60	-0.49
5.000	1.30	1.19	1.10	1.67	2.49	3.57	1.99	1.73	1.47	5.000	-364.40	-0.48
10.000	1.31	1.20	1.10	1.53	2.33	3.37	2.01	1.74	1.47	10.000	-375.00	-0.49
20.000	1.31	1.20	1.11	1.57	2.38	3.42	2.02	1.75	1.48	20.000	-370.10	-0.48
50.000	1.27	1.16	1.08	1.53	2.30	3.29	2.02	1.75	1.50	50.000	-361.80	-0.49
60.870	1.26	1.16	1.08	1.49	2.24	3.19	2.04	1.76	1.51	53.510	-373.30	-0.51
100.000	1.18	1.09	1.07	1.49	2.25	3.19	2.09	1.82	1.56	100.000	-379.60	-0.40
121.440	1.15	1.09	1.10	1.52	2.28	3.22	2.12	1.86	1.61	106.810	-378.60	-0.41
171.910	1.15	1.17	1.21	1.54	2.25	3.13	2.23	1.97	1.74	160.120	-359.30	0.09
200.000	1.19	1.24	1.29	1.60	2.31	3.19	2.30	2.04	1.82	186.770	-360.70	0.31
207.250	1.20	1.26	1.30	1.64	2.37	3.27	2.31	2.05	1.84	200.000	-368.80	0.63
232.480	1.25	1.31	1.36	1.71	2.48	3.42	2.34	2.10	1.90	213.430	-366.50	0.42
277.910	1.33	1.39	1.43	1.71	2.40	3.29	2.31	2.08	1.92	266.730	-342.90	1.10
328.390	1.34	1.39	1.40	2.00	2.69	3.56	2.26	2.03	1.88	320.040	-312.50	0.64
373.810	1.24	1.27	1.28	2.12	2.89	3.81	2.20	1.95	1.77	373.350	-265.84	2.32
388.960	1.20	1.22	1.23	2.12	2.90	3.82	2.15	1.90	1.73	386.670	-257.09	0.14
400.000	1.14	1.16	1.18	2.13	2.90	3.82	2.15	1.87	1.68	400.000	-248.23	0.39

very high dynamic range

Frequency Mixers

Model
SIMA-5H

LEVEL 17 (+17 dBm LO, up to +10 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
2.000	32.000	7.47	7.20	7.14	78.46	78.18	78.07	74.46	71.38	68.12
4.000	34.000	7.23	6.92	6.86	77.08	76.93	76.54	73.78	70.73	67.75
5.000	35.000	7.18	6.86	6.78	76.88	75.95	75.35	73.68	70.75	67.66
10.000	40.000	6.98	6.73	6.66	73.50	72.17	71.64	72.70	69.37	66.85
20.000	50.000	7.03	6.72	6.64	68.76	67.37	67.13	69.96	67.87	66.11
50.000	80.000	7.05	6.71	6.64	60.95	59.93	59.62	63.28	62.42	61.67
100.000	70.000	7.00	6.75	6.67	54.79	54.27	53.84	56.59	56.40	55.94
162.500	132.500	7.01	6.81	6.73	51.24	50.46	50.19	52.23	52.07	52.17
200.000	170.000	7.19	6.94	6.79	49.73	48.77	48.60	50.32	50.41	50.29
376.500	346.500	7.45	7.07	6.84	45.43	43.97	43.39	44.35	43.09	42.61
500.000	470.000	7.60	7.32	7.04	43.82	42.46	41.78	41.11	39.34	38.67
590.500	560.500	8.33	7.84	7.27	42.64	41.96	41.05	38.85	38.16	37.41
750.000	720.000	7.49	7.10	6.81	39.98	38.19	37.20	35.91	34.48	33.25
804.500	774.500	7.28	6.83	6.65	39.81	37.85	36.71	35.01	33.39	32.27
1000.000	970.000	7.08	6.80	6.72	38.35	36.59	35.30	29.77	29.05	28.54
1018.500	988.500	7.04	6.78	6.71	38.19	36.20	34.97	29.44	28.58	28.11
1232.500	1202.500	7.19	6.95	6.93	35.00	33.05	31.66	27.61	26.99	26.23
1393.000	1363.000	7.53	7.26	7.22	33.93	31.84	30.44	28.50	27.40	26.62
1446.500	1416.500	7.65	7.26	7.18	32.85	31.02	29.43	27.77	27.35	26.45
1500.000	1470.000	7.70	7.31	7.16	33.07	30.42	29.14	28.05	27.05	26.58

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.26	1.30	1.33	1.54	2.25	3.07	1.32	1.16	1.05	2.000	-722.90	-0.43
10.000	1.18	1.22	1.26	1.50	2.21	3.05	1.33	1.16	1.06	4.000	-729.10	-0.42
20.000	1.13	1.19	1.22	1.60	2.27	3.11	1.33	1.17	1.06	5.000	-728.20	-0.42
50.000	1.12	1.18	1.21	1.53	2.21	3.06	1.33	1.16	1.06	10.000	-724.00	-0.41
100.000	1.11	1.17	1.20	1.55	2.22	2.97	1.35	1.18	1.08	20.000	-721.10	-0.39
149.677	1.10	1.15	1.19	1.56	2.18	2.94	1.37	1.20	1.11	50.000	-774.30	-0.34
200.000	1.09	1.13	1.16	1.56	2.17	2.80	1.39	1.22	1.13	100.000	-735.70	-0.27
294.355	1.08	1.08	1.10	1.61	2.12	2.76	1.42	1.26	1.17	200.000	-769.00	-0.11
439.032	1.15	1.10	1.07	1.60	2.03	2.60	1.43	1.28	1.21	208.621	-760.20	-0.09
500.000	1.21	1.17	1.15	1.66	2.09	2.46	1.43	1.29	1.22	415.241	-676.70	0.82
583.710	1.30	1.28	1.27	1.57	1.92	3.10	1.43	1.30	1.24	500.000	-629.20	1.04
728.387	1.45	1.46	1.47	1.64	1.97	2.88	1.41	1.33	1.30	621.862	-623.40	1.44
750.000	1.47	1.47	1.48	1.68	2.05	2.55	1.41	1.32	1.30	750.000	-636.10	4.36
873.065	1.58	1.59	1.61	1.81	2.01	2.39	1.53	1.50	1.53	828.483	-632.50	7.03
1000.000	1.70	1.73	1.74	1.89	1.91	2.27	1.83	1.90	1.97	1000.000	-701.80	10.15
1017.742	1.73	1.75	1.78	1.92	1.91	2.20	1.91	1.99	2.07	1035.103	-698.30	11.15
1162.419	1.91	1.95	1.98	2.10	1.80	1.97	3.06	3.26	3.34	1241.724	-690.30	12.70
1307.097	2.01	2.05	2.09	2.27	1.70	1.74	5.38	5.52	5.59	1396.690	-624.30	8.79
1451.774	2.05	2.09	2.13	2.30	1.58	1.48	7.17	7.08	7.00	1448.345	-611.00	7.87
1500.000	2.08	2.12	2.15	2.26	1.52	1.40	7.25	7.14	7.05	1500.000	-603.70	7.02

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broadband, high dynamic range

Frequency Mixers

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

Model
SBL-11LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
5.000	35.000	6.93	6.55	6.32	66.46	71.57	74.37	62.26	64.17	65.17
10.000	40.000	6.62	6.31	6.09	66.09	68.83	71.33	66.49	67.23	67.03
20.000	50.000	6.67	6.29	6.06	67.08	69.62	72.32	77.78	79.82	71.72
50.000	80.000	6.57	6.24	6.05	66.40	69.03	71.69	74.90	73.13	65.79
100.000	70.000	6.62	6.23	6.05	62.70	65.20	67.26	73.30	67.00	60.91
200.000	170.000	6.83	6.54	6.29	61.40	63.38	66.04	72.40	65.78	59.70
204.500	174.500	6.97	6.62	6.33	55.54	58.53	60.34	65.41	56.32	51.36
404.000	374.000	8.11	7.13	6.38	54.11	56.35	58.12	60.62	52.67	48.01
500.000	470.000	7.60	6.89	6.48	49.18	52.61	55.63	45.98	41.12	38.33
603.500	573.500	7.67	6.84	6.41	47.43	48.02	49.12	44.62	40.44	36.84
803.000	773.000	7.88	7.41	7.19	51.32	55.35	59.14	35.92	32.96	31.14
1000.000	970.000	7.79	7.38	7.14	50.26	58.31	56.22	47.73	44.18	36.60
1002.500	972.500	7.79	7.38	7.15	64.88	63.25	57.86	30.93	31.13	29.57
1200.000	1170.000	7.14	6.67	6.47	54.71	60.14	59.01	30.31	31.22	30.17
1335.000	1305.000	8.53	7.76	7.39	39.62	40.52	41.76	27.73	29.47	30.66
1500.000	1470.000	8.98	7.94	7.40	37.34	36.05	34.39	26.38	25.50	26.52
1667.500	1637.500	7.77	6.93	6.58	29.23	29.45	30.37	59.64	59.66	59.52
1867.000	1837.000	7.27	6.71	6.48	34.07	35.05	36.24	45.27	45.23	45.16
1933.500	1903.500	7.25	6.76	6.49	36.54	38.82	41.21	36.77	36.88	36.36
2000.000	1970.000	7.24	6.78	6.51	37.97	40.63	43.51	30.92	30.77	30.42

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm
5.000	2.26	2.22	2.14	2.07	2.66	3.61	10.000	1.82	1.81	1.84
10.000	1.86	1.78	1.69	1.63	2.35	3.36	20.000	1.39	1.45	1.54
20.000	1.74	1.65	1.57	1.59	2.38	3.41	50.000	1.19	1.27	1.39
50.000	1.79	1.68	1.58	1.52	2.31	3.30	86.000	1.12	1.20	1.33
100.000	1.86	1.73	1.62	1.46	2.20	3.14	100.000	1.10	1.19	1.32
200.000	2.04	1.89	1.76	1.47	2.12	2.96	146.000	1.05	1.14	1.30
325.270	2.35	2.13	1.95	1.51	2.05	2.83	192.000	1.04	1.13	1.26
500.000	3.00	2.65	2.40	1.55	1.95	2.63	200.000	1.04	1.13	1.27
545.450	3.23	2.85	2.59	1.55	1.92	2.59	252.000	1.02	1.12	1.26
705.590	3.76	3.45	3.20	1.80	1.85	2.33	300.000	1.01	1.13	1.24
865.720	3.89	3.77	3.62	2.11	1.86	2.17	313.000	1.01	1.12	1.27
1000.000	3.72	3.72	3.67	2.42	1.84	1.95	328.000	1.00	1.13	1.27
1085.900	3.48	3.46	3.42	2.47	1.81	1.81	358.000	1.01	1.14	1.28
1246.040	3.12	3.01	2.96	2.81	1.78	1.53	403.000	1.04	1.16	1.31
1406.170	3.10	2.88	2.70	2.83	1.71	1.27	449.000	1.08	1.20	1.35
1566.300	3.53	3.22	2.94	2.71	1.57	1.09	500.000	1.14	1.27	1.42
1733.110	3.63	3.29	2.94	2.35	1.40	1.22	509.000	1.15	1.28	1.43
1893.240	3.05	2.77	2.54	1.73	1.32	1.48	555.000	1.23	1.37	1.52
1946.620	3.21	3.01	2.77	1.63	1.32	1.58	585.000	1.30	1.44	1.59
2000.000	3.20	3.01	2.79	1.47	1.34	1.65	600.000	1.34	1.48	1.64

broadband high dynamic range

Frequency Mixers

Model
SIMA-5MH

LEVEL 13 (+13 dBm LO, up to +9 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-R (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm	Isolation L-I (dB) LO +10 dBm	LO +13 dBm	LO +16 dBm
2.000	32.000	7.44	7.16	6.98	67.33	67.57	67.96	74.93	70.97	69.36
4.000	34.000	7.15	6.84	6.67	66.85	66.81	67.11	73.75	70.21	68.31
5.000	35.000	7.12	6.80	6.62	66.85	66.99	67.24	73.45	69.69	68.14
10.000	40.000	6.90	6.67	6.45	66.17	66.21	66.09	70.37	67.01	64.94
20.000	50.000	7.02	6.70	6.47	66.03	65.57	64.87	65.73	62.90	60.95
50.000	80.000	7.12	6.77	6.52	62.55	61.02	59.92	57.90	55.09	53.64
100.000	70.000	6.96	6.72	6.51	57.61	55.91	54.97	51.39	48.94	47.99
162.500	132.500	7.01	6.80	6.61	55.30	53.26	51.81	47.99	45.83	44.67
200.000	170.000	7.25	6.95	6.65	54.18	52.23	50.21	46.92	44.77	43.31
376.500	346.500	7.65	7.02	6.66	51.79	49.05	46.22	41.30	39.25	37.29
500.000	470.000	7.99	7.27	6.92	50.36	47.59	46.64	35.54	35.15	34.94
590.500	560.500	8.89	7.75	6.96	46.00	44.36	43.19	33.38	33.14	33.15
750.000	720.000	7.30	6.76	6.43	42.99	39.92	37.49	29.09	29.30	28.98
804.500	774.500	7.19	6.69	6.37	41.94	39.55	37.37	27.56	28.09	27.85
1000.000	970.000	6.99	6.74	6.56	40.65	37.20	34.98	24.26	24.96	25.06
1018.500	988.500	6.98	6.77	6.62	40.55	37.06	34.57	24.07	24.73	24.82
1232.500	1202.500	7.48	7.09	7.03	37.67	34.04	31.65	23.71	24.13	24.05
1393.000	1363.000	8.00	7.65	7.55	36.17	32.16	30.02	24.88	24.40	24.49
1446.500	1416.500	8.28	7.77	7.63	34.88	31.47	29.20	24.79	24.32	24.37
1500.000	1470.000	8.52	7.94	7.75	35.41	31.37	29.37	25.48	24.68	24.92

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR LO port LO +10 dBm	LO +13 dBm	LO +16 dBm	VSWR IF port LO +10 dBm	LO +13 dBm	LO +16 dBm
5.000	1.62	1.30	1.33	1.39	2.06	2.89	1.62	1.36	1.23
10.000	1.64	1.20	1.25	1.37	2.01	2.83	1.64	1.36	1.23
20.000	1.64	1.16	1.22	1.49	2.08	2.96	1.64	1.37	1.23
50.000	1.63	1.16	1.21	1.45	2.02	2.85	1.63	1.36	1.23
100.000	1.66	1.14	1.20	1.46	2.02	2.82	1.66	1.38	1.25
149.677	1.68	1.12	1.17	1.58	2.01	2.73	1.68	1.40	1.26
200.000	1.71	1.09	1.14	1.66	1.96	2.72	1.71	1.42	1.29
294.355	1.75	1.01	1.04	1.61	1.90	2.58	1.75	1.46	1.32
439.032	1.73	1.19	1.18	1.74	1.95	2.49	1.73	1.48	1.33
500.000	1.70	1.30	1.29	1.51	1.81	2.42	1.70	1.46	1.32
583.710	1.61	1.46	1.46	1.54	1.83	2.27	1.61	1.41	1.30
728.387	1.45	1.74	1.76	1.69	1.87	2.37	1.45	1.33	1.30
750.000	1.42	1.78	1.80	1.70	1.83	2.55	1.42	1.31	1.30
873.065	2.00	1.99	2.02	1.85	1.83	2.36	1.43	1.48	1.55
1000.000	2.21	2.22	2.25	1.96	1.78	2.13	1.73	1.87	2.04
1017.742	2.24	2.26	2.28	1.99	1.75	2.09	1.80	1.96	2.13
1162.419	2.49	2.52	2.53	2.26	1.71	1.86	2.80	3.02	3.18
1307.097	2.61	2.65	2.70	2.25	1.58	1.60	4.11	4.24	4.23
1451.774	2.63	2.71	2.73	2.09	1.41	1.39	4.53	4.54	4.42
1500.000	2.63	2.71	2.74	2.01	1.36	1.32	4.47	4.50	4.37

ϕ detection

FREQ. (MHz)	max DC output mV	DC offset mV
2.000	-428.60	0.54
4.000	-432.40	0.53
5.000	-431.90	0.53
10.000	-427.90	0.52
20.000	-421.60	0.52
50.000	-454.80	0.54
100.000	-432.20	0.59
200.000	-454.50	0.82
208.621	-448.00	0.88
415.241	-405.60	2.26
500.000	-374.20	2.31
621.862	-370.10	2.91
750.000	-372.60	6.73
828.483	-377.80	9.11
1000.000	-420.10	10.92
1035.103	-408.70	11.06
1241.724	-397.10	12.85
1396.690	-355.60	8.05
1448.345	-362.60	7.30
1500.000	-373.60	7.62

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broadband, high dynamic range

Frequency Mixers

Model SBL-1LH

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
2.000	32.000	7.08	6.68	6.47	54.70	56.27	57.70	58.13	61.48	64.77
4.000	34.000	6.44	5.99	5.80	53.93	55.49	56.87	58.13	61.08	63.47
5.000	35.000	6.33	5.91	5.68	53.83	55.45	56.81	58.22	60.78	62.56
10.000	40.000	6.07	5.67	5.46	53.50	55.36	56.81	57.55	59.10	60.35
20.000	50.000	6.07	5.64	5.41	53.32	55.12	56.65	56.63	57.18	56.99
50.000	80.000	6.05	5.67	5.48	53.54	55.26	56.82	54.37	51.88	50.11
50.190	80.194	6.07	5.67	5.48	53.55	55.32	56.87	54.44	51.90	50.16
98.390	68.387	6.21	5.75	5.49	53.95	56.41	58.37	52.10	48.52	46.18
100.000	70.000	6.10	5.66	5.48	53.94	56.47	58.55	52.01	48.39	46.03
146.580	116.581	5.82	5.59	5.50	56.48	59.78	61.26	49.88	45.79	43.63
194.770	164.774	5.79	5.64	5.56	60.93	64.83	62.83	44.60	43.30	42.13
200.000	170.000	5.82	5.66	5.55	61.63	65.19	62.51	44.13	42.88	42.00
242.970	212.968	5.85	5.70	5.60	65.90	60.00	57.12	39.92	39.71	39.15
250.000	220.000	5.89	5.71	5.60	66.57	59.58	56.77	39.90	39.98	39.68
291.160	261.161	6.11	5.92	5.84	61.19	56.13	53.94	36.93	36.74	37.06
339.350	309.355	6.30	6.04	5.91	55.31	52.01	50.09	35.28	35.96	36.28
387.550	357.548	6.44	6.28	6.15	47.35	46.67	46.18	34.04	35.31	36.04
435.740	405.742	6.55	6.31	6.18	47.08	46.78	46.10	30.73	31.57	32.37
483.940	453.936	7.03	6.47	6.17	44.17	43.38	43.16	30.34	30.06	30.88
500.000	470.000	7.34	6.69	6.26	42.04	41.79	41.99	30.12	29.69	30.15

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
2.000	1.61	1.65	1.69	1.63	2.08	2.67	1.61	1.45	1.32	2.000	-337.00	1.55
4.490	1.32	1.36	1.40	1.48	1.99	2.60	1.62	1.45	1.32	4.000	-347.40	1.47
19.430	1.07	1.15	1.20	1.30	1.81	2.37	1.63	1.47	1.33	5.000	-348.50	1.49
49.310	1.04	1.13	1.19	1.28	1.79	2.36	1.65	1.48	1.34	10.000	-348.40	1.44
99.110	1.04	1.13	1.20	1.26	1.76	2.32	1.69	1.54	1.40	20.000	-346.80	1.45
119.030	1.04	1.13	1.20	1.25	1.74	2.28	1.73	1.56	1.42	50.000	-363.20	1.52
133.970	1.04	1.13	1.19	1.25	1.74	2.27	1.76	1.59	1.44	50.190	-363.10	1.50
171.320	1.05	1.13	1.19	1.27	1.73	2.22	1.81	1.64	1.51	98.390	-353.70	1.48
211.160	1.07	1.15	1.20	1.30	1.75	2.22	1.91	1.72	1.59	100.000	-351.90	1.48
238.550	1.10	1.16	1.22	1.33	1.77	2.25	1.98	1.79	1.65	146.580	-360.40	1.52
251.000	1.11	1.18	1.23	1.34	1.79	2.27	2.02	1.84	1.68	194.770	-369.10	1.73
263.450	1.12	1.19	1.24	1.36	1.80	2.28	2.07	1.87	1.72	200.000	-368.60	1.69
303.290	1.18	1.24	1.30	1.43	1.89	2.40	2.17	1.95	1.78	242.970	-361.00	1.51
343.130	1.25	1.31	1.38	1.48	1.94	2.45	2.30	2.07	1.88	250.000	-361.60	1.51
368.030	1.30	1.37	1.43	1.52	1.96	2.45	2.38	2.13	1.94	291.160	-378.40	2.13
382.970	1.32	1.40	1.47	1.54	1.95	2.43	2.42	2.17	1.98	339.350	-331.90	2.36
420.320	1.40	1.48	1.54	1.64	2.02	2.47	2.54	2.30	2.10	387.550	-304.60	2.41
460.160	1.47	1.54	1.61	1.76	2.16	2.57	2.65	2.40	2.22	435.740	-307.30	2.93
487.550	1.51	1.58	1.64	1.79	2.21	2.63	2.69	2.43	2.32	483.940	-271.86	2.52
500.000	1.51	1.58	1.64	1.80	2.22	2.65	2.74	2.49	2.31	500.000	-265.34	2.56

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plug-in, surface-mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
TUF-5
TUF-5SM
ZP-5

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
20.000	50.000	6.33	5.76	5.50	69.02	69.06	68.24	50.16	50.01	49.77
40.000	70.000	6.11	5.54	5.27	63.58	63.75	63.61	46.13	45.70	45.41
50.000	80.000	6.00	5.44	5.20	61.66	61.73	61.60	44.11	43.88	43.72
100.000	70.000	5.94	5.38	5.14	56.16	56.05	55.78	38.85	38.99	38.98
158.750	128.750	5.96	5.40	5.19	52.34	52.30	51.82	36.10	36.23	35.74
200.000	170.000	5.91	5.41	5.20	50.15	49.90	48.79	34.62	34.38	33.79
297.500	267.500	6.12	5.58	5.33	47.03	46.54	45.34	31.74	31.36	30.79
436.250	406.250	6.40	5.81	5.52	45.66	46.39	47.22	28.23	28.70	28.59
500.000	470.000	6.57	5.94	5.63	45.24	46.35	47.53	26.79	27.70	27.93
575.000	545.000	6.79	6.28	5.78	44.28	45.43	46.69	25.50	26.65	27.62
713.750	683.750	7.45	6.65	6.23	42.95	43.76	44.80	23.58	25.47	27.32
750.000	720.000	7.62	6.73	6.29	42.81	43.43	44.23	23.20	25.18	27.28
852.500	822.500	7.67	6.83	6.35	41.93	42.21	42.70	22.64	24.77	26.98
991.250	961.250	7.85	7.20	6.70	40.44	40.31	40.22	21.27	22.85	24.04
1000.000	970.000	7.77	7.15	6.66	40.30	40.23	40.15	21.10	22.65	23.80
1130.000	1100.000	7.86	7.28	6.85	39.02	38.87	38.41	19.21	19.85	19.82
1268.750	1238.750	7.86	7.27	6.91	38.49	38.46	38.13	16.87	17.22	17.01
1407.500	1377.500	8.15	7.29	6.91	37.51	37.61	37.31	14.38	14.48	14.44
1453.750	1423.750	8.29	7.22	6.79	37.09	37.14	36.69	13.51	13.58	13.43
1500.000	1470.000	8.60	7.38	6.93	36.81	36.87	36.41	12.94	12.98	12.91

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
20.000	1.66	1.56	1.49	1.67	2.37	3.26	1.61	1.34	1.15	20.000	-227.32	0.17
50.000	1.56	1.44	1.35	1.63	2.31	3.18	1.61	1.34	1.15	40.000	-238.44	0.11
100.000	1.69	1.56	1.46	1.54	2.17	2.97	1.61	1.34	1.15	50.000	-242.56	0.10
200.000	1.75	1.62	1.51	1.54	2.16	2.94	1.62	1.34	1.16	100.000	-253.79	0.12
323.400	2.04	1.89	1.77	1.58	2.18	2.92	1.60	1.33	1.15	158.750	-229.69	0.16
401.100	2.28	2.12	1.99	1.63	2.20	2.90	1.58	1.31	1.15	200.000	-231.62	0.17
438.100	2.42	2.25	2.10	1.67	2.23	2.90	1.57	1.30	1.14	297.500	-238.47	0.33
552.800	2.84	2.65	2.48	1.77	2.27	2.88	1.51	1.26	1.11	436.250	-243.06	0.36
663.800	3.22	3.02	2.85	1.88	2.33	2.87	1.42	1.19	1.07	500.000	-208.99	0.46
741.500	3.45	3.26	3.10	1.93	2.35	2.85	1.35	1.13	1.05	575.000	-217.27	0.70
778.500	3.53	3.36	3.19	1.97	2.38	2.88	1.30	1.10	1.05	713.750	-202.23	0.92
815.500	3.60	3.43	3.29	2.03	2.42	2.91	1.26	1.07	1.08	750.000	-217.23	1.22
930.200	3.75	3.60	3.46	2.20	2.54	2.97	1.10	1.08	1.20	852.500	-189.86	0.76
1044.900	3.76	3.65	3.53	2.41	2.71	3.09	1.10	1.28	1.42	991.250	-185.84	0.51
1118.900	3.79	3.65	3.55	2.58	2.84	3.19	1.24	1.43	1.58	1000.000	-183.93	0.55
1159.600	3.79	3.62	3.54	2.68	2.90	3.24	1.34	1.55	1.71	1130.000	-196.56	1.95
1270.600	3.73	3.58	3.50	3.02	3.10	3.38	1.74	1.97	2.14	1268.750	-202.24	4.70
1385.300	3.66	3.50	3.42	3.48	3.39	3.57	2.32	2.57	2.75	1407.500	-169.06	5.38
1463.000	3.58	3.42	3.35	3.91	3.62	3.67	2.77	3.00	3.18	1453.750	-184.80	9.35
1500.000	3.54	3.39	3.32	4.09	3.76	3.76	3.06	3.30	3.48	1500.000	-159.22	8.52

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very low distortion

Frequency Mixers

LEVEL 17S (+17 dBm LO, up to +14 dBm RF)

Models
RMS-5H
LRMS-5H
JMS-5H

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-R (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm	Isolation L-I (dB) LO +14 dBm	LO +17 dBm	LO +20 dBm
10.000	40.000	8.22	6.95	6.34	80.40	70.78	63.30	59.97	61.92	55.11
20.000	50.000	7.82	6.58	6.12	77.03	65.19	58.10	56.00	63.52	52.26
50.000	80.000	7.47	6.34	5.87	66.43	58.27	51.79	47.18	59.11	46.77
100.000	70.000	7.33	6.16	5.77	56.26	57.50	46.11	40.17	49.97	40.28
149.688	119.688	7.35	6.25	5.82	51.17	57.97	47.45	36.86	51.05	42.62
200.000	170.000	7.56	6.35	5.94	46.01	58.46	43.83	33.63	44.60	37.32
289.375	259.375	7.36	6.44	6.02	40.17	45.97	41.42	29.98	40.19	33.64
429.063	399.063	7.70	6.52	6.01	33.26	35.99	36.79	26.09	40.36	28.22
500.000	470.000	7.72	6.57	6.05	31.16	33.86	33.91	25.71	35.13	25.05
568.750	538.750	7.92	6.70	6.20	29.36	31.80	33.00	26.37	31.81	24.69
708.438	678.438	8.73	7.17	6.43	26.26	28.34	29.87	26.32	25.09	21.09
750.000	720.000	8.94	7.33	6.52	25.56	27.82	29.02	26.18	23.34	19.68
848.125	818.125	8.86	7.63	6.86	24.37	27.14	28.81	25.04	20.18	17.06
987.813	957.813	8.71	7.85	7.27	22.55	25.28	27.18	21.35	17.43	14.03
1000.000	970.000	8.75	7.86	7.29	22.40	25.09	27.05	20.73	16.91	13.91
1127.500	1097.500	8.58	7.96	7.64	21.17	23.28	24.71	17.06	14.89	13.10
1267.188	1237.188	8.51	8.09	7.78	19.82	21.51	22.88	14.45	13.36	12.00
1406.875	1376.875	8.92	8.10	7.92	19.11	20.40	21.42	12.21	11.73	11.17
1453.437	1423.438	9.40	8.28	8.06	18.88	20.09	20.78	11.96	11.57	11.34
1500.000	1470.000	10.05	8.50	8.17	18.43	19.62	20.42	11.53	11.46	11.38

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR LO port LO +14 dBm	LO +17 dBm	LO +20 dBm	VSWR IF port LO +14 dBm	LO +17 dBm	LO +20 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
10.000	2.32	2.20	2.06	1.21	1.53	2.24	2.06	1.48	1.17	10.000	851.20	-0.88
20.000	1.76	1.63	1.53	1.10	1.56	2.34	2.07	1.48	1.17	20.000	859.90	-0.92
50.000	1.62	1.47	1.35	1.03	1.51	2.27	2.05	1.47	1.17	50.000	888.20	-0.79
100.000	1.65	1.49	1.35	1.01	1.50	2.20	2.06	1.48	1.17	100.303	834.70	-0.99
149.688	1.70	1.52	1.38	1.02	1.49	2.22	2.05	1.47	1.17	145.455	840.20	-1.20
200.000	1.74	1.57	1.42	1.05	1.47	2.14	2.04	1.47	1.16	200.000	872.50	-0.79
289.375	1.86	1.66	1.52	1.08	1.45	2.13	1.99	1.46	1.18	280.909	902.50	0.12
429.063	2.04	1.85	1.68	1.15	1.48	2.08	1.87	1.44	1.22	416.364	815.00	5.39
500.000	2.20	1.96	1.79	1.19	1.52	2.05	1.81	1.43	1.25	500.000	741.90	5.34
568.750	2.34	2.07	1.91	1.27	1.65	2.26	1.74	1.42	1.30	551.818	754.20	9.82
708.438	2.70	2.42	2.19	1.37	1.79	2.42	1.67	1.46	1.43	687.273	732.10	14.79
750.000	2.85	2.56	2.32	1.40	1.80	2.40	1.64	1.46	1.46	732.424	700.80	14.73
848.125	3.12	2.79	2.56	1.53	1.94	2.49	1.76	1.68	1.72	867.879	704.70	22.92
987.813	3.24	2.98	2.77	1.67	2.02	2.53	1.90	1.89	1.96	1000.000	749.50	18.87
1000.000	3.25	3.00	2.79	1.73	2.12	2.69	1.90	1.90	1.97	1003.333	747.10	18.58
1127.500	3.35	3.16	3.01	1.92	2.21	2.75	2.11	2.26	2.40	1138.788	831.90	8.68
1267.188	3.30	3.15	3.07	2.40	2.57	3.07	2.72	2.85	2.93	1274.242	765.90	-12.15
1406.875	3.12	2.97	2.90	2.90	2.82	3.13	3.26	3.45	3.62	1409.697	747.80	-8.08
1453.437	3.16	2.99	2.90	3.11	2.97	3.20	3.99	4.20	4.30	1454.849	752.80	0.48
1500.000	3.12	2.94	2.86	3.34	3.15	3.31	3.74	3.81	3.86	1500.000	722.20	12.35

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broadband high dynamic range

Frequency Mixers

Model
LMX-1481

LEVEL 10 (+10 dBm LO, up to +5 dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-R (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm	Isolation L-I (dB) LO +7 dBm	LO +10 dBm	LO +13 dBm
3.000	33.000	7.14	6.60	6.34	64.01	67.32	50.75	56.77	56.71	56.67
6.000	36.000	7.01	6.47	6.22	63.18	66.32	52.34	55.97	55.19	54.77
10.000	40.000	6.97	6.42	6.18	63.38	66.86	53.61	54.84	53.60	52.46
20.000	50.000	6.98	6.46	6.22	63.34	66.82	52.59	51.99	49.63	48.11
30.000	60.000	7.01	6.54	6.35	63.47	66.65	52.59	49.97	47.18	45.41
50.000	80.000	7.17	6.62	6.35	63.09	66.07	48.15	45.96	42.87	41.05
100.000	70.000	7.13	6.61	6.38	61.06	63.12	45.79	40.78	37.52	35.91
149.267	119.267	7.11	6.54	6.35	59.05	60.28	42.70	38.24	35.16	33.72
200.000	170.000	7.01	6.52	6.36	57.59	58.40	41.69	36.55	33.75	31.74
295.533	265.533	6.94	6.56	6.39	56.76	56.16	38.59	34.68	31.40	29.10
441.800	411.800	7.07	6.64	6.42	50.72	48.00	39.81	27.96	26.80	25.31
514.933	484.933	7.10	6.66	6.44	48.85	45.79	42.84	25.67	25.09	24.28
550.000	520.000	7.12	6.68	6.47	46.48	43.84	44.82	24.73	24.33	23.40
588.067	558.067	7.13	6.66	6.46	45.05	42.95	50.33	23.75	23.48	22.81
734.333	704.333	7.54	6.91	6.53	39.67	39.00	38.01	19.81	20.31	20.02
880.600	850.600	8.21	7.30	6.70	37.05	37.65	37.16	17.41	18.47	18.55
1000.000	970.000	8.40	7.57	7.03	33.64	34.80	35.13	16.25	17.41	17.81
1026.867	996.867	8.54	7.70	7.21	32.89	34.29	34.91	16.02	17.31	17.80
1063.433	1033.433	8.59	7.90	7.35	31.43	32.77	33.24	15.66	16.86	17.34
1100.000	1070.000	8.82	8.13	7.66	30.34	31.95	32.78	15.35	16.74	17.33

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR LO port LO +7 dBm	LO +10 dBm	LO +13 dBm	VSWR IF port LO +7 dBm	LO +10 dBm	LO +13 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
3.000	1.33	1.38	1.44	1.83	2.58	3.64	2.02	1.62	1.36	3.000	-269.18	-0.41
6.000	1.17	1.25	1.31	1.69	2.48	3.56	2.03	1.62	1.37	5.000	-270.30	-0.40
10.000	1.12	1.21	1.29	1.56	2.34	3.38	2.04	1.63	1.37	6.000	-270.11	-0.46
20.000	1.11	1.21	1.29	1.60	2.39	3.46	2.04	1.63	1.37	10.000	-273.41	-0.43
30.000	1.12	1.22	1.30	1.58	2.36	3.41	2.04	1.63	1.37	20.000	-263.78	-0.41
50.000	1.13	1.24	1.31	1.57	2.35	3.37	2.04	1.63	1.37	30.000	-265.36	-0.38
100.000	1.14	1.24	1.32	1.52	2.26	3.24	2.04	1.63	1.38	50.000	-279.32	-0.37
200.000	1.14	1.24	1.31	1.49	2.20	3.13	2.04	1.65	1.42	100.000	-286.36	-0.39
244.340	1.14	1.24	1.31	1.54	2.29	3.25	2.05	1.65	1.43	159.714	-265.18	-0.34
365.010	1.13	1.22	1.30	1.59	2.30	3.20	2.01	1.65	1.47	200.000	-278.20	-0.36
485.680	1.14	1.20	1.28	1.68	2.35	3.19	1.93	1.61	1.47	316.429	-286.56	-0.11
550.000	1.19	1.23	1.29	1.74	2.38	3.19	1.89	1.59	1.47	473.143	-247.56	0.48
584.410	1.22	1.25	1.31	1.75	2.37	3.14	1.85	1.57	1.45	500.000	-239.03	0.55
639.260	1.29	1.30	1.35	1.82	2.43	3.19	1.82	1.54	1.43	550.000	-256.74	0.86
759.930	1.49	1.47	1.49	1.92	2.49	3.19	1.69	1.43	1.32	629.857	-251.19	0.42
891.570	1.78	1.75	1.76	1.94	2.44	3.08	1.55	1.29	1.17	786.571	-209.25	0.70
1000.000	2.16	2.10	2.09	1.99	2.43	3.04	1.43	1.18	1.05	943.286	-217.02	2.15
1034.180	2.30	2.23	2.22	2.04	2.50	3.12	1.40	1.15	1.04	1000.000	-216.18	2.36
1067.090	2.44	2.36	2.35	2.08	2.50	3.09	1.35	1.12	1.06	1060.821	-234.55	4.40
1100.000	2.61	2.52	2.50	2.09	2.46	3.02	1.31	1.10	1.09	1100.000	-211.59	5.34

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surface mount, plug-in

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
ASK-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1.000	31.000	8.06	7.37	7.47	76.97	83.47	86.14	82.27	91.97	79.84
2.000	32.000	7.44	7.07	6.90	75.98	80.37	79.56	80.18	87.67	76.46
5.000	35.000	7.13	6.73	6.46	71.68	72.27	71.64	73.98	82.47	70.34
10.000	40.000	7.03	6.62	6.35	66.92	66.17	65.67	67.22	77.87	64.77
20.000	50.000	6.93	6.55	6.30	61.46	61.04	60.44	61.46	73.34	59.64
50.000	80.000	6.96	6.57	6.30	53.29	52.51	51.85	53.95	61.14	50.19
97.677	67.677	7.00	6.59	6.30	47.97	47.22	46.56	48.62	54.12	44.44
100.000	70.000	7.01	6.59	6.30	47.88	47.11	46.48	48.17	53.57	44.46
194.355	164.355	6.89	6.53	6.30	42.90	41.80	40.95	43.31	49.32	39.67
200.000	170.000	6.87	6.53	6.32	42.64	41.66	40.91	42.74	49.33	39.64
291.032	261.032	6.89	6.57	6.34	39.32	38.25	37.39	39.91	47.35	36.34
387.710	357.710	7.02	6.67	6.40	36.38	35.81	35.22	38.80	42.38	33.81
484.387	454.387	7.04	6.68	6.42	33.84	33.54	33.25	34.85	37.69	31.48
500.000	470.000	7.03	6.68	6.43	33.60	33.24	32.94	34.77	36.29	30.48
581.065	551.065	7.21	6.87	6.59	31.84	31.64	31.47	33.08	32.31	28.29
677.742	647.742	7.61	7.12	6.84	29.22	29.02	28.88	29.74	27.88	24.76
774.419	744.419	7.96	7.40	7.04	27.08	26.95	26.89	25.78	24.13	21.89
871.097	841.097	8.48	7.80	7.42	25.95	25.84	25.84	22.00	20.52	19.08
967.774	937.774	8.83	8.22	7.97	25.88	25.87	26.06	18.97	17.33	16.06
1000.000	970.000	9.01	8.38	8.10	25.88	25.95	26.18	17.92	16.29	14.78

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
5.000	1.33	1.38	1.43	1.86	2.66	3.59	1.36	1.19	1.07	1.000	221.50	-0.07
10.000	1.22	1.29	1.35	1.78	2.56	3.48	1.36	1.19	1.07	2.000	226.26	-0.06
20.000	1.17	1.24	1.31	1.87	2.67	3.66	1.36	1.19	1.07	5.000	226.60	-0.05
50.000	1.16	1.23	1.29	1.81	2.56	3.48	1.36	1.19	1.07	10.000	230.11	-0.05
95.454	1.15	1.23	1.29	1.79	2.51	3.45	1.37	1.20	1.08	20.000	227.70	-0.04
100.000	1.15	1.22	1.29	1.81	2.53	3.47	1.37	1.20	1.08	50.000	220.13	0.00
185.909	1.15	1.23	1.29	1.80	2.51	3.44	1.41	1.24	1.12	97.677	227.39	0.02
200.000	1.15	1.23	1.29	1.81	2.49	3.39	1.42	1.24	1.13	100.000	226.03	0.02
276.364	1.17	1.24	1.30	1.82	2.49	3.34	1.46	1.28	1.17	194.355	228.90	0.40
366.818	1.20	1.27	1.32	1.88	2.49	3.29	1.49	1.33	1.22	200.000	228.73	0.51
457.273	1.26	1.32	1.38	1.89	2.44	3.13	1.53	1.37	1.27	291.032	231.68	1.67
487.424	1.28	1.34	1.39	1.97	2.56	3.28	1.54	1.39	1.29	387.710	240.54	3.19
500.000	1.29	1.35	1.41	1.98	2.55	3.24	1.54	1.40	1.31	484.387	211.07	4.08
547.727	1.34	1.40	1.45	2.06	2.64	3.35	1.53	1.38	1.28	500.000	207.52	4.17
638.182	1.46	1.52	1.57	2.36	3.03	3.90	1.53	1.40	1.31	581.065	197.07	4.80
728.636	1.64	1.69	1.75	2.64	3.49	4.62	1.52	1.40	1.33	677.742	192.07	8.28
819.091	1.88	1.93	1.97	2.66	3.33	4.09	1.49	1.39	1.35	774.419	190.15	13.51
909.546	2.16	2.20	2.24	2.54	3.00	3.47	1.46	1.39	1.37	871.097	179.18	17.54
969.849	2.41	2.45	2.50	2.57	2.97	3.42	1.44	1.39	1.38	967.774	186.01	15.06
1000.000	2.54	2.58	2.62	2.58	2.98	3.40	1.44	1.39	1.39	1000.000	177.86	13.41

low LO power

Frequency Mixers

LEVEL 3 (+3 dBm LO, up to −3 dBm RF)

Models

RMS-5L
RMS-2L
LRMS-5L
LRMS-2L
JMS-2L

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO + 0 dBm	LO + 3 dBm	LO + 6 dBm	Isolation L-R (dB) LO + 0 dBm	LO + 3 dBm	LO + 6 dBm	Isolation L-I (dB) LO + 0 dBm	LO + 3 dBm	LO + 6 dBm
400.000	430.000	8.66	7.74	7.20	45.46	39.94	36.72	24.05	28.82	37.26
476.923	506.923	7.78	6.92	6.36	62.86	43.12	37.83	23.06	28.11	37.19
553.846	583.846	7.38	6.37	5.88	42.17	56.16	42.66	22.44	27.98	34.31
605.128	635.128	7.31	6.19	5.62	35.40	41.52	49.39	22.31	27.30	31.00
630.769	660.769	7.29	6.10	5.53	33.19	37.96	44.09	22.11	26.89	29.79
707.692	737.692	7.31	5.93	5.24	26.55	29.29	32.70	21.20	24.68	25.30
733.333	763.333	7.29	5.89	5.20	25.16	27.74	30.80	20.90	24.04	24.60
810.256	840.256	7.19	5.81	5.13	21.99	24.32	26.65	19.83	21.96	21.48
835.897	865.897	7.26	5.95	5.22	21.36	23.55	25.64	19.66	21.29	20.21
887.180	917.180	7.41	6.28	5.55	20.36	22.39	24.29	19.24	20.26	18.77
912.821	942.821	7.27	6.26	5.56	19.91	21.89	23.56	18.82	19.74	18.14
989.744	959.744	7.67	6.84	6.15	18.83	20.56	21.86	17.29	17.73	16.22
1066.667	1036.667	7.78	7.26	6.69	17.90	19.47	20.59	15.29	15.58	14.42
1117.949	1087.949	7.84	7.40	6.99	17.43	18.97	20.08	14.11	14.31	13.41
1143.590	1113.590	8.15	7.64	7.35	17.16	18.77	19.92	13.50	13.78	12.95
1220.513	1190.513	8.36	7.63	7.41	16.55	18.25	19.45	12.04	12.26	11.30
1297.436	1267.436	8.73	7.75	7.47	16.05	17.96	19.40	10.74	10.95	10.27
1348.718	1318.718	8.96	7.73	7.47	15.83	17.87	19.45	9.84	10.20	9.64
1374.359	1344.359	9.16	7.64	7.32	15.81	17.90	19.58	9.40	9.72	9.22
1400.000	1370.000	9.33	7.79	7.46	15.74	17.92	19.67	8.95	9.13	8.78

mixer VSWR

ϕ detection

FREQ. (MHz)	VSWR RF port LO + 0 dBm	LO + 3 dBm	LO + 6 dBm	VSWR LO port LO + 0 dBm	LO + 3 dBm	LO + 6 dBm	FREQ. (MHz)	VSWR IF port LO + 0 dBm	LO + 3 dBm	LO + 6 dBm	FREQ. (MHz)	max DC output mV	DC offset mV
400.000	1.53	1.50	1.47	1.32	1.45	1.67	1.000	2.65	2.10	1.73	400.000	142.20	-3.39
477.500	1.44	1.40	1.36	1.40	1.53	1.71	2.000	2.65	2.11	1.74	475.000	143.89	-3.99
500.000	1.42	1.38	1.34	1.43	1.56	1.73	5.000	2.66	2.11	1.74	500.000	147.80	-4.34
580.000	1.33	1.28	1.23	1.51	1.64	1.77	10.000	2.67	2.12	1.74	575.000	147.54	-4.94
657.500	1.25	1.19	1.15	1.60	1.71	1.81	20.000	2.61	2.09	1.79	650.000	153.50	-4.93
707.500	1.23	1.16	1.12	1.65	1.75	1.83	50.000	2.67	2.13	1.75	700.000	148.82	-4.06
732.500	1.22	1.17	1.12	1.68	1.78	1.85	100.000	2.69	2.14	1.77	725.000	151.91	-3.25
760.000	1.22	1.17	1.13	1.72	1.80	1.85	156.000	2.68	2.15	1.80	750.000	153.86	-2.53
800.000	1.21	1.18	1.14	1.77	1.85	1.89	200.000	2.67	2.17	1.83	800.000	155.38	-0.83
862.500	1.22	1.20	1.17	1.86	1.93	1.95	267.000	2.65	2.18	1.87	850.000	143.16	1.10
937.500	1.25	1.24	1.22	1.99	2.03	2.00	356.000	2.56	2.17	1.91	925.000	142.71	3.74
1000.000	1.26	1.26	1.25	2.13	2.10	2.04	400.000	2.49	2.14	1.94	1000.000	146.75	7.02
1040.000	1.27	1.27	1.26	2.21	2.18	2.09	423.000	2.45	2.11	1.92	1025.000	142.23	7.68
1092.500	1.28	1.29	1.29	2.33	2.28	2.14	467.000	2.37	2.06	1.91	1075.000	141.82	7.20
1117.500	1.29	1.30	1.30	2.39	2.34	2.16	500.000	2.31	2.04	1.92	1100.000	153.67	7.35
1200.000	1.31	1.32	1.32	2.60	2.51	2.25	578.000	2.14	1.92	1.88	1175.000	152.39	8.63
1272.500	1.31	1.32	1.32	2.81	2.68	2.33	667.000	1.92	1.78	1.82	1250.000	154.48	9.41
1347.500	1.33	1.33	1.34	2.99	2.89	2.46	750.000	1.72	1.64	1.77	1325.000	154.45	9.87
1375.000	1.34	1.34	1.35	3.06	2.98	2.52	778.000	1.65	1.62	1.77	1375.000	142.31	11.36
1400.000	1.35	1.35	1.35	3.12	3.06	2.57	800.000	1.60	1.58	1.76	1400.000	151.00	12.56

most widely used

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
ZEM-4300
TFM-4300

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
300.000	400.000	8.07	7.36	7.06	300.000	48.11	51.34	55.13	31.70	31.66	33.32
414.286	514.286	6.69	6.29	6.02	414.286	61.86	64.83	58.27	31.56	33.69	36.28
528.571	428.571	5.38	5.08	4.94	528.571	48.93	49.72	49.68	34.05	36.96	38.78
757.143	657.143	5.15	4.96	4.84	757.143	39.89	41.17	41.55	43.20	38.13	35.24
1000.000	900.000	5.91	5.45	5.14	1000.000	36.14	37.81	39.15	30.00	30.37	30.57
1214.286	1114.286	6.68	6.11	5.78	1214.286	35.77	36.73	37.31	25.63	26.04	26.60
1442.857	1342.857	7.04	6.61	6.30	1442.857	35.56	35.66	35.36	22.57	22.90	23.13
1671.429	1571.429	7.19	6.86	6.70	1671.429	35.82	34.88	33.87	19.53	19.27	19.09
1900.000	1800.000	7.40	7.03	6.85	1900.000	35.33	33.74	32.59	17.85	17.66	17.57
2000.000	1900.000	7.61	7.13	6.96	2000.000	35.16	33.54	32.41	17.57	17.52	17.55
2128.571	2028.571	7.86	7.43	7.17	2128.571	35.54	33.70	32.37	17.79	17.76	17.79
2471.429	2371.429	8.47	8.04	7.80	2471.429	34.33	33.24	32.30	18.78	18.85	18.90
2700.000	2600.000	8.83	8.34	8.08	2700.000	34.36	33.45	32.60	19.73	19.52	19.31
2814.286	2714.286	9.07	8.52	8.20	2814.286	35.04	34.07	33.29	20.22	19.86	19.59
3000.000	2900.000	9.48	8.85	8.48	3000.000	34.97	33.99	33.06	20.43	19.95	19.43
3157.143	3057.143	9.71	9.03	8.65	3157.143	34.67	33.55	32.87	19.93	19.48	19.24
3500.000	3400.000	10.27	9.22	8.77	3500.000	33.07	32.04	30.96	18.35	18.72	18.78
3728.571	3628.571	10.47	9.04	8.55	3728.571	31.06	30.42	29.43	17.74	18.47	19.03
4000.000	3900.000	10.91	8.91	8.29	4000.000	29.92	29.46	28.86	19.87	20.82	22.16
4300.000	4200.000	10.70	8.41	7.87	4300.000	34.74	33.24	32.24	25.46	24.62	23.79

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
300.000	6.21	5.75	5.49	5.04	4.40	4.70	5.000	1.63	1.37	1.19	300.000	−228.32	+.38
421.212	3.55	3.35	3.22	2.52	2.89	3.61	10.000	1.63	1.36	1.19	414.286	−203.28	−.24
500.000	2.70	2.55	2.44	2.11	2.65	3.47	20.000	1.62	1.36	1.19	528.571	−194.47	−.21
784.848	1.94	1.71	1.55	1.70	2.19	2.81	35.152	1.63	1.37	1.19	757.143	−206.10	−.19
1000.000	2.78	2.55	2.37	1.76	2.08	2.48	50.000	1.63	1.36	1.20	1000.000	−152.68	+.63
1148.485	3.37	3.13	2.94	1.83	1.99	2.25	65.303	1.62	1.36	1.19	1214.286	−115.73	+1.41
1269.697	3.74	3.50	3.30	1.81	1.85	2.08	100.000	1.61	1.36	1.19	1442.857	−109.97	+1.83
1500.000	4.34	4.13	3.97	1.75	1.68	1.84	125.606	1.60	1.35	1.18	1671.429	−60.67	+1.78
1633.333	4.66	4.48	4.32	1.70	1.61	1.78	185.909	1.58	1.33	1.17	1900.000	−43.40	+2.68
1875.758	5.16	5.06	4.95	1.67	1.57	1.71	200.000	1.58	1.33	1.17	2000.000	−58.02	+2.71
2118.182	5.47	5.38	5.30	1.60	1.47	1.56	246.212	1.55	1.31	1.15	2128.571	−37.38	+2.83
2300.000	5.63	5.56	5.49	1.51	1.41	1.51	306.515	1.51	1.28	1.13	2471.429	+72.61	+2.81
2481.818	5.59	5.51	5.47	1.47	1.37	1.47	396.970	1.44	1.24	1.11	2700.000	+84.72	+3.15
2724.242	5.42	5.27	5.16	1.41	1.36	1.46	457.273	1.41	1.22	1.13	2814.286	+81.27	+2.78
3000.000	6.05	5.77	5.54	1.56	1.58	1.74	500.000	1.40	1.23	1.17	3000.000	+126.24	+3.40
3209.091	7.31	6.97	6.71	1.59	1.60	1.70	608.030	1.42	1.34	1.35	3157.143	+138.37	+3.86
3451.515	9.13	8.72	8.43	2.06	2.03	2.19	758.788	1.66	1.69	1.77	3500.000	+158.76	+4.77
3815.152	8.43	8.23	7.97	2.69	2.39	2.41	849.242	1.92	1.99	2.11	3728.571	+161.70	+4.01
4000.000	7.66	7.47	7.20	2.86	2.43	2.34	939.697	2.21	2.38	2.57	4000.000	+168.81	+1.97
4300.000	6.37	6.26	6.07	2.52	2.13	1.95	1000.000	2.39	2.61	2.85	4300.000	+186.07	+3.89

ϕ detection

surface-mount

Frequency Mixers

LEVEL 7 (+7 dBm LO, up to +1 dBm RF)

Models
RMS-11A
LRMS-11A

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-R (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm	Isolation L-I (dB) LO +4 dBm	LO +7 dBm	LO +10 dBm
1500.000	1699.000	6.97	6.31	5.89	25.39	25.21	25.10	21.14	21.11	20.55
1530.000	1729.000	6.83	6.20	5.82	25.14	25.01	24.84	21.50	21.56	20.90
1560.000	1759.000	6.82	6.25	5.90	25.06	25.04	24.91	22.14	22.26	21.48
1580.000	1779.000	6.69	6.10	5.74	25.00	24.98	24.84	22.44	22.45	21.63
1590.000	1789.000	6.70	6.10	5.74	24.89	24.92	24.74	22.66	22.77	21.88
1620.000	1819.000	6.80	6.31	5.93	24.65	24.76	24.69	23.31	23.47	22.53
1650.000	1849.000	6.69	6.21	5.81	24.35	24.60	24.63	23.99	24.30	23.12
1670.000	1869.000	6.80	6.41	6.04	24.33	24.50	24.48	24.40	24.57	23.36
1680.000	1879.000	6.89	6.53	6.15	24.19	24.39	24.35	24.66	24.92	23.72
1710.000	1511.000	6.38	6.07	6.05	24.17	24.36	24.36	25.59	25.81	24.44
1740.000	1541.000	6.69	6.40	6.35	24.04	24.31	24.31	26.54	26.87	25.43
1760.000	1561.000	7.11	6.74	6.62	24.04	24.31	24.39	27.15	27.57	25.97
1770.000	1571.000	7.16	6.77	6.63	23.97	24.27	24.40	27.51	28.15	26.40
1800.000	1601.000	7.38	7.00	6.83	24.15	24.40	24.65	28.77	29.79	27.73
1830.000	1631.000	8.04	7.61	7.32	24.28	24.49	24.77	30.09	31.74	29.38
1850.000	1651.000	8.02	7.60	7.29	24.59	24.72	25.00	30.94	33.24	30.74
1860.000	1661.000	8.09	7.67	7.39	24.67	24.84	25.08	31.24	34.10	31.61
1880.000	1681.000	8.62	8.19	7.92	25.10	25.08	25.43	31.28	35.70	33.47
1890.000	1691.000	8.86	8.39	8.10	25.36	25.25	25.50	31.11	36.20	34.42
1900.000	1701.000	8.93	8.44	8.14	25.48	25.40	25.64	30.83	36.33	35.25

mixer VSWR

FREQ. (MHz)	VSWR RF port LO +4 dBm	LO +7 dBm	LO +10 dBm	VSWR LO port LO +4 dBm	LO +7 dBm	LO +10 dBm	FREQ. (MHz)	VSWR IF port LO +4 dBm	LO +7 dBm	LO +10 dBm
1500.000	1.44	1.65	1.89	3.11	2.37	1.79	40.000	2.06	1.84	1.73
1531.000	1.43	1.68	1.94	3.17	2.38	1.76	67.000	2.06	1.88	1.74
1562.000	1.50	1.78	2.04	3.10	2.34	1.74	77.800	2.04	1.88	1.78
1572.000	1.52	1.80	2.07	3.12	2.35	1.74	104.800	2.08	1.90	1.74
1592.000	1.57	1.86	2.12	3.13	2.34	1.73	122.800	2.11	1.94	1.77
1623.000	1.71	2.00	2.27	3.05	2.31	1.70	131.800	2.11	1.94	1.77
1644.000	1.80	2.09	2.35	3.07	2.31	1.67	160.600	2.12	1.95	1.80
1654.000	1.87	2.15	2.42	3.06	2.30	1.66	187.600	2.12	1.96	1.82
1685.000	2.07	2.36	2.60	3.16	2.33	1.63	196.600	2.13	1.97	1.84
1715.000	2.40	2.71	2.95	3.21	2.33	1.60	214.600	2.12	1.98	1.85
1726.000	3.05	3.56	4.01	3.17	2.30	1.59	225.400	2.12	1.98	1.87
1746.000	2.36	2.61	2.80	3.15	2.28	1.58	252.400	2.13	2.02	1.91
1777.000	2.57	2.77	2.93	3.10	2.23	1.56	279.400	2.10	2.07	2.01
1800.000	2.70	2.89	3.02	3.03	2.19	1.55	299.200	2.13	2.05	1.97
1808.000	2.76	2.93	3.07	3.02	2.18	1.54	308.200	2.13	2.06	2.00
1838.000	2.94	3.10	3.21	2.97	2.14	1.52	335.200	2.11	2.06	2.01
1869.000	3.13	3.25	3.31	2.87	2.08	1.51	362.200	2.14	2.11	2.14
1879.000	3.19	3.26	3.33	2.86	2.06	1.50	382.000	2.09	2.10	2.12
1890.000	3.27	3.33	3.38	2.84	2.05	1.49	391.000	2.10	2.12	2.12
1900.000	3.32	3.37	3.41	2.81	2.03	1.48	400.000	2.15	1.99	2.24

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most widely-used

Frequency Mixers

Model SRA-3500

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
500.000	530.000	5.96	5.49	5.22	500.000	43.39	44.57	45.11	34.16	34.18	33.63
676.471	646.471	5.06	4.86	4.80	676.471	42.23	45.01	47.85	32.90	32.12	31.39
852.941	822.941	5.62	5.14	4.87	852.941	40.34	44.31	49.20	31.84	30.77	29.90
1000.000	970.000	6.31	5.49	5.05	1000.000	39.09	43.00	48.01	31.65	30.12	29.16
1117.647	1087.647	6.94	6.31	5.86	1117.647	38.56	41.48	44.70	31.38	29.93	29.04
1294.118	1264.118	7.10	6.71	6.51	1294.118	37.24	38.60	39.89	29.79	28.62	27.87
1382.353	1352.353	7.06	6.65	6.48	1382.353	37.12	38.54	39.71	30.33	29.04	27.92
1500.000	1470.000	7.00	6.73	6.59	1500.000	36.27	37.52	38.92	30.44	28.95	27.54
1647.059	1617.059	7.04	6.75	6.61	1647.059	34.35	35.53	36.50	27.39	26.47	25.58
1823.529	1793.529	7.61	7.16	6.94	1823.529	33.40	34.94	36.40	23.56	23.92	24.28
2000.000	1970.000	7.72	7.35	7.05	2000.000	32.93	34.78	36.56	21.93	22.93	23.82
2088.235	2058.235	7.73	7.33	7.02	2088.235	32.71	34.08	35.33	21.69	22.73	23.58
2264.706	2234.706	7.78	7.35	6.99	2264.706	32.54	33.58	34.38	22.13	22.82	23.50
2500.000	2470.000	7.81	7.31	6.88	2500.000	33.93	35.10	36.28	23.23	23.41	23.78
2617.647	2587.647	7.62	7.08	6.71	2617.647	33.70	34.51	35.27	23.24	23.33	23.38
2882.353	2852.353	8.42	7.51	7.15	2882.353	34.37	34.73	35.05	23.07	23.28	23.39
3000.000	2970.000	8.55	7.49	6.94	3000.000	34.72	35.30	35.71	22.79	23.26	23.25
3147.059	3117.059	8.76	7.27	6.76	3147.059	35.48	36.75	38.38	23.17	23.89	23.74
3323.529	3293.529	9.48	7.09	6.35	3323.529	39.93	43.96	43.32	24.31	25.30	24.55
3500.000	3470.000	8.88	6.45	5.82	3500.000	43.44	40.55	36.85	24.98	26.12	25.87

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
500.000	2.20	1.82	1.55	1.92	2.52	3.19	5.000	1.40	1.20	1.08	500.000	+151.79	−.87
576.923	1.44	1.20	1.12	2.00	2.56	3.19	30.513	1.41	1.20	1.08	676.471	+185.23	−.63
730.769	1.16	1.33	1.51	2.27	2.66	3.18	56.026	1.42	1.21	1.09	852.941	+127.03	−.52
884.615	1.51	1.64	1.79	2.62	2.80	3.14	81.539	1.43	1.21	1.09	1000.000	+112.30	−.32
1038.462	1.86	1.89	1.99	2.73	2.68	2.82	107.051	1.44	1.21	1.08	1117.647	+111.48	+.28
1192.308	2.48	2.32	2.27	2.63	2.35	2.37	132.564	1.44	1.21	1.08	1294.118	+113.96	+1.86
1269.231	3.15	2.85	2.68	2.50	2.17	2.11	158.077	1.44	1.21	1.07	1382.353	+113.47	+2.51
1346.154	3.91	3.54	3.26	2.41	2.01	1.90	209.103	1.42	1.17	1.06	1500.000	+101.38	+2.46
1500.000	5.19	4.67	4.38	2.10	1.68	1.54	260.128	1.36	1.12	1.09	1647.059	+65.72	+2.04
1730.769	6.01	5.54	5.20	1.55	1.27	1.29	336.667	1.22	1.06	1.22	1823.529	+19.80	+.79
1884.615	6.56	6.01	5.63	1.33	1.26	1.43	413.205	1.06	1.20	1.41	2000.000	−12.96	−.03
2038.462	5.68	5.25	4.84	1.32	1.36	1.52	489.744	1.10	1.38	1.63	2088.235	−32.09	+.43
2269.231	5.85	5.33	4.80	1.50	1.55	1.70	566.282	1.27	1.58	1.83	2264.706	−57.68	+.72
2346.154	5.74	5.23	4.72	1.58	1.61	1.74	617.308	1.38	1.70	1.95	2500.000	−83.15	+1.55
2500.000	6.13	5.56	4.96	2.00	2.09	2.30	668.333	1.47	1.79	2.03	2617.647	−98.82	+.05
2730.769	7.02	6.46	5.77	2.58	2.31	2.32	744.872	1.55	1.85	2.07	2882.353	−106.91	−.63
2961.539	5.66	5.30	4.91	2.64	2.36	2.37	821.410	1.54	1.80	1.99	3000.000	−104.33	−.78
3115.385	5.68	5.28	4.87	2.57	2.34	2.37	897.949	1.50	1.69	1.84	3147.059	−107.47	−.38
3269.231	4.72	4.27	3.92	2.58	2.29	2.23	948.974	1.49	1.63	1.76	3323.529	−87.32	+1.36
3500.000	2.67	2.39	2.20	2.46	2.15	1.99	1000.000	1.52	1.60	1.70	3500.000	−81.29	+3.48

most widely-used

Frequency Mixers

Model
LMX-156

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
800.000	830.000	9.06	8.59	8.32	800.000	41.99	42.18	42.24	31.68	30.74	30.02
847.222	877.222	9.02	8.51	8.23	847.222	41.34	42.09	42.75	31.14	30.13	29.30
894.444	924.444	8.90	8.20	7.77	894.444	39.12	40.22	40.91	30.51	29.57	28.73
941.667	911.667	8.00	7.28	6.78	941.667	35.85	36.78	37.06	29.90	29.08	28.15
1000.000	970.000	7.42	6.67	6.28	1000.000	33.41	34.86	35.76	29.21	28.46	27.57
1083.333	1053.333	6.96	6.33	6.00	1083.333	31.47	33.45	34.57	28.09	27.56	26.89
1130.556	1100.556	7.11	6.50	6.16	1130.556	30.62	32.74	34.41	27.38	27.04	26.46
1225.000	1195.000	7.18	6.67	6.39	1225.000	31.43	32.87	34.44	25.93	25.59	25.17
1366.667	1336.667	7.52	7.08	6.77	1366.667	32.30	34.22	35.53	26.47	25.74	24.77
1413.889	1383.889	7.65	7.23	6.98	1413.889	32.86	34.67	36.07	26.06	25.12	23.95
1500.000	1470.000	7.71	7.36	7.16	1500.000	33.87	36.11	37.67	25.52	24.59	23.53
1555.556	1525.556	7.72	7.38	7.18	1555.556	32.33	34.17	35.63	25.63	24.65	23.54
1650.000	1620.000	7.80	7.44	7.23	1650.000	33.14	33.95	34.27	25.27	24.73	23.83
1791.667	1761.667	8.07	7.60	7.39	1791.667	33.96	33.93	33.77	25.43	25.57	25.38
1933.333	1903.333	8.89	7.99	7.63	1933.333	33.75	33.57	33.43	26.95	27.91	28.24
2000.000	1970.000	8.81	7.88	7.50	2000.000	33.37	33.27	33.36	28.02	29.39	29.90
2122.222	2092.222	8.70	7.72	7.32	2122.222	32.48	32.91	33.47	29.92	31.65	32.40
2263.889	2233.889	8.00	7.19	6.80	2263.889	31.21	31.82	32.58	32.17	33.61	34.08
2405.556	2375.556	7.92	7.11	6.73	2405.556	30.05	29.75	29.26	33.00	33.43	32.97
2500.000	2470.000	8.31	7.55	7.23	2500.000	29.00	28.19	27.45	32.94	32.18	31.45

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. MHz	max. DC output mV	DC offset mV
800.000	2.71	2.63	2.58	1.95	2.38	3.04	5.000	2.11	1.85	1.68	800.000	−180.04	−1.05
847.222	2.48	2.42	2.40	1.94	2.35	2.98	42.563	2.11	1.86	1.69	847.222	−193.40	−1.43
894.444	1.73	1.70	1.70	1.95	2.33	2.95	80.126	2.12	1.87	1.70	894.444	−197.63	−2.64
941.667	1.37	1.36	1.39	2.00	2.38	2.98	117.688	2.12	1.88	1.72	941.667	−199.21	−1.50
1000.000	1.03	1.11	1.18	2.01	2.35	2.93	200.000	2.12	1.92	1.80	1000.000	−194.00	−.82
1083.333	1.41	1.42	1.43	2.02	2.33	2.88	275.452	2.07	1.95	1.88	1083.333	−188.97	+1.93
1130.556	1.68	1.68	1.67	2.06	2.32	2.84	350.578	1.98	1.94	1.93	1130.556	−185.40	+3.01
1225.000	2.19	2.15	2.12	2.12	2.37	2.86	463.266	1.80	1.85	1.92	1225.000	−181.58	+5.63
1366.667	2.77	2.67	2.61	2.25	2.39	2.81	538.392	1.69	1.78	1.89	1366.667	−170.12	+4.99
1413.889	2.90	2.80	2.73	2.26	2.36	2.73	621.030	1.61	1.73	1.87	1413.889	−160.53	+4.38
1500.000	3.04	2.92	2.85	2.33	2.37	2.73	733.719	1.55	1.68	1.85	1500.000	−160.51	+3.64
1555.556	3.09	2.96	2.89	2.38	2.37	2.67	808.844	1.53	1.69	1.86	1555.556	−149.02	+5.78
1650.000	3.08	2.94	2.86	2.53	2.40	2.65	883.970	1.51	1.69	1.87	1650.000	−148.05	+7.71
1791.667	2.93	2.80	2.71	2.69	2.46	2.63	1000.000	1.43	1.63	1.84	1791.667	−132.53	+8.51
1933.333	2.69	2.58	2.48	2.88	2.51	2.57	1079.296	1.39	1.60	1.81	1933.333	−106.49	+7.51
2000.000	2.57	2.46	2.38	2.85	2.51	2.57	1154.422	1.33	1.51	1.69	2000.000	−105.69	+7.90
2122.222	2.34	2.24	2.16	2.98	2.53	2.51	1229.548	1.25	1.43	1.59	2122.222	−85.62	+8.56
2263.889	2.11	2.01	1.93	3.01	2.52	2.44	1349.749	1.25	1.42	1.58	2263.889	−66.31	+9.32
2405.556	1.97	1.86	1.79	3.04	2.49	2.34	1424.874	1.15	1.34	1.50	2405.556	−39.49	+10.40
2500.000	1.92	1.82	1.75	3.09	2.50	2.31	1500.000	1.29	1.46	1.59	2500.000	−18.66	+12.36

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broadband high dynamic range

Frequency Mixers

Model SRA-2CR

LEVEL 10 (+10dBm LO, up to +5dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	Isolation L-R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L-I (dB) LO +7dBm	LO +10dBm	LO +13dBm
10.000	40.000	6.30	5.87	5.62	10.000	56.71	60.06	63.79	50.41	51.74	52.97
20.000	50.000	6.06	5.70	5.51	20.000	56.56	59.97	63.61	44.34	45.75	46.94
50.000	80.000	6.34	5.95	5.76	50.000	56.91	60.34	63.51	37.03	38.56	40.23
97.353	67.353	6.58	6.16	5.88	97.353	55.95	59.24	62.18	31.78	34.17	35.98
100.000	70.000	6.57	6.13	5.85	100.000	55.87	59.13	62.16	31.62	34.03	35.84
184.706	154.706	6.30	5.91	5.72	184.706	54.94	58.77	57.61	28.50	30.33	31.67
200.000	170.000	6.22	5.89	5.74	200.000	55.02	58.88	57.13	28.02	29.84	31.25
272.059	242.059	6.35	6.04	5.84	272.059	60.14	66.01	57.10	26.01	27.72	29.07
359.412	329.412	6.49	6.13	5.89	359.412	58.23	61.92	54.38	23.28	25.21	26.73
446.765	416.765	6.51	6.07	5.75	446.765	47.89	48.69	47.46	23.16	24.81	26.47
475.882	445.882	6.18	5.85	5.63	475.882	46.28	47.01	45.28	23.49	25.23	26.78
500.000	470.000	6.09	5.79	5.60	500.000	43.08	43.34	42.13	23.59	25.72	27.33
534.118	504.118	6.09	5.81	5.63	534.118	41.39	41.56	41.45	23.19	25.74	27.68
621.471	591.471	6.15	5.98	5.93	621.471	54.97	59.03	52.13	22.22	25.67	28.30
708.824	678.824	6.66	6.42	6.26	708.824	44.93	43.56	41.51	23.18	26.15	28.88
796.177	766.177	8.11	7.24	6.57	796.177	37.71	37.66	38.25	25.47	27.17	27.51
883.529	853.529	8.40	7.19	6.49	883.529	37.60	37.82	38.10	26.17	26.16	25.02
941.765	911.765	8.07	7.28	6.76	941.765	38.05	38.41	38.60	23.24	22.04	21.12
970.882	940.882	8.17	7.40	6.95	970.882	38.06	38.44	38.57	21.46	20.22	19.28
1000.000	970.000	8.40	7.66	7.15	1000.000	37.61	38.08	38.09	19.62	18.48	17.53

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	max. DC output mV	DC offset mV
10.000	1.51	1.44	1.39	1.53	2.29	3.35	5.000	1.66	1.46	1.32	10.000	−356.40	−0.89
20.000	1.49	1.42	1.37	1.47	2.27	3.27	10.000	1.67	1.47	1.33	20.000	−351.80	−0.89
50.000	1.45	1.39	1.34	1.58	2.37	3.42	20.000	1.67	1.46	1.33	50.000	−337.60	−0.91
97.353	1.45	1.38	1.34	1.53	2.30	3.30	48.677	1.66	1.46	1.32	97.353	−344.20	−1.00
100.000	1.45	1.38	1.34	1.49	2.29	3.25	50.000	1.66	1.45	1.32	100.000	−344.30	−1.02
184.706	1.44	1.38	1.35	1.53	2.24	3.15	92.353	1.66	1.44	1.30	184.706	−349.80	−0.91
200.000	1.44	1.38	1.35	1.53	2.25	3.16	100.000	1.65	1.43	1.29	200.000	−351.60	−0.88
272.059	1.45	1.40	1.39	1.60	2.33	3.21	136.029	1.62	1.40	1.27	272.059	−344.00	−0.70
359.412	1.49	1.47	1.47	1.72	2.38	3.20	179.706	1.57	1.35	1.23	359.412	−311.00	−0.73
446.765	1.56	1.57	1.59	1.83	2.45	3.24	200.000	1.54	1.32	1.20	446.765	−302.75	−0.51
475.882	1.59	1.61	1.63	1.88	2.47	3.20	223.382	1.48	1.28	1.17	475.882	−321.40	−1.24
500.000	1.61	1.64	1.66	1.92	2.52	3.25	237.941	1.45	1.26	1.16	500.000	−335.20	−1.63
534.118	1.63	1.68	1.71	2.02	2.60	3.33	252.500	1.42	1.23	1.14	534.118	−345.90	−1.17
621.471	1.71	1.78	1.83	2.25	2.84	3.58	281.618	1.34	1.17	1.12	621.471	−336.70	−1.52
708.824	1.74	1.83	1.91	2.34	3.00	3.78	325.294	1.22	1.08	1.12	708.824	−293.17	−1.48
796.177	1.65	1.70	1.75	2.39	3.00	3.74	368.971	1.10	1.07	1.20	796.177	−235.15	−2.17
883.529	1.56	1.54	1.55	2.46	3.03	3.79	412.647	1.08	1.19	1.33	883.529	−251.99	−1.80
941.765	1.62	1.58	1.56	2.55	3.04	3.65	456.324	1.23	1.36	1.51	941.765	−261.49	−1.10
970.882	1.75	1.71	1.69	2.61	3.04	3.60	485.441	1.37	1.51	1.65	970.882	−268.11	−0.05
1000.000	1.90	1.87	1.85	2.67	3.01	3.44	500.000	1.45	1.59	1.73	1000.000	−270.23	0.15

ultra-low distortion

Frequency Mixers

Model RAY-6U

LEVEL 23 (+23dBm LO, up to +15dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +20dBm	LO +23dBm	LO +26dBm	freq. (MHz)	Isolation L-R (dB) LO +20dBm	LO +23dBm	LO +26dBm	Isolation L-I (dB) LO +20dBm	LO +23dBm	LO +26dBm
.010	30.010	6.10	5.66	5.47	.010	81.53	79.86	76.21	73.93	76.26	74.21
.020	30.020	5.70	5.33	5.08	.020	82.38	80.63	77.59	64.28	63.63	60.81
.050	30.050	5.58	5.17	4.97	.050	81.90	79.19	75.88	63.40	61.75	58.07
.100	30.100	5.58	5.22	5.01	.100	81.84	79.45	75.64	63.44	61.54	57.94
.200	30.200	5.59	5.20	4.99	.200	81.65	79.24	75.12	63.35	61.54	57.70
.500	30.500	5.61	5.22	5.01	.500	80.95	78.84	74.72	63.35	61.56	57.67
1.000	31.000	5.58	5.23	5.02	1.000	80.37	78.29	74.72	63.57	61.49	57.71
2.000	32.000	5.60	5.24	5.04	2.000	78.69	77.60	74.30	63.79	61.76	57.86
5.000	35.000	5.71	5.35	5.13	5.000	73.33	74.22	72.34	65.63	62.90	58.20
10.000	40.000	5.85	5.47	5.36	10.000	67.90	69.60	69.92	68.80	65.50	59.84
14.294	44.294	5.69	5.37	5.25	14.294	64.59	66.38	66.12	66.49	67.38	60.96
20.000	50.000	5.30	4.94	4.79	20.000	61.83	64.53	74.44	57.97	61.45	74.54
25.007	55.007	5.27	4.84	4.69	25.007	60.14	63.21	70.59	53.42	57.36	74.09
32.150	62.150	5.67	5.21	4.93	32.150	58.94	61.72	60.61	49.75	52.92	62.46
39.292	69.292	5.93	5.52	5.32	39.292	54.17	56.11	58.54	46.15	49.37	53.89
50.000	80.000	5.92	5.59	5.50	50.000	58.73	62.58	60.63	44.21	46.14	49.77
60.718	90.718	5.99	5.60	5.60	60.718	47.22	49.27	48.57	42.32	45.21	47.32
75.002	45.003	6.18	5.80	5.63	75.002	41.40	42.49	45.34	38.20	40.86	41.40
85.716	55.716	6.17	6.04	5.93	85.716	42.27	43.68	42.05	35.63	38.59	33.30
100.000	70.000	6.38	6.29	6.15	100.000	43.06	46.53	39.36	37.34	37.83	33.32

mixer VSWR

freq. MHz	VSWR, RF port LO +20dBm	LO +23dBm	LO +26dBm	VSWR, LO port LO +20dBm	LO +23dBm	LO +26dBm	freq. (MHz)	VSWR, IF port LO +20dBm	LO +23dBm	LO +26dBm
5.000	1.56	1.35	1.22	1.03	1.70	2.82	5.000	1.70	1.53	1.43
7.639	1.56	1.35	1.22	1.04	1.66	2.75	7.639	1.71	1.54	1.43
10.000	1.56	1.35	1.22	1.05	1.61	2.65	10.000	1.73	1.56	1.45
15.556	1.55	1.35	1.22	1.03	1.61	2.54	15.556	1.76	1.59	1.49
20.000	1.54	1.34	1.21	1.04	1.67	2.56	20.000	1.78	1.62	1.52
23.472	1.53	1.33	1.21	1.05	1.65	2.46	23.472	1.82	1.65	1.55
31.389	1.51	1.31	1.20	1.11	1.61	2.32	31.389	1.91	1.74	1.64
36.667	1.50	1.31	1.20	1.15	1.60	2.26	36.667	1.99	1.82	1.72
41.944	1.49	1.30	1.20	1.18	1.59	2.23	41.944	2.08	1.91	1.80
47.222	1.48	1.30	1.20	1.20	1.60	2.26	47.222	2.20	2.00	1.89
50.000	1.47	1.29	1.20	1.22	1.62	2.29	50.000	2.26	2.06	1.94
55.139	1.45	1.29	1.21	1.26	1.63	2.33	55.139	2.36	2.15	2.04
60.417	1.44	1.29	1.22	1.28	1.67	2.41	60.417	2.45	2.26	2.12
65.694	1.43	1.30	1.24	1.30	1.69	2.48	65.694	2.55	2.36	2.24
70.972	1.43	1.31	1.27	1.33	1.69	2.53	70.972	2.68	2.47	2.35
76.250	1.44	1.34	1.30	1.38	1.71	2.53	76.250	2.84	2.62	2.48
81.528	1.46	1.37	1.34	1.43	1.73	2.52	81.528	3.01	2.83	2.66
89.444	1.49	1.41	1.39	1.46	1.77	2.46	89.444	3.37	3.12	3.01
94.722	1.49	1.43	1.42	1.45	1.78	2.42	94.722	3.54	3.30	3.20
100.000	1.49	1.45	1.44	1.42	1.77	2.37	100.000	3.58	3.40	3.32

ϕ detection

freq. MHz	max. DC output mV	DC offset mV
.010	−865.20	−.02
.020	−1681.10	−.26
.050	−1730.00	−.33
.500	−1755.70	−.36
2.000	−1750.60	−.37
5.000	−1764.90	−.39
10.723	−1782.50	−.36
17.865	−1848.70	+.02
21.436	−1883.80	+.22
28.579	−1954.70	−1.16
35.721	−1992.80	−.58
42.863	−1997.40	−.52
50.000	−1950.00	−1.53
53.576	−1908.60	−1.94
60.718	−1839.70	−2.19
67.860	−1783.40	−1.31
75.002	−1663.70	+3.92
85.716	−1577.20	+12.27
92.858	−1532.60	+14.60
100.000	−1485.90	+19.25

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most widely-used

Frequency Mixers

Model SRA-149

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.000	5.73	5.49	5.37	5.000	84.38	86.28	88.18	59.18	60.08	60.09
10.000	40.000	5.72	5.44	5.30	10.000	80.85	82.65	83.15	53.94	55.47	56.58
20.000	50.000	5.82	5.48	5.32	20.000	76.11	76.91	77.61	48.74	50.61	52.27
34.118	64.118	5.77	5.48	5.35	34.118	71.91	72.61	73.31	44.31	46.52	48.61
50.000	80.000	5.78	5.48	5.35	50.000	68.56	69.16	70.06	41.33	43.64	46.04
63.235	93.235	5.72	5.49	5.37	63.235	66.41	67.21	68.41	39.46	42.00	44.28
77.794	47.794	5.80	5.52	5.37	77.794	64.54	65.64	66.54	37.97	40.53	42.71
92.353	62.353	5.64	5.37	5.26	92.353	63.32	64.62	65.62	36.93	39.37	41.57
100.000	70.000	5.55	5.37	5.22	100.000	63.04	64.84	65.94	36.43	38.86	40.83
121.471	91.471	5.54	5.32	5.23	121.471	60.77	60.67	61.47	35.24	37.55	39.61
165.147	135.147	5.54	5.36	5.29	165.147	58.08	58.48	58.10	32.93	34.98	36.88
194.265	164.265	5.60	5.44	5.37	194.265	56.93	56.83	57.41	31.56	33.54	35.51
223.382	193.382	5.71	5.54	5.46	223.382	57.72	58.30	57.51	30.31	32.27	34.41
250.000	220.000	5.77	5.57	5.48	250.000	58.13	58.83	58.87	29.36	31.23	32.93
267.059	237.059	5.79	5.61	5.51	267.059	59.28	59.28	61.58	28.70	30.88	32.76
296.177	266.177	5.78	5.52	5.39	296.177	58.08	58.58	58.00	27.88	29.57	31.44
354.412	324.412	5.80	5.62	5.51	354.412	54.47	53.49	53.17	27.28	28.99	30.48
398.088	368.088	6.00	5.83	5.76	398.088	52.81	52.60	51.37	26.20	27.78	29.40
456.324	426.324	6.48	6.35	6.27	456.324	52.62	52.58	50.92	26.00	26.75	27.04
500.000	470.000	6.73	6.48	6.23	500.000	55.18	56.92	58.43	27.45	28.61	29.45

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.20	1.20	1.21	1.76	2.81	4.41	5.000	1.50	1.38	1.30	5.000	+244.69	+.03
17.692	1.06	1.05	1.08	1.75	2.80	4.05	17.692	1.50	1.38	1.30	17.692	+244.52	+.03
30.385	1.03	1.05	1.09	1.77	2.72	3.70	30.385	1.50	1.38	1.30	30.385	+242.04	+.02
43.077	1.02	1.06	1.10	1.71	2.54	3.36	43.077	1.51	1.39	1.31	43.077	+242.79	+.01
55.769	1.02	1.06	1.11	1.65	2.45	3.28	55.769	1.51	1.39	1.31	55.769	+243.92	−.01
68.461	1.01	1.07	1.11	1.64	2.50	3.37	68.461	1.51	1.39	1.32	68.461	+243.93	−.03
93.846	1.01	1.08	1.12	1.62	2.49	3.38	93.846	1.54	1.42	1.34	93.846	+249.60	−.02
119.231	1.01	1.09	1.14	1.64	2.50	3.35	119.231	1.57	1.45	1.37	119.231	+250.13	+0.00
144.615	1.02	1.10	1.15	1.65	2.51	3.43	144.615	1.60	1.47	1.40	144.615	+250.77	+.05
170.000	1.04	1.12	1.17	1.65	2.48	3.42	170.000	1.67	1.53	1.44	170.000	+248.99	+.03
195.385	1.05	1.14	1.19	1.62	2.42	3.30	195.385	1.70	1.56	1.47	195.385	+248.00	−.03
220.769	1.07	1.16	1.21	1.63	2.41	3.29	220.769	1.78	1.62	1.54	220.769	+251.13	−.12
246.154	1.09	1.17	1.23	1.64	2.40	3.27	246.154	1.80	1.64	1.55	246.154	+255.01	−.16
271.539	1.10	1.19	1.25	1.65	2.40	3.25	271.539	1.90	1.74	1.63	271.539	+252.62	−.26
296.923	1.12	1.22	1.27	1.69	2.42	3.27	296.923	1.96	1.80	1.68	296.923	+245.64	−.38
322.308	1.15	1.24	1.29	1.72	2.42	3.27	322.308	2.03	1.85	1.75	322.308	+238.89	−.49
360.385	1.18	1.27	1.33	1.79	2.44	3.31	360.385	2.15	1.97	1.86	360.385	+226.44	−.39
398.462	1.23	1.31	1.36	1.83	2.48	3.34	398.462	2.29	2.08	1.96	398.462	+213.04	−.63
449.231	1.30	1.38	1.43	1.89	2.50	3.34	449.231	2.44	2.21	2.09	449.231	+215.56	−.52
500.000	1.38	1.47	1.52	1.98	2.51	3.37	500.000	2.54	2.31	2.18	500.000	+224.77	−.68

most widely-used, surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
LRMS-1R
RMS-1
LRMS-1
JMS-1

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
.500	30.500	7.81	7.45	7.25	.500	77.47	89.00	86.40	58.57	64.40	71.90
1.000	31.000	7.02	6.68	6.52	1.000	76.77	82.65	81.16	59.07	64.35	70.66
2.000	32.000	6.45	6.15	6.00	2.000	74.40	76.59	75.41	58.90	63.49	66.01
5.000	35.000	6.12	5.84	5.69	5.000	68.98	68.78	67.98	57.58	59.68	59.61
10.000	40.000	6.09	5.78	5.64	10.000	63.87	63.45	62.82	55.47	55.38	54.46
20.000	50.000	6.18	5.84	5.66	20.000	57.27	56.92	56.64	50.26	48.99	48.06
50.000	80.000	6.16	5.84	5.67	50.000	48.30	48.06	49.87	42.15	40.83	40.96
67.100	97.100	6.07	5.78	5.63	67.100	47.09	47.33	48.46	40.99	39.62	39.46
100.000	70.000	6.01	5.74	5.59	100.000	45.58	45.42	45.04	38.53	36.85	35.88
117.050	87.050	5.99	5.71	5.57	117.050	45.23	45.23	44.81	37.97	36.32	35.29
150.350	120.350	6.00	5.73	5.59	150.350	45.07	44.09	42.81	36.76	34.84	33.16
200.000	170.000	6.06	5.78	5.63	200.000	43.85	41.97	40.59	35.32	32.90	31.04
216.950	186.950	6.14	5.84	5.66	216.950	42.30	40.74	39.65	34.64	32.23	30.22
250.000	220.000	6.25	5.91	5.72	250.000	40.08	38.62	37.54	32.78	30.58	28.88
283.550	253.550	6.13	5.81	5.64	283.550	38.42	36.99	35.87	31.34	29.19	27.41
333.500	303.500	6.11	5.81	5.69	333.500	35.20	34.17	33.03	28.71	26.96	25.49
383.450	353.450	6.31	6.03	5.90	383.450	32.23	31.17	30.12	27.01	25.64	24.22
433.400	403.400	6.63	6.34	6.21	433.400	30.09	29.18	28.64	24.83	23.85	22.69
466.700	436.700	6.92	6.56	6.43	466.700	28.97	27.71	27.04	23.95	22.78	21.60
500.000	470.000	7.25	6.82	6.59	500.000	28.29	27.09	26.44	23.13	22.32	21.19

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.13	1.11	1.12	1.58	2.27	3.21	5.000	1.41	1.24	1.12	.500	+233.06	−.09
10.000	1.10	1.05	1.07	1.57	2.27	3.08	10.000	1.41	1.25	1.13	1.000	+240.55	−.08
20.000	1.09	1.02	1.05	1.68	2.43	3.34	20.000	1.41	1.24	1.13	5.000	+245.92	−.07
34.118	1.09	1.01	1.05	1.75	2.52	3.51	34.118	1.40	1.24	1.12	10.000	+246.17	−.06
50.000	1.09	1.01	1.05	1.77	2.50	3.52	50.000	1.41	1.24	1.12	20.000	+245.27	−.05
63.235	1.09	1.02	1.06	1.77	2.50	3.50	63.235	1.41	1.24	1.12	33.800	+242.31	−.03
77.794	1.09	1.03	1.06	1.72	2.48	3.45	77.794	1.41	1.24	1.13	50.000	+238.70	−.01
92.353	1.09	1.04	1.06	1.69	2.43	3.36	92.353	1.41	1.24	1.13	50.450	+238.56	−.01
100.000	1.10	1.04	1.06	1.67	2.40	3.33	100.000	1.41	1.24	1.13	67.100	+235.59	−.02
150.588	1.11	1.07	1.09	1.66	2.38	3.21	150.588	1.42	1.25	1.13	117.050	+236.67	−.22
194.265	1.13	1.09	1.11	1.63	2.29	3.12	194.265	1.42	1.26	1.14	167.000	+244.95	+.09
223.382	1.15	1.11	1.13	1.63	2.29	3.10	223.382	1.43	1.27	1.15	200.000	+241.01	+.37
250.000	1.16	1.13	1.14	1.63	2.25	3.03	250.000	1.42	1.25	1.14	216.950	+238.64	+.89
296.177	1.19	1.17	1.18	1.64	2.28	3.03	296.177	1.44	1.28	1.16	266.900	+243.96	+1.77
325.294	1.22	1.19	1.20	1.67	2.30	2.97	325.294	1.46	1.29	1.18	300.200	+249.58	+2.52
354.412	1.25	1.22	1.24	1.68	2.23	2.87	354.412	1.46	1.30	1.18	333.500	+251.46	+4.04
398.088	1.29	1.28	1.29	1.72	2.29	2.91	398.088	1.46	1.30	1.19	383.450	+243.55	+5.99
427.206	1.32	1.31	1.32	1.73	2.24	2.82	427.206	1.46	1.31	1.20	416.750	+234.95	+7.51
470.882	1.38	1.37	1.38	1.81	2.34	2.95	470.882	1.46	1.31	1.21	466.700	+221.12	+9.24
500.000	1.43	1.43	1.43	1.83	2.31	2.89	500.000	1.45	1.31	1.21	500.000	+216.50	+11.38

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Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

most widely-used, surface-mount

Frequency Mixers Model SCM-2

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.000	7.93	7.70	7.46	5.000	88.15	91.15	90.85	87.15	81.65	77.95
10.000	40.000	7.07	6.74	6.62	10.000	75.96	79.06	79.76	78.96	74.26	72.26
20.000	50.000	6.62	6.43	6.16	20.000	70.93	72.63	75.43	70.63	67.23	66.13
35.151	65.151	6.32	6.02	5.81	35.151	65.32	67.42	69.52	65.12	61.82	61.02
50.000	80.000	6.20	5.92	5.71	50.000	60.82	62.72	64.62	56.32	54.16	53.31
65.303	95.303	6.04	5.79	5.61	65.303	58.98	61.08	62.98	58.88	56.02	54.56
100.000	70.000	5.88	5.69	5.52	100.000	55.19	57.24	59.02	58.19	54.55	52.69
155.758	125.758	5.86	5.65	5.51	155.758	50.90	52.92	54.84	53.85	50.70	48.87
200.000	170.000	5.93	5.73	5.58	200.000	48.72	50.87	52.80	50.83	48.52	47.30
246.212	216.212	6.05	5.83	5.65	246.212	46.23	47.20	48.37	48.26	46.40	45.18
336.667	306.667	6.24	5.96	5.75	336.667	43.32	45.14	46.37	43.72	43.55	42.78
427.121	397.121	6.21	5.89	5.65	427.121	41.03	41.17	41.74	41.39	41.75	41.11
500.000	470.000	6.60	6.32	6.02	500.000	40.77	42.19	42.70	40.11	40.98	41.37
547.727	517.727	6.63	6.50	6.21	547.727	40.40	41.49	42.31	39.92	40.81	41.57
608.030	578.030	6.63	6.41	6.08	608.030	41.07	41.53	42.33	37.89	38.45	39.05
668.333	638.333	6.89	6.50	6.08	668.333	38.33	38.93	39.77	37.13	37.08	37.22
758.788	728.788	8.68	7.67	6.60	758.788	39.17	41.79	43.85	35.24	36.35	38.61
819.091	789.091	8.49	7.83	7.01	819.091	40.03	43.08	46.07	34.08	35.42	36.19
909.545	879.545	8.55	7.89	7.20	909.545	40.82	45.07	49.33	33.17	33.32	33.38
1000.000	970.000	7.79	7.08	6.59	1000.000	37.88	39.99	42.12	28.75	28.91	28.50

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
5.000	6.01	5.79	5.59	4.37	4.26	5.49	5.000	1.40	1.25	1.13
10.000	2.30	2.25	2.21	2.57	3.25	4.63	10.000	1.41	1.26	1.14
20.000	1.60	1.59	1.58	2.15	3.04	4.52	20.000	1.41	1.27	1.14
35.151	1.31	1.30	1.31	1.95	2.89	4.32	35.151	1.40	1.26	1.13
50.000	1.20	1.19	1.20	1.83	2.77	4.01	50.000	1.41	1.26	1.13
65.303	1.14	1.12	1.13	1.79	2.72	4.00	65.303	1.41	1.26	1.14
100.000	1.07	1.02	1.04	1.74	2.63	3.76	100.000	1.42	1.26	1.14
155.758	1.15	1.11	1.10	1.75	2.61	3.79	155.758	1.43	1.28	1.16
200.000	1.24	1.20	1.19	1.77	2.60	3.73	200.000	1.43	1.28	1.17
246.212	1.34	1.30	1.29	1.80	2.60	3.80	246.212	1.43	1.29	1.19
336.667	1.56	1.51	1.47	1.93	2.60	3.74	336.667	1.44	1.30	1.22
427.121	1.75	1.68	1.62	2.13	2.74	3.69	427.121	1.44	1.33	1.28
500.000	1.86	1.78	1.71	2.19	2.72	3.61	500.000	1.31	1.16	1.08
547.727	1.94	1.85	1.77	2.30	2.80	3.64	547.727	1.38	1.24	1.14
608.030	2.03	1.93	1.85	2.55	3.05	3.84	608.030	1.44	1.30	1.18
668.333	2.11	2.01	1.92	2.66	3.17	4.01	668.333	1.51	1.38	1.25
758.788	2.29	2.18	2.07	2.92	3.43	4.25	758.788	1.72	1.59	1.45
819.091	2.38	2.25	2.14	3.01	3.47	4.17	819.091	1.92	1.79	1.65
909.545	2.25	2.12	2.01	3.17	3.45	4.09	909.545	2.10	2.01	1.92
1000.000	1.99	1.90	1.78	3.27	3.51	4.17	1000.000	2.15	2.07	2.03

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
5.000	−213.11	−.08
10.000	−226.17	−.08
20.000	−229.30	−.08
35.151	−228.98	−.10
50.000	−230.14	−.13
65.303	−229.01	−.09
100.000	−233.76	−.07
155.758	−231.30	−.02
200.000	−231.19	+.04
246.212	−238.64	+.13
336.667	−235.96	+.50
427.121	−203.34	+1.01
500.000	−209.01	+.46
547.727	−206.30	+.46
608.030	−228.73	+1.04
668.333	−206.02	+1.86
758.788	−182.02	+.68
819.091	−178.24	+1.07
909.545	−167.86	+1.38
1000.000	−162.74	+3.45

broadband high dynamic range

Frequency Mixers

LEVEL 10 (+10dBm LO, up to +5dBm RF)

Models
RMS-1LH
LRMS-1LH
JMS-1LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	Isolation L–R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L–I (dB) LO +7dBm	LO +10dBm	LO +13dBm
2.000	32.000	7.08	6.73	6.55	2.000	65.89	68.96	71.56	55.04	58.87	62.73
5.000	35.000	6.14	5.87	5.71	5.000	65.11	67.37	69.67	54.46	56.74	57.76
10.000	40.000	6.47	6.17	5.99	10.000	63.38	65.16	66.06	52.78	52.79	52.34
20.000	50.000	6.52	6.15	5.98	20.000	59.44	60.74	61.11	48.83	47.32	46.43
32.182	62.182	6.43	6.06	5.90	32.182	55.84	57.04	57.56	45.02	43.21	42.62
50.000	80.000	6.39	6.05	5.90	50.000	54.54	48.82	48.60	31.02	29.76	29.52
77.454	47.454	6.41	6.06	5.89	77.454	53.04	55.97	56.08	39.92	37.96	36.59
100.000	70.000	6.22	5.90	5.76	100.000	53.94	59.73	58.30	38.89	36.65	35.45
122.727	92.727	6.19	5.91	5.80	122.727	60.06	63.14	58.62	38.06	35.55	34.01
152.909	122.909	6.16	5.92	5.84	152.909	60.00	56.38	54.16	36.71	34.01	32.14
198.182	168.182	6.19	5.94	5.85	198.182	50.27	48.84	47.52	34.51	32.04	30.39
228.364	198.364	6.23	5.96	5.86	228.364	46.53	45.44	44.39	32.73	30.49	28.84
250.000	220.000	6.31	6.03	5.91	250.000	44.76	43.77	42.72	31.59	29.78	28.17
273.636	243.636	6.36	6.06	5.91	273.636	42.98	42.07	41.03	30.44	28.92	27.32
303.818	273.818	6.48	6.12	5.95	303.818	40.23	39.63	38.75	29.00	27.42	25.96
334.000	304.000	6.45	6.12	5.94	334.000	38.50	37.56	36.43	27.44	26.38	24.74
379.273	349.273	6.42	6.09	5.89	379.273	36.16	34.91	33.95	25.55	25.00	23.68
409.455	379.455	6.29	5.98	5.81	409.455	34.74	33.53	32.01	24.30	24.14	22.53
454.727	424.727	6.38	6.04	5.92	454.727	32.96	31.70	30.24	22.91	22.72	21.21
500.000	470.000	6.49	6.19	6.05	500.000	31.47	30.03	28.73	21.67	21.67	20.55

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.15	1.16	1.18	1.61	2.42	3.53	5.000	1.31	1.18	1.08	2.000	+336.50	+.37
10.000	1.09	1.08	1.11	1.58	2.33	3.49	10.000	1.31	1.18	1.08	5.000	+341.20	+.37
20.000	1.06	1.03	1.08	1.67	2.43	3.73	20.000	1.31	1.18	1.08	17.091	+341.40	+.36
34.118	1.06	1.02	1.07	1.68	2.47	3.60	34.118	1.32	1.18	1.08	20.000	+340.50	+.37
50.000	1.07	1.03	1.08	1.64	2.47	3.43	50.000	1.33	1.19	1.09	47.273	+335.30	+.41
77.794	1.08	1.05	1.09	1.61	2.35	3.39	77.794	1.33	1.20	1.10	62.364	+335.60	+.30
100.000	1.11	1.08	1.10	1.62	2.35	3.37	100.000	1.34	1.20	1.11	92.545	+335.90	+.08
121.471	1.13	1.10	1.12	1.65	2.35	3.43	121.471	1.34	1.21	1.12	107.636	+338.80	+.03
150.588	1.15	1.13	1.15	1.66	2.35	3.43	150.588	1.35	1.23	1.14	137.818	+340.00	+.14
179.706	1.19	1.16	1.17	1.66	2.30	3.35	179.706	1.37	1.24	1.16	168.000	+340.40	+.75
208.824	1.22	1.20	1.20	1.67	2.31	3.29	208.824	1.38	1.26	1.18	198.182	+338.00	+1.47
250.000	1.26	1.24	1.24	1.73	2.34	3.28	250.000	1.38	1.24	1.16	243.455	+339.90	+3.08
267.059	1.28	1.26	1.26	1.70	2.32	3.23	267.059	1.41	1.28	1.20	258.545	+343.50	+3.66
296.177	1.32	1.30	1.30	1.75	2.33	3.21	296.177	1.44	1.31	1.23	288.727	+346.70	+4.56
339.853	1.37	1.35	1.35	1.82	2.37	3.21	339.853	1.46	1.34	1.25	334.000	+352.70	+7.63
368.971	1.41	1.39	1.39	1.83	2.34	3.12	368.971	1.48	1.36	1.28	364.182	+351.00	10.03
398.088	1.45	1.43	1.43	1.86	2.39	3.17	398.088	1.50	1.37	1.29	394.364	+339.70	11.54
441.765	1.51	1.49	1.49	1.89	2.36	3.10	441.765	1.52	1.40	1.32	439.636	+321.60	14.70
470.882	1.56	1.54	1.53	1.92	2.39	3.08	470.882	1.53	1.41	1.33	469.818	+314.50	16.19
500.000	1.60	1.58	1.57	1.98	2.46	3.17	500.000	1.53	1.42	1.34	500.000	+312.10	17.82

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surface-mount

Frequency Mixers

Model SCM-1

LEVEL 7 (+7dBm LO, up to +1dBm RF)

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
1.000	31.000	6.58	6.20	6.00	1.000	71.78	72.88	73.48	65.58	66.78	67.58
2.000	32.000	6.53	6.16	5.97	2.000	71.15	72.45	73.65	65.65	67.15	68.05
5.000	35.000	5.48	5.16	5.00	5.000	70.67	72.07	72.97	65.67	67.07	67.77
10.000	40.000	5.72	5.46	5.30	10.000	69.97	70.97	72.17	65.37	66.57	67.47
20.000	50.000	5.76	5.51	5.33	20.000	67.69	68.99	69.89	64.89	65.69	66.09
32.188	62.188	5.76	5.48	5.32	32.188	65.07	65.97	66.87	63.67	64.17	64.27
50.000	80.000	5.78	5.52	5.38	50.000	61.61	62.51	64.01	62.01	62.11	62.01
78.969	48.969	5.81	5.53	5.38	78.969	57.88	59.28	60.27	58.98	58.98	58.69
100.000	70.000	5.63	5.46	5.35	100.000	56.48	57.50	58.70	57.28	57.03	57.16
125.750	95.750	5.52	5.33	5.24	125.750	53.40	56.16	57.25	54.89	55.12	55.75
156.938	126.938	5.52	5.36	5.29	156.938	52.92	54.05	54.91	51.54	52.46	53.17
188.125	158.125	5.63	5.50	5.43	188.125	50.98	51.97	52.83	49.56	51.08	51.98
219.313	189.313	5.69	5.56	5.50	219.313	49.84	50.13	50.64	47.50	49.66	51.79
250.000	220.000	5.76	5.61	5.50	250.000	49.38	50.85	51.64	45.44	46.65	47.65
281.687	251.688	5.89	5.72	5.60	281.687	47.86	48.93	49.97	44.71	45.50	46.78
328.469	298.469	5.86	5.69	5.58	328.469	45.24	46.10	46.78	44.04	46.51	48.79
375.250	345.250	5.89	5.80	5.76	375.250	43.31	43.70	44.66	42.20	44.36	45.15
422.031	392.031	6.22	6.12	6.04	422.031	43.62	45.26	45.97	41.18	41.75	41.40
453.219	423.219	6.47	6.26	6.06	453.219	44.39	45.18	45.87	40.33	41.16	40.94
500.000	470.000	7.00	6.56	5.99	500.000	42.58	43.13	43.99	41.60	42.64	41.91

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.19	1.23	1.28	1.65	2.68	4.16	5.000	1.53	1.39	1.29	1.000	−232.35	−.18
10.000	1.09	1.14	1.19	1.60	2.55	4.01	10.000	1.51	1.39	1.29	2.000	−235.90	−.17
20.000	1.03	1.11	1.17	1.72	2.69	4.18	20.000	1.51	1.38	1.29	10.000	−237.92	−.15
34.118	1.02	1.12	1.18	1.71	2.66	4.07	34.118	1.52	1.39	1.29	16.594	−237.61	−.15
50.000	1.04	1.13	1.19	1.62	2.52	3.82	50.000	1.53	1.40	1.31	32.188	−234.39	−.15
63.235	1.04	1.13	1.20	1.61	2.50	3.78	63.235	1.53	1.41	1.32	47.781	−234.81	−.17
92.353	1.06	1.15	1.21	1.62	2.48	3.72	92.353	1.59	1.45	1.36	63.375	−234.44	−.16
100.000	1.06	1.15	1.21	1.64	2.49	3.69	100.000	1.60	1.46	1.37	78.969	−237.46	−.14
121.471	1.07	1.16	1.22	1.65	2.50	3.56	121.471	1.64	1.50	1.41	100.000	−242.94	−.14
150.588	1.09	1.17	1.23	1.66	2.52	3.62	150.588	1.70	1.56	1.47	125.750	−245.99	+0.00
165.147	1.10	1.19	1.24	1.69	2.54	3.62	165.147	1.75	1.60	1.51	141.344	−243.17	−.09
208.824	1.15	1.22	1.29	1.71	2.54	3.50	208.824	1.90	1.74	1.65	188.125	−235.89	−.04
250.000	1.20	1.27	1.33	1.77	2.53	3.54	250.000	2.00	1.86	1.73	234.906	−247.51	−.14
267.059	1.23	1.30	1.36	1.77	2.50	3.40	267.059	2.14	1.99	1.84	250.500	−250.94	−.13
296.177	1.29	1.36	1.41	1.82	2.56	3.46	296.177	2.26	2.09	1.94	281.687	−245.08	−.02
339.853	1.40	1.47	1.52	1.91	2.61	3.54	339.853	2.49	2.30	2.13	328.469	−225.76	−.13
398.088	1.58	1.67	1.72	2.01	2.59	3.48	398.088	2.85	2.62	2.44	390.844	−203.31	+.16
427.206	1.68	1.76	1.81	2.16	2.72	3.54	427.206	2.93	2.72	2.54	422.031	−201.69	+.52
456.324	1.76	1.84	1.90	2.25	2.87	3.66	456.324	3.02	2.81	2.64	453.219	−206.11	+.35
500.000	1.84	1.92	1.97	2.33	3.00	3.80	500.000	3.06	2.87	2.73	500.000	−205.13	+.33

broadband high dynamic range

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Models
RMS-1MH
LRMS-1MH
JMS-1MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	Isolation L-R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L-I (dB) LO +10dBm	LO +13dBm	LO +16dBm
2.000	32.000	7.33	6.87	6.69	2.000	76.01	74.51	74.01	68.31	65.71	64.46
5.000	35.000	6.39	5.99	5.81	5.000	69.66	68.76	68.46	63.66	61.00	59.73
10.000	40.000	6.66	6.21	6.01	10.000	64.01	63.07	62.89	58.52	55.80	54.50
20.000	50.000	6.70	6.21	6.02	20.000	58.46	57.31	57.09	52.30	49.78	48.69
32.182	62.182	6.62	6.13	5.92	32.182	54.07	52.98	53.07	47.44	45.20	44.53
50.000	80.000	6.60	6.10	5.92	50.000	50.44	49.34	49.74	42.93	40.85	40.18
77.454	47.454	6.68	6.18	5.97	77.454	48.40	47.86	47.41	40.44	38.28	37.07
100.000	70.000	6.39	6.00	5.79	100.000	48.50	47.68	47.27	39.28	37.14	36.11
122.727	92.727	6.48	6.08	5.94	122.727	49.19	47.59	46.53	38.54	36.20	35.00
168.000	138.000	6.43	6.07	5.95	168.000	48.05	45.07	43.92	36.55	34.10	32.44
198.182	168.182	6.43	6.11	5.98	198.182	44.92	42.15	40.89	34.20	31.58	30.54
228.364	198.364	6.45	6.11	5.97	228.364	41.35	39.78	38.41	32.53	30.31	28.77
250.000	220.000	6.56	6.27	6.11	250.000	38.94	37.93	36.65	31.31	29.36	27.82
273.636	243.636	6.51	6.21	6.03	273.636	36.56	35.54	34.67	29.52	27.74	26.84
303.818	273.818	6.65	6.26	6.06	303.818	33.81	32.56	32.01	27.84	25.93	25.11
349.091	319.091	6.76	6.39	6.14	349.091	31.78	29.95	29.08	25.87	24.88	23.39
379.273	349.273	6.78	6.47	6.27	379.273	30.58	28.87	27.79	24.17	23.78	22.39
409.455	379.455	6.71	6.45	6.29	409.455	29.17	27.89	26.33	22.28	22.58	21.08
454.727	424.727	7.10	6.64	6.52	454.727	26.85	25.80	24.60	20.37	20.47	19.35
500.000	470.000	7.66	7.03	6.81	500.000	24.92	23.97	23.20	19.00	18.39	17.86

mixer VSWR

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm
5.000	1.16	1.13	1.15	1.38	2.10	3.07	5.000	1.41	1.24	1.14
10.000	1.12	1.06	1.09	1.33	2.01	2.91	10.000	1.42	1.25	1.14
20.000	1.10	1.02	1.06	1.40	2.15	3.00	20.000	1.41	1.24	1.14
34.118	1.10	1.01	1.06	1.42	2.20	2.92	34.118	1.41	1.24	1.14
50.000	1.10	1.02	1.07	1.40	2.17	2.92	50.000	1.42	1.25	1.14
77.794	1.11	1.04	1.08	1.34	2.08	2.83	77.794	1.42	1.25	1.14
100.000	1.12	1.06	1.09	1.34	2.06	2.92	100.000	1.43	1.26	1.15
136.029	1.14	1.09	1.11	1.37	2.04	2.79	136.029	1.44	1.27	1.16
165.147	1.15	1.11	1.12	1.36	2.00	2.83	165.147	1.45	1.28	1.17
194.265	1.17	1.13	1.15	1.37	1.98	2.77	194.265	1.46	1.29	1.18
223.382	1.20	1.16	1.17	1.39	1.99	2.74	223.382	1.48	1.30	1.20
250.000	1.21	1.18	1.19	1.40	1.98	2.80	250.000	1.46	1.28	1.18
267.059	1.23	1.20	1.20	1.41	1.98	2.79	267.059	1.49	1.31	1.21
296.177	1.25	1.23	1.23	1.45	2.01	2.72	296.177	1.51	1.34	1.23
325.294	1.28	1.25	1.25	1.48	2.01	2.76	325.294	1.52	1.35	1.25
354.412	1.30	1.28	1.28	1.52	2.01	2.68	354.412	1.54	1.37	1.27
398.088	1.35	1.33	1.33	1.56	2.01	2.69	398.088	1.56	1.39	1.29
427.206	1.38	1.36	1.36	1.59	2.03	2.73	427.206	1.58	1.41	1.31
470.882	1.44	1.41	1.42	1.63	2.07	2.69	470.882	1.59	1.43	1.34
500.000	1.47	1.45	1.46	1.67	2.09	2.79	500.000	1.61	1.45	1.35

ϕ detection

freq. (MHz)	max. DC output mV	DC offset mV
2.000	+511.40	+.13
5.000	+521.50	+.14
17.091	+522.60	+.12
20.000	+521.30	+.14
47.273	+517.60	+.36
62.364	+519.10	+.39
92.545	+521.30	+.03
122.727	+521.40	+.23
152.909	+527.40	+.33
183.091	+533.50	+.66
213.273	+521.50	+1.49
243.455	+518.30	+2.59
258.545	+524.50	+2.82
288.727	+529.80	+3.66
318.909	+542.00	+3.97
349.091	+547.60	+5.07
394.364	+527.70	+12.25
424.546	+500.60	+13.20
469.818	+475.50	+16.63
500.000	+468.10	+19.31

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EUROPE 44-252-835094 Fax 44-252-837010

broadband high dynamic range

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Models
RMS-5MH
LRMS-5MH
JMS-5MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	Isolation L-R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L-I (dB) LO +10dBm	LO +13dBm	LO +16dBm
10.000	40.000	6.19	5.67	5.41	10.000	75.02	72.72	71.13	64.92	71.62	72.43
20.000	50.000	5.91	5.34	5.11	20.000	68.86	69.32	68.89	58.72	67.42	69.79
50.000	80.000	5.67	5.13	4.83	50.000	63.03	64.80	65.49	52.46	61.00	68.55
100.000	70.000	5.34	4.84	4.61	100.000	55.25	57.53	59.59	44.78	52.99	63.30
149.688	119.688	5.29	4.83	4.64	149.688	49.18	51.47	54.06	38.90	47.61	54.72
200.000	170.000	5.22	4.84	4.66	200.000	42.62	45.11	47.66	33.29	42.45	50.33
289.375	259.375	5.71	5.23	4.92	289.375	40.53	42.74	44.83	31.70	40.45	47.39
382.500	352.500	6.15	5.65	5.17	382.500	37.75	40.00	42.00	29.04	38.72	39.28
429.063	399.063	6.33	5.74	5.43	429.063	36.23	38.30	39.79	28.28	38.06	37.13
500.000	470.000	6.69	5.96	5.54	500.000	34.56	36.54	38.40	27.19	37.26	32.19
568.750	538.750	7.04	6.21	5.76	568.750	33.85	36.02	38.14	27.80	36.79	27.85
661.875	631.875	7.27	6.31	5.86	661.875	32.14	34.63	36.57	27.98	31.64	24.96
750.000	720.000	7.90	6.75	6.17	750.000	30.64	32.69	33.86	27.83	27.81	22.50
801.563	771.563	8.21	7.02	6.38	801.563	30.07	32.12	33.03	27.37	26.48	22.48
894.688	864.688	8.69	7.51	6.87	894.688	29.08	31.35	32.02	25.70	22.10	19.21
1000.000	970.000	8.85	8.06	7.47	1000.000	27.23	29.45	30.79	22.14	18.64	16.09
1127.500	1097.500	8.67	8.09	7.67	1127.500	25.53	27.46	29.11	19.50	16.61	14.31
1267.188	1237.188	8.60	8.18	8.07	1267.188	24.74	26.47	27.96	15.66	13.75	12.02
1406.875	1376.875	8.64	8.33	8.30	1406.875	24.15	26.08	27.52	13.49	12.44	11.22
1500.000	1470.000	9.20	8.59	8.44	1500.000	23.67	25.44	26.71	11.82	11.30	10.43

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	max. DC output mV	DC offset mV
10.000	1.82	1.72	1.66	1.31	2.09	3.34	5.000	1.51	1.15	1.06	10.000	+494.00	+.05
20.000	1.60	1.47	1.39	1.27	2.05	3.20	10.000	1.52	1.15	1.06	20.000	+491.80	+.09
50.000	1.55	1.39	1.28	1.34	2.09	3.15	20.000	1.52	1.15	1.06	50.000	+532.40	+.20
100.000	1.57	1.40	1.28	1.30	2.06	3.14	50.000	1.28	1.09	1.08	100.000	+493.60	+.37
149.688	1.61	1.43	1.31	1.27	1.99	2.88	83.971	1.53	1.16	1.07	149.688	+489.30	+.83
200.000	1.66	1.48	1.36	1.28	1.97	2.88	110.294	1.53	1.16	1.06	200.000	+519.20	+.95
289.375	1.76	1.59	1.46	1.34	1.97	2.83	162.941	1.53	1.16	1.07	289.375	+517.70	+3.25
382.500	1.91	1.72	1.60	1.43	1.98	2.80	200.000	1.54	1.16	1.07	382.500	+461.10	+5.40
429.063	1.99	1.79	1.67	1.48	2.07	2.92	215.588	1.54	1.16	1.07	429.063	+460.20	+6.05
500.000	2.13	1.91	1.77	1.55	2.06	2.81	268.235	1.54	1.16	1.07	500.000	+403.00	+8.05
568.750	2.25	2.02	1.87	1.61	2.11	2.81	320.882	1.52	1.16	1.08	568.750	+434.00	+10.02
661.875	2.40	2.18	2.01	1.74	2.23	2.89	373.529	1.51	1.15	1.08	661.875	+372.30	+14.12
750.000	2.56	2.32	2.18	1.86	2.32	2.97	426.177	1.49	1.14	1.08	750.000	+417.80	+18.21
801.563	2.66	2.41	2.27	2.00	2.44	3.15	478.824	1.46	1.12	1.09	801.563	+374.50	+21.66
894.688	2.79	2.56	2.43	2.18	2.61	3.27	531.471	1.42	1.10	1.11	894.688	+400.70	+23.39
1000.000	2.89	2.72	2.59	2.32	2.70	3.33	610.441	1.35	1.05	1.15	1000.000	+427.80	+22.17
1127.500	2.95	2.85	2.77	2.63	2.90	3.45	689.412	1.26	1.01	1.22	1127.500	+424.30	+17.52
1267.188	3.04	3.03	3.00	3.02	3.14	3.57	768.382	1.19	1.16	1.33	1267.188	+394.10	+25.82
1406.875	3.21	3.25	3.29	3.65	3.52	3.81	847.353	1.13	1.20	1.39	1406.875	+360.90	+33.65
1500.000	3.34	3.40	3.50	4.20	3.82	4.03	900.000	1.12	1.26	1.44	1500.000	+407.70	+27.87

most widely-used, surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-2
LRMS-2R
LRMS-2
JMS-2

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L–R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L–I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.000	7.36	6.93	6.73	5.000	63.51	67.42	71.51	54.09	57.23	60.91
10.000	40.000	7.46	7.00	6.77	10.000	62.56	66.49	69.85	53.93	56.87	60.05
20.000	50.000	7.48	6.97	6.74	20.000	62.58	65.94	67.41	54.31	56.78	58.53
35.151	65.151	7.44	6.92	6.69	35.151	61.45	62.92	63.63	54.38	55.59	55.96
50.000	80.000	7.34	6.86	6.64	50.000	59.46	60.51	60.50	53.62	53.87	53.50
65.303	95.303	7.34	6.89	6.83	65.303	58.47	58.52	58.32	52.68	52.15	51.36
100.000	70.000	7.28	6.84	6.63	100.000	55.37	55.07	54.79	50.33	48.85	47.88
155.758	125.758	7.13	6.72	6.69	155.758	52.32	52.10	52.01	47.76	46.19	45.23
200.000	170.000	7.05	6.70	6.57	200.000	50.02	49.75	49.52	46.56	44.71	43.39
246.212	216.212	7.10	6.75	6.62	246.212	48.29	48.10	47.91	45.70	43.71	42.09
306.515	276.515	7.36	6.96	6.76	306.515	45.94	45.81	45.93	44.23	41.99	40.44
366.818	336.818	7.32	6.97	6.74	366.818	44.47	44.49	44.55	41.86	39.66	38.17
427.121	397.121	7.33	6.99	6.72	427.121	41.97	42.09	41.90	39.61	37.81	36.16
500.000	470.000	7.39	7.03	6.79	500.000	39.79	39.89	40.06	36.42	35.06	33.99
577.879	547.879	7.76	7.29	6.96	577.879	38.54	38.51	38.57	33.96	32.59	31.15
668.333	638.333	8.01	7.63	7.29	668.333	36.95	36.87	36.82	30.50	29.46	28.24
758.788	728.788	8.26	7.68	7.26	758.788	35.07	34.71	34.32	27.57	26.72	25.82
849.242	819.242	8.75	7.98	7.47	849.242	33.45	33.07	32.91	24.48	23.71	23.08
909.545	879.545	9.29	8.51	7.90	909.545	32.65	32.47	32.32	22.84	22.35	21.55
1000.000	970.000	9.54	8.90	8.34	1000.000	32.22	32.02	31.76	20.37	20.21	19.62

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.30	1.35	1.38	1.72	2.44	3.27	5.000	1.40	1.22	1.11	10.000	+230.39	−.33
10.000	1.19	1.25	1.29	1.68	2.37	3.24	10.000	1.41	1.22	1.11	20.000	+229.73	−.33
20.000	1.15	1.22	1.27	1.80	2.52	3.36	20.000	1.42	1.23	1.12	39.118	+228.12	−.33
35.151	1.15	1.22	1.28	1.79	2.57	3.40	35.151	1.43	1.23	1.11	50.000	+228.00	−.30
50.000	1.15	1.23	1.29	1.77	2.54	3.37	50.000	1.45	1.24	1.12	68.235	+225.82	−.27
65.303	1.15	1.23	1.29	1.75	2.49	3.29	65.303	1.45	1.24	1.12	97.353	+226.77	−.27
100.000	1.15	1.22	1.28	1.70	2.44	3.24	100.000	1.45	1.25	1.13	126.471	+227.26	−.01
155.758	1.14	1.22	1.27	1.72	2.43	3.29	155.758	1.45	1.25	1.14	184.706	+231.16	−.21
200.000	1.15	1.23	1.28	1.68	2.36	3.19	200.000	1.46	1.27	1.16	213.824	+228.88	−.14
246.212	1.16	1.23	1.28	1.69	2.37	3.14	246.212	1.47	1.28	1.17	272.059	+231.97	−.06
306.515	1.18	1.25	1.30	1.71	2.40	3.16	306.515	1.51	1.31	1.20	330.294	+243.02	+.13
366.818	1.21	1.27	1.32	1.75	2.39	3.15	366.818	1.54	1.34	1.23	388.529	+241.59	+.44
427.121	1.24	1.30	1.35	1.81	2.44	3.24	427.121	1.56	1.37	1.26	446.765	+221.41	+1.08
500.000	1.30	1.36	1.41	1.91	2.58	3.36	500.000	1.55	1.35	1.25	505.000	+210.09	+.90
577.879	1.39	1.44	1.49	2.07	2.74	3.57	577.879	1.61	1.43	1.33	592.353	+198.96	+.85
668.333	1.52	1.56	1.61	2.26	2.95	3.85	668.333	1.63	1.46	1.36	679.706	+195.18	+1.19
758.788	1.68	1.72	1.77	2.50	3.17	4.04	758.788	1.62	1.46	1.37	767.059	+196.67	+2.99
849.242	1.91	1.95	1.99	2.81	3.58	4.39	849.242	1.59	1.44	1.37	854.412	+185.41	+3.77
909.545	2.09	2.13	2.17	2.96	3.70	4.51	909.545	1.56	1.43	1.37	912.647	+176.74	+4.58
1000.000	2.44	2.45	2.48	3.15	3.80	4.52	1000.000	1.49	1.38	1.33	1000.000	+174.33	+5.34

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most widely-used, surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-5
LRMS-5
LRMS-5R
JMS-5

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq.. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
5.000	35.000	6.56	6.17	5.95	5.000	77.61	78.28	78.52	69.01	82.08	77.02
10.000	40.000	6.45	6.03	5.79	10.000	71.70	73.09	73.85	63.30	75.39	72.75
20.000	50.000	6.30	5.86	5.58	20.000	65.75	67.43	68.70	56.85	67.33	69.10
50.000	80.000	5.86	5.46	5.27	50.000	58.22	60.16	61.98	49.81	61.16	60.18
100.000	70.000	5.65	5.31	5.14	100.000	51.76	53.66	55.73	43.72	53.86	54.91
149.677	119.677	5.65	5.33	5.15	149.677	48.05	50.07	51.88	40.10	50.77	51.03
200.000	170.000	5.67	5.37	5.22	200.000	45.70	47.54	49.42	37.65	48.24	48.88
246.129	216.129	5.89	5.54	5.34	246.129	43.96	45.92	47.81	36.21	48.66	44.32
342.581	312.581	6.12	5.71	5.44	342.581	41.17	43.07	44.96	34.58	48.72	38.42
439.032	409.032	6.17	5.77	5.51	439.032	38.94	40.76	42.41	34.20	43.78	33.68
500.000	470.000	6.52	5.97	5.64	500.000	37.83	39.74	41.60	35.19	38.41	30.83
583.710	553.710	6.87	6.25	5.90	583.710	36.92	39.21	41.49	35.66	33.19	27.46
680.161	650.161	7.26	6.55	6.09	680.161	35.89	38.34	40.17	33.77	29.32	24.53
750.000	720.000	7.71	6.89	6.36	750.000	35.57	37.60	38.86	30.59	26.77	23.19
873.065	843.065	8.22	7.45	6.96	873.065	34.72	36.91	37.92	25.15	21.63	19.44
1000.000	970.000	8.19	7.70	7.38	1000.000	33.19	35.50	37.01	20.93	18.14	16.11
1114.194	1084.194	8.20	7.76	7.48	1114.194	31.77	33.72	35.34	18.44	16.32	14.67
1210.645	1180.645	8.39	8.02	7.78	1210.645	30.70	32.50	33.79	16.50	14.96	13.44
1355.323	1325.323	8.78	8.41	8.25	1355.323	28.98	30.92	32.34	14.10	13.25	12.20
1500.000	1470.000	9.59	8.83	8.49	1500.000	26.92	28.64	29.93	12.76	12.28	11.48

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	2.73	2.64	2.55	1.68	2.43	3.47	5.000	1.51	1.21	1.03	5.000	+221.90	-.01
10.000	1.68	1.62	1.58	1.67	2.43	3.47	10.000	1.52	1.22	1.03	10.000	+231.01	-.01
20.000	1.45	1.37	1.32	1.62	2.37	3.38	20.000	1.52	1.22	1.03	20.000	+233.72	-.01
50.000	1.38	1.27	1.19	1.71	2.46	3.47	50.000	1.52	1.21	1.03	50.000	+231.15	+0.00
100.000	1.41	1.29	1.20	1.63	2.38	3.29	100.000	1.53	1.22	1.04	100.000	+236.20	+.06
149.677	1.47	1.34	1.24	1.60	2.33	3.27	149.677	1.53	1.22	1.05	149.677	+244.16	+.17
200.000	1.53	1.40	1.30	1.63	2.28	3.20	200.000	1.53	1.22	1.06	200.000	+238.66	+.31
246.129	1.61	1.48	1.37	1.62	2.29	3.15	246.129	1.52	1.22	1.06	246.129	+241.33	+.63
342.581	1.82	1.68	1.57	1.70	2.29	3.12	342.581	1.51	1.21	1.07	342.581	+239.71	+1.04
439.032	2.09	1.93	1.80	1.79	2.33	3.12	439.032	1.46	1.19	1.07	439.032	+206.12	+1.79
500.000	2.27	2.10	1.96	1.86	2.41	3.19	500.000	1.43	1.17	1.07	500.000	+203.55	+2.00
583.710	2.56	2.36	2.22	1.96	2.48	3.27	583.710	1.35	1.13	1.09	583.710	+208.69	+3.07
680.161	2.96	2.71	2.52	2.12	2.69	3.40	680.161	1.25	1.08	1.15	680.161	+199.24	+4.09
750.000	3.17	2.92	2.74	2.25	2.80	3.59	750.000	1.10	1.14	1.30	750.000	+193.29	+5.44
873.065	3.56	3.32	3.14	2.54	3.09	3.90	873.065	1.07	1.23	1.40	873.065	+192.02	+6.35
1000.000	3.73	3.56	3.40	2.73	3.20	3.82	1000.000	1.36	1.57	1.75	1000.000	+200.88	+5.97
1114.194	3.76	3.69	3.53	2.81	3.18	3.93	1114.194	1.81	2.02	2.23	1114.194	+188.00	+5.59
1210.645	3.79	3.73	3.66	2.95	3.19	3.94	1210.645	2.36	2.60	2.82	1210.645	+183.61	+5.78
1355.323	3.78	3.75	3.73	3.15	3.12	4.13	1355.323	3.52	3.78	4.03	1355.323	+192.03	+6.69
1500.000	3.86	3.83	3.80	3.29	2.98	4.30	1500.000	4.99	5.07	5.22	1500.000	+185.85	+8.33

broadband high dynamic range

Frequency Mixers

LEVEL 10 (+10dBm LO, up to +5dBm RF)

Models
RMS-2LH
LRMS-2LH
JMS-2LH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	Isolation L-R (dB) LO +7dBm	LO +10dBm	LO +13dBm	Isolation L-I (dB) LO +7dBm	LO +10dBm	LO +13dBm
5.000	35.000	7.21	6.77	6.54	5.000	62.90	63.03	63.17	61.70	59.74	58.59
10.000	40.000	7.35	6.92	6.69	10.000	60.72	60.63	60.56	56.64	54.85	53.02
20.000	50.000	7.43	6.93	6.68	20.000	56.90	56.56	56.38	50.87	48.96	47.44
35.151	65.151	7.26	6.82	6.54	35.151	52.94	52.70	52.19	46.68	44.78	43.21
50.000	80.000	7.27	6.80	6.52	50.000	50.55	50.21	49.76	44.19	42.03	40.63
65.303	95.303	7.19	6.77	6.55	65.303	48.62	48.42	48.07	42.20	40.14	38.52
100.000	70.000	7.09	6.71	6.43	100.000	45.57	46.01	45.50	38.94	37.18	35.43
155.758	125.758	7.05	6.67	6.50	155.758	45.00	44.69	43.50	36.99	34.75	32.64
200.000	170.000	7.00	6.65	6.50	200.000	43.27	42.20	40.74	35.71	33.10	30.66
246.212	216.212	7.14	6.76	6.58	246.212	41.61	40.22	38.78	33.82	31.46	29.12
306.515	276.515	7.21	6.78	6.54	306.515	38.09	37.07	35.78	30.82	29.28	27.31
366.818	336.818	6.99	6.62	6.43	366.818	35.00	33.94	32.69	27.62	26.64	24.87
427.121	397.121	7.07	6.68	6.48	427.121	32.17	30.94	29.87	25.77	24.95	23.42
500.000	470.000	7.13	6.70	6.51	500.000	29.37	28.40	27.45	23.10	22.81	21.62
577.879	547.879	7.16	6.71	6.51	577.879	26.83	25.77	25.06	20.87	20.52	19.50
668.333	638.333	7.47	7.07	6.91	668.333	24.18	23.71	22.90	18.33	18.54	17.51
758.788	728.788	8.23	7.63	7.34	758.788	22.16	21.83	21.42	16.22	16.38	15.80
849.242	819.242	9.07	8.30	7.83	849.242	20.62	20.52	20.48	14.76	14.77	14.11
909.545	879.545	9.58	8.82	8.38	909.545	19.88	20.13	20.36	14.06	14.18	13.66
1000.000	970.000	9.80	9.17	8.89	1000.000	19.27	19.83	20.36	12.63	12.95	12.47

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +7dBm	LO +10dBm	LO +13dBm	VSWR, LO port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	VSWR, IF port LO +7dBm	LO +10dBm	LO +13dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.33	1.36	1.41	1.63	2.36	3.52	5.000	1.32	1.14	1.01	5.000	+328.30	−.65
10.000	1.19	1.24	1.30	1.60	2.34	3.39	10.000	1.33	1.15	1.02	10.000	+333.90	−.64
20.000	1.12	1.20	1.26	1.69	2.44	3.55	20.000	1.32	1.14	1.02	20.000	+331.70	−.64
35.151	1.12	1.20	1.26	1.64	2.42	3.45	35.151	1.32	1.14	1.02	35.151	+327.10	−.62
50.000	1.11	1.20	1.26	1.61	2.36	3.41	50.000	1.32	1.14	1.03	50.000	+326.90	−.55
65.303	1.11	1.20	1.26	1.59	2.31	3.37	65.303	1.33	1.14	1.04	65.303	+323.10	−.55
100.000	1.12	1.20	1.27	1.61	2.32	3.29	100.000	1.33	1.15	1.05	100.000	+326.50	−.94
155.758	1.14	1.22	1.28	1.64	2.34	3.41	155.758	1.35	1.17	1.09	155.758	+329.40	−1.40
200.000	1.17	1.24	1.30	1.64	2.28	3.29	200.000	1.37	1.20	1.12	200.000	+330.90	−.71
246.212	1.20	1.26	1.32	1.64	2.29	3.28	246.212	1.38	1.21	1.14	246.212	+337.50	+1.33
306.515	1.25	1.31	1.37	1.69	2.32	3.17	306.515	1.40	1.24	1.17	306.515	+345.80	+2.25
366.818	1.32	1.37	1.43	1.76	2.33	3.09	366.818	1.42	1.26	1.21	366.818	+357.50	+5.78
427.121	1.39	1.44	1.49	1.82	2.40	3.17	427.121	1.42	1.28	1.22	427.121	+332.90	+8.81
500.000	1.51	1.54	1.60	1.94	2.47	3.24	500.000	1.38	1.24	1.19	500.000	+318.00	+11.81
577.879	1.64	1.68	1.72	2.00	2.54	3.26	577.879	1.39	1.27	1.23	577.879	+301.88	+13.86
668.333	1.81	1.84	1.88	2.13	2.67	3.44	668.333	1.36	1.25	1.22	668.333	+306.80	+19.75
758.788	2.00	2.03	2.07	2.28	2.83	3.54	758.788	1.30	1.22	1.21	758.788	+308.30	+27.51
849.242	2.23	2.27	2.32	2.43	2.95	3.58	849.242	1.26	1.18	1.19	849.242	+286.14	+28.33
909.545	2.39	2.42	2.46	2.49	2.94	3.59	909.545	1.22	1.16	1.18	909.546	+279.70	+27.10
1000.000	2.67	2.69	2.70	2.53	2.91	3.49	1000.000	1.16	1.13	1.17	1000.000	+276.78	+24.83

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most widely-used, surface-mount

Frequency Mixers

LEVEL 7 (+7dBm LO, up to +1dBm RF)

Models
RMS-2U
LRMS-2U

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	Isolation L-R (dB) LO +4dBm	LO +7dBm	LO +10dBm	Isolation L-I (dB) LO +4dBm	LO +7dBm	LO +10dBm
10.000	40.000	5.89	5.69	5.59	10.000	54.08	55.08	56.02	56.58	57.44	57.25
20.000	50.000	6.01	5.78	5.68	20.000	53.01	53.83	54.58	53.57	52.73	51.98
39.118	69.118	6.18	5.90	5.76	39.118	50.70	51.99	51.76	48.99	47.22	47.02
50.000	80.000	6.14	5.88	5.74	50.000	49.49	51.27	50.26	47.00	45.11	45.30
68.235	98.235	6.06	5.83	5.72	68.235	47.86	49.27	48.10	44.43	42.51	42.63
100.000	70.000	5.97	5.82	5.72	100.000	45.46	46.22	45.85	41.67	39.55	39.22
126.471	96.471	6.14	5.90	5.76	126.471	43.90	44.61	44.63	39.82	37.77	37.05
155.588	125.588	6.30	6.04	5.88	155.588	42.73	43.33	43.53	38.44	35.95	34.84
200.000	170.000	6.65	6.28	6.03	200.000	41.63	42.36	42.99	36.81	34.23	33.08
242.941	212.941	6.76	6.39	6.13	242.941	41.41	42.52	42.95	35.71	32.47	30.63
301.176	271.176	7.02	6.60	6.33	301.176	41.43	42.44	43.27	34.38	31.27	29.43
330.294	300.294	6.95	6.58	6.24	330.294	41.60	42.50	42.67	33.85	30.71	28.56
388.529	358.529	7.27	6.70	6.44	388.529	40.92	42.62	42.67	32.34	29.23	27.36
446.765	416.765	7.04	6.58	6.19	446.765	36.93	38.36	39.45	31.17	28.68	27.09
500.000	470.000	7.16	6.61	6.26	500.000	35.46	35.52	36.63	29.59	27.43	26.20
592.353	562.353	7.38	6.89	6.59	592.353	35.99	34.35	33.58	31.09	28.33	26.50
708.824	678.824	7.84	7.34	6.97	708.824	35.44	34.65	33.66	31.77	29.18	28.34
796.176	766.176	8.02	7.61	7.33	796.176	31.93	30.87	30.32	29.22	28.03	28.82
912.647	882.647	8.34	7.98	7.68	912.647	31.42	29.10	27.76	25.56	26.37	30.61
1000.000	970.000	8.63	8.28	8.07	1000.000	31.17	28.18	26.44	22.44	24.07	28.80

mixer VSWR

freq. MHz	VSWR, RF port LO +4dBm	LO +7dBm	LO +10dBm	VSWR, LO port LO +4dBm	LO +7dBm	LO +10dBm	freq. (MHz)	VSWR, IF port LO +4dBm	LO +7dBm	LO +10dBm
10.000	1.79	1.73	1.67	1.70	2.45	3.47	10.000	1.71	1.65	1.65
20.000	1.70	1.63	1.56	1.76	2.59	3.63	20.000	1.38	1.34	1.35
39.118	1.69	1.61	1.54	1.72	2.49	3.54	39.118	1.25	1.20	1.21
50.000	1.71	1.63	1.56	1.69	2.47	3.48	50.000	1.23	1.17	1.19
68.235	1.75	1.67	1.59	1.68	2.44	3.43	68.235	1.21	1.14	1.16
100.000	1.80	1.72	1.63	1.69	2.43	3.38	100.000	1.20	1.12	1.14
155.588	1.91	1.81	1.73	1.74	2.44	3.25	155.588	1.18	1.11	1.15
184.706	1.98	1.87	1.78	1.68	2.40	3.15	184.706	1.16	1.11	1.16
200.000	1.99	1.89	1.80	1.70	2.35	3.15	200.000	1.15	1.11	1.17
242.941	2.09	1.97	1.88	1.70	2.33	3.12	242.941	1.13	1.12	1.19
301.176	2.27	2.12	2.02	1.71	2.29	3.02	301.176	1.11	1.16	1.25
359.412	2.40	2.25	2.13	1.74	2.25	2.92	359.412	1.12	1.22	1.32
388.529	2.47	2.31	2.19	1.75	2.23	2.89	388.529	1.14	1.26	1.36
446.765	2.67	2.47	2.33	1.77	2.21	2.84	446.765	1.21	1.36	1.48
500.000	2.39	2.20	2.06	1.84	2.29	2.91	500.000	1.37	1.54	1.65
534.118	2.61	2.43	2.31	1.85	2.28	2.87	534.118	1.39	1.56	1.68
592.353	2.76	2.57	2.45	1.86	2.29	2.89	592.353	1.53	1.71	1.83
737.941	3.00	2.83	2.74	1.92	2.31	2.86	737.941	2.04	2.24	2.39
854.412	3.18	3.03	2.91	2.02	2.30	2.82	854.412	2.48	2.68	2.81
1000.000	3.52	3.42	3.27	2.17	2.32	2.72	1000.000	3.14	3.24	3.30

broadband high dynamic range

Frequency Mixers

LEVEL 13 (+13dBm LO, up to +9dBm RF)

Models
RMS-2MH
LRMS-2MH
JMS-2MH

computer-automated performance data

typical production unit / for data of other models consult factory

mixer conversion loss and isolation

RF MHz	LO MHz	Conversion Loss (dB) LO +10dBm	LO +13dBm	LO +16dBm	freq. - (MHz)	Isolation L-R (dB) LO +10dBm	LO +13dBm	LO +16dBm	Isolation L-I (dB) LO +10dBm	LO +13dBm	LO +16dBm
5.000	35.000	7.41	6.87	6.60	5.000	68.00	67.46	67.25	64.60	60.42	58.26
10.000	40.000	7.27	6.71	6.43	10.000	61.75	61.14	60.85	58.56	54.89	52.71
20.000	50.000	7.41	6.81	6.50	20.000	55.65	55.36	55.06	53.14	49.28	47.35
35.151	65.151	7.42	6.82	6.50	35.151	50.90	50.90	50.76	47.75	44.75	42.96
50.000	80.000	7.46	6.86	6.52	50.000	48.21	48.33	48.26	45.36	42.38	40.27
65.303	95.303	7.37	6.76	6.47	65.303	46.21	46.42	46.53	43.63	40.39	38.31
100.000	70.000	7.30	6.73	6.46	100.000	43.43	44.03	44.68	41.54	37.91	35.78
155.758	125.758	7.07	6.54	6.34	155.758	42.00	43.58	43.20	41.16	37.14	34.01
200.000	170.000	6.99	6.54	6.35	200.000	42.03	42.48	41.47	40.48	36.16	32.68
246.212	216.212	7.07	6.62	6.43	246.212	41.80	40.92	39.46	37.44	34.54	31.13
306.515	276.515	7.26	6.76	6.50	306.515	39.70	38.19	37.21	32.86	31.82	29.51
366.818	336.818	7.35	6.79	6.46	366.818	36.73	34.91	33.65	29.34	28.84	26.71
427.121	397.121	7.11	6.59	6.33	427.121	33.75	32.18	30.97	26.78	26.69	25.11
500.000	470.000	6.95	6.52	6.32	500.000	30.60	29.15	28.09	24.29	24.87	23.43
577.879	547.879	7.19	6.74	6.54	577.879	27.74	26.48	25.54	22.08	22.60	21.35
668.333	638.333	7.51	7.07	6.78	668.333	25.24	24.41	23.63	19.75	20.55	19.39
758.788	728.788	7.91	7.37	7.08	758.788	22.84	22.47	21.97	17.57	18.54	18.08
849.242	819.242	8.61	7.86	7.43	849.242	20.95	20.85	20.75	16.26	16.52	16.18
909.546	879.546	9.18	8.30	7.75	909.546	19.82	19.83	19.82	15.31	15.54	15.05
1000.000	970.000	9.54	8.73	8.22	1000.000	18.72	19.01	19.26	13.94	14.41	14.09

mixer VSWR

ϕ detection

freq. MHz	VSWR, RF port LO +10dBm	LO +13dBm	LO +16dBm	VSWR, LO port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	VSWR, IF port LO +10dBm	LO +13dBm	LO +16dBm	freq. (MHz)	max. DC output mV	DC offset mV
5.000	1.22	1.26	1.31	1.43	2.23	3.52	5.000	1.70	1.38	1.18	5.000	+474.50	−.06
10.000	1.11	1.16	1.23	1.34	2.14	3.44	10.000	1.70	1.38	1.18	10.000	+486.20	−.05
20.000	1.04	1.12	1.20	1.28	2.06	3.24	20.000	1.70	1.38	1.18	20.000	+484.90	−.01
35.151	1.02	1.13	1.21	1.36	2.13	3.31	35.151	1.70	1.38	1.17	35.151	+511.00	+.06
50.000	1.03	1.13	1.21	1.35	2.09	3.22	50.000	1.69	1.37	1.17	50.000	+526.80	+.21
65.303	1.03	1.13	1.21	1.30	2.04	3.15	65.303	1.69	1.37	1.17	65.303	+505.80	+.45
100.000	1.04	1.14	1.21	1.28	2.02	3.10	100.000	1.69	1.37	1.17	100.000	+489.30	−.21
155.758	1.08	1.15	1.22	1.27	1.97	2.94	155.758	1.69	1.37	1.18	155.758	+501.70	−.91
200.000	1.11	1.16	1.23	1.27	1.95	2.87	200.000	1.69	1.37	1.18	200.000	+515.60	−1.23
246.212	1.14	1.19	1.25	1.31	1.98	2.86	246.212	1.68	1.37	1.18	246.212	+487.00	+.94
306.515	1.20	1.23	1.29	1.35	1.93	2.71	306.515	1.68	1.37	1.18	306.515	+536.60	+2.37
366.818	1.26	1.29	1.34	1.42	2.04	2.89	366.818	1.66	1.35	1.17	366.818	+475.90	+6.58
427.121	1.32	1.35	1.40	1.49	2.09	2.89	427.121	1.62	1.33	1.17	427.121	+457.60	+10.90
500.000	1.41	1.44	1.48	1.58	2.11	2.79	500.000	1.55	1.28	1.12	500.000	+401.70	+15.53
577.879	1.52	1.54	1.58	1.66	2.15	2.80	577.879	1.51	1.26	1.12	577.879	+440.10	+23.21
668.333	1.65	1.68	1.71	1.77	2.21	2.84	668.333	1.45	1.23	1.10	668.333	+376.40	+34.10
758.788	1.80	1.82	1.85	1.87	2.31	2.89	758.788	1.40	1.21	1.08	758.788	+391.40	+46.83
849.242	1.97	1.98	2.04	2.03	2.47	3.05	849.242	1.37	1.18	1.06	849.242	+428.80	+49.54
909.546	2.17	2.18	2.23	2.13	2.56	3.14	909.546	1.34	1.16	1.05	909.546	+380.20	+47.85
1000.000	2.42	2.43	2.44	2.21	2.61	3.15	1000.000	1.30	1.13	1.03	1000.000	+432.10	+43.09

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POWER SPLITTER COMBINERS

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understanding power splitters . . .

how they work, what parameters are critical, and how to select the best value for your application.

Basically, a 0° splitter is a passive device which accepts an input signal and delivers multiple output signals with specific phase and amplitude characteristics. The output signals theoretically possess the following characteristics:

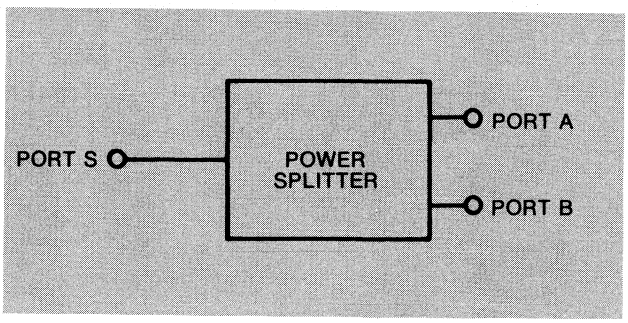
- equal amplitude
- 0° phase relationship between any two output signals
- high isolation between each output signal
- insertion loss as follows:

Number of Output Ports	Theoretical Insertion Loss (dB)
2	3.0
3	4.8
4	6.0
5	7.0
6	7.8
8	9.0
10	10.0
12	10.8
16	12.0
24	13.8
48	16.8

Since the 0° power splitter is a reciprocal passive device it may be used as a power combiner simply by applying each signal singularly into each of the splitter output ports. The vector sum of the signals will appear as a single output at the splitter input port.

The power combiner will exhibit an insertion loss that varies depending upon the phase and amplitude relationship of the signals being combined. For example, in a 2 way 0° power splitter/combiner, Fig. 1 if the two input signals are equal in amplitude and are in-phase then the insertion loss is zero. However, if the signals are 180° out-of-phase the insertion loss is infinite. And, if the two signals are at different frequencies, the insertion loss will equal the theoretical insertion loss shown above.

The power combiner will also exhibit isolation between the input ports. The amount of isolation will depend upon the impedance termination at the combiner output or sum port. For example, in the 2 way 0° power splitter/combiner of Fig. 1 if port S is open then the isolation between ports A and B would be 6dB. And, if port S is terminated by a matched impedance (for maximum power transfer) then the isolation between ports A and B would be infinite.

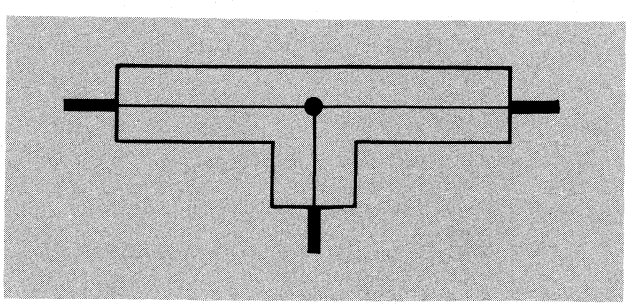


1. When used as a 0° power splitter, the input is applied to port S and equal outputs appear at ports A and B. When used as a power combiner, both inputs are applied to ports A and B and the sum taken from port S.

The following signal processing functions can be accomplished by power splitter/combiners:

1. Add or subtract signals vectorially.
2. Obtain multi in-phase output signals proportional to the level of a common input signal.
3. Split an input signal into multi-outputs.
4. Combine signals from different sources to obtain a single port output.
5. Provide a capability to obtain RF logic arrangements.

let's analyze a basic power splitter



1A. Basic 2 way 0° power splitter, simple "T".

The most basic form of a power splitter is a simple "T" connection, which has one input and two outputs. If the "T" is mechanically symmetrical, a signal applied to the input will be divided into two output signals, equal in amplitude and phase. The arrangement is simple and it works, with limitations.

The two obvious limitations are impedance mismatch

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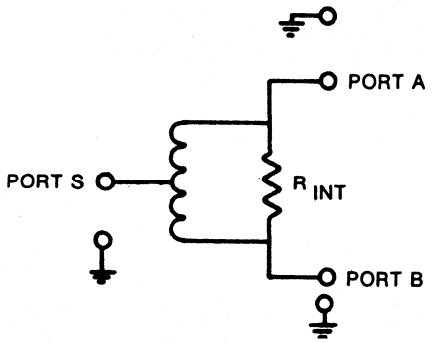


2. In two-way splitter/combiner, equal and opposite currents flow through the internal resistor and transformer, cancel each other, and provide high isolation between ports A and B.

and poor isolation. In a 50-ohm system, each output would be connected to a 50-ohm impedance, thus offering a 25-ohm impedance to the input port. Thus, the impedance looking into the common or input port would present a mismatch in a 50-ohm system. To correct this mismatch, a 25 to 50-ohm matching transformer would be necessary for the simple "T."

Now, consider the second serious limitation of a simple "T," poor isolation. Suppose, for example, that two antennas were fed to a receiver input using a simple "T" as a combiner. If one antenna appears as a short at its resonant frequency, it would load down the other antenna and, in effect, wipe out the receiver input. However, a properly designed power combiner would provide high isolation between inputs so that the antenna "short condition" at one input would have little influence on the other input and would cause approximately a 3:1 VSWR mismatch at the output port, in this case, the receiver input.

In a simple "T" circuit power combiner the isolation between input ports will depend upon the impedance termination at the output port. If the output port is open then the input ports wouild have zero isolation between them. And, if the output port is terminated by a matched impedance the isolation would be 3dB.

Improving upon the simple "T" circuit, consider the basic lumped element power splitter/combiner circuit of Fig. 2. The transformer has an equal number of turns from the center tap to each end. Therefore, as an auto transformer (2 to 1 turns ratio) the impedance across the output ends is 4 times larger than the impedance across the center tap to one end.

Let's examine how this circuit enables high isolation between ports A and B. As a power combiner, an input signal applied to port A will cause a current to flow through the transformer and experience a 180° phase shift by the time it arrives at port B. Similarly, a current will also flow through the resistor, R int and will not experience a phase shift by the time it arrives at port B. When R int equals the impedance value across the transformer ends then, the currents appearing at port B will be equal in amplitude but opposite in phase and cancel. The net result is that no voltage appears at port B from the input signal applied at port A. Thus, there is theoretically infinite isolation between the ports.

Further examining the circuit of Fig. 2, let's determine the theoretical insertion loss between port S and ports A and B. As a power splitter, a signal applied at port S will be split so that identical signals appear at ports A and B, due to the circuit symmetry. If the impedance values are matched then maximum power transfer will take place and half the input power would appear at each port resulting in a 3dB theoretical loss at each port. Furthermore, under the conditions described the circuit is lossless since the voltage across R int is zero.

Let's take an example to illustrate the concepts described. Suppose we have a 50 ohm system so that ports A and B are each terminated in 50 ohms. They appear across the transformer in series so that a 100 ohm transformer impedance is required for optimum power match. Since the transformer has a 4 to 1 impedance ratio, the impedance at port S is 25 ohms. In this example we must add a 2 to 1 (50 to 25 ohm) transformer at port S so that the S port impedance is matched to the 50 ohm system. Remembering the value of R int equals the transformer impedance (to obtain maximum isolation), R int equals 100 ohms. We have now completely specified the circuit values of the 50 ohm 2 way 0° power splitter.

mismatch effect on isolation

Consider the ideal situation in a two-way power combiner where there is infinite isolation between the two input ports. A signal applied to port A will be routed to port S, minus a 3 dB loss in the internal resistor; since isolation is perfect, none of the input signal will reach the other input port. Now, if port S is properly terminated, the sum signals will be absorbed and nothing will be reflected back to the input ports. Fine, as long as port S is properly terminated and thus no mismatch.

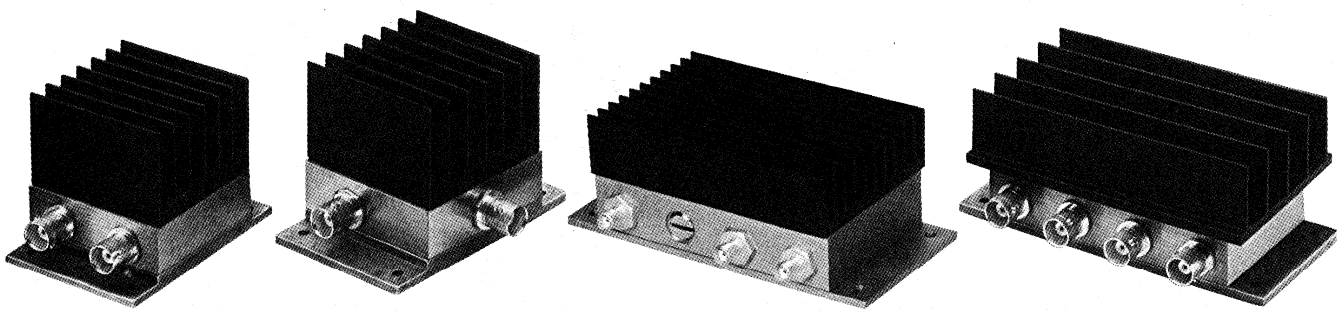
Now, let's consider two examples of mismatch at port S, one slight and another large. Assume a +20 dBm signal is applied to port A; with perfect isolation, none of this signal reaches port B. Since there is a 3 dB loss between input A and port S due to the loss in the internal resistor, +17 dBm arrives at port S ignoring any slight transformer loss. If a slight impedance mismatch exists at port S, which causes a −20 dB signal reflection, then a signal of −3 dBm (+17 dBm attenuated by 20 dB) is sent back to ports A and B. This −3 dBm signal experiences a 3 dB loss as it is fed to port B, and the mismatch has now resulted in a −6 dB signal at input B from port A. Now isolation between both input ports is not infinite; there is a +20 dBm signal at port A and a −6 dBm signal at port B for an isolation of 26 dB. Reason? Slight impedance mismatch at port S.

What about a more serious mismatch? Suppose the +17 dBm signal arrives at port S and a mismatch produces a −10 dB signal reflection. Now +7 dBm is fed back to port B (+17 dBm with 10 dB loss); add the additional return 3 dB loss, and a +4 dBm signal appears at port B. Now isolation is only 16 dB, the difference between port A's 20 dBm and the 4 dBm signal at port B due to the mismatch.

Important point: make sure port S is properly matched to eliminate reflections and thus maintain high isolation. Mismatch at either port A or B is not critical if port S of a power combiner is properly matched. If cancellation through the transformer and internal resistor is taking place, there will not be any voltage drop across port A and B and thus no effect on isolation.

HIGH POWER COMBINERS/SPLITTERS

2,3 and 4 WAY 2 MHz to 2 GHz



ZA2CS ZA3CS ZB3CS ZB4CS

	MODEL NO.	No. of WAYS	FREQ. MHz f_L	FREQ. MHz f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS+ dB (above theoretical) Typ.	INSERTION LOSS+ dB (above theoretical) Max.	PHASE UNBALANCE Degrees Typ.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Typ.	AMPLITUDE UNBALANCE dB Max.	POWER INPUT, W[1] as Combiner[2] Max.	POWER INPUT, W[1] as Splitter Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZA2CS-500-15W	2	200	500	31	20	0.3	1.0	0.3	3.0	0.10	0.4	15	15	2-121	AW254	—	74.95
	ZA2CS-600-10W	2	100	600	27	15	0.4	1.3	0.4	3.0	0.15	0.5	10	10	2-121	AW254	—	74.95
NEW △	ZA2CS-2G-20W	2	1800	2000	30	20	0.2	0.5	0.5	4.0	0.05	0.2	20	20	2-122	AW254	—	89.95
	ZA3CS-400-3W*	3	2	400	25	17	0.5	1.2	0.2	3.0	0.15	0.5	3	10	2-122	CC258	—	59.95
	ZA3CS-450-9W	3	100	450	22	15	0.9	1.8	2.5	8.0	0.20	0.7	9	12	2-123	AX255	—	99.95
NEW △	ZB3CS-920-15W	3	825	920	27	17	0.2	0.8	1.7	6.0	0.11	0.5	15	15	2-123	AW256	—	114.95
	ZB4CS-440-12W	4	100	440	27	17	0.6	1.2	0.8	4.0	0.15	0.5	12	10	2-124	AW256	—	134.95
NEW △	ZB4CS-960-12W	4	820	960	28	17	0.3	0.8	2.0	6.0	0.2	0.6	12	12	2-124	AW256	—	134.95

features

- low insertion loss
- very low amplitude unbalance
- low phase unbalance
- as a combiner, ideal for VHF transmitter applications
- cellular applications

+Theoretical Insertion Loss

2-Way ..... 3.0 dB
3-Way ..... 4.8 dB
4-Way ..... 6.0 dB
6-Way ..... 7.8 dB
8-Way ..... 9.0 dB

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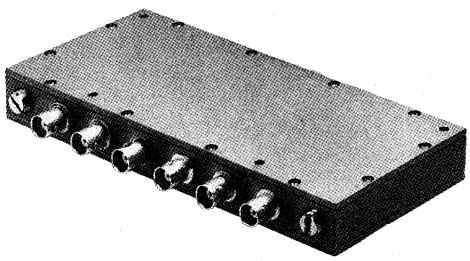
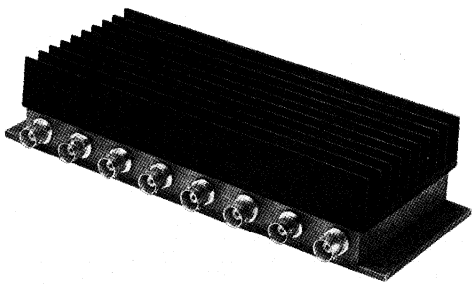
6 AND 8 WAY 50 MHz to 950 MHz



ZB6CS



ZB8CS

MODEL NO.	No. of WAYS	FREQ. MHz f_L f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS+ dB (above theoretical) Typ.	INSERTION LOSS+ dB (above theoretical) Max.	PHASE UNBALANCE Degrees Typ.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Typ.	AMPLITUDE UNBALANCE dB Max.	POWER INPUT, W[1] as Combiner[2] Max.	POWER INPUT, W[1] as Splitter Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZB6CS-150-12W	6	50-150	32	20	0.5	1.2	3.0	9.0	0.15	0.5	12	10	2-125	Z259	—	159.95
ZB8CS-950-32W	8	800-950	30	18	0.4	1.0	2.0	6.0	0.10	0.5	32	32	2-125	AW257	—	199.95

NOTES:

△ Available only with SMA connectors

A. General Quality Control Procedures, Environmental Specifications are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted option, case finishes are given in section 0, see "Case styles & Outline drawings".

C. Prices and Specifications subject to change without notice.

* Photo for ZA3CS-400-3W not shown. See outline drawing CC258.

1. Over -55°C to +55°C. Derate linearly to 20% of rating at 90°C.
2. As a combiner of noncoherent signals, max. power per port is power rating divided by number of ports.
3. Operating temperature: -55°C to 90°C
   Storage temperature: -55°C to 100°C

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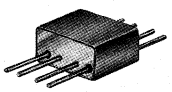
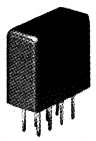
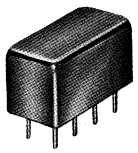
POWER SPLITTERS/COMBINERS 50 & 75Ω Plug-In

2 WAY-0° 4 kHz to 2.5 GHz


LPS


MSC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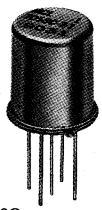
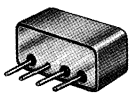

TO5SC


TSC

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	LPS-109	10-500	35	25	30	25	30	25	0.3	0.5	0.4	0.6	0.5	1.1	2.0	3.0	4.0	0.15	0.2	0.3	2-84	BB48	an	17.95
	MSC-2-1	0.1-450	20	15	30	20	30	20	0.3	0.5	0.4	0.75	0.6	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-89	A03	ap	18.95
	MSC-2-1W	2-650	22	18	30	20	22	18	0.3	0.5	0.5	0.8	0.8	1.2	1.0	2.0	4.0	0.3	0.2	0.3	2-89	A03	ap	20.95
	MSC-2-5	5-1500	18	16	20	16	20	14	0.6	0.8	0.6	0.8	0.6	1.1	2.0	3.0	5.0	0.2	0.3	0.4	2-29	A03	ap	24.95
	MSC-2-11	5-2000	18	16	20	16	18	11	0.6	0.8	0.6	0.8	1.2	1.8	2.0	3.0	5.0	0.2	0.3	0.5	2-94	A03	ap	29.95
	PSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.6	0.4	0.75	0.6	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-84	A01	ap	10.95
	PSC-2-1W	1-650	25	20	35	20	25	20	0.3	0.6	0.5	0.9	0.7	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-85	A01	ap	16.95
✣	PSC-2-2	0.004-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2.0	3.0	4.0	0.15	0.25	0.3	2-85	A01	ap	23.95
	PSC-2-4	10-1000	30	25	25	20	25	20	0.6	1.0	0.6	1.2	0.7	1.3	2.0	4.0	8.0	0.15	0.2	0.4	2-86	A01	ap	23.95
	PSC-2-5	10-1400	28	18	22	17	24	17	0.3	0.6	0.6	1.0	0.9	1.6	2.0	3.0	4.0	0.15	0.2	0.4	2-29	A01	ap	29.95
	PSC-2-11	5-2000	21	16	22	18	19	9	0.5	0.8	0.6	0.9	0.7	1.5	1.0	3.0	6.0	0.20	0.4	1.0	2-126	A01	ap	34.95
	PSC-2-45	700-900			20	17					0.2	0.4				3.0			0.2		2-86	A01	ap	22.95
	PSC-2-1000	400-1000			35	25					0.5	1.0				2.0			0.3		2-126	A06	ap	22.95
■	PSC-2-1-75	0.25-300	20	15	30	20	20	15	0.4	0.75	0.4	0.75	0.4	1.0	2.0	3.0	5.0	0.15	0.2	0.3	2-87	A01	ap	13.45
■	PSC-2-1-75A*	1-200	35	27	46	35	36	25	0.1	0.3	0.2	0.4	0.35	0.6	1.0	1.0	2.0	0.1	0.15	0.15	2-97	A06	ap	14.45
■	PSC-2-1V-75	40-450			31	27					0.5	1.0				4.0			0.3		2-96	A01	ap	14.45
■	PSC-2-1W-75**	30-600	30	22	—	—	30	20	0.4	0.8	—	—	0.6	1.2	2.0	—	4.0	0.2	—	0.3	2-97	A06	ap	18.95
✣■	PSC-2-2-75	0.008-60	35	20	40	25	30	22	0.1	0.4	0.15	0.4	0.3	0.8	1.0	1.0	1.0	0.15	0.15	0.15	2-96	A01	ap	23.95
■	PSC-2-4-752	10-850	31	20	32	23	23	15	0.3	0.5	0.4	0.6	0.5	1.0	2.0	5.0	10.0	0.1	0.2	0.5	2-88	A01	ap	23.95
■	PSC-2375	55-85			35	25					0.3	0.5				1.0			0.1		2-87	A01	ap	23.95
	PSC-2-500-1W	225-500			27	20					0.2	0.6				2.0			0.2		2-127	A01	ap	21.95
	PSC-2-960-1W	300-960			27	20					0.5	1.2				3.0			0.4		2-127	A01	ap	25.95
	TO5SC-110	5-500	36	20	40	25	36	20	0.3	0.6	0.3	0.7	0.6	1.0	1.0	2.0	2.0	0.10	0.20	0.2	2-128	PP163	ak	19.95
	TO5SC-2-1	1-500	30	20	28	20	26	20	0.2	0.5	0.3	0.7	0.7	1.5	2.0	1.0	2.5	0.25	0.25	0.4	2-95	PP163	ak	18.95
	TSC-2-1	1-400	30	25	30	25	30	20	0.25	0.5	0.4	0.75	0.8	1.0	2.0	3.0	4.0	0.15	0.2	0.6	2-90	B02	aj	15.95
			L2		U2				L2		U2				L2	U2		L2	U2					
NEW	TSC-2-1W	200-1000	26	20	23	14			0.3	0.8	0.7	1.5			5	10		0.7	0.5		2-129	B02	aj	19.95

L = low range (f_L to 10 f_L)
L_2 = (f_L to f_U/2)

M = mid range (10 f_L to f_U/2)
U_2 = (f_U/2 to f_U)

U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

* VSWR typical 1.1:1 over total range of frequency, max 1.2:1 for low and upper range, max 1.15:1 for mid range.

** VSWR low range 1.1:1 typical, 1.3:1 max; upper range 1.15:1 typical, 1.25:1 max.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating, 1 Watt except JYPS-2-4-75, PSC-2-11, 0.5 Watt
   1b. Internal load dissipation, 0.125 Watt except PSC-2-500-1W, PSC-2-960-1W, 0.5 Watt

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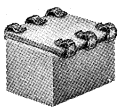
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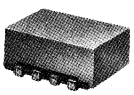
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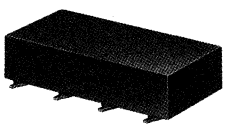

SCP

SYPS

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
NEW	JPS-2-1N	350-550			30	20					0.25	0.5				3.0			0.3		2-129	BH292	hv	8.95
	JPS-2-1W	3-750	36	20	28	17	19	16	0.5	0.8	0.4	1.0	0.9	1.4	1.0	2.0	4.0	0.2	0.3	0.4	2-130	BH292	hv	8.95
NEW	JPS-2-4	100-1000			22	16					0.5	1.4				5.0			0.4		2-130	BH292	hv	9.95
NEW	JPS-2-900	400-900			24	18					0.5	1.2				3.0			0.4		2-131	BH292	hv	9.95
NEW ■	JYPS-2-4-75	5-1000	24	17	25	20	30	18	0.4	0.8	0.4	1.0	0.8	1.5	3.0	4.0	5.0	0.2	0.3	0.4	2-138	BJ293	jf	16.95
	LRPS-2-1	5-500	50	25	33	24	30	23	0.25	0.5	0.3	0.6	0.5	1.2	1.0	2.0	3.0	0.15	0.2	0.3	2-118	QQQ130	am	8.95
■	LRPS-2-1-75	2-500	35	18	35	25	27	20	0.30	0.8	0.35	0.6	0.5	1.0	1.0	2.0	3.0	0.15	0.2	0.3	2-139	QQQ130	am	8.95
■	LRPS-2-1W-75	10-650	28	22	29	24	30	20	0.5	1.0	0.6	0.75	0.6	1.2	1.0	2.0	3.0	0.15	0.2	0.3	2-139	QQQ130	am	9.95
	LRPS-2-4	10-1000	25	20	23	16	19	14	0.3	0.5	0.4	0.9	0.8	1.5	1.0	3.0	5.0	0.15	0.2	0.4	2-120	QQQ130	am	19.95
	LRPS-2-11	20-2000	19	15	21	15	30	15	0.6	0.8	0.7	1.0	0.8	1.5	2.0	3.0	5.0	0.2	0.3	0.7	2-132	QQQ130	gn	24.95
	LRPS-2-25	1700-2500			20	16					0.8	1.3				10.0			0.9		2-132	QQQ130	gn	21.95
	LRPS-2-980	800-980			30	18					0.5	1.0				3.0			0.5		2-133	QQQ130	am	8.95
	SCP-2-1	0.1-400	25	15	30	20	25	20	0.3	1.2	0.2	0.6	0.4	1.1	2.0	2.0	3.0	0.15	0.2	0.3	2-92	YY101	aq	10.45
	SCP-2-1A	1-550	25	20	25	20	25	20	0.3	0.6	0.3	0.6	0.7	1.3	2.0	2.0	3.0	0.15	0.2	0.4	2-92	YY101	aq	10.45
	SYPS-2-1	2-500	40	20	32	20	30	20	0.2	0.6	0.3	0.75	0.6	1.0	2.0	3.0	4.0	0.2	0.3	0.5	2-133	TTT167	hk	12.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN	MIL-P-23971/15*
MSC-2-1	6625-01-124-8595	02
PSC-2-1	6625-00-548-0739	01
PSC-2-1W	5985-01-190-7701	
PSC-2-2	6625-01-143-2571	
PSC-2-4	6625-01-230-0492	
TSC-2-1	5895-01-332-8100	

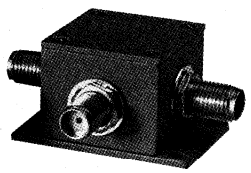
* units are not QPL listed

pin connections see case style outline drawings for pin locations

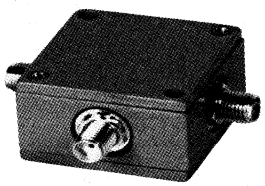
PORT	aj	ak	am	an	ap	aq	gn	he	hk	hv	jf
SUM PORT	1	2	6	1	1	1	6	5	3	1	1
PORT 1	2	1	4	4	5	5	4	9	1	3	3
PORT 2	4	3	3	5	6	6	3	1	2	4	6
GND EXT.	3	4,5	1	2,3,6,7,8	2,3,4,7,8	2,3,4,7,8	1,2,5	all other pins	4,5,6	6	7,8
CASE GND	3	4,5	—	2,3,6,7,8	2,3,4,7,8	—	—	all other pins	—	—	—
NOT USED			2,5		—	—	—		—	2,5	2,4,5

POWER SPLITTERS/COMBINERS 50 & 75Ω

2 WAY-0° 2 kHz to 10 GHz



ZESC-2



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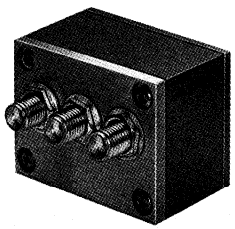

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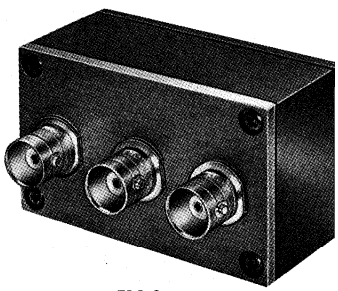


ZSC-2

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 3dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ.	S Max.	OUT Typ.	OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZESC-2-11	10-2000	19	10	18	13	20	11	0.5	0.9	0.5	1.0	0.6	1.2	1	3	6	0.20	0.30	0.50					2-94	V37	ar	71.95
	ZFSC-2-1	5-500	30	25	28	20	25	20	0.2	0.5	0.3	0.6	0.6	0.8	2	4	4	0.15	0.15	0.30					2-91	K18	ar	44.95
■	ZFSC-2-1-75	0.25-300	20	15	30	25	25	20	0.4	0.75	0.4	0.75	0.4	1.0	2	3	5	0.15	0.20	0.30					2-91	K18	ar	45.95
■	ZFSC-2-1W-75	5-600	44	26	45	30	31	20	0.22	0.6	0.27	0.7	0.46	0.9	1	2	3	0.20	0.30	0.40					2-138	K18	ar	50.95
	ZFSC-2-1W	1-750	30	20	28	20	25	20	0.2	0.5	0.4	0.8	0.8	1.0	2	4	4	0.15	0.15	0.30					2-163	K18	ar	48.95
	ZFSC-2-2	10-1000	30	20	25	20	23	18	0.2	0.5	0.5	1.0	0.9	1.2	2	4	4	0.15	0.15	0.30					2-163	K18	ar	51.95
		GHz	L1	U1					L1		U1				L1	U1		L1	U1									
	ZFSC-2-9G	3.5-9.0	18	12	20	12			0.5	1.5	0.6	1.2			7	10		0.30	0.50						2-93	JJJ142	as	59.95
	ZFSC-2-10G	2.0-10.0	15	9	20	12			0.5	1.5	0.6	1.6			7	12		0.60	0.50						2-93	JJJ142	as	69.95
	ZFSC-2-4	0.2-1000	20	15	25	20	23	18	0.2	0.5	0.5	1.0	0.9	1.2	2	4	4	0.15	0.15	0.30					2-164	K18	ar	55.95
	ZFSC-2-5	10-1500	25	15	30	20	25	18	0.25	0.6	0.5	1.0	0.8	1.5	2	3	4	0.15	0.20	0.50					2-164	K18	ar	59.95
✣	ZFSC-2-6*	0.002-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.20	0.30					2-165	K18	ar	49.95
✣■	ZFSC-2-6-75	0.004-60	30	20	35	20	25	20	0.5	0.8	0.4	0.8	0.7	1.0	1	2	3	0.15	0.20	0.30					2-165	K18	ar	51.95
NEW	ZFSC-2-11	10-2000	14	10	16	14	20	15	1.2	1.5	1.2	1.5	1.0	2.2	1	2	4	0.20	0.30	0.50					2-94	K18	ar	64.95
△	ZFSC-2-2500	10-2500	16	11	17	14	17	14	0.5	0.8	0.6	1.4	0.8	1.5	1	4	8	0.20	0.30	0.40					2-94	K18	ar	74.95
	ZMSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.5	0.4	0.75	0.6	1.0	2	3	4	0.15	0.20	0.30					2-32	M21	at	49.95
	ZMSC-2-1W	1-650	25	20	35	20	25	20	0.3	0.5	0.5	0.8	0.7	1.0	2	3	4	0.15	0.20	0.30					2-32	M21	at	54.95
✣	ZMSC-2-2*	0.002-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30					2-43	M21	at	59.95
	ZSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.5	0.4	0.75	0.6	1.0	2	3	4	0.15	0.20	0.30					2-32	M22	at	47.95
	ZSC-2-1W	1-650	25	20	35	25	25	20	0.3	0.5	0.5	0.8	0.7	1.0	2	3	4	0.15	0.20	0.30					2-32	M22	at	49.95
✣	ZSC-2-2*	0.002-60	25	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30					2-33	M22	at	52.95
✣■	ZSC-2-2-75*	0.002-60	25	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30					2-96	M22	at	53.95
	ZSC-2-4	10-1000	25	20	35	20	25	20	0.2	0.5	0.5	0.8	0.7	1.3	2	4	6	0.15	0.20	0.30					2-33	M22	at	52.95
■	ZSC-2375	55-85			35	25					0.3	0.5				1			0.10						2-166	M22	at	52.95
■	ZSC-2-1-75	0.25-300	20	15	30	20	20	15	0.4	0.75	0.4	0.75	0.4	1.0	2	3	5	0.15	0.20	0.30					2-166	M22	at	49.95

see Performance Data and curves

NOTES:

* Isolation specified to 0.004 MHz

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (fL to 10 fL), linearly derate maximum input power by 13 dB.

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

△ Available only with SMA connectors

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

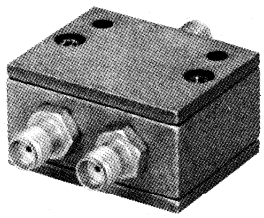
1a. Matched power rating, models ZAPD, ZN2PD, ZC2PD 10 Watt ZAPD-900-5W, 5W (as a splitter), other models 1 Watt

1b. Internal load dissipation 0.125 Watt; ZAPD-900-5W, 1W max

coaxial connections

see case style outline drawing for pin locations

PORT	ar	as	at
SUM PORT	3	S	2
PORT 1	1	1	1
PORT 2	2	2	3
GND EXT.			
CASE GND			
NOT USED			



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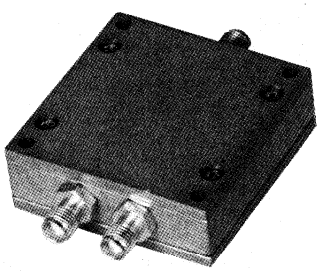

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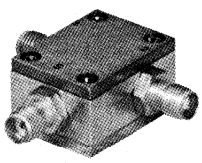

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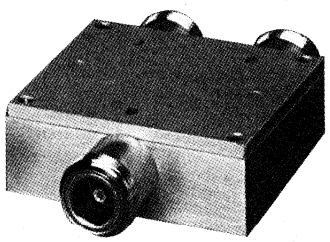

ZAPD

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ. Min.	ISOLATION dB Mº Typ. Min.	ISOLATION dB U Typ. Min.	INSERTION LOSS, dB Above 3dB L Typ. Max.	INSERTION LOSS, dB Above 3dB Mº Typ. Max.	INSERTION LOSS, dB Above 3dB U Typ. Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees Mº Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB Mº Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ.	VSWR (:1) S Max.	VSWR (:1) OUT Typ.	VSWR (:1) OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZC2PD-900	800-900		30	20		0.1	0.4		2			0.20		1.10	1.30	1.10	1.30	2-109	F183	as	64.95
ZN2PD-920	800-920		30	20		0.15	0.4		2			0.20		1.10	1.20	1.04	1.20	2-108	VVV180	as	59.95
ZN2PD-920W	700-1050		22	15		0.15	0.5		3			0.30		1.20	1.50	1.04	1.20	2-108	VVV180	as	54.95
ZN2PD-1900	1600-1900		30	20		0.18	0.4		2			0.20		1.20	1.35	1.04	1.20	2-134	VVV180	as	69.95
ZN2PD-1900W	1500-2000		24	15		0.2	0.5		3			0.30		1.20	1.50	1.04	1.20	2-134	VVV180	as	64.95
	GHz																				
IZY2PD-64	5.8-6.4		35	24		0.2	0.5		5			0.30		1.05	1.30	1.20	1.35	2-135	JJJ245	as	89.95
IZY2PD-86	7.0-8.6		30	18		0.1	0.5		6			0.25		1.10	1.45	1.10	1.40	2-135	JJJ245	as	94.95
ZAPD-1	0.5-1.0		25	19		0.25	0.6		2			0.20		see				2-34	F14	ar	54.95
ZAPD-2	1.0-2.0		25	19		0.25	0.6		2			0.20		Performance				2-34	F14	ar	54.95
ZAPD-21	0.5-2.0		25	18		0.25	1.0		3			0.20		Data and				2-35	F53	ar	59.95
ZAPD-4	2.0-4.2		25	19		0.4	0.8		6			0.40		curves				2-35	F14	ar	59.95
ZAPD-50	4.4-5.0		26	20		0.3	0.8		5			0.50						2-136	F14	ar	54.95
ZAPD-50W	4.2-6.0		26	16		0.3	0.8		5			0.70						2-136	F14	ar	64.95
NEW ZAPD-900-5W	0.1-0.9		23	18		0.3	1.0		3			0.30		1.15	1.50	1.22	1.50	2-137	F14	ar	59.95
ZAPD-1750	0.95-1.75		30	22		0.2	0.4		4			0.50		1.15	1.50	1.22	1.50	2-137	F14	ar	54.95

L = low range (f_L to 10 f_L)
L1 = f_L to 6 GHz

M = mid range (10 f_L to f_U/2)
U1 = 6 GHz to f_U

U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN	MCL NO.	NSN	MCL NO.	NSN
ZAPD-1(TNC)	5985-01-250-4883	ZFSC-2-2(SMA)	6625-01-333-1127	ZSC-2-1(TNC)	6625-01-310-2129
ZAPD-2(SMA)	5895-01-229-7431	ZFSC-2-2B	5895-01-330-4416	ZSC-2-1	5895-01-214-6032
ZAPD-4	6625-01-173-1887	ZFSC-2-4(TNC)	5985-01-250-4882	ZSC-2-1B	6625-01-018-1066
ZAPD-4(SMA)	5985-01-383-0636	ZFSC-2-5	6625-01-253-2444	ZSC-2-1B(TNC)	6625-01-109-3706
ZESC-2-11	5985-01-381-9081	ZFSC-2-6	6625-01-419-4241	ZSC-2-1(BNC)	5895-01-036-6254
ZFSC-2-1	6625-01-139-3499	ZFSC-2-6(BNC)	5895-01-408-6857	ZSC-2-1B(BNC)	6625-00-270-3055
ZFSC-2-1(SMA)	6625-01-213-6490	ZFSC-2-6B	5985-01-315-2869	ZSC-2-1W	5895-01-283-0850
ZFSC-2-1(BNC)	5985-01-176-4551	ZFSC-2-11(SMA)	6625-01-415-2183	ZSC-2-1WB	6625-01-264-8985
ZFSC-2-1-75	5895-01-325-4795	ZMSC-2-1	5985-01-333-1128	ZSC-2-1-75B	5895-01-136-8182
ZFSC-2-1W(SMA)	6625-01-200-5094	ZMSC-2-1B	5895-01-253-2445	ZSC-2-2B	5820-01-136-7245
ZFSC-2-1W	5895-01-348-3534	ZMSC-2-1BR	5985-01-338-9329	ZSC-2-2-75B	5915-01-012-8162
ZFSC-2-2B(SMA)	6625-01-362-1801	ZMSC-2-1W	5895-01-127-0232	ZSC-2375	5895-01-229-0157

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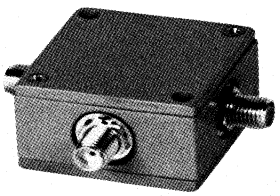
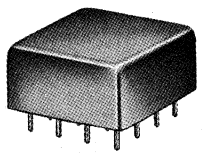
POWER SPLITTERS/COMBINERS 50 Ω

2 WAY-0° RESISTIVE DC to 4200 MHz



ZFRSC



PRSC

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB M Typ.	ISOLATION dB U Typ.	INSERTION LOSS, dB Above 6dB L Typ.	INSERTION LOSS, dB Above 6dB L Max.	INSERTION LOSS, dB Above 6dB M Typ.	INSERTION LOSS, dB Above 6dB M Max.	INSERTION LOSS, dB Above 6dB U Typ.	INSERTION LOSS, dB Above 6dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
△	ZFRSC-42	DC-4200	6.2	6.5	7.0	0.1	0.2	0.1	0.5	0.4	1.4	1	3	5	0.1	0.2	0.5	2-90	K18	ar	59.95
■	ZFRSC-2075	DC-2000	6.2	6.6	7.0	0.1	0.2	0.3	0.6	0.5	1.4	1	2	5	0.1	0.2	0.5	2-88	K18	ar	59.95
	ZFRSC-2050	DC-2000	6.2	6.6	7.0	0.1	0.2	0.3	0.6	0.5	1.4	1	2	5	0.1	0.2	0.5	2-95	K18	ar	59.95
	PRSC-2050	DC-2000	6.0	6.2	6.5	0.1	0.3	0.2	0.7	0.5	1.0	1	3	5	0.1	0.3	0.5	2-95	C145	au	29.95

L = DC to 100 MHz M = mid range (100 MHz to $f_U/2$) U = upper range ($f_U/2$ to f_U)

Above models are resistive power dividers to enable frequency coverage from dc to the highest rated frequency. Since resistive power dividers do not provide a high degree of isolation (basically isolation equals the insertion loss between ports), an amplifier such as Mini-Circuits' ZFL series is recommended when high isolation is required. Matched power rating 0.75W, internal load dissipation 0.375W.

NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

△ Available only with SMA connectors

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,
model ZAPDQ 10 Watt
all other models 1 Watt

1b. Internal load dissipation, 0.125 Watt

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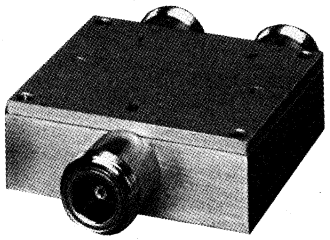
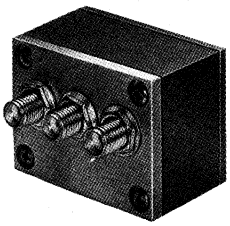
2 WAY-90° 20 to 4200 MHz



ZAPDQ



ZMSCQ-2

ZSCQ-2

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Typ.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Max.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZAPDQ-2	1000-2000	22	16	0.4	1.4	6.0	0.8	2-42	F14	ar	79.95
ZAPDQ-4	2000-4200	22	16	0.4	0.9	8.0	1.0	2-42	F14	ar	79.95
ZMSCQ-2-21.4	20-23	30	25	0.4	0.7	3.0	1.2	2-39	M21	at	61.95
ZMSCQ-2-50	25-50	30	20	0.3	0.7	3.0	1.5	2-39	M21	at	61.95
ZMSCQ-2-90	55-90	30	20	0.3	0.7	3.0	1.2	2-40	M21	at	61.95
ZMSCQ-2-120	80-120	25	18	0.3	0.7	3.0	1.5	2-99	M21	at	61.95
ZMSCQ-2-180	120-180	23	15	0.3	0.7	4.0	1.2	2-40	M21	at	61.95
ZSCQ-2-50	25-50	30	20	0.3	0.7	3.0	1.5	2-39	M22	at	54.95
ZSCQ-2-90	55-90	30	20	0.3	0.7	3.0	1.2	2-39	M22	at	54.95
ZSCQ-2-180	120-180	23	15	0.3	0.7	4.0	1.2	2-40	M22	at	54.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN
ZAPDQ-4	5985-01-412-9064
ZMSCQ-2-250	5985-01-394-4982
ZFRSC-2050B	5985-01-310-5748
ZFRSC-2075	5985-01-266-6144
ZFRSC-42	5985-01-332-3083

* units are not QPL listed

pin and coaxial connections

see case style outline drawings for pin connections

PORT	ar	at	au
SUM PORT	3	2	5
PORT 1	1	1	3
PORT 2	2	3	15
GND EXT.	—		1,2,4,8,9,12,13,14,16
CASE GND	—		1,2,4,8,9,12,13,14,16

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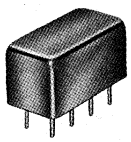
POWER SPLITTERS/COMBINERS 50Ω Plug-In

2 WAY-90° 0.42 MHz to 4200 MHz



PSCQ-2 / PQW-2

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Typ.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Max.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PQW-2-90	30-90	27	20	0.3	0.6	3	1.0	2-142	A01	gy	27.95
NEW PQW-2-270	90-270	20	17	0.4	0.7	4	1.4	2-142	A01	gy	29.95
PSCQ-2-0.455	0.42-0.51	30	25	0.1	0.5	3	1.2	2-99	A01	aw	25.95
PSCQ-2-1.25	1.13-1.38	29	25	0.4	0.7	3	1.2	2-36	A01	aw	14.95
PSCQ-2-1.5	1.4-1.7	29	25	0.4	0.7	3	1.2	2-36	A01	aw	14.95
PSCQ-2-3.4	3.0-3.8	30	25	0.4	0.7	3.8	1.2	2-36	A01	aw	19.95
PSCQ-2-4	3.5-4.5	36	25	0.4	0.7	3	1.5	2-100	A01	aw	14.95
PSCQ-2-6.4	5.8-7.0	30	25	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-7.5	7-8	35	25	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-8	2-8	36	27	0.3	0.7	6	0.5	2-142	A01	gx	49.95
PSCQ-2-10.5	9-11	25	20	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-13	12-14	29	25	0.4	0.7	3	1.2	2-38	A01	aw	14.95
PSCQ-2-14	12-16	30	25	0.3	0.6	3	1.8	2-38	A01	aw	19.95
PSCQ-2-17.5	16-19	28	25	0.6	0.7	3	1.6	2-38	A01	aw	14.95
PSCQ-2-21.4	20-23	30	25	0.4	0.7	3	1.2	2-39	A01	aw	14.95
PSCQ-2-26	14-30	25	20	0.4	0.7	3	1.5	2-100	A01	aw	23.95
PSCQ-2-32	3.2-32	32	25	0.4	0.8	5	0.4	2-143	A01	gx	89.95
PSCQ-2-40	23-40	21	18	0.3	0.7	3	1.5	2-100	A01	aw	19.95
PSCQ-2-50	25-50	30	20	0.3	0.7	3	1.5	2-39	A01	aw	23.95
PSCQ-2-60	30-60	30	20	0.3	0.7	3	1.5	2-143	A01	aw	23.95
PSCQ-2-70	40-70	30	20	0.3	0.7	3	1.5	2-39	A01	aw	23.95
PSCQ-2-70N	66-74	22	19	0.2	0.5	0.8	0.25	2-101	A01	aw	23.95
PSCQ-2-85A	55-85	35	20	0.3	0.6	3	0.6	2-143	A01	ax	24.95
PSCQ-2-90	55-90	30	20	0.3	0.7	3	1.2	2-40	A01	aw	23.95
PSCQ-2-120	80-120	25	18	0.3	0.7	3	1.5	2-40	A01	aw	23.95
PSCQ-2-160	100-160	24	19	0.3	0.7	3	1.5	2-101	A01	aw	23.95
PSCQ-2-180	120-180	23	15	0.3	0.7	4	1.2	2-40	A01	aw	23.95
PSCQ-2-250	150-250	30	22	0.4	0.8	4	1.5	2-41	A01	aw	23.95
PSCQ-2-300	220-300	27	20	0.3	0.7	3	1.3	2-101	A01	aw	23.95
PSCQ-2-400	250-400	23	16	0.5	0.9	4	1.5	2-41	A01	aw	23.95
PSCQ-2-450	350-450	23	16	0.5	0.9	5	1.5	2-41	A01	aw	23.95
PSCQ-2-550	450-550	19	15	0.4	0.7	5	1.5	2-42	A01	aw	23.95
PSCQ-2-1000	800-1000	27	20	0.28	0.6	3	1.3	2-109	A05	ax	25.95

NOTES:

❑ Non-hermetic
** LRPQ units have bottom barrier ground plane insulated with glass barrier.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating
   models PSCQ-2-8,PSCQ-2-32 50mWatt
   models SCPQ-10.5 0.5 Watt
   all other models 1Watt
   1b. Internal load dissipation 0.125 Watt

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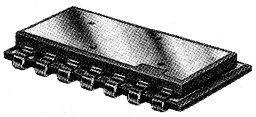
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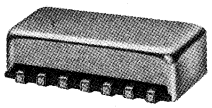
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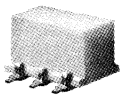
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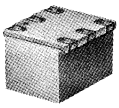
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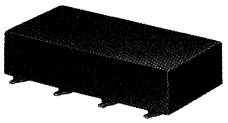

SCPQ

SYPQ

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3 dB Typ.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3 dB Max.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
NEW	JSPQ-1875W	1325-1875	28	18	0.2	0.5	6	1.0	2-144	BK343	ja	17.95
	JSPQW-100	40-100	24	18	0.2	0.6	3	1.2	2-144	BK276	hm	14.95
	LRPQ-70**	65-75	30	20	0.1	0.5	3	1	2-119	QQQ130	ay	9.95
	LRPQ-700**	500-700	23	18	0.2	0.6	3	1.5	2-119	QQQ130	ay	9.95
	LRPQ-980**	820-980	28	20	0.15	0.5	4	1	2-120	QQQ130	ay	13.95
	RPQ-820	760-860	22	15	0.15	0.7	4	1	2-145	TT100	gp	13.95
	RPQ-1495	1400-1600	18	14	0.3	0.8	5	1	2-145	TT100	gp	15.95
	SCPQ-10.5	9-11	31	20	0.15	0.7	3	1.2	—	YY101	aw	13.95
	SCPQ-21.4	20-23	32	25	0.15	0.5	2.5	1	2-98	YY101	aw	13.95
	SCPQ-50	25-50	25	20	0.15	0.7	3	1.5	2-145	YY101	aw	14.95
	SCPQ-60	30-60	30	20	0.15	0.7	3	1.5	2-146	YY101	aw	14.95
	SCPQ-85C	55-85	30	20	0.3	0.6	3	0.6	2-146	YY101	gy	14.95
	SCPQ-90	55-90	26	20	0.2	0.7	3	1.2	2-98	YY101	aw	13.95
	SCPQ-150	95-150	22	18	0.3	0.7	3	1.2	2-146	YY101	aw	14.95
	SCPQ-180	120-180	20	16	0.3	0.7	3	1.2	2-98	YY161	aw	13.95
	SCPQ-400	250-400	20	16	0.3	0.7	3	1.2	2-99	YY161	aw	14.95
	SYPQ-21.4	20-23	33	25	0.1	0.4	3	1.1	2-98	AH202	av	13.95
	SYPQ-70	65-75	31	24	0.1	0.4	3	1.1	2-119	AH202	av	13.95
	SYPQ-113-1	108-118	25	20	0.15	0.4	3	1.0	2-144	AH202	av	13.95

NSN GUIDE

MCL NO.	NSN
PSCQ-2-21.4	6625-01-415-3074
PSCQ-2-180	6625-01-186-4456
PSCQ-2-90	6625-01-160-0151
PSCQ-2-70	5985-01-292-8834
PSCQ-2-50	5895-01-374-0023
PSCQ-2-550	5895-01-347-0206

pin connections see case style outline drawings

PORT	av	aw	ax	ay	gp	gx	gy	hm	ja
SUM PORT	1	1	1	6	4	1	1	9	1
PORT 1	5	2	2	4	1	2	2(0°)	2(0°)	8
PORT 2	8	5	8	1	3	5	6(90°)	6(-90°)	14
GND EXT.	2,3,6,7	3,4,7,8	3,4,5,6 3,5,6	2,5	2,5	3,4,7,8 —	3,4,7,8	1,3,4,5,7,8 10,11,12,14	2,3,4,5,6,9 10,11,12,13
50 OHM TERM.	4	6	7	3	6	—	5	13	7

In Stock... Immediate Delivery

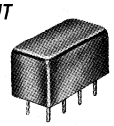
For Custom Versions Of Standard Models Consult Our Applications Dept.

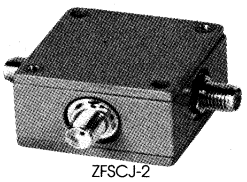
POWER SPLITTERS/COMBINERS 50 & 75Ω

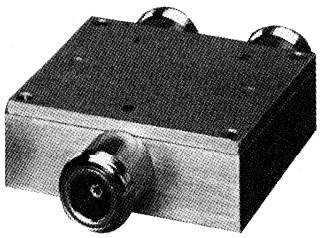
2 WAY-180° 10 kHz to 2 GHz

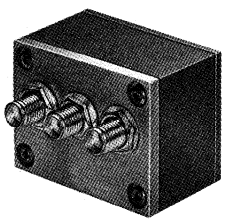
SURFACE MOUNT

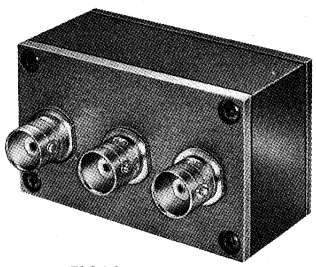
SCPJ


PSCJ-2


ZFSCJ-2


ZAPDJ-2


ZMSCJ-2


ZSCJ-2

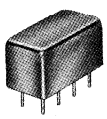
	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
■	SCPJ-2-1W-75	10-500	30	25	27	20	22	16	1.0	1.5	1.1	1.6	1.5	2.2	3	4	6	0.3	0.5	0.9	2-140	YY161	az	26.95
**■	SCPJ-2-750-75	30-750	26	20	—	—	26	16	1.0	1.5	—	—	1.5	2.2	3	—	6	0.8	—	0.9	2-140	YY161	az	27.95
	PSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.5	0.8	0.75	1.2	2	2.5	4	0.3	0.15	0.3	2-43	A01	az	23.95
	PSCJ-2-1W	100-600			30	20					1.0	1.9				6			0.5		2-141	A06	az	26.95
✣	PSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	A01	az	34.95
■	PSCJ-2-1-75	1-200	35	30	31	25	26	20	0.6	1.2	0.8	1.2	1.2	1.8	2	4	6	0.25	0.2	0.5	2-45	A01	az	23.95
	ZFSCJ-2-1	1-500	30	20	33	25	30	18	1	1.5	1	1.5	1	1.5	2	4	7	0.5	0.2	0.5	2-44	K18	as	59.95
△✣	ZFSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	K18	as	57.95
	ZFSCJ-2-3	5-300	30	20	33	25	30	18	1	1.5	1	1.5	1	1.5	2	4	6	0.15	0.2	0.5	2-44	K18	as	49.95
△	ZFSCJ-2-4	50-1000	30	20	—	—	25	18	1.2	1.9	—	—	1.6	2.4	6	—	7	0.6	—	0.6	2-102	K18	as	69.95
	ZMSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.6	0.8	0.75	1.2	2	2.5	4	0.15	0.15	0.3	2-45	M21	at	57.95
✣	ZMSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	M21	at	67.95
	ZSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.6	0.8	0.75	1.2	2	2.5	4	0.15	0.15	0.3	2-45	M22	at	51.95
✣	ZSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	M22	at	59.95
	ZAPDJ-2	1000-2000	22	18	22	18	22	18	1.3	1.8	1.3	1.8	1.3	1.8	6	6	6	0.8	0.8	0.8	2-102	F14	as	71.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic
* Phase unbalance is 3 degrees max from fL to 3 fL.
** For SCPJ-2-750-75: L=30-375 MHz, U=375-750 MHz
✪ When only specification for M range given, specifications applied to entire frequency range.
■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
△ Available only with SMA connectors.
✣ At low range frequency band (fL to 10 fL), linearly derate maximum input power by 13 dB.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Matched power rating, 1 Watt, except models PSCJ-2-1W and SCPJ-2-1W-75, SCPJ-2-750-75 0.5 Watt
1b. Internal load dissipation 0.125 Watt

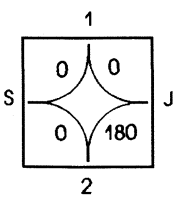
2 WAY-0°/180° 5 to 200 MHz



PMT

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 3dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PMT-1	5-200	22	20	24	20	24	18	0.8	1.0	0.9	1.1	1.0	1.5	2	4	8	0.1	0.2	0.5	2-83	A01	ba	23.95
■	PMT-1-75	5-200	22	18	22	18	22	18	1.0	1.3	1.0	1.4	1.0	1.5	2	4	8	0.1	0.2	0.5	2-83	A01	ba	23.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)



- S-J ports, isolation 40 dB typical
- Inphase ports, S-1 and S-2, insertion loss 0.2 dB typical
- Amplitude unbalance defined by input S or J ports to output 1 and 2

pin and coaxial connections

see case style outline drawing

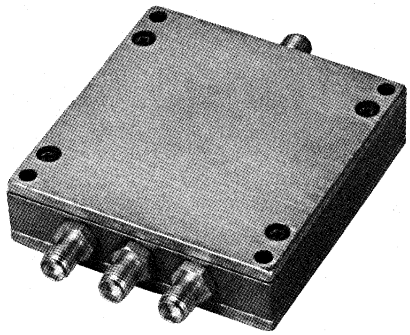
PORT	as	at	az	ba
SUM PORT	S	2	1	1
PORT 1	1	1	5	2
PORT 2	2	3	6	3
PORT J			—	4
GND EXT.			2,3,4,7,8	5,6,7,8
CASE GND			2,3,4,7,8	5,6,7,8

NSN GUIDE

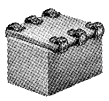
MCL NO.	NSN
PSCJ-2-1	6625-01-413-2386
PSCJ-2-2	5985-01-332-3084
ZSCJ-2-2	5895-01-340-7761

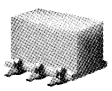
POWER SPLITTERS/COMBINERS 50 & 75Ω

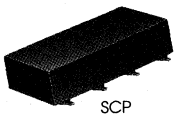
3 WAY-0° 10 kHz to 4.2 GHz

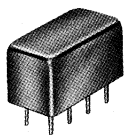


SURFACE MOUNT


JPS


LRPS


SCP


PSC-3

ZN3PD

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 4.8dB L Typ.	INSERTION LOSS, dB Above 4.8dB L Max.	INSERTION LOSS, dB Above 4.8dB M° Typ.	INSERTION LOSS, dB Above 4.8dB M° Max.	INSERTION LOSS, dB Above 4.8dB U Typ.	INSERTION LOSS, dB Above 4.8dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ.	VSWR (:1) S Max.	VSWR (:1) OUT Typ.	VSWR (:1) OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
			L2		U2				L2		U2				L2	U2		L2	U2									
NEW	JPS-3-1	5-300	34	25	33	23	32	20	0.3	0.6	0.3	0.7	0.5	1.4	2	4	6	0.4	0.4	0.6					2-147	BH292	jg	13.95
NEW	JPS-3-1W	50-750	23	17	26	17			0.4	1.0	0.9	1.4			6	7		0.3	0.6						2-147	BH292	jg	14.95
	LRPS-3-1	10-300	25	20	25	20	25	20	0.2	0.6	0.3	0.8	0.5	1.2	2	3	4	0.1	0.3	0.7					2-148	QQQ130	gt	19.95
	LRPS-3-850	500-850			23	16					0.7	1.6				6			0.9						2-148	QQQ130	hc	16.95
	SCP-3-1	1-300	30	25	25	20	20	15	0.3	0.6	0.4	0.8	0.7	1.5	1	2	4	0.1	0.15	0.5					2-104	YY101	bd	16.95
	PSC-3-1	1-200	45	30	40	30	40	25	0.6	1.0	0.4	0.7	0.6	1	1	2	4	0.15	0.2	0.3					2-46	A01	bb	23.95
	PSC-3-1A	1-300	38	30	33	23	29	22	0.2	0.5	0.2	0.7	0.6	1.5	1	3	5	0.2	0.3	0.6					2-104	A01	bb	26.95
	PSC-3-1W	5-500	25	20	31	15	25	15	0.4	0.8	0.4	1.4	0.8	1.4	2	3	5	0.1	0.3	0.6					2-46	A01	bc	35.95
✣	PSC-3-2	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4					2-105	A01	bb	35.95
■	PSC-3-1-75	1-200	35	23	35	25	35	25	0.6	1.0	0.3	0.7	0.6	1	2	3	4	0.15	0.2	0.3					2-48	A01	bb	23.95
■	PSC-3-1-75-2	10-300	28	20	25	20	28	20	0.2	0.4	0.3	0.5	0.4	0.7	2	3	4	0.15	0.2	0.3					2-48	A01	bc	27.95
	PSC-3-13	1-200	45	35	45	30	37	30	0.25	0.5	0.35	0.6	0.35	0.8	1	3	4	0.1	0.2	0.2					2-47	A01	bb	29.95
	PSC-3-13-39	0.5-50	47	33	46	35	40	33	0.15	0.4	0.15	0.4	0.15	0.4	1	1	2	0.1	0.1	0.1					2-105	A01	bb	29.95
	ZN3PD-900	800-900			30	20					0.2	0.4				—			0.5		1.09	1.30	1.09	1.30	2-103	UU181	be	74.95
	ZN3PD-900W	650-1050			22	15					0.3	0.8				—			0.8		1.09	1.80	1.09	1.30	2-103	UU181	be	69.95

L = low range (f_L to 10 f_L)
L_2 = (f_L to f_U/2)

M = mid range (10 f_L to f_U/2)
U_2 = (f_U/2 to f_U)

U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic
* Isolation 25 dB, -55 to 0 deg.C over 0.01-0.1 MHz
■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.
✪ When only specification for M range given, specifications apply to entire frequency range.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Matched power rating, models ZA3PD, ZN3PD 10 Watt
other models 1 Watt
1b. Internal load dissipation 0.375 Watt, except models JPS-3-1, JPS-3-1W, 0.5 Watt.

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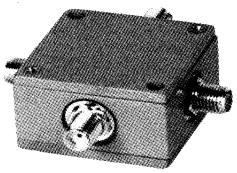
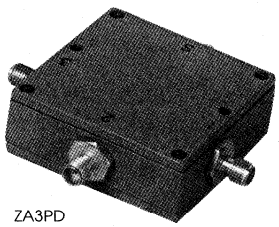
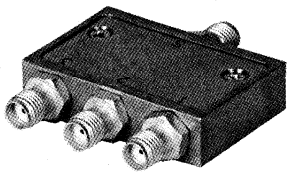
Surface Mount, Plug-In & Coaxial



ZFSC-3



ZA3PD



ZCSC-3

ZMSC-3

ZSC-3

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 4.8dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE DEGREES L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZFSC-3-1	1-500	30	20	30	20	25	18	0.4	0.75	0.5	0.9	0.8	1.2	2	3	4	0.2	0.3	0.4	2-50	J17	be	51.95
ZFSC-3-1W	2-750	30	20	30	20	25	18	0.4	0.75	0.5	1.0	1.0	1.6	3	5	7	0.2	0.3	0.5	2-50	J17	be	53.95
ZFSC-3-13	1-200	45	30	48	35	37	30	0.25	0.5	0.35	0.6	0.35	0.6	1	3	5	0.1	0.2	0.2	2-47	J17	be	51.95
ZFSC-3-4	1-1000	35	20	20	18	20	17	0.2	0.5	0.7	1.4	1.0	2.0	3	6	10	0.2	0.4	0.9	2-51	J17	be	59.95
ZA3PD-1	500-1000	20	14	20	14	20	14	0.3	0.6	0.3	0.6	0.3	0.6	—	—	—	0.4	0.4	0.4	2-52	CC51	be	89.95
ZA3PD-1.5	750-1500	20	14	20	14	20	14	0.3	0.7	0.3	0.7	0.3	0.7	—	—	—	0.4	0.4	0.4	2-52	CC51	be	89.95
ZA3PD-2	1000-2000	20	15	20	15	20	15	0.3	0.6	0.3	0.6	0.3	0.6	—	—	—	0.3	0.3	0.3	2-53	CC51	be	89.95
ZA3PD-4	2000-4200	18	14	18	14	18	14	0.7	1.0	0.7	1.0	0.7	1.0	—	—	—	0.9	0.9	0.9	2-53	CC51	be	89.95
ZCSC-3-R3	2-300	32	28	31	28	32	22	0.3	0.8	0.4	1.0	0.8	1.2	1	2	3	0.1	0.3	0.3	2-149	UU233	be	43.95
ZMSC-3-1	1-200	45	35	40	25	40	25	0.3	0.5	0.4	0.7	0.6	1	1	2	4	0.15	0.2	0.3	2-51	P26	be	57.95
✣ ZMSC-3-2*	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4	2-47	P26	be	67.95
ZSC-3-1	1-200	45	30	40	25	40	25	0.3	0.5	0.4	0.7	0.6	1.0	1	2	4	0.15	0.2	0.3	2-51	P25	be	51.95
✣ ZSC-3-2*	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4	2-47	P25	be	61.95
■ ZSC-3-1-75	1-200	35	30	35	25	35	25	0.6	1.0	0.4	0.7	0.6	1.0	2	3	4	0.15	0.2	0.3	2-48	P25	be	52.95
✣■ ZSC-3-2-75	0.02-20	35	30	35	25	30	20	0.2	0.5	0.25	0.6	0.45	0.75	2	3	4	0.2	0.3	0.4	2-49	P25	be	62.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawings

PORT	bb	bc	bd	be	gt	hc	jg
SUM PORT	6	1	6	S	6	6	1
PORT 1	1	5	1	1	1	1	6
PORT 2	2	7	2	2	2	3	4
PORT 3	5	8	5	3	3	4	3
GND EXT.	3,4,7,8	2,3,4,6	3,4,7,8		4,5	2,5	2,5
CASE GND	3,4,7,8	2,3,4,6	—		—	—	—

MIL-P-23971/15, NSN GUIDE

MCL NO.	NSN
PSC-3-1	6625-01-015-6027
PSC-3-1W	5985-01-295-5898
PSC-3-13	6625-01-249-8011
ZFSC-3-4(SMA)	6625-01-333-1126
ZFSC-3-1	6625-01-235-6873
ZFSC-3-13	5895-01-335-1824
ZFSC-3-13(SMA)	5985-01-409-0884
ZMSC-3-2B	6625-01-303-4624
ZMSC-3-1B(SMA)	6625-01-170-0102
ZSC-3-1	6625-01-327-4755
ZSC-3-1B(BNC)	6625-01-008-9566
ZSC-3-2BR	5985-01-315-2870
ZSC-3-2B(BNC)	5820-01-120-9320
ZA3PD-2	5895-01-357-3919
ZFSC-3-1(SMA)	5895-01-361-8520

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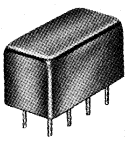
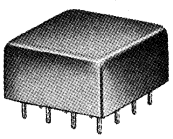
POWER SPLITTERS/COMBINERS 50 & 75Ω Plug-In

4 WAY-0° 10 kHz to 1000 MHz


PSC-4


PSC-4A

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1	4	6	8	0.15	0.2	0.25	2-54	A01	bf	35.95
	PSC-4-1W	1-500	29	20	27	18	25	18	0.4	0.8	0.5	1	0.8	1.5	1	3	5	0.2	0.3	0.5	2-106	A01	bf	38.95
■	PSC-4-1-75	1-200	30	20	25	20	25	20	0.4	0.7	0.5	0.9	0.7	1.2	2	3	4	0.15	0.2	0.3	2-62	A01	bf	32.95
	PSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	8	0.15	0.2	0.25	2-55	A01	bf	31.95
	PSC-4-5	1-800	29	20	24	18	25	17	0.4	0.8	0.6	1.5	1.3	2.5	1	4	5	0.2	0.5	0.6	2-106	A01	bf	45.45
✣	PSC-4-6	0.01-40	35	18	32	25	25	18	0.4	0.8	0.3	0.5	0.5	1	2	2	2	0.1	0.15	0.2	2-55	A01	bf	36.95
■	PSC-4-1W-75	5-650	38	22	40	22	25	18	0.6	0.9	0.65	1.2	0.9	1.5	1	3	5	0.2	0.3	0.6	—	A05	bf	39.95
	PSC-4A-4	10-1000	25	20	21	15	18	15	0.5	0.8	0.8	1.8	1.5	2.5	4	16	20	0.2	0.5	0.7	2-54	C07	bg	64.95
■	PSC-4A-475	10-800	30	20	33	20	25	18	0.4	0.7	0.6	0.9	1.2	1.6	—	—	—	0.2	0.4	0.8	2-62	C07	bg	64.95
■	PSC-4A-1W-75*	30-600	27	20	—	—	22	18	0.6	0.8	—	—	0.8	1.1	2	—	5	0.2	—	5	2-107	C07	bg	49.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic
■ Denotes 75 Ohm model
✪ When only specification for M range given, specification applies to entire frequency range.
✣ At low range frequency band (f_L to 10f_L), linearly derate maximum power by 13 dB.
* Maximum VSWR: input 1.5:1, output 1.3:1
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating,
   Models PSC-4-5, PSC-4-1W, SCP-4-1W-75 0.5 Watt
   All other models 1 Watt
   1b. Internal load dissipation,
   SCP-4-1W-75, SCP-4-4-75 0.375 Watt
   All other models 0.250 Watt

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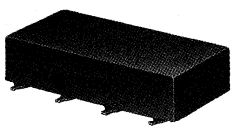
1 to 1000 MHz



SCP

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
SCP-4-1	1-400	32	23	26	18	21	17	0.4	1.2	0.6	1.2	1.0	1.5	1	4	9	0.2	0.3	0.5	2-150	YY101	bv	24.95
SCP-4-1W	10-650	34	28	23	18	21	15	0.7	1.0	0.9	1.5	1.1	1.9	3	7	12	0.2	0.4	0.7	2-150	YY101	bv	26.95
■ SCP-4-1W-75	10-750	36	20	32	20	24	15	0.5	1.0	0.65	1.3	0.8	2.0	1.5	3	6	0.2	0.4	0.9	2-154	YY161	bv	27.95
SCP-4-4	800-1000			24	17					0.7	1.5				12			1.0		2-151	YY101	bv	21.95
■ SCP-4-4-75	10-1000	36	20	32	18	24	14	0.5	1.0	0.65	1.3	0.8	2.0	3	6	12	0.2	0.4	0.9	2-154	YY161	bv	28.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawing

PORT	bf	bg	bv
SUM PORT	4	2	3
PORT 1	7	8	2
PORT 2	8	12	4
PORT 3	1	5	6
PORT 4	2	9	8
GND EXT.	3,5,6	All other pins	1,5,7
CASE GND	3,5,6	All other pins	

NSN GUIDE

MCL NO.	NSN	MIL-P-23971/15*
PSC-4-1	5895-01-065-0106	-10
PSC-4-2	5825-01-044-8945	
PSC-4-3	5895-01-105-6189	-11
PSC-4-5	5985-01-423-7929	
PSC-4-6	5985-01-332-3086	
PSC-4A-4	5895-01-347-0205	

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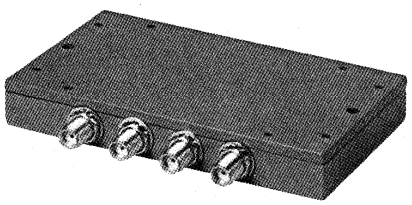
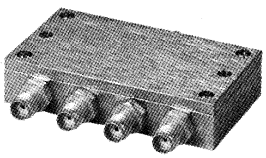
POWER SPLITTERS/COMBINERS 50 & 75Ω

4 WAY-0° 2 kHz to 8.4 GHz


ZBSC-4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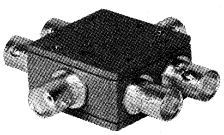
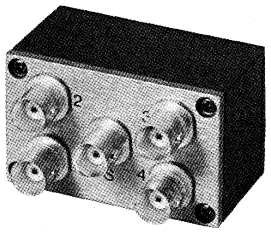

ZFSC-4

ZMSC-4



ZSC-4

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZBSC-413	10-800	26	20	18	15	18	15	0.6	1	1	1.5	1.6	2	4	8	8	0.2	0.4	0.6	2-57	UU102	bh	99.95
ZCSC-4-1W	10-650	34	22	23	17	21	15	0.7	1.2	0.9	1.5	1.1	1.9	3	7	12	0.2	0.4	0.7	2-151	UU244	bh	79.95
ZFSC-4-1	1-1000	25	20	23	18	20	15	0.4	1.2	0.6	1.5	1.6	2.5	4	8	8	0.2	0.4	0.7	2-56	G15	bh	89.95
ZFSC-4-1W	10-500	23	20	23	20	23	20	0.6	1.5	0.6	1.5	0.6	1.5	4	8	8	0.2	0.3	0.4	2-50	G15	bh	84.95
ZFSC-4-3	10-300	32	28	38	30	38	30	0.5	0.8	0.6	0.9	0.9	1.2	4	6	8	0.1	0.1	0.2	2-57	G15	bh	78.95
■ ZFSC-4375	50-90	34	30	34	30	34	30	0.3	0.8	0.3	0.8	0.3	0.8	4	6	8	0.15	0.15	0.15	2-63	G15	bh	89.95
■ ZFSC-4-2-75-1**	200-800	25	20	—	—	25	20	0.8	1.6	—	—	1	1.6	4	16	20	0.2	—	0.4	2-63	G15	bh	84.95
■ ZFSC-4-175	10-1000	35	25	38	20	22	18	0.5	0.8	0.6	1.2	0.9	2	—	—	—	0.2	0.3	0.6	2-61	G15	bh	89.95
ZMSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N24	bh	66.95
✣ ZMSC-4-2	0.002-20	30	20	33	25	33	25	0.45	0.75	0.3	0.5	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N24	bh	76.95
ZMSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	10	0.15	0.20	0.25	2-61	N24	bh	64.95
ZSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N27	bh	59.95
■ ZSC-4-1-75	1-200	30	20	25	20	25	20	0.4	0.7	0.5	0.8	0.7	1.2	4	6	10	0.15	0.20	0.30	2-62	N27	bh	59.95
✣ ZSC-4-2	0.002-20	30	20	33	25	33	25	0.45	0.75	0.3	0.5	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N27	bh	74.95
ZSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	10	0.15	0.20	0.25	2-61	N27	bh	56.95
■ ZSC-4-3-75	0.25-250	28	20	30	20	27	20	0.4	0.8	0.3	0.7	0.5	1.0	1	2	3	0.15	0.20	0.25	2-107	N27	bh	56.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (f_L to 10f_L), linearly derate maximum power by 13 dB.

* Maximum VSWR: input 1.5:1, output 1.3:1

** Frequency range L=f_L to f_U/2. Up to 15V and 15mA DC may be passed from input to all outputs.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,
Models ZA4PD, ZB4PD-4, ZB4PD1(except -500-75), ZN4PD, ZC4PD 10W
Model ZCSC-4-1W 0.5W
All other models 1W

1b. Internal load dissipation,
Model ZB4PD-1750-75 0.750W
Models ZA4PD, ZB4PD-4, ZB4PD, ZB4PD1, ZN4PD, ZC4PD, ZCSC 0.375W
All other models 0.250W

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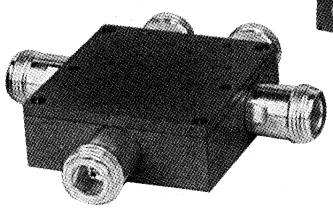
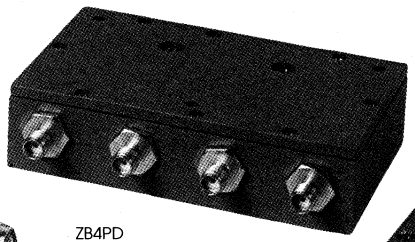
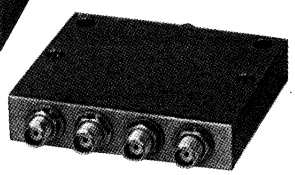


ZA4PD



ZB4PD
ZB4PD1



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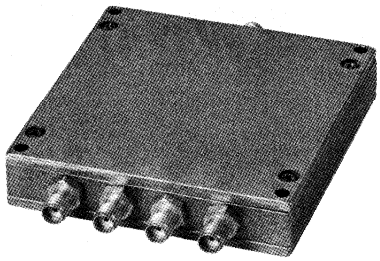

ZN4PD

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6 dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ.	S Max.	OUT Typ.	OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZA4PD-2	1000-2000	25	16	25	16	25	16	0.3	1.0	0.3	1.0	0.3	1.0		6		0.70	0.70	0.70	see Performance Data and curves				2-58	DD52	bh	89.95
	ZA4PD-4	2000-4200	25	16	25	16	25	16	0.5	1.0	0.3	1.0	0.3	1.0		16		0.80	0.80	0.80					2-58	DD52	bh	89.95
	ZB4PD-42	1700-4200	23	16	23	16	23	16	0.5	1.4	0.5	1.4	0.5	1.4		8		0.80	0.80	0.80					2-59	Z54	bh	99.95
	ZB4PD-4	3700-4200	24	15	24	15	24	15	0.6	1.1	0.6	1.1	0.6	1.1		8		0.80	0.80	0.80					2-59	Z54	bh	94.95
■	ZB4PD-1750-75	875-1750			30	20					0.4	0.8				3			0.40		1.08	1.50	1.25	1.50	2-153	UU188	bh	99.95
■	ZB4PD1-500-75	5-500	34	20	34	20	30	20	0.45	1.0	0.6	0.9	1.0	1.5	1	3	6	0.20	0.20	0.30					2-153	UU188	bh	89.95
	ZB4PD1-930W	725-1050			22	15					0.3	0.8				5			0.40		1.20	1.80	1.10	1.30	2-111	UU188	bh	94.95
	ZB4PD1-2000	800-2000			25	18					0.6	1.2				—			0.30		1.20	1.60	1.10	1.30	2-152	UU188	bh	94.95
	ZB4PD1-930	850-930			30	20					0.3	0.5				5			0.25		1.10	1.25	1.09	1.25	2-111	UU188	bh	99.95
	ZB4PD1-8.4	6700-8400			29	18					0.5	1.3				9			0.90		1.12	1.50	1.27	1.50	2-152	UU188	bh	149.95
	ZC4PD-900	800-900			30	20					0.3	0.6				3			0.20		1.08	1.25	1.17	1.30	2-118	Z184	bh	89.95
	ZN4PD-920	800-920			30	20					0.25	0.5				2			0.20		1.08	1.25	1.07	1.25	2-110	UU182	bh	84.95
NEW	ZN4PD-920W	670-1000			22	15					0.3	0.6				3			0.20		1.20	1.60	1.07	1.25	2-110	UU182	bh	79.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

coaxial connections

see case style outline drawing

PORT	bh
SUM PORT	S
PORT 1	1
PORT 2	2
PORT 3	3
PORT 4	4

NSN GUIDE

MCL NO.	NSN
ZBSC-413(SMA)	5985-01-370-6145
ZFSC-4-1	6625-01-303-4623
ZFSC-4-1(SMA)	6625-01-303-4623
ZFSC-4-1A	5825-01-227-6681
ZFSC-4-1W(SMA)	5985-01-372-6418
ZFSC-4-1WB(SMA)	5985-01-364-1944
ZFSC-4-3B	5985-01-253-2843
ZMSC-4-1B	4935-01-229-3228
ZSC-4-1B	5820-00-270-3056
ZSC-4-1B(BNC)	6625-00-270-3056
ZSC-4-1B(TNC)	6625-01-109-3707
ZSC-4-1-75	5998-01-228-8995
ZSC-4-2BR	6625-01-357-2227
ZSC-4-2B(BNC)	5820-01-120-5238
ZSC-4-3B	6625-01-038-8553

* units are not QPL listed.

CAPD now available! computer-automated performance data

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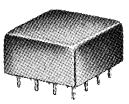
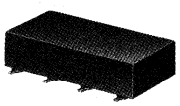
POWER SPLITTERS/COMBINERS 50 & 75Ω

5 WAY-0° 1 MHz to 750 MHz

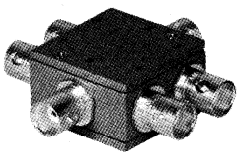


PSC-5

SURFACE MOUNT



SCP-5



ZFSC-5

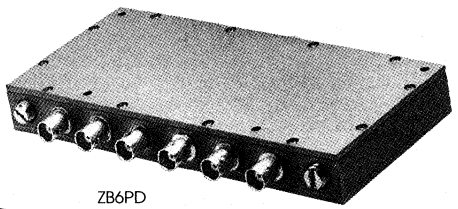
MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 7.0dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRIC $ Qty. (1-9)
PSC-5-1	1-300	25	20	23	18	20	17	0.2	0.5	0.6	1.0	1.5	2.0	2	4	8	0.2	0.3	0.6	2-64	C07	bj	64.45
PSC-5-2	250-750			22	17					1.1	2.5				14			0.7		2-155	C07	gq	67.95
■ PSC-5-1-75	1-300	35	20	30	18	25	17	0.4	0.6	0.6	0.9	0.9	1.3	2	4	8	0.2	0.3	0.6	2-64	C07	bj	64.45
SCP-5-1	2-200	30	20	29	20	30	20	0.2	0.5	0.3	0.75	0.6	1.5	1	3	5	0.2	0.3	0.6	2-155	YY161	hv	26.95
ZFSC-5-1	1-300	25	20	23	18	20	17	0.2	0.5	0.6	1.0	1.5	2.0	2	4	8	0.2	0.3	0.6	2-64	G15	bm	99.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

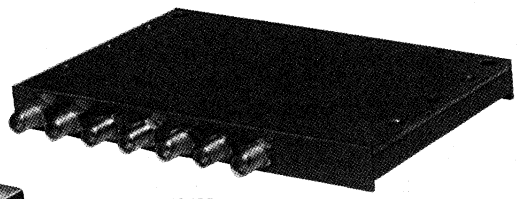
NOTES:

- ❑ Non-hermetic
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- ✪ When only specification for M range given, specification applies to entire frequency range.
- △ Available only with SMA connectors.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Matched power rating:
    - Models ZB6PD, ZC6PD — 10 Watt
    - Model PSC-5-2 — 2 Watt
    - All other models — 1 Watt
  - 1b. Internal load dissipation:
    - Models ZB6PD, ZC6PD — 0.875 Watt
    - ZB6PD-1700 — 0.750 Watt
    - Model PSC-5-2, SCP-5-1 — 0.625 Watt
    - All other models — 0.500 Watt

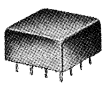
6 WAY-0° 1 MHz to 2 GHz



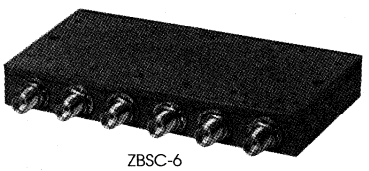
ZB6PD



ZC6PD



PSC-6



ZBSC-6

ZFSC-6

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ. Min.	ISOLATION dB M° Typ. Min.	ISOLATION dB U Typ. Min.	INSERTION LOSS, dB Above 7.8dB L Typ. Max.	INSERTION LOSS, dB Above 7.8dB M° Typ. Max.	INSERTION LOSS, dB Above 7.8dB U Typ. Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ. Max.	VSWR (:1) OUT Typ. Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PSC-6-1	1-175	30 24	26 18	26 18	0.50 0.80	0.70 1.00	1.00 1.50	4	6	12	0.2	0.4	0.8			2-67	C07	bk	74.95
■	PSC-6-1-75	1-300	35 25	30 23	25 18	0.60 1.20	0.60 1.10	0.60 1.30	2	4	8	0.2	0.3	0.6			2-65	C07	bk	78.95
	ZC6PD-960	890-960		30 20			0.40 0.80		—	—	—		0.4		1.20 1.50	1.10 1.50	2-112	AB185	bn	124.95
	ZC6PD-960W	700-1000		28 15			0.40 1.00		—	—	—		0.6		1.30 1.50	1.20 1.50	2-112	AB185	bn	119.95
	ZC6PD-1900	1700-1900		30 20			0.40 0.80		—	—	—		0.5		1.10 1.40	1.10 1.50	2-113	AB185	bn	134.95
	ZC6PD-1900W	1500-2000		30 15			0.50 1.00		—	—	—		0.6		1.10 1.68	1.10 1.50	2-113	AB185	bn	129.95
	ZBSC-611	10-200	28 22	26 20	23 20	0.50 0.80	0.70 1.00	0.90 1.20	4	5	6	0.2	0.3	0.5			2-66	UU102	bn	114.95
	ZBSC-615	1-500	30 25	26 18	24 18	0.50 0.80	0.70 1.20	1.00 2.20	4	8	20	0.2	0.4	1.2			2-66	UU102	bn	119.95
	ZB6PD1-900	800-900		32 20			0.30 0.70		—	—	—		0.5		1.10 1.50	1.13 1.35	2-114	UU187	bn	139.95
NEW △	ZB6PD-2	800-2000		27 17			0.70 1.70		—	—	—		0.7		1.20 1.60	1.13 1.30	2-156	Z259	bn	158.95
	ZB6PD1-960	890-960		35 20			0.30 0.80		—	—	—		0.6		1.10 1.30	1.10 1.30	2-114	UU187	bn	139.95
NEW	ZB6PD-1700	1500-1700		30 20			0.50 1.00		—	—	—		0.6		1.15 1.50	1.30 1.50	2-156	Z40	bn	149.95
	ZB6PD1-1900	1700-1900		32 20			0.40 0.80		—	—	—		0.6		1.10 1.30	1.09 1.40	2-115	UU187	bn	149.95
	ZFSC-6-1	1-175	27 22	26 20	26 20	0.75 1.00	0.75 1.20	0.80 1.20	2	6	12	0.2	0.4	0.6			2-67	Q28	bn	99.95
■	ZFSC-6-1-75	1-200	30 25	30 22	20 18	0.75 1.00	0.75 1.00	0.90 1.20	2	6	12	0.2	0.4	0.6			2-65	Q28	bn	102.95
	ZFSC-6-110	1-500	35 25	26 20	25 20	0.50 0.80	0.60 1.10	1.00 1.70	2	6	12	0.3	0.3	0.8			2-67	Q28	bn	109.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawing for pin locations

PORT	bj	bk	bm	bn	gq	hv
SUM PORT	1	1	S	S (COM)	1	1
PORT 1	4	3	1	1	3	6
PORT 2	8	4	2	2	8	8
PORT 3	12	8	3	3	12	7
PORT 4	16	12	4	4	16	5
PORT 5	15	16	5	5	15	3
PORT 6	—	15	—	6	—	—
GND EXT.	2,5,7,11,13,14	2,5,7,11,13,14	—	—	2,5,7,11,13,14	2,4
CASE GND	2,5,7,11,13,14	2,5,7,11,13,14	—	—	4,6,9,10	—
NOT USED	3,6,9,10	6,9,10	—	—	—	—

NSN GUIDE

MCL NO.	NSN
PSC-5-1	6625-01-255-3143
ZFSC-6-1(BNC)	6625-01-225-6965
ZFSC-6-1(SMA)	6625-01-263-9871
PSC-6-1	6625-01-249-8012
ZBSC-615	6625-01-391-5026

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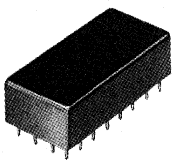
POWER SPLITTERS/COMBINERS 50 & 75Ω

8 WAY-0° 10 kHz to 850 MHz

SURFACE MOUNT

JCPS-8

PSC-8



PSC-8A

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 9dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
■	JCPS-8-850-75	10-850	34	20	25	15	20	15	0.7	1.5	1.0	2.0	1.8	3.0	—	—	—	0.6	0.7	1.0	2-157	BG291	hn	69.95
	PSC-8-1	0.5-175	30	25	30	20	25	18	0.8	1.2	0.8	1.2	1.0	1.6	1.0	2.5	5.0	0.2	0.3	0.5	2-68	C07	bp	74.95
NEW	PSC-8-1W	10-600	25	20	23	16	20	16	1.0	1.8	1.2	2.2	1.7	2.8	2.0	4.0	10.0	0.3	0.6	0.9	2-157	C07	bp	109.95
■	PSC-8-1-75	0.5-175	25	20	30	20	25	20	0.5	1.0	0.6	1.1	0.7	1.3	1.0	2.5	5.0	0.2	0.2	0.3	2-73	C07	bp	78.95
✣	PSC-8-6	0.01-10	40	20	40	25	28	23	0.3	1.0	0.5	1.0	0.6	1.1	4.0	2.5	4.0	0.4	0.2	0.3	2-69	C07	bp	93.95
	PSC-8A-4	5-500	25	20	23	18	20	15	0.7	1.2	1.0	1.8	1.4	2.5	3.0	8.0	16.0	0.2	0.3	0.5	2-68	E10	bq	103.95
■	PSC-8A4-75	1-300	26	20	30	25	30	23	0.8	1.2	0.7	1.1	0.9	1.3	1.0	3.0	8.0	0.2	0.2	0.4	2-72	E10	br	93.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

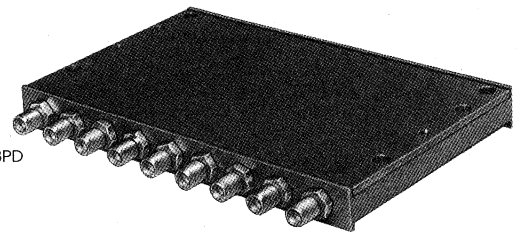
NSN GUIDE

MCL NO.	NSN
PSC-8-1	6625-01-365-5615
ZB8PD-4(SMA)	5985-01-372-8880
ZFSC-8-1(BNC)	5820-01-136-7244
ZFSC-8-1(SMA)	6620-01-223-1235
ZFSC-8-1-75	5895-01-326-8664
ZFSC-8-43(SMA)	6625-01-333-1125
ZFSC-8375	5895-01-229-0156

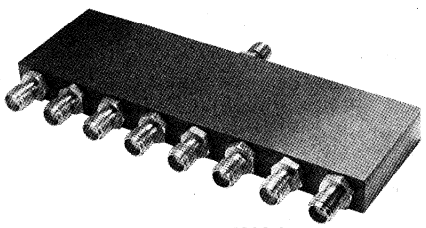
pin connections see case style outline drawings

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	NOT USED	GND EXT.	CASE GND
bp	2	1	5	9	13	16	12	8	4	10,11	3,6,7,14,15	3,6,7,14,15
bq	29	7	16	31	24	9	2	26	17	4,5,15	—	All other pins
br	29	7	16	31	24	9	2	26	17	15	—	All other pins
hn	1	3	4	5	6	9	10	11	12	—	2,7,8,13,14	2,7,8,13,14

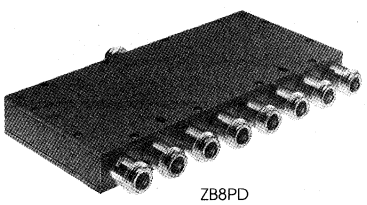
10 kHz to 8.4 GHz



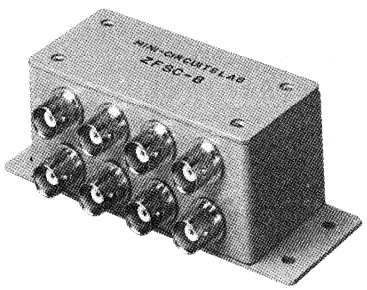
ZC8PD



ZCSC-8



ZB8PD



ZFSC-8

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 9dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZC8PD-900*	800-900			30	20					0.4	0.7				5.0			0.4		2-115	AB186	—	158.95
	ZCSC-8-1	2-250	37	27	30	20	24	18	0.65	1.2	0.8	1.2	1.0	1.6	2.0	4.0	8.0	0.2	0.3	0.5	2-158	UU215	—	119.95
	ZFSC-8-1	0.5-175	30	25	30	20	25	18	0.8	1.2	0.8	1.2	1.0	1.6	1.0	2.5	5.0	0.2	0.2	0.3	2-68	R29	—	99.95
■	ZFSC-8-1-75	0.5-175	25	20	30	20	25	20	0.5	1.0	0.6	1.1	0.7	1.3	1.0	2.5	5.0	0.2	0.3	0.5	2-73	R29	—	102.95
■	ZFSC-82-75	10-900	35	17	23	17	20	15	0.6	0.9	0.9	1.6	1.6	2.7	2.0	4.0	10.0	0.2	0.5	1.2	2-73	R29	—	139.95
■	ZFSC-84-75	1-300	26	20	30	25	30	23	0.8	1.5	0.7	1.1	0.9	1.5	4.0	3.0	8.0	0.2	0.2	0.4	2-72	R29	—	119.95
■	ZFSC-8375	50-90	30	25	30	25	25	25	1.0	1.0	1.0	1.3	1.3	1.3	2.0	2.0	2.0	0.2	0.2	0.2	2-72	R29	—	119.95
	ZFSC-8-4	5-700	35	20	25	17	20	17	0.8	1.2	1.2	1.8	1.8	2.5	2.0	5.0	15.0	0.2	0.4	0.7	2-70	R29	—	128.95
	ZFSC-8-43	10-1000	23	20	25	20	26	20	1.0	1.6	1.4	2.1	2.1	2.9	5.0	10.0	20.0	0.2	0.4	0.7	2-70	R29	—	138.95
✣	ZFSC-8-6	0.01-10	35	20	40	25	35	25	0.3	1.0	0.2	0.6	0.3	0.7	4.0	2.0	3.0	0.4	0.2	0.3	2-69	R29	—	109.95
	ZB8PD-1**	800-960			30	20					0.4	0.9				8.0			0.4		2-158	Z40	—	138.95
	ZB8PD-2	1000-2000			24	17					0.8	1.3				18.0			0.8		2-71	Z40	—	138.95
	ZB8PD-4	2000-4200			23	16					0.8	1.8				10.0			1.2		2-71	Z40	—	138.95
	ZB8PD-8.4	7200-8400			25	20					0.9	1.6				15.0			0.8		2-159	Z41	—	149.95
NEW △	ZB8PD-2000***	800-2000			26	18					0.8	1.7				—			0.7		2-159	Z40	—	149.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic

* VSWR, input 1.06:1 typical, 1.2:1 max; output 1.17:1 typical, 1.35:1 max

** VSWR, input 1.22:1 typical, 1.5:1 max; output 1.11:1 typical, 1.30:1 max

*** VSWR, input 1.25:1 typical, 1.8:1 max; output 1.10:1 typical 1.40:1 max

✣ Below 0.1 MHz power handling decrease as to typically 15 dBm at 0.01 MHz, 23 dBm at 0.025 Mhz, and 29 dBm at 0.05 MHz.

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

✪ When only specification for M range given, specification applies to entire frequency range.

△ Available only with SMA connectors.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,
Models ZB8PD, ZC8PD 10 Watt
All other models, 1 Watt

1b. Internal load dissipation,
Models JCPS, ZB8PD, ZC8PD 0.875 Watt
All other models, 0.62 Watt

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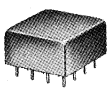
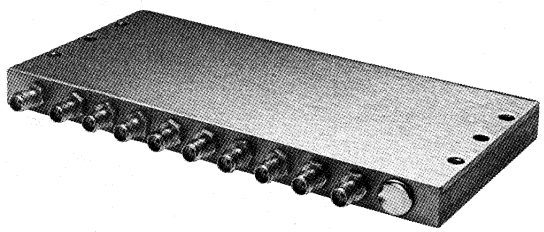
Available Tape & Reel

POWER SPLITTERS/COMBINERS 50Ω Plug-In & Coaxial

9 WAY-0° 2 to 1000 MHz



PSC-9



ZC9PD

MODEL NO.	FREQ. RANGE MHz	ISOLATION dB						INSERTION LOSS, dB Above 9.6dB						PHASE UNBALANCE Degrees			AMPLITUDE UNBALANCE dB			VSWR (:1)				CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
		L		M°		U		L		M°		U		L	M°	U	L	M°	U	S		OUT					
	f_L-f_U	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Typ.	Max.	Typ.	Max.	Page	Note B		Qty. (1-9)
PSC-9-1	2-300	38	25	26	20	22	15	0.6	1.1	0.9	1.4	1.5	2.0	2.0	5.0	10.0	0.2	0.3	0.8	—		—		2-160	C07	gr	93.9
ZC9PD-1000	800-1000			30	20					0.6	1.2			—				0.6		1.22	1.60	1.11	1.30	2-160	AB204	—	169.9

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

* VSWR, input 1.2: typical, 1.6:1 max; output 1.2:1 typical, 1.35:1 max.

✪ When only specification for M range given, specification applies to entire frequency range.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,

Models PSC-9-1, ZC9PD-1000	0.5 Watt
Model ZC10PD	10 Watt
All other models	1 Watt

1b. Internal load dissipation,

Models PSC-9-1, ZC9PD-1000, ZC10PD	1.5 Watt
All other models	0.87 Watt

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INTERNET http://www.minicircuits.com
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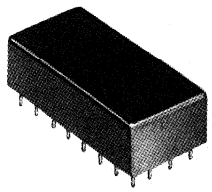
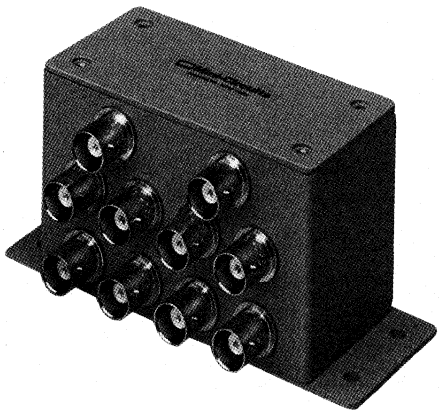
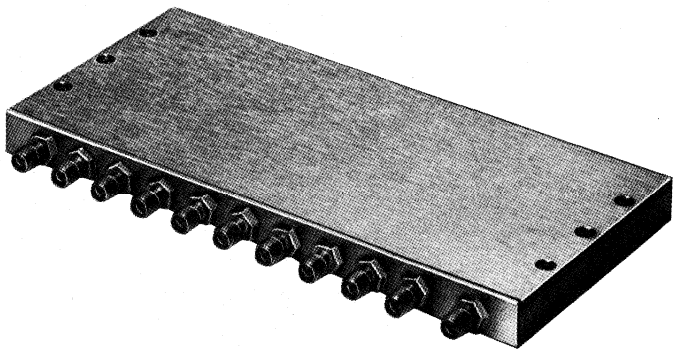
10 WAY-0° 0.5 to 900 MHz



PSC-10



ZFSC-10



ZC10PD

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	Min.	M° Typ.	Min.	U Typ.	Min.	INSERTION LOSS, dB Above 10dB L Typ.	Max.	M° Typ.	Max.	U Typ.	Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PSC-10-1	1-150	36	23	27	23	23	18	0.3	0.6	0.4	0.8	1.0	1.3	3	6	10	0.2	0.3	0.4	2-74	E10	bs	85.95
FSC-10-1	0.5-100	28	20	30	24	27	20	0.5	0.8	0.4	1.0	0.8	1.5	3	6	10	0.2	0.3	0.4	2-74	RR93	—	119.95
C10PD-900	800-900			25	20					1.5	2.0				—			0.8		2-120	AB204	—	178.95
C10PD-900W*	750-900			30	20					0.4	1.0				—			0.6		2-161	AB204	—	189.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections see case style outline drawings for pin locations

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	NOT USED	GND EXT.	CASE GND
bs	29	7	16	31	24	9	2	26	17	4	5	15	All other pins	All other pins
gr	1	9	13	14	15	16	12	8	4	3	—	—	All other pins	All other pins

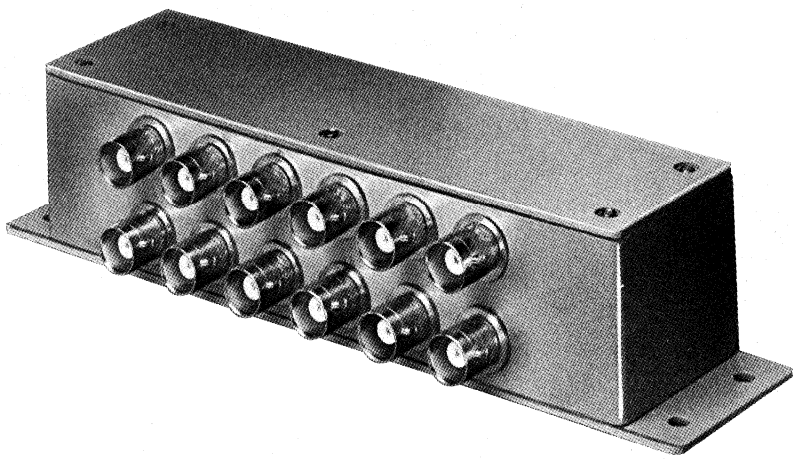
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 & 75Ω

12 WAY-0° 1 to 500 MHz

PSC-12



ZFSC-12

MODEL NO.	FREQ. RANGE MHz	ISOLATION dB						INSERTION LOSS, dB Above 10.8dB						PHASE UNBALANCE Degrees			AMPLITUDE UNBALANCE dB			CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
		L		M		U		L		M		U		L	M	U	L	M	U				
	f_L-f_U	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Page	Note B		Qty. (1-9)
PSC-12-1	1-200	35	30	27	20	21	18	0.5	0.8	0.8	1.2	1.0	1.4	4	8	16	0.2	0.4	0.7	2-75	E10	bu	88.9
ZFSC-12-1	1-200	30	25	35	20	28	20	0.8	1.2	1.1	1.4	1.3	1.6	4	8	16	0.3	0.2	0.3	2-75	R67	—	174.9
ZFSC-12-11	10-300	28	20	33	25	28	20	1.1	1.3	1.1	1.5	1.5	1.8	2	4	6	0.2	0.3	0.4	2-75	R67	—	174.9
■ ZFSC-12-1-75	10-200	35	27	—	—	27	20	0.5	0.8	—	—	0.8	1.3	—	—	—	0.25	—	0.4	2-76	R67	—	179.9
■ ZFSC-12-175	10-500	23	20	24	20	22	18	0.9	1.2	1.0	1.3	1.2	2.0	—	—	—	0.4	0.5	0.8	2-76	R67	—	197.9

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.

* For adjacent ports, isolation is 28 dB minimum.
Adjacent ports defined as: (1,3) (5,7) (9,11) (13,15)
(2,4) (6,8) (10,12) (14,16)

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

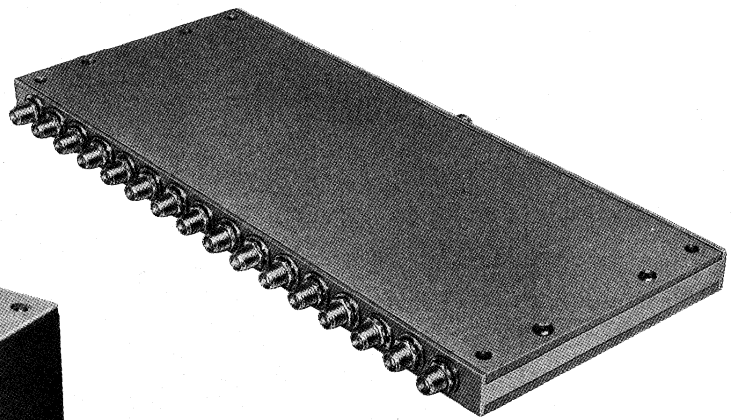
C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating,
   Model ZC16PD 10 Watt
   All other models 1 Watt
   1b. Internal load dissipation,
   Model ZC16PD 2.4 Watt
   Model ZC16PD-2185 1.75 Watt
   All other models 0.87 Watt

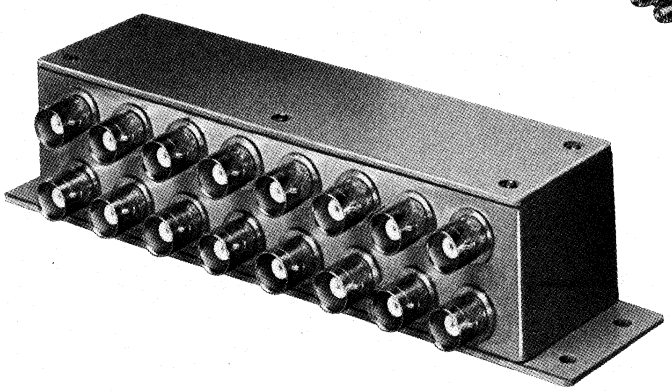
NSN GUIDE

MCL NO.	NSN
ZFSC-16-1(BNC)	5820-01-9321

16 WAY-0° 10 kHz to 2.6 GHz



ZC16PD



ZFSC-16

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 12dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ.	S Max.	OUT Typ.	OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
	ZFSC-16-1	0.5-125	30	24	25	18	20	15	1.0	1.2	1.1	1.3	1.2	1.4	1	3	5	0.3	0.2	0.5	see				2-78	R30	—	172.95
■	ZFSC-16-1-75	1-150	30	25	30	25	25	20	0.8	1.1	0.7	1.1	1.0	1.3	3	6	10	0.4	0.2	0.4					2-77	R30	—	182.95
	ZFSC-16-3*	1-30	45	35	45	40	41	35	0.5	0.9	0.5	0.9	0.5	0.9	1	2	3	0.1	0.1	0.1	Performance				2-78	R30	—	172.95
✣■	ZFSC-16-675	0.01-25	25	20	40	25	25	20	0.8	1.1	0.4	0.8	1.0	1.6	1	3	5	0.1	0.2	0.4					2-77	R30	—	189.95
	ZFSC-16-12	0.1-200	33	20	27	20	26	20	0.6	1.5	0.7	1.0	0.9	1.5	2	6	9	0.4	0.2	0.4	Data and				2-79	R30	—	189.95
																					curves							
	ZC16PD-900	800-900			30	20					0.5	1.0						0.5			1.06	1.20	1.06	1.20	2-117	UU179	—	295.00
	ZC16PD-960	890-960			28	20					0.5	1.0						0.5			1.06	1.30	1.06	1.20	2-116	UU179	—	295.00
	ZC16PD-960W	700-1000			26	15					0.5	1.3						0.6			1.10	1.60	1.06	1.30	2-116	UU179	—	265.00
	ZC16PD-1900	1700-1900			30	20					0.5	1.0						0.8			1.15	1.35	1.06	1.30	2-117	UU179	—	349.00
	ZC16PD-1900W	1500-2100			30	15					0.7	1.4						0.8			1.25	1.60	1.15	1.35	2-162	UU179	—	319.00
NEW	ZC16PD-2185	1800-2600			30	16					0.5	1.4				6		0.7			1.15	1.60	1.05	1.30	2-162	UU179	—	319.00

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawings

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	NOT USED	GND EXT.	CASE GND
bu	5	7	8	1	2	31	32	25	26	22	30	19	27	11,14,21	4	All other pins

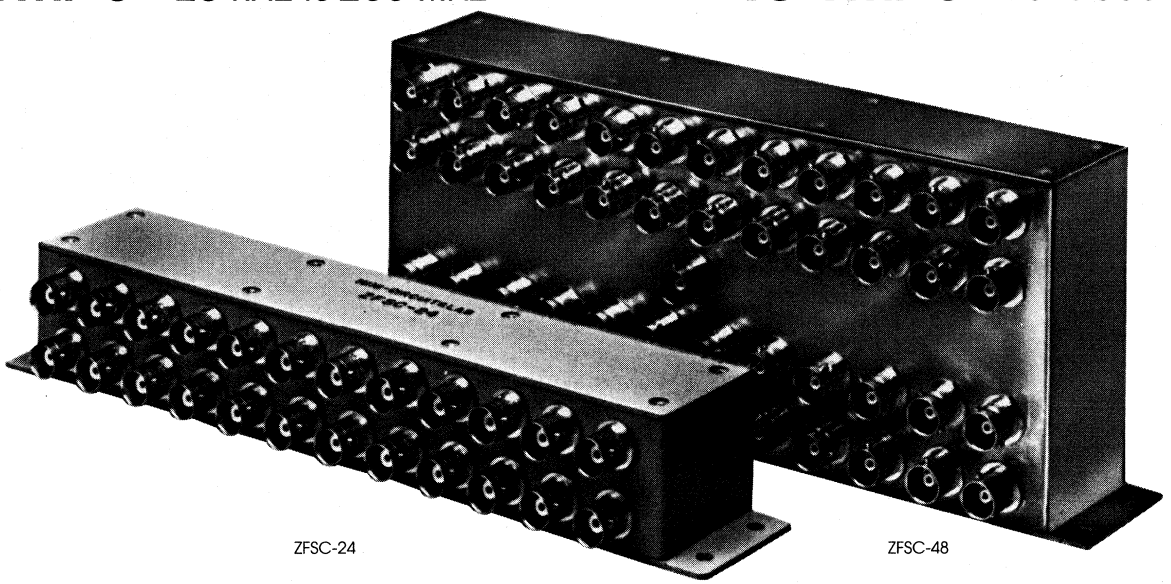
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 & 75Ω

24 WAY-0° 25 kHz to 200 MHz

48 WAY-0° 10 to 300 MHz



ZFSC-24 ZFSC-48

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB 24 WAY (above 13.8dB) 48 WAY (above 16.8dB) L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
ZFSC-24-1	0.2-100	25	20	25	20	25	20	1.0	2.0	1.0	2.0	1.0	2.0	0.6	0.4	0.5	2-80	R31	—	264.95
ZFSC-24-11	1-200	33	25	22	20	20	17	0.9	1.7	1.0	1.8	1.3	2.2	0.6	0.8	0.8	2-80	R31	—	274.95
■ ZFSC-24-11-75	1-200	35	25	33	20	27	20	0.6	1.3	0.8	1.5	1.1	2.0	0.6	0.4	0.6	2-161	R31	—	274.95
✣ ZFSC-24-6	0.025-50	30	25	39	28	30	22	0.4	1.0	0.4	1.0	0.6	1.5	0.2	0.3	0.7	2-81	R31	—	274.95
ZFSC-48-1	10-300	30	25	28	20	23	20	1.2	2.0	2.1	2.5	2.8	4.0	0.6	0.7	1.0	2-82	HH68	—	590.00
■ ZFSC-48-1-75	10-300	30	25	28	20	23	20	1.2	2.0	2.1	2.5	2.8	4.0	0.6	0.7	1.0	2-82	HH68	—	590.00

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating, 1 Watt
   1b. Internal load dissipation, 0.87 Watt

POWER DIVIDERS

500MHz - 8.4GHz

2 to 16 Way from $54.95 (1-9)

When you turn to Mini-Circuits to locate the right power divider for your applications, you can choose from dozens of low cost 2way to 16 way models. Thanks to advanced microstrip design, these units are able to handle high matched power with good VSWR (1.2:1 typ.) and low insertion loss... just 0.1dB (typ., above 3dB) for 2way units to 0.5dB (typ., above 12dB) for 16way. Additionally, this performance packed series features high isolation between ports (30dB typ.) and rugged construction to handle operational temperatures of -55°C to +100°C. Immediate off-the-shelf availability is backed by our 1 week shipment guarantee. So, if you're looking for a better blend of usability and affordability in a power divider...
there's only "1 way" to go...Mini-Circuits !

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SPECIFICATIONS

MODEL	Freq. (GHz)	Price $ea. (1-9)
■ ZC2PD-900	.80-.90	64.95
■ ZN2PD-920	.80-.92	59.95
■ ZN2PD-920W	.70-1.05	54.95
■ IZY2PD-64	5.80-6.40	89.95
■ IZY2PD-86	7.0-8.60	94.95
■●▼ ZAPD-1	.50-1.0	54.95
■●▼ ZAPD-2	1.0-2.0	54.95
■● ZAPD-4	2.0-4.20	59.95
■●▼ ZAPD-21	.50-2.0	59.95
● ZAPD-50	4.4-5.0	54.95
● ZAPD-50W	4.2-6.0	64.95
■ ZN2PD-1900	1.6-1.9	69.95
■ ZN2PD-1900W	1.5-2.0	64.95
■ ZN3PD-900	.70-1.05	54.95
■ ZN3PD-900W	.65-1.05	69.95
■● ZA3PD-1	.50-1.0	89.95
■● ZA3PD-1.5	.75-1.50	89.95
■● ZA3PD-2	1.0-2.0	89.95
■● ZA3PD-4	2.0-4.20	89.95
■ ZC6PD-960	.89-.96	124.95
■ ZC6PD-960W	.70-1.0	119.95
■ ZC6PD-1900	1.70-1.90	134.95
■ ZC6PD-1900W	1.50-2.0	129.95
■● ZB6PD1-900	.80-.90	139.95
■● ZB6PD1-960	.89-.96	139.95
■● ZB6PD1-1900	1.70-1.90	149.95
■● ZAPDQ-2 (90°)	1.0-2.0	79.95
■● ZAPDQ-4 (90°)	2.0-4.20	79.95

MODEL	Freq. (GHz)	Price $ea. (1-9)
■●▼ ZAPDJ-2 (180°)	1.0-2.0	71.95
■● ZA4PD-2	1.0-2.0	89.95
■● ZA4PD-4	2.0-4.20	89.95
■● ZB4PD-42	1.70-4.20	99.95
■● ZB4PD-4	3.70-4.20	94.95
▼ ZB4PD-1750-75	.875-1.75	99.95
■● ZB4PD1-930	.85-.93	99.95
■● ZB4PD1-930W	.725-1.05	94.95
● ZB4PD1-8.4	6.70-8.40	149.95
■ ZC4PD-900	.80-.90	89.95
■ ZN4PD-920	.80-.92	84.95
■ ZN4PD-920W	.67-1.0	79.95
■ ZC8PD-900	.80-.90	158.95
■● ZB8PD-1	.80-.96	138.95
■● ZB8PD-2	1.0-2.0	138.95
■● ZB8PD-4	2.0-4.20	138.95
● ZB8PD-8.4	7.10-8.40	149.95
■ ZC9PD-1000	.80-1.0	169.95
■ ZC10PD-900	.80-.90	178.95
■ ZC10PD-900W	.75-.90	189.95
■ ZC16PD-900	.80-.90	295.00
■ ZC16PD-960	.89-.96	295.00
■ ZC16PD-960W	.70-1.0	265.00
■ ZC16PD-1900	1.70-1.90	349.00
■ ZC16PD-1900W	1.50-2.10	319.00

For detailed specs refer to Mini-Circuits Short Form Catalog, Trade Directories listed below or consult factory.
Connector Type: ■ SMA ● N ▼ BNC

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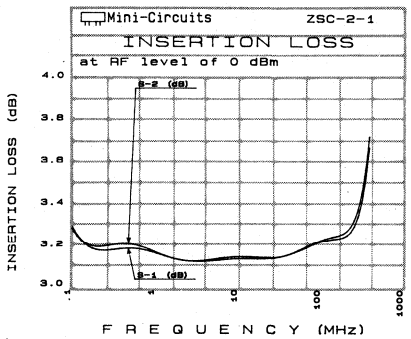
For detailed specs on all Mini-Circuits products refer to • 740- pg. HANDBOOK • INTERNET • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM

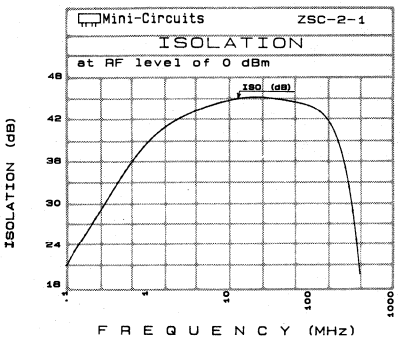
CUSTOM PRODUCT NEEDS...Let Our Experience Work For You.

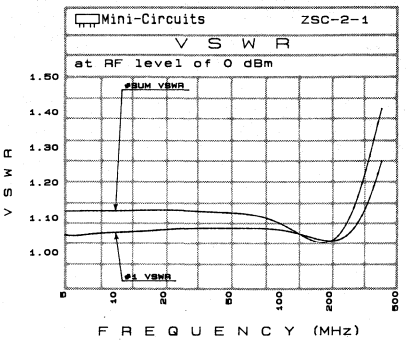
Power Splitter/Combiners 50 ohms

ZMSC-2-1, ZSC-2-1

0.1 to 400MHz





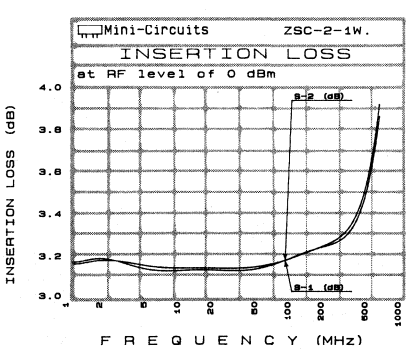


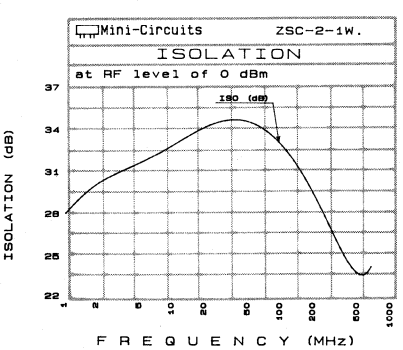
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.1	3.33	3.33	0.00	22.82
0.5	3.24	3.23	0.01	35.06
1.0	3.25	3.24	0.01	39.76
5.0	3.19	3.15	0.04	51.14
10.0	3.17	3.17	0.00	49.55
20.0	3.23	3.20	0.03	44.22
50.0	3.23	3.20	0.03	37.22
100.0	3.27	3.26	0.01	32.39
128.6	3.30	3.29	0.01	30.81
171.5	3.30	3.31	0.01	29.38
200.0	3.31	3.29	0.02	28.96
257.2	3.35	3.33	0.02	29.45
300.0	3.42	3.39	0.03	31.46
328.6	3.46	3.47	0.01	33.72
400.0	3.49	3.45	0.04	34.03

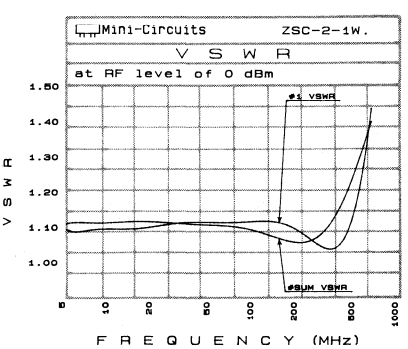
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.1	1.49	1.96	1.97
0.5	1.14	1.20	1.20
1.0	1.14	1.16	1.16
5.0	1.15	1.11	1.11
10.0	1.15	1.11	1.11
20.0	1.16	1.11	1.11
50.0	1.15	1.10	1.10
100.0	1.13	1.08	1.08
128.6	1.12	1.07	1.08
171.5	1.08	1.07	1.07
200.0	1.06	1.07	1.07
257.2	1.05	1.10	1.11
300.0	1.10	1.15	1.16
328.6	1.15	1.18	1.20
400.0	1.25	1.24	1.26

ZMSC-2-1W, ZSC-2-1W

1 to 650MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
1.0	3.31	3.28	0.03	27.72
5.0	3.18	3.21	0.03	37.92
10.0	3.19	3.21	0.02	45.09
20.0	3.22	3.24	0.02	46.45
50.0	3.21	3.24	0.03	37.51
100.0	3.29	3.29	0.00	31.91
152.4	3.35	3.34	0.01	28.72
200.0	3.33	3.35	0.02	26.74
260.6	3.38	3.40	0.02	24.91
300.0	3.40	3.46	0.06	24.02
390.4	3.47	3.49	0.02	22.64
455.3	3.59	3.61	0.02	22.15
500.0	3.62	3.65	0.03	22.04
563.5	3.68	3.71	0.03	22.33
650.0	3.86	3.89	0.03	23.85

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	1.11	1.26	1.26
5.0	1.13	1.16	1.16
10.0	1.13	1.14	1.14
20.0	1.14	1.14	1.14
50.0	1.13	1.13	1.13
100.0	1.13	1.12	1.12
152.4	1.14	1.11	1.11
200.0	1.13	1.10	1.10
260.6	1.14	1.07	1.08
300.0	1.15	1.06	1.06
390.4	1.18	1.03	1.03
455.3	1.21	1.05	1.05
500.0	1.23	1.07	1.07
563.5	1.26	1.12	1.12
650.0	1.30	1.19	1.18

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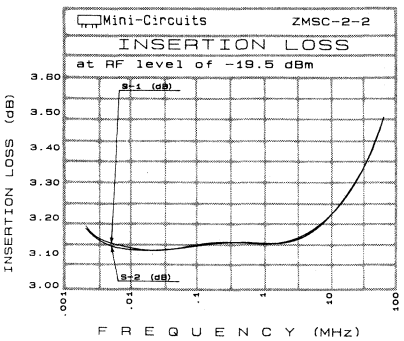
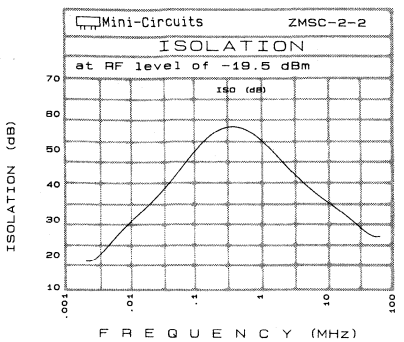
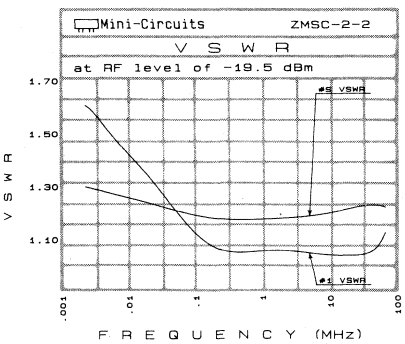
ZMSC-2-2, ZSC-2-2

0.002 to 60MHz





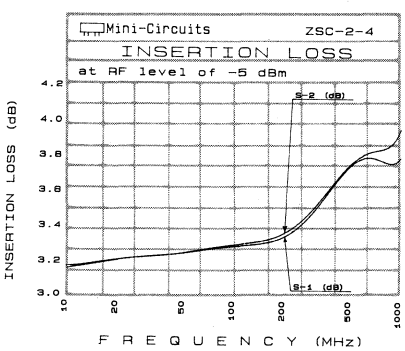


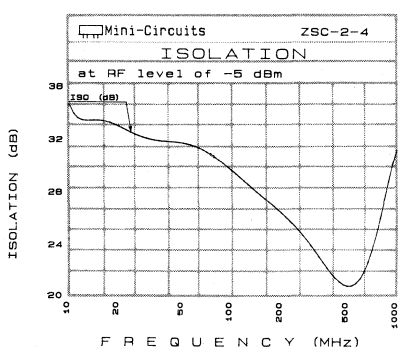
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
002	3.18	3.17	0.01	17.44
005	3.13	3.12	0.01	24.03
010	3.12	3.11	0.01	29.51
020	3.10	3.11	0.01	35.51
101	3.13	3.13	0.00	49.92
1.000	3.13	3.13	0.00	51.68
5.000	3.16	3.16	0.00	39.50
9.900	3.22	3.22	0.00	34.91
14.300	3.24	3.25	0.01	32.76
19.900	3.29	3.29	0.00	30.66
30.900	3.35	3.35	0.00	28.08
41.100	3.41	3.40	0.01	26.55
50.500	3.46	3.45	0.01	25.62
54.500	3.47	3.46	.01	25.23
60.000	3.49	3.50	.01	24.87

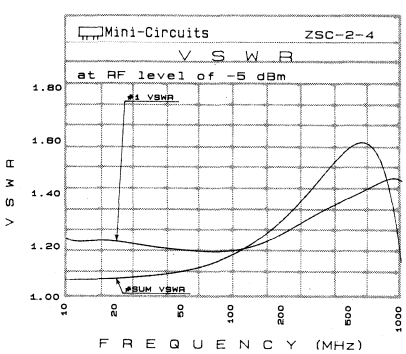
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
.002	1.30	1.62	1.62
.005	1.18	1.06	1.06
.010	1.17	1.06	1.06
.020	1.18	1.06	1.05
.101	1.19	1.05	1.05
1.000	1.20	1.04	1.04
5.000	1.21	1.04	1.03
9.900	1.22	1.04	1.04
14.300	1.23	1.04	1.04
19.900	1.23	1.05	1.05
30.900	1.23	1.07	1.07
41.100	1.22	1.09	1.09
50.500	1.22	1.12	1.12
54.500	1.23	1.10	1.10
60.000	1.22	1.12	1.12

ZSC-2-4

10 to 1000MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
10.0	3.16	3.17	0.01	34.05
19.9	3.21	3.21	0.00	32.89
49.6	3.25	3.25	0.00	31.63
99.1	3.28	3.30	0.02	29.86
156.0	3.32	3.34	0.02	27.71
200.6	3.35	3.38	0.03	26.31
302.1	3.50	3.52	0.02	23.78
359.0	3.56	3.58	0.02	22.74
418.4	3.68	3.69	0.01	22.00
500.1	3.77	3.78	0.01	21.43
591.6	3.80	3.81	0.01	21.37
708.0	3.75	3.80	0.05	22.56
797.1	3.81	3.89	0.08	25.32
913.4	3.81	3.93	0.12	33.90
1000.0	3.71	3.85	0.14	24.74

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	1.08	1.22	1.22
19.9	1.08	1.22	1.22
49.6	1.11	1.19	1.19
99.1	1.17	1.19	1.19
156.0	1.25	1.22	1.22
200.6	1.31	1.25	1.26
302.1	1.44	1.32	1.32
359.0	1.49	1.35	1.35
418.4	1.55	1.38	1.38
500.1	1.59	1.40	1.40
591.6	1.60	1.41	1.42
708.0	1.56	1.44	1.45
797.1	1.48	1.46	1.48
913.4	1.32	1.48	1.50
1000.0	1.15	1.43	1.47

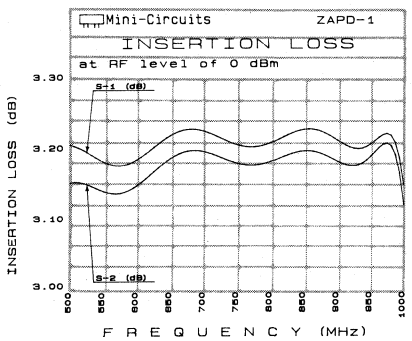
2WAY-0°

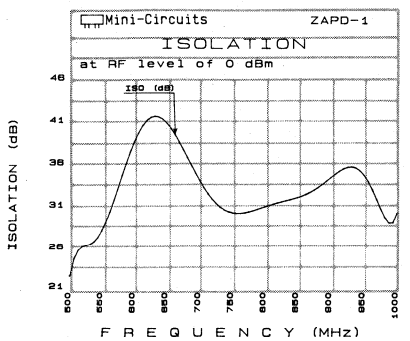
Power Splitter/Combiners

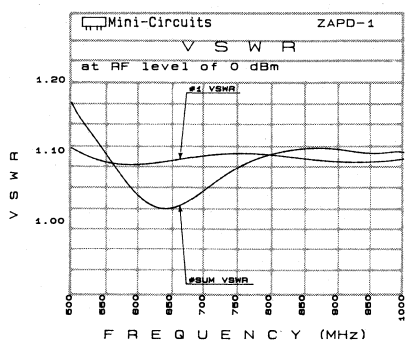
50 ohms

ZAPD-1

0.5 to 1GHz





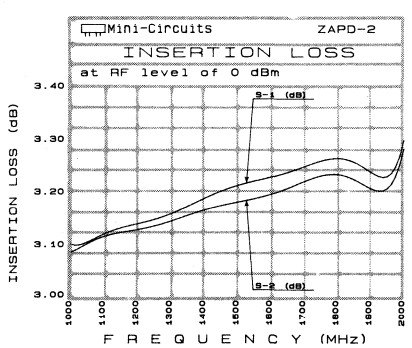


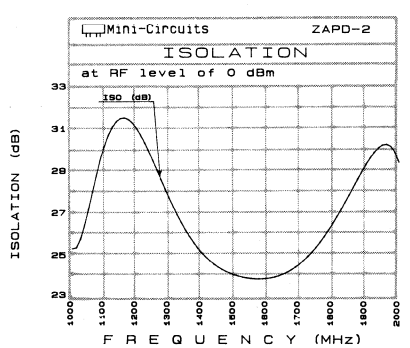
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
500.0	3.21	3.16	0.05	23.83
525.0	3.19	3.14	0.05	25.98
550.0	3.18	3.14	0.04	28.63
600.0	3.17	3.14	0.03	37.12
650.0	3.22	3.18	0.04	40.68
700.0	3.23	3.20	0.03	33.24
750.0	3.20	3.17	0.03	30.69
775.0	3.20	3.17	0.03	30.30
800.0	3.21	3.18	0.03	30.34
850.0	3.25	3.21	0.04	31.69
875.0	3.22	3.19	0.03	33.00
900.0	3.18	3.15	0.03	34.52
950.0	3.22	3.21	0.01	33.85
975.0	3.21	3.19	0.02	31.00
1000.0	3.18	3.16	0.02	28.08

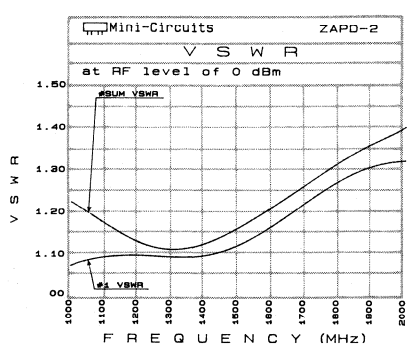
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
500.0	1.16	1.10	1.09
525.0	1.13	1.09	1.08
550.0	1.10	1.08	1.07
600.0	1.03	1.08	1.07
650.0	1.02	1.08	1.07
700.0	1.04	1.09	1.07
750.0	1.08	1.10	1.07
775.0	1.09	1.10	1.07
800.0	1.10	1.09	1.07
850.0	1.10	1.09	1.06
875.0	1.10	1.09	1.06
900.0	1.10	1.08	1.06
950.0	1.10	1.08	1.06
975.0	1.10	1.08	1.06
1000.0	1.10	1.09	1.07

ZAPD-2

1 to 2GHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
1000.0	3.11	3.10	0.01	24.77
1050.0	3.10	3.10	0.00	27.28
1100.0	3.13	3.12	0.01	29.92
1200.0	3.15	3.14	0.01	31.18
1300.0	3.15	3.13	0.02	27.64
1350.0	3.18	3.16	0.02	26.24
1400.0	3.20	3.18	0.02	25.19
1450.0	3.21	3.18	0.03	24.48
1500.0	3.20	3.17	0.03	24.04
1550.0	3.21	3.18	0.03	23.83
1600.0	3.21	3.18	0.03	23.86
1725.0	3.25	3.22	0.03	24.95
1825.0	3.18	3.15	0.03	27.05
1875.0	3.33	3.30	0.03	28.60
2000.0	3.29	3.28	0.01	29.68

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1000.0	1.22	1.07	1.06
1050.0	1.20	1.09	1.08
1100.0	1.17	1.09	1.08
1200.0	1.13	1.10	1.08
1300.0	1.11	1.09	1.07
1350.0	1.11	1.09	1.07
1400.0	1.13	1.10	1.06
1450.0	1.14	1.10	1.07
1500.0	1.16	1.12	1.08
1550.0	1.18	1.14	1.10
1600.0	1.21	1.17	1.12
1725.0	1.27	1.23	1.18
1825.0	1.32	1.28	1.22
1875.0	1.35	1.30	1.24
2000.0	1.40	1.32	1.26

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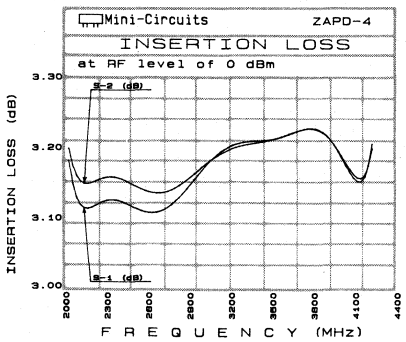
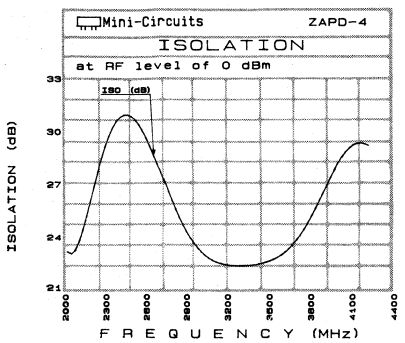
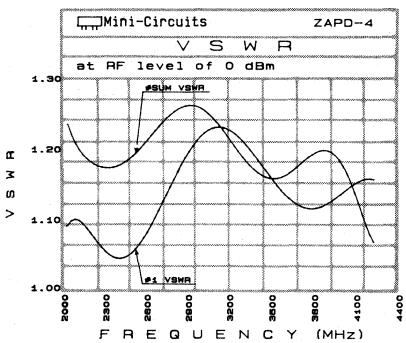
ZAPD-4

2 to 4.2GHz





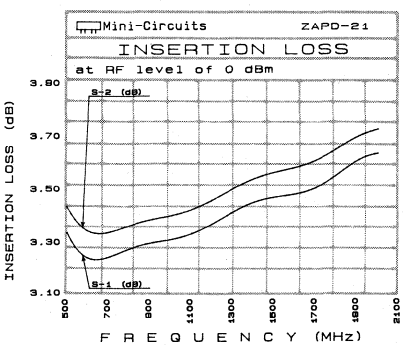


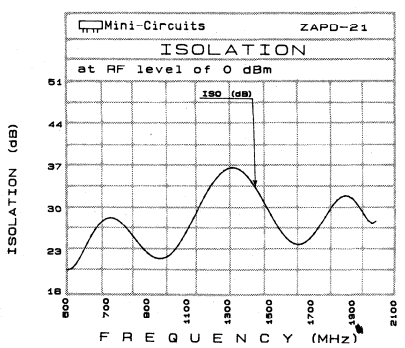
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
2000.0	3.15	3.18	0.03	22.44
2110.0	3.12	3.16	0.04	24.68
2220.0	3.13	3.16	0.03	27.37
2440.0	3.11	3.14	0.03	31.51
2550.0	3.17	3.20	0.03	30.19
2770.0	3.08	3.10	0.02	25.92
2990.0	3.17	3.18	0.01	23.39
3100.0	3.24	3.23	0.01	22.73
3320.0	3.15	3.15	0.00	22.24
3540.0	3.24	3.24	0.00	22.88
3760.0	3.22	3.22	0.00	24.81
3870.0	3.23	3.23	0.00	26.40
3980.0	3.16	3.17	0.01	28.10
4090.0	3.17	3.17	0.00	29.46
4200.0	3.17	3.17	0.00	29.13

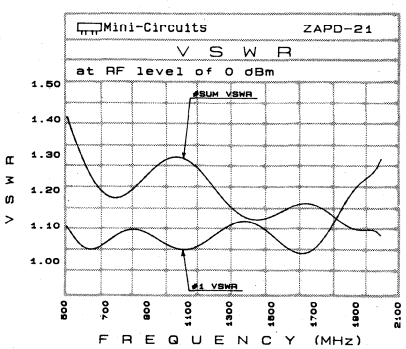
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
2000.0	1.23	1.10	1.12
2110.0	1.20	1.09	1.11
2220.0	1.17	1.07	1.10
2440.0	1.18	1.04	1.09
2550.0	1.21	1.07	1.11
2770.0	1.25	1.16	1.20
2990.0	1.26	1.22	1.27
3100.0	1.24	1.23	1.28
3320.0	1.18	1.20	1.26
3540.0	1.16	1.14	1.20
3760.0	1.20	1.11	1.14
3870.0	1.20	1.13	1.13
3980.0	1.17	1.14	1.14
4090.0	1.13	1.15	1.15
4200.0	1.06	1.16	1.17

ZAPD-21

0.5 to 2.0GHz





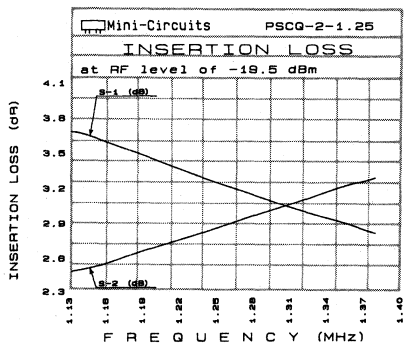


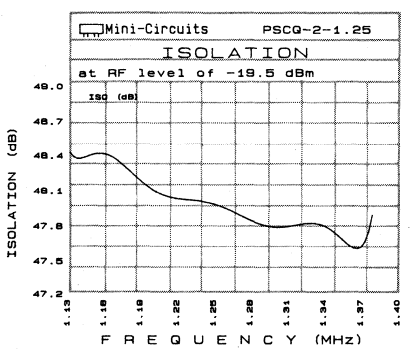
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
500.0	3.34	3.44	0.10	19.29
575.0	3.24	3.35	0.11	23.06
650.0	3.23	3.34	0.11	27.74
725.0	3.25	3.34	0.09	28.50
800.0	3.26	3.34	0.08	25.57
950.0	3.34	3.43	0.09	23.23
1100.0	3.32	3.41	0.09	25.71
1250.0	3.34	3.45	0.11	36.78
1400.0	3.45	3.54	0.09	31.83
1550.0	3.47	3.57	0.10	26.51
1700.0	3.52	3.62	0.10	26.81
1775.0	3.54	3.64	0.10	28.82
1850.0	3.54	3.64	0.10	31.81
1925.0	3.62	3.71	0.09	31.64
2000.0	3.63	3.72	0.09	26.35

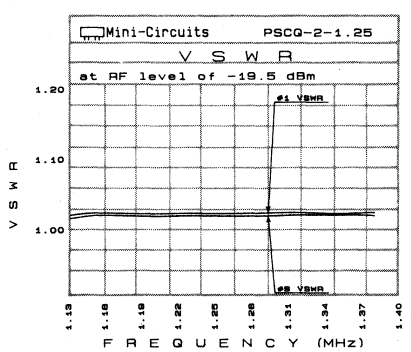
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
500.0	1.40	1.10	1.10
575.0	1.29	1.04	1.04
650.0	1.21	1.04	1.03
725.0	1.17	1.07	1.07
800.0	1.20	1.09	1.09
950.0	1.28	1.07	1.08
1100.0	1.28	1.03	1.04
1250.0	1.19	1.09	1.09
1400.0	1.11	1.11	1.11
1550.0	1.15	1.05	1.07
1700.0	1.16	1.05	1.05
1775.0	1.13	1.11	1.11
1850.0	1.10	1.18	1.17
1925.0	1.09	1.23	1.24
2000.0	1.09	1.28	1.29

2WAY-90°
Power Splitter/Combiners 50 ohm

PSCQ-2-1.25 1.13 to 1.38MHz

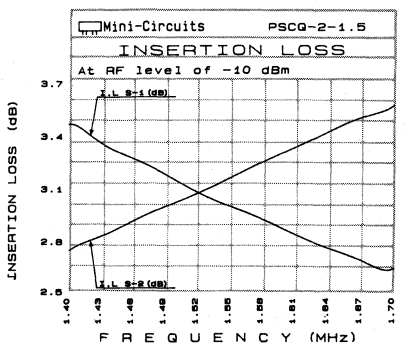


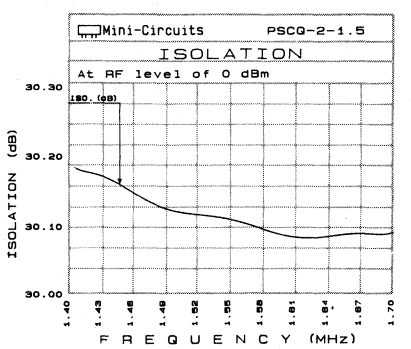


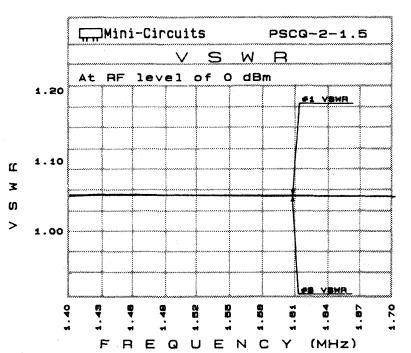


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1.130	3.69	2.49	1.20	89.8	48
1.145	3.66	2.53	1.13	89.8	49
1.150	3.63	2.53	1.10	89.8	48
1.159	3.59	2.56	1.03	89.8	48
1.174	3.54	2.62	0.92	89.8	48
1.200	3.43	2.70	0.73	89.8	48
1.226	3.33	2.78	0.55	89.8	48
1.240	3.31	2.82	0.49	89.8	48
1.250	3.28	2.83	0.45	89.8	48
1.270	3.25	2.87	0.38	89.8	48
1.300	3.18	2.94	0.24	89.8	48
1.336	3.06	3.03	0.03	89.8	48
1.350	2.95	3.15	0.20	89.8	48
1.365	2.90	3.20	0.30	89.7	47
1.380	2.86	3.25	0.39	89.8	47

PSCQ-2-1.5 1.4 to 1.7MHz

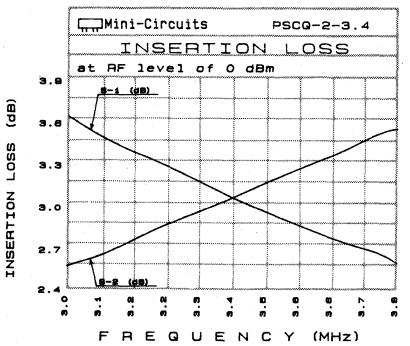


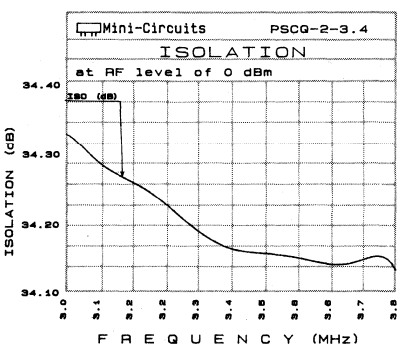


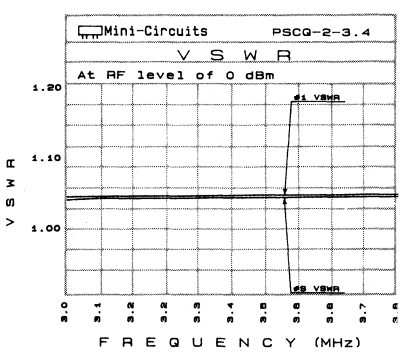


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1.410	3.48	2.75	0.73	90.00	30.19
1.431	3.41	2.81	0.60	90.00	30.18
1.452	3.33	2.86	0.47	90.00	30.16
1.472	3.26	2.93	0.33	90.00	30.14
1.493	3.21	2.98	0.23	90.00	30.13
1.514	3.14	3.03	0.11	90.00	30.12
1.535	3.07	3.08	0.01	90.00	30.12
1.555	3.01	3.15	0.14	90.00	30.11
1.576	2.97	3.20	0.23	90.00	30.11
1.597	2.92	3.27	0.35	90.00	30.09
1.617	2.85	3.33	0.48	90.10	30.09
1.638	2.79	3.37	0.58	90.10	30.09
1.659	2.75	3.45	0.70	90.10	30.08
1.679	2.70	3.50	0.80	90.10	30.10
1.690	2.63	3.56	0.93	90.10	30.09

PSCQ-2-3.4 3.0 to 3.8MHz







FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL (dB)
3.028	3.65	2.58	1.07	90.00	34.3
3.083	3.55	2.63	0.92	90.00	34.3
3.138	3.46	2.71	0.75	90.00	34.2
3.193	3.40	2.78	0.62	90.00	34.2
3.248	3.32	2.86	0.46	89.90	34.2
3.303	3.26	2.93	0.33	89.90	34.2
3.359	3.17	3.00	0.17	89.90	34.1
3.414	3.10	3.06	0.04	89.90	34.1
3.469	3.03	3.14	0.11	89.90	34.1
3.524	2.96	3.19	0.23	89.90	34.1
3.579	2.89	3.28	0.39	89.90	34.1
3.635	2.83	3.33	0.50	89.90	34.1
3.690	2.76	3.39	0.63	89.90	34.1
3.745	2.71	3.48	0.77	89.90	34.1
3.772	2.61	3.58	0.97	89.90	34.1

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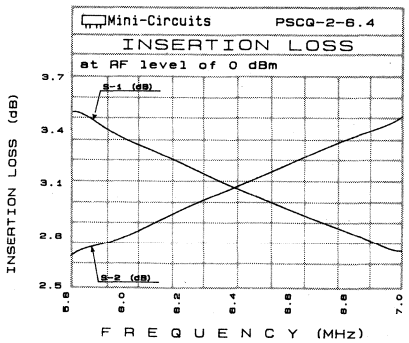
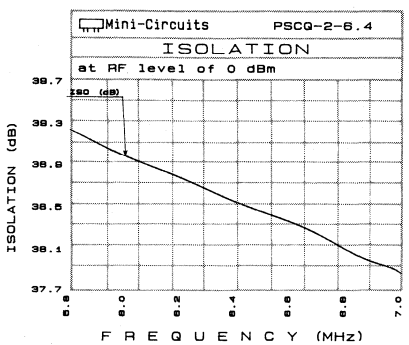
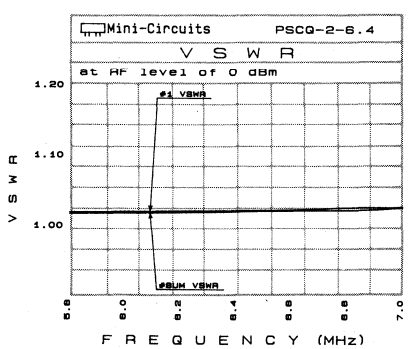
PSCQ-2-6.4 5.8 to 7.0MHz

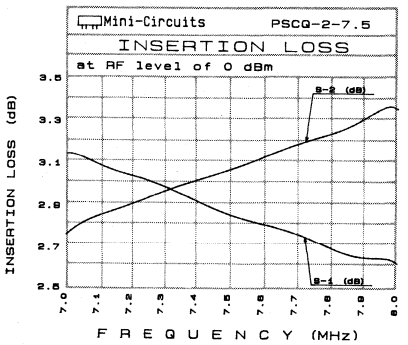


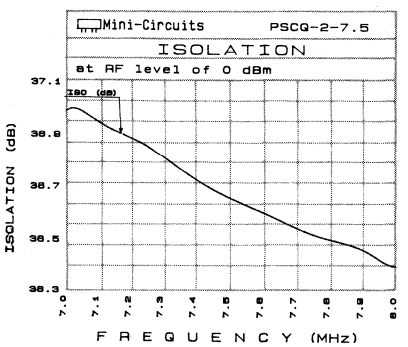


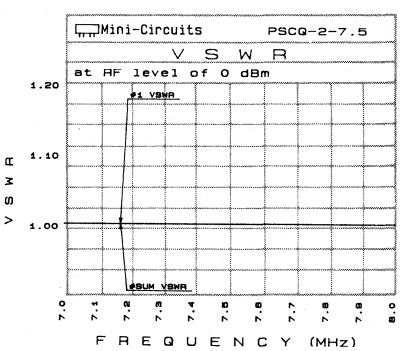


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
5.841	3.51	2.67	0.84	89.70	39.23
5.924	3.46	2.74	0.72	89.70	39.13
6.007	3.38	2.77	0.61	89.70	39.01
6.090	3.31	2.84	0.47	89.70	38.96
6.172	3.28	2.89	0.39	89.70	38.86
6.255	3.21	2.96	0.25	89.70	38.75
6.338	3.15	3.02	0.13	89.70	38.66
6.421	3.09	3.06	0.03	89.70	38.60
6.503	3.05	3.13	0.08	89.70	38.50
6.586	2.98	3.18	0.20	89.70	38.40
6.669	2.93	3.24	0.31	89.70	38.33
6.752	2.89	3.30	0.41	89.70	38.26
6.835	2.84	3.35	0.51	89.70	38.07
6.917	2.79	3.40	0.61	89.70	38.02
6.959	2.72	3.48	0.76	89.70	37.89

PSCQ-2-7.5 7.0 to 8.0MHz

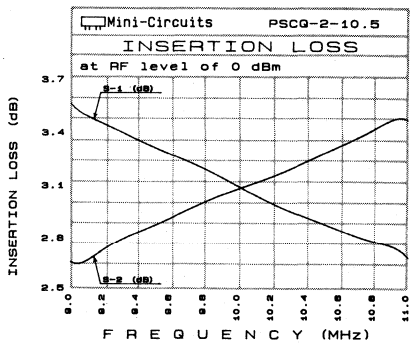


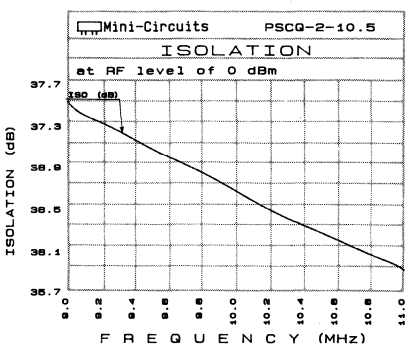


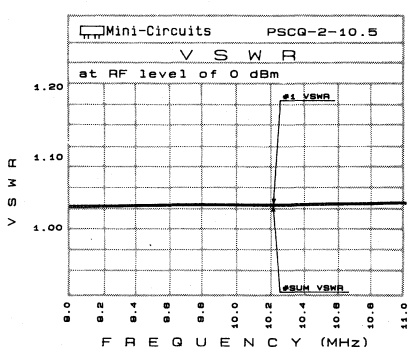


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
7.035	3.14	2.76	0.38	89.60	37.00
7.103	3.11	2.83	0.28	89.60	36.99
7.172	3.06	2.87	0.19	89.60	36.90
7.241	3.04	2.90	0.14	89.60	36.87
7.310	3.03	2.95	0.08	89.60	36.86
7.379	2.95	3.01	0.06	89.60	36.76
7.448	2.90	3.03	0.13	89.60	36.72
7.517	2.88	3.05	0.17	89.60	36.66
7.586	2.85	3.11	0.26	89.60	36.64
7.655	2.80	3.13	0.33	89.60	36.58
7.724	2.78	3.20	0.42	89.60	36.54
7.793	2.74	3.23	0.49	89.60	36.54
7.862	2.69	3.27	0.58	89.60	36.49
7.931	2.65	3.30	0.65	89.60	36.46
7.966	2.63	3.36	0.73	89.60	36.39

PSCQ-2-10.5 9.0 to 11.0MHz





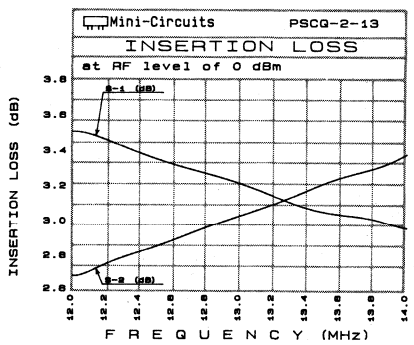


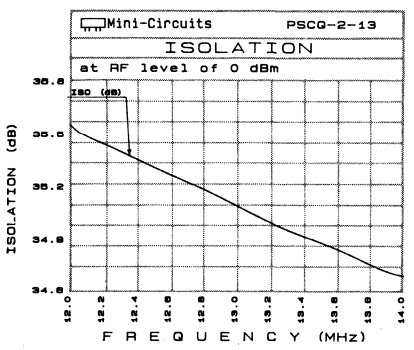
FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
9.00	3.55	2.65	0.90	89.30	37.53
9.14	3.46	2.69	0.77	89.30	37.37
9.28	3.42	2.78	0.64	89.30	37.28
9.41	3.35	2.84	0.51	89.30	37.15
9.55	3.30	2.90	0.40	89.30	37.05
9.69	3.24	2.96	0.28	89.30	36.95
9.83	3.18	3.02	0.16	89.30	36.82
9.97	3.13	3.08	0.05	89.30	36.72
10.10	3.04	3.11	0.07	89.30	36.58
10.24	2.98	3.18	0.20	89.30	36.47
10.38	2.93	3.23	0.30	89.30	36.37
10.52	2.87	3.29	0.42	89.30	36.27
10.66	2.82	3.34	0.52	89.30	36.16
10.79	2.79	3.43	0.64	89.30	36.10
11.00	2.70	3.49	0.79	89.30	35.95

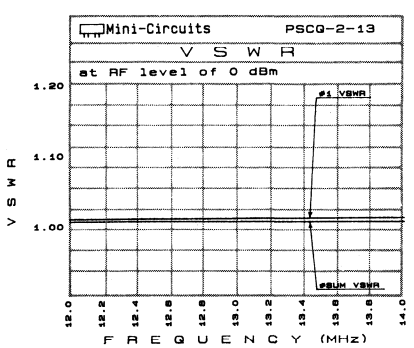
2WAY-90°

Power Splitter/Combiners 50 ohm

PSCQ-2-13 12 to 14MHz

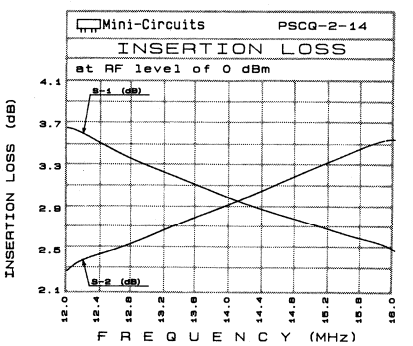


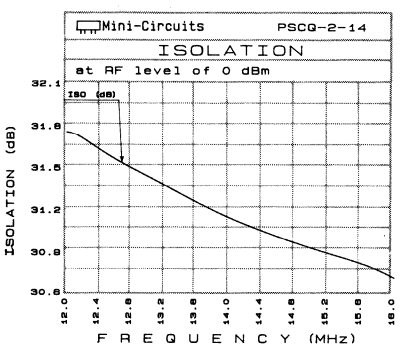


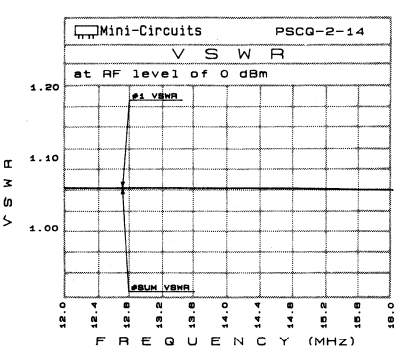


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
12.00	3.52	2.69	0.83	89.40	35.56
12.10	3.49	2.73	0.76	89.40	35.47
12.30	3.43	2.77	0.66	89.40	35.40
12.40	3.38	2.82	0.56	89.40	35.35
12.60	3.33	2.87	0.46	89.40	35.29
12.70	3.32	2.93	0.39	89.40	35.24
12.80	3.26	2.97	0.29	89.40	35.17
13.00	3.21	3.01	0.20	89.40	35.09
13.10	3.18	3.06	0.12	89.40	35.05
13.20	3.12	3.10	0.02	89.40	34.98
13.40	3.07	3.16	0.09	89.40	34.92
13.50	3.04	3.21	0.17	89.40	34.88
13.70	3.04	3.26	0.22	89.40	34.83
13.80	3.01	3.29	0.28	89.40	34.76
14.00	2.95	3.37	0.42	89.40	34.69

PSCQ-2-14 12 to 16MHz

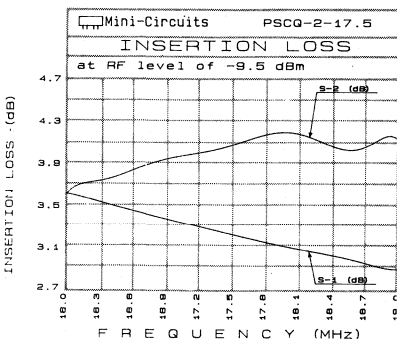


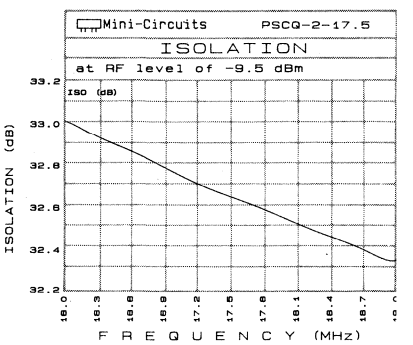


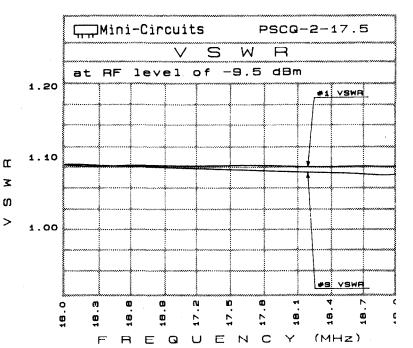


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
12.00	3.69	2.32	1.37	89.50	31.77
12.20	3.62	2.42	1.20	89.50	31.70
12.40	3.52	2.47	1.05	89.50	31.64
12.70	3.41	2.53	0.88	89.50	31.52
13.00	3.31	2.65	0.66	89.60	31.45
13.30	3.22	2.73	0.49	89.60	31.35
13.50	3.15	2.81	0.34	89.60	31.27
13.70	3.08	2.87	0.21	89.60	31.22
14.10	2.99	2.95	0.04	89.60	31.12
14.40	2.90	3.05	0.15	89.50	31.07
14.70	2.86	3.19	0.33	89.40	31.00
15.10	2.75	3.31	0.56	89.30	30.93
15.50	2.66	3.45	0.79	89.20	30.86
15.80	2.58	3.54	0.96	89.10	30.78
16.00	2.53	3.58	1.05	89.00	30.74

PSCQ-2-17.5 16 to 19MH







FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL (dB)
16.00	3.62	3.65	0.03	88.98	33.0
16.20	3.56	3.74	0.18	88.99	32.9
16.40	3.51	3.77	0.26	89.00	32.9
16.60	3.46	3.83	0.37	88.96	32.8
16.80	3.40	3.88	0.48	88.94	32.8
17.10	3.33	3.99	0.66	88.92	32.7
17.20	3.30	4.00	0.70	88.92	32.7
17.40	3.25	4.05	0.80	88.93	32.6
17.50	3.21	4.08	0.87	88.93	32.6
17.80	3.15	4.16	1.01	88.92	32.5
18.00	3.10	4.20	1.10	88.87	32.5
18.30	3.05	4.00	0.95	88.89	32.4
18.40	3.03	4.04	1.01	88.90	32.4
18.70	2.95	4.07	1.12	88.87	32.4
19.00	2.89	4.18	1.29	88.86	32.3

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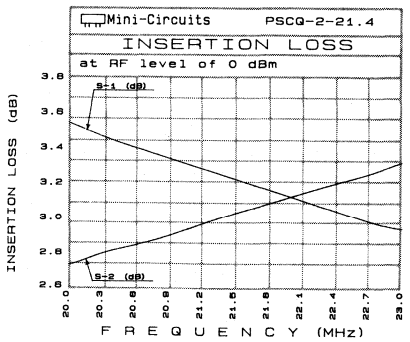
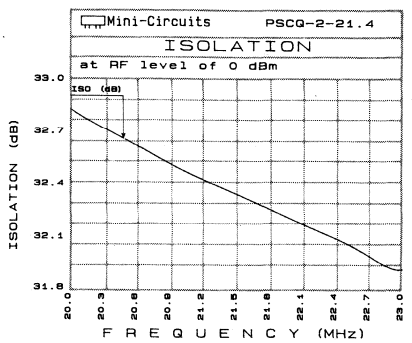
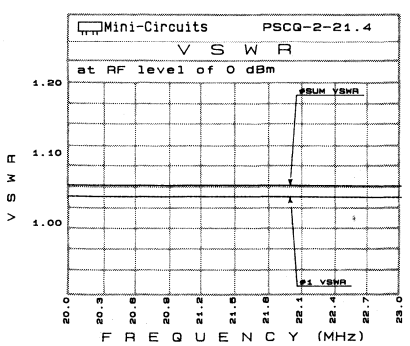
ZMSCQ-2-21.4
PSCQ-2-21.4 — 20 to 23MHz

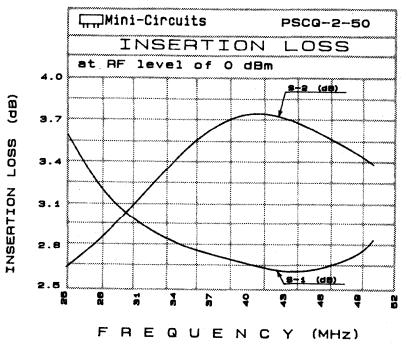


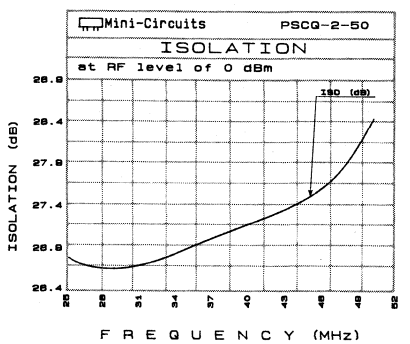


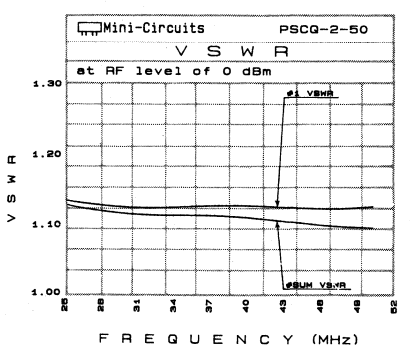


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
20.00	3.54	2.73	0.81	89.40	32.89
20.20	3.48	2.77	0.71	89.34	32.84
20.40	3.45	2.82	0.63	89.34	32.73
20.50	3.40	2.83	0.57	89.33	32.70
20.80	3.38	2.88	0.50	89.36	32.58
21.00	3.31	2.91	0.40	89.38	32.55
21.20	3.28	2.98	0.30	89.34	32.44
21.50	3.20	3.02	0.18	89.36	32.35
21.80	3.18	3.09	0.09	89.34	32.25
22.00	3.12	3.11	0.01	89.34	32.14
22.20	3.07	3.16	0.09	89.35	32.10
22.40	3.05	3.20	0.15	89.33	32.02
22.50	3.01	3.21	0.20	89.30	31.98
22.80	2.97	3.27	0.30	89.30	31.93
23.00	2.94	3.32	0.38	89.34	31.86

PSCQ-2-50,
ZMSCQ-2-50,
ZSCQ-2-50 — 25 to 50MHz

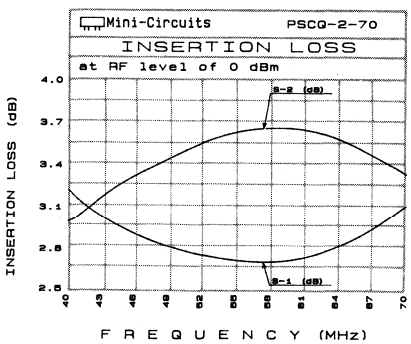


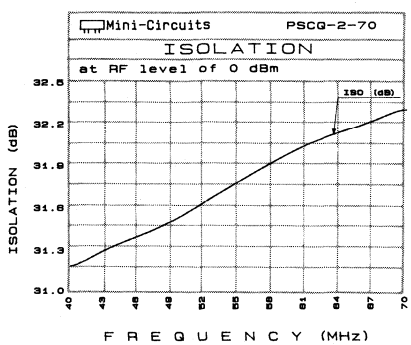


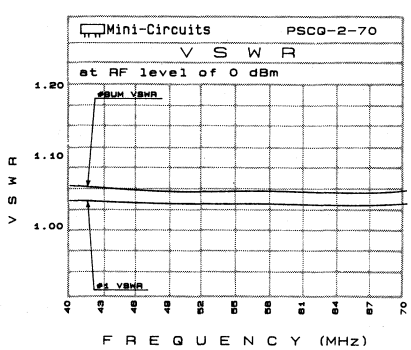


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
25.00	3.62	2.64	0.98	90.26	26.78
27.00	3.39	2.83	0.56	90.29	26.68
29.10	3.20	3.03	0.17	90.36	26.67
30.00	3.13	3.12	0.01	90.48	26.66
31.80	3.00	3.24	0.24	90.54	26.73
34.40	2.88	3.39	0.51	90.70	26.87
36.50	2.82	3.47	0.65	90.80	26.98
38.50	2.79	3.51	0.72	90.90	27.10
40.00	2.79	3.53	0.74	91.02	27.20
42.60	2.84	3.50	0.66	91.36	27.35
44.60	2.92	3.42	0.50	91.61	27.48
46.60	2.68	3.56	0.88	91.83	27.72
48.00	2.70	3.50	0.78	92.09	27.95
49.30	2.80	3.40	0.63	92.38	28.26
50.00	2.84	3.41	0.57	92.53	28.43

PSCQ-2-70 — 40 to 70MHz





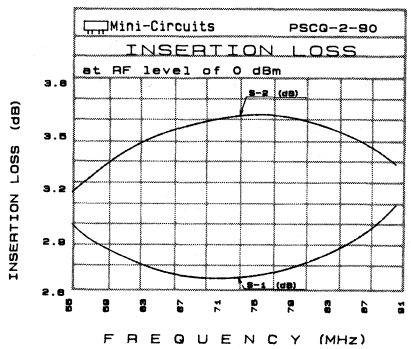


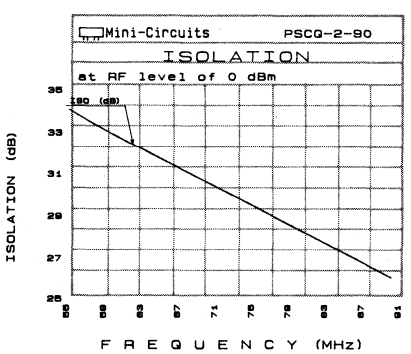
FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
40.00	3.21	2.99	0.22	89.70	31.18
41.60	3.11	3.08	0.03	89.70	31.25
42.40	3.05	3.13	0.08	89.70	31.27
44.70	2.96	3.26	0.30	89.70	31.36
47.10	2.88	3.38	0.50	89.70	31.45
49.50	2.80	3.46	0.66	89.70	31.51
51.10	2.76	3.51	0.75	89.70	31.58
53.40	2.73	3.60	0.87	89.70	31.71
55.80	2.71	3.63	0.92	89.70	31.81
58.20	2.71	3.67	0.96	89.80	31.92
60.50	2.73	3.65	0.92	89.90	32.02
62.90	2.79	3.62	0.83	89.90	32.10
65.30	2.87	3.54	0.67	90.00	32.17
67.60	2.99	3.45	0.46	90.10	32.24
70.00	3.12	3.34	0.22	90.20	32.29

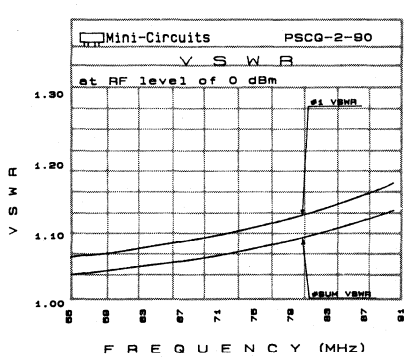
2WAY-90°

Power Splitter/Combiners 50 ohm

PSCQ-2-90,
ZMSCQ-2-90,
ZSCQ-2-90 55 to 90MHz

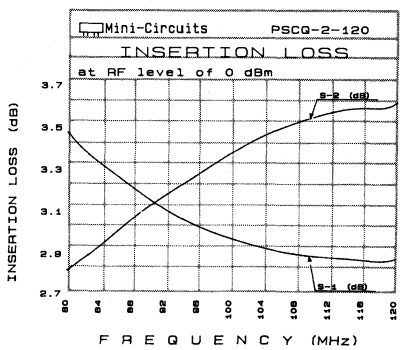


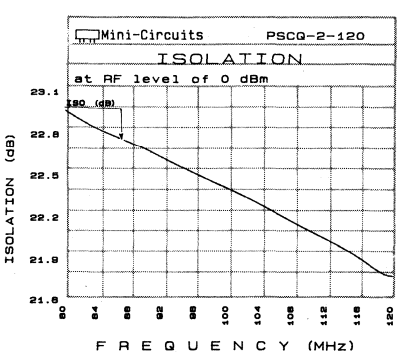


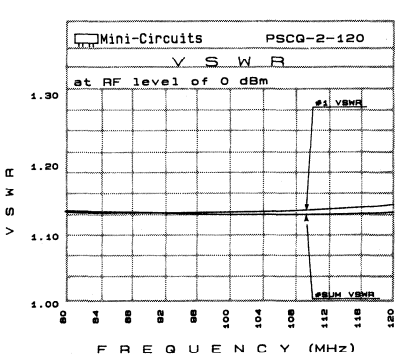


FREQ. (MHz)	INSERT. LOSS (db) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
55.00	2.86	3.42	0.56	90.11	33.90
57.90	2.97	3.30	0.33	90.13	32.96
59.90	3.04	3.24	0.20	90.13	32.26
61.80	3.10	3.18	0.08	90.16	31.53
64.70	3.17	3.12	0.05	90.20	30.45
67.60	3.24	3.09	0.15	90.30	29.48
70.60	3.29	3.06	0.23	90.33	28.38
73.50	3.32	3.08	0.24	90.51	27.37
75.40	3.32	3.09	0.23	90.48	26.74
80.00	3.30	3.18	0.12	90.89	25.15
82.20	3.27	3.25	0.02	91.05	24.38
85.10	3.20	3.33	0.13	91.34	23.41
87.10	3.15	3.44	0.29	91.59	22.73
89.00	3.10	3.53	0.43	91.85	22.11
90.00	3.07	3.61	0.54	91.99	21.79

PSCQ-2-120 80 to 120MHz

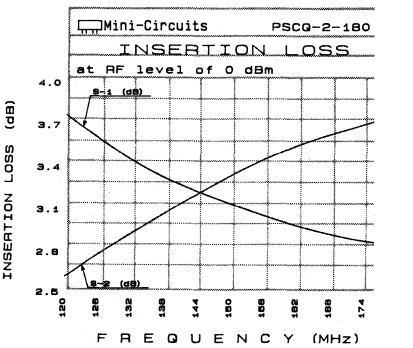


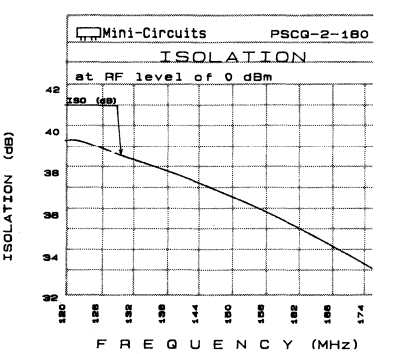


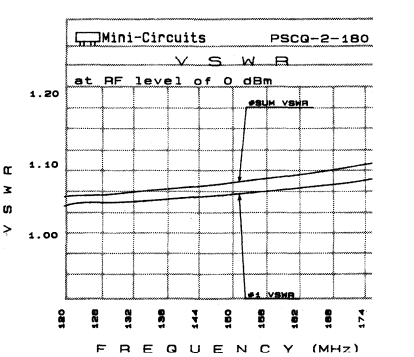


FREQ. (MHz)	INSERT. LOSS (db) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
80.00	3.47	2.82	0.65	89.22	22.97
82.10	3.39	2.89	0.50	89.23	22.90
85.30	3.29	2.99	0.30	89.28	22.81
87.40	3.23	3.05	0.18	89.25	22.76
90.50	3.15	3.14	0.01	89.35	22.68
92.60	3.09	3.19	0.10	89.34	22.61
95.80	3.04	3.28	0.24	89.35	22.53
100.00	2.98	3.39	0.41	89.42	22.42
102.10	2.95	3.42	0.47	89.42	22.34
105.30	2.93	3.50	0.57	89.49	22.27
107.40	2.90	3.52	0.62	89.49	22.19
110.50	2.90	3.56	0.66	89.58	22.09
113.70	2.88	3.59	0.71	89.66	22.00
115.80	2.88	3.60	0.72	89.66	21.93
120.00	2.87	3.61	0.74	89.79	21.78

PSCQ-2-180,
ZMSCQ-2-180.
ZSCQ-2-180 120 to 180M







FREQ. (MHz)	INSERT. LOSS (db) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	IS ((
120.00	3.80	2.69	1.11	88.74	3
123.20	3.72	2.76	0.96	88.72	3
126.30	3.63	2.84	0.79	88.65	3
129.50	3.55	2.92	0.63	88.65	3
132.60	3.48	2.99	0.49	88.61	3
135.80	3.41	3.07	0.34	88.61	3
138.90	3.34	3.13	0.21	88.58	3
140.60	3.31	3.17	0.14	88.53	3
145.20	3.23	3.26	0.03	88.53	3
150.00	3.16	3.35	0.19	88.55	3
153.20	3.11	3.43	0.32	88.45	3
159.50	3.03	3.53	0.50	88.48	3
164.30	2.99	3.62	0.63	88.37	3
170.60	2.94	3.70	0.76	88.31	3
180.00	2.92	3.76	0.84	88.27	3

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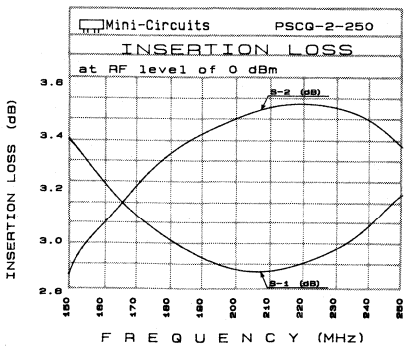
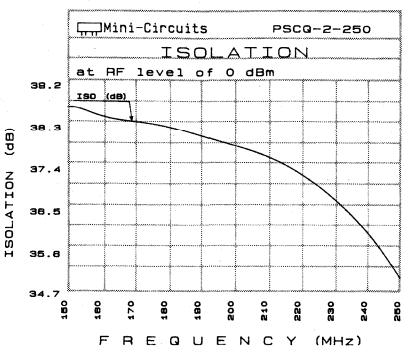
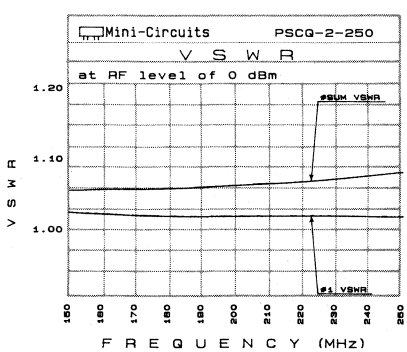
Mini-Circuits

PSCQ-2-250 150 to 250MHz

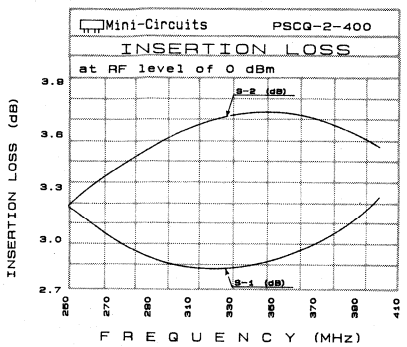


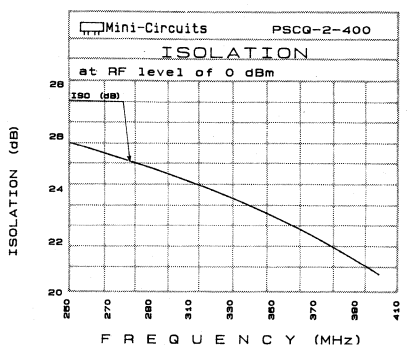


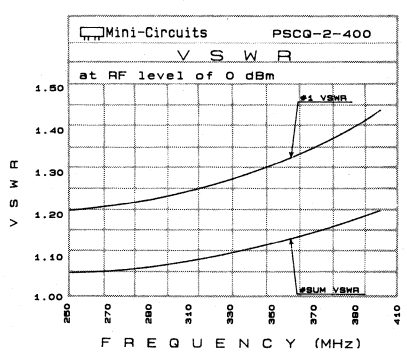


FREQ. (MHz)	INSERT. LOSS (db) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
150.00	3.39	2.89	0.50	90.00	38.75
155.00	3.31	2.99	0.32	89.80	38.63
160.00	3.23	3.07	0.16	89.70	38.53
165.00	3.16	3.13	0.03	89.50	38.50
170.00	3.10	3.20	0.10	89.40	38.40
175.00	3.05	3.27	0.22	89.20	38.46
180.00	3.01	3.33	0.32	89.30	38.36
185.00	2.96	3.37	0.41	89.40	38.25
190.00	2.93	3.41	0.48	89.40	38.17
200.00	2.89	3.46	0.57	89.60	37.84
210.00	2.89	3.51	0.62	89.50	37.63
220.00	2.92	3.53	0.61	89.40	37.32
230.00	2.96	3.50	0.54	89.60	36.85
240.00	3.05	3.46	0.41	89.90	36.11
250.00	3.18	3.36	0.18	90.30	35.14

PSCQ-2-400 250 to 400MHz

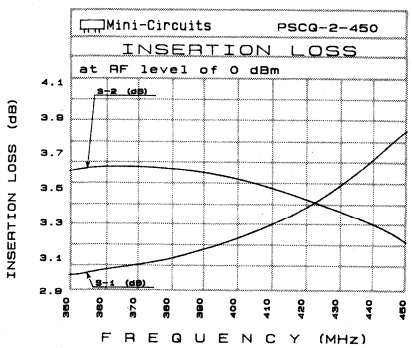


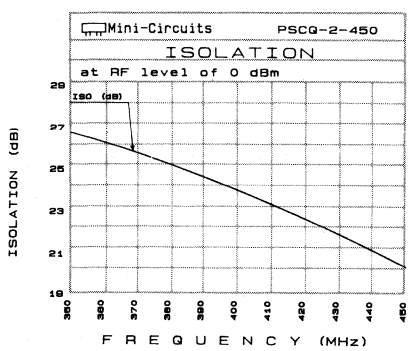


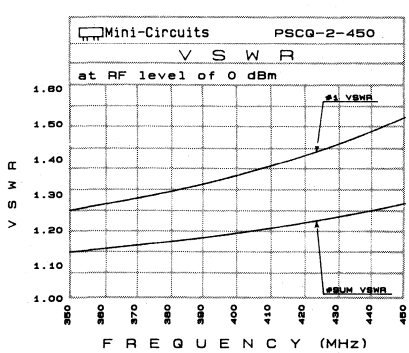


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
250.00	3.18	3.20	0.02	89.58	25.76
261.60	3.09	3.32	0.23	89.53	25.50
273.30	3.00	3.41	0.41	89.48	25.24
280.80	2.95	3.46	0.51	89.43	25.05
292.40	2.89	3.53	0.64	89.40	24.76
304.00	2.86	3.61	0.75	89.53	24.47
311.50	2.85	3.65	0.80	89.59	24.25
323.10	2.84	3.69	0.85	89.75	23.90
342.30	2.87	3.73	0.86	89.86	23.27
350.10	2.89	3.73	0.84	89.70	22.99
361.40	2.93	3.71	0.78	89.58	22.56
373.00	3.00	3.69	0.69	89.34	22.09
380.90	3.06	3.65	0.59	89.15	21.75
392.10	3.15	3.59	0.44	89.05	21.23
400.00	3.24	3.54	0.30	89.06	20.85

PSCQ-2-450 350 to 450MHz



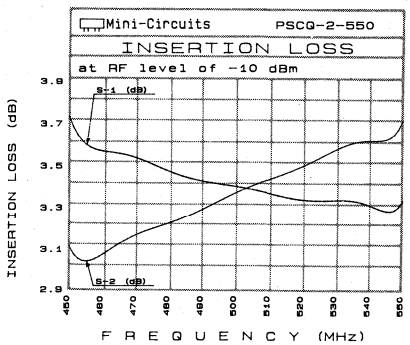


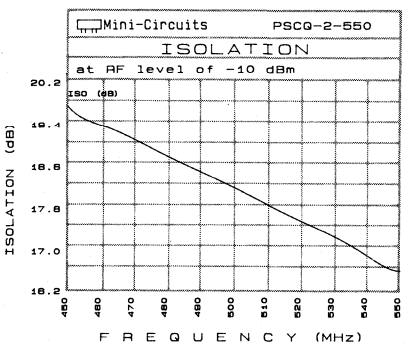


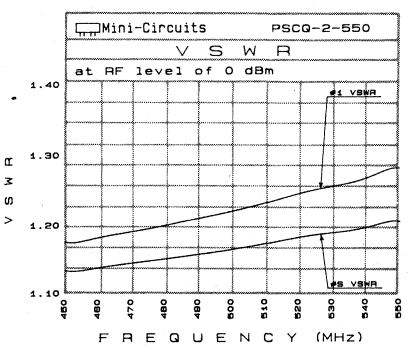
FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
350.00	3.01	3.61	0.60	90.33	26.76
355.30	3.02	3.62	0.60	90.33	26.51
360.50	3.04	3.63	0.59	90.37	26.26
365.80	3.05	3.62	0.57	90.39	26.00
371.00	3.07	3.62	0.55	90.39	25.72
381.50	3.10	3.61	0.51	90.42	25.14
392.00	3.17	3.58	0.41	90.42	24.53
400.00	3.22	3.56	0.34	90.46	24.03
410.50	3.30	3.50	0.20	90.49	23.35
415.80	3.34	3.47	0.13	90.52	23.00
421.00	3.40	3.44	0.04	90.50	22.63
426.30	3.46	3.39	0.07	90.57	22.25
431.50	3.53	3.36	0.17	90.47	21.87
442.00	3.70	3.29	0.41	90.57	21.09
450.00	3.84	3.21	0.63	90.54	20.46

2WAY-90°
Power Splitter/Combiners 50 ohm

PSCQ-2-550 450 to 550MHz

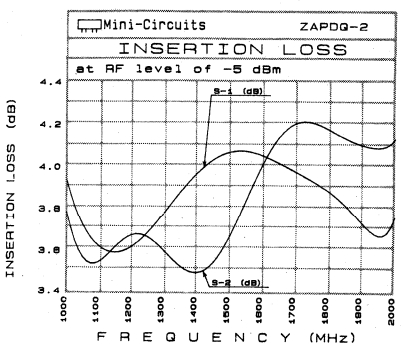


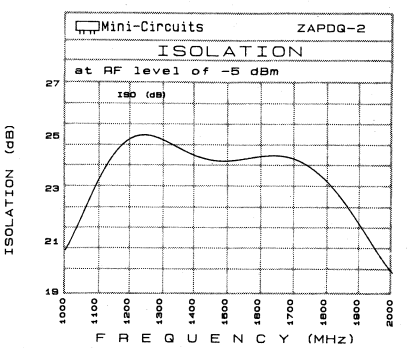


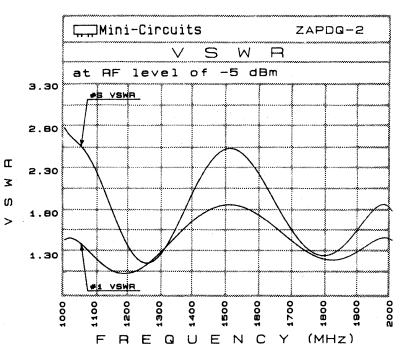


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
450.00	3.70	3.07	0.63	91.0	20
455.30	3.62	3.06	0.56	90.9	20
460.50	3.55	3.07	0.48	90.7	19
471.10	3.56	3.20	0.36	90.4	19
481.60	3.48	3.25	0.23	90.5	19
492.10	3.42	3.32	0.10	90.8	18
500.00	3.42	3.40	0.02	91.0	18
510.50	3.32	3.40	0.08	91.0	18
515.80	3.36	3.49	0.13	91.0	18
521.10	3.36	3.53	0.17	91.0	18
529.00	3.33	3.56	0.23	91.0	17
534.20	3.33	3.61	0.28	91.0	17
539.50	3.31	3.61	0.30	91.0	17
544.70	3.29	3.61	0.32	91.0	17
550.00	3.32	3.69	0.37	91.0	17

ZAPDQ-2 1 to 2.0GHz

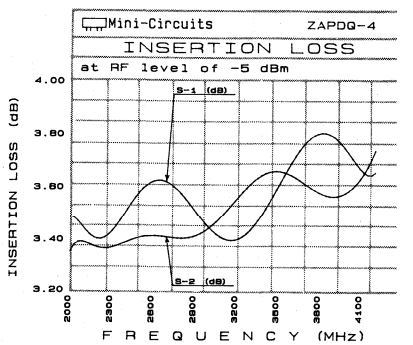


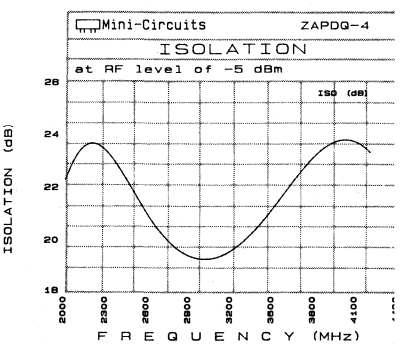


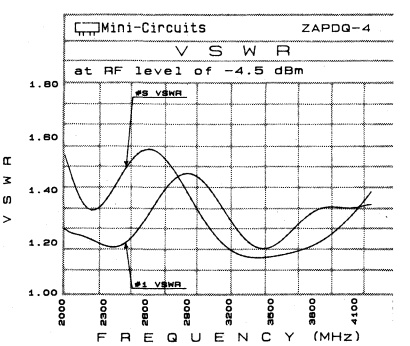


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1000.00	3.94	3.83	0.11	93.29	20.26
1052.50	3.75	3.66	0.09	90.27	21.65
1132.50	3.61	3.61	0.00	87.98	23.62
1210.00	3.64	3.63	0.01	87.46	24.62
1290.00	3.77	3.64	0.13	87.25	24.57
1367.50	3.89	3.62	0.27	86.76	24.13
1447.50	3.96	3.63	0.33	86.05	23.75
1500.00	3.97	3.67	0.30	85.59	23.64
1580.00	3.99	3.83	0.16	85.32	23.70
1657.50	3.95	3.99	0.04	85.68	23.70
1737.50	3.91	4.14	0.23	86.70	23.38
1815.00	3.87	4.22	0.35	87.93	22.55
1895.00	3.80	4.24	0.44	88.99	21.25
1947.50	3.75	4.22	0.47	89.50	20.30
2000.00	3.73	4.18	0.45	89.89	19.31

ZAPDQ-4 2 to 4.2GH







FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL (dB)
2000.00	3.52	3.37	0.15	94.9	22.3
2126.50	3.43	3.39	0.04	94.7	23.5
2253.00	3.40	3.33	0.07	94.5	23.6
2500.50	3.62	3.53	0.09	94.3	21.8
2753.50	3.64	3.39	0.25	94.0	19.9
2880.00	3.49	3.44	0.05	93.8	19.4
3001.00	3.43	3.41	0.02	93.6	19.2
3193.50	3.41	3.56	0.15	93.4	19.5
3320.00	3.45	3.56	0.11	93.2	20.1
3501.50	3.57	3.68	0.11	93.0	21.2
3699.50	3.78	3.61	0.17	92.8	22.5
3886.50	3.82	3.58	0.24	92.6	23.5
4002.00	3.73	3.62	0.11	92.6	23.7
4139.50	3.64	3.64	0.00	92.2	23.5
4200.00	3.65	3.77	0.12	91.9	23.3

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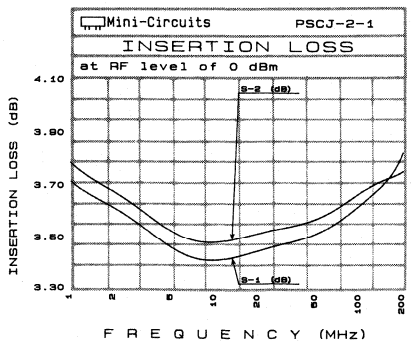
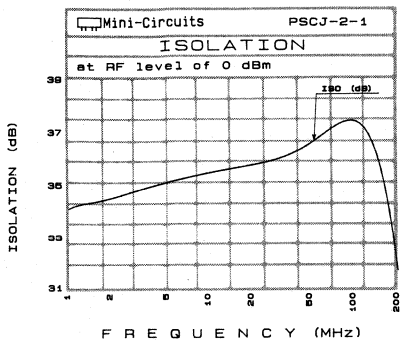
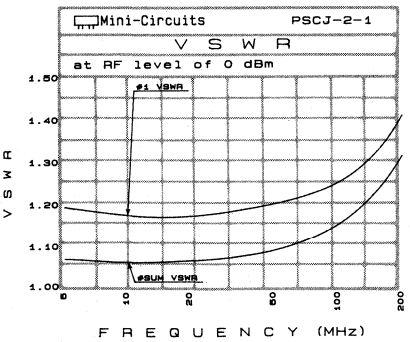
Mini-Circuits

PSCJ-2-1 50 ohms 1 to 200MHz

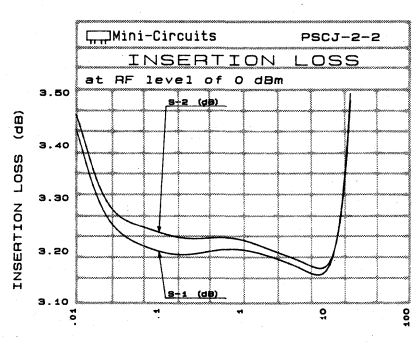


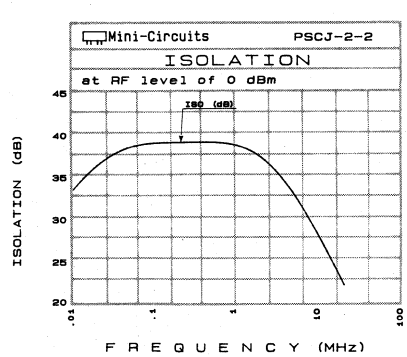


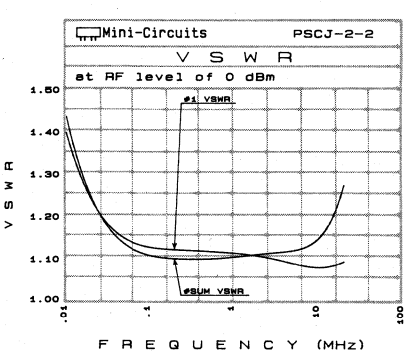


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	PHASE (DEGREES) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	3.71	3.78	0.07	34.14	180.30	5.0	1.07	1.19	1.15
5.0	3.47	3.53	0.06	35.09	180.20	10.6	1.06	1.17	1.13
10.0	3.41	3.47	0.06	35.47	180.00	20.0	1.07	1.17	1.13
19.1	3.48	3.54	0.06	35.64	179.60	27.3	1.07	1.18	1.14
31.2	3.46	3.52	0.06	36.05	179.60	44.0	1.08	1.20	1.15
43.2	3.48	3.55	0.07	36.32	179.50	50.0	1.09	1.20	1.15
50.0	3.50	3.56	0.06	36.59	179.50	60.7	1.10	1.21	1.16
67.3	3.53	3.57	0.04	37.03	179.70	77.4	1.12	1.23	1.17
85.4	3.57	3.61	0.04	37.37	179.90	94.1	1.15	1.25	1.19
100.0	3.56	3.65	0.09	37.32	180.00	105.3	1.16	1.26	1.20
121.6	3.59	3.63	0.04	37.04	180.20	127.6	1.19	1.29	1.22
151.8	3.80	3.82	0.02	35.72	180.50	155.4	1.24	1.33	1.25
175.9	3.73	3.71	0.02	33.76	180.80	177.7	1.27	1.37	1.28
187.9	3.89	3.85	0.04	33.02	180.90	188.9	1.29	1.39	1.29
200.0	3.72	3.66	0.06	31.84	181.00	200.0	1.31	1.41	1.30

PSCJ-2-2, ZMSCJ-2-2, ZSCJ-2-2, ZFSCJ-2-2 0.01 to 20MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	PHASE (DEGREES) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.01	3.43	3.46	0.03	33.63	180.3	0.01	1.43	1.39	1.42
0.1	3.21	3.25	0.04	39.14	180.3	0.1	1.11	1.13	1.13
0.5	3.22	3.24	0.02	39.23	180.2	0.5	1.10	1.12	1.12
1.0	3.20	3.22	0.02	38.87	180.2	1.0	1.11	1.11	1.11
2.0	3.18	3.20	0.02	37.49	180.2	2.0	1.11	1.11	1.10
4.0	3.16	3.18	0.02	34.41	180.1	4.0	1.12	1.09	1.09
6.0	3.16	3.20	0.04	31.89	180.0	6.0	1.12	1.09	1.08
8.0	3.17	3.19	0.02	29.81	180.0	8.0	1.13	1.08	1.08
10.0	3.14	3.15	0.01	28.07	180.0	10.0	1.14	1.08	1.07
11.3	3.16	3.18	0.02	27.08	179.9	11.3	1.16	1.08	1.07
12.7	3.20	3.21	0.01	26.18	179.9	12.7	1.17	1.08	1.07
14.0	3.22	3.22	0.00	25.35	179.8	14.0	1.19	1.09	1.07
16.0	3.30	3.30	0.00	24.24	179.7	16.0	1.22	1.09	1.07
18.0	3.39	3.37	0.02	23.24	179.6	18.0	1.25	1.09	1.07
20.0	3.46	3.44	0.02	22.36	179.5	20.0	1.26	1.09	1.07

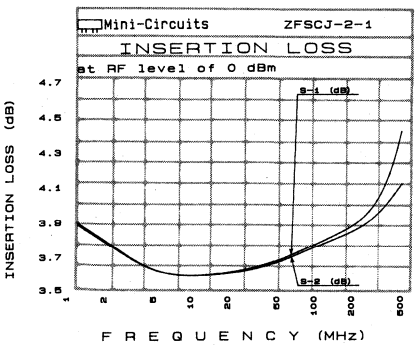
2WAY-180°

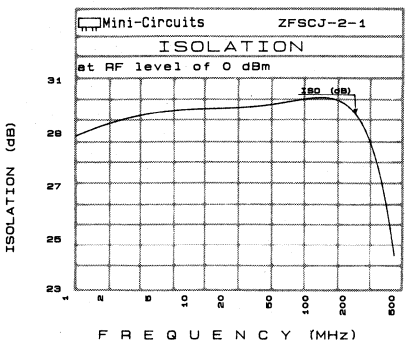
Power Splitter/Combiners

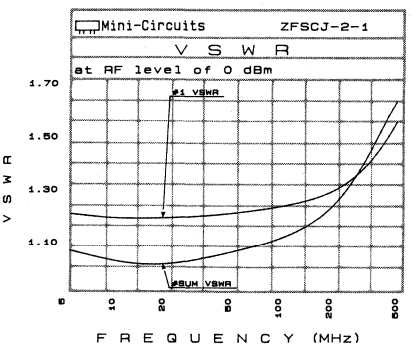
50 ohms

ZFSCJ-2-1

1 to 500MHz



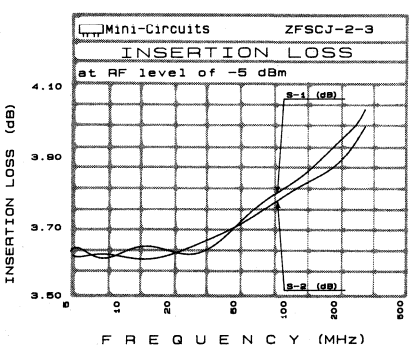


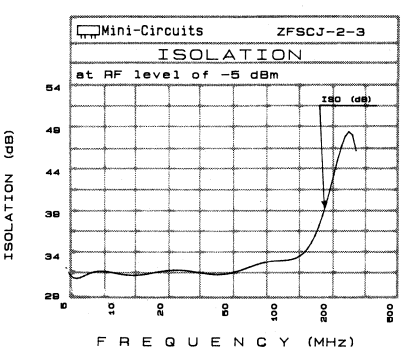


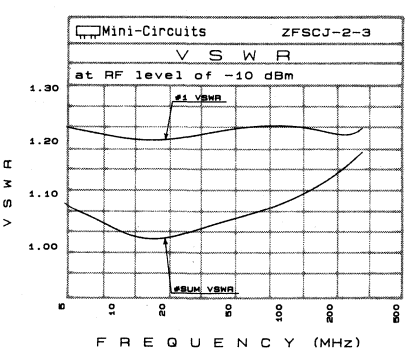
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	PHASE (Degrees) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	3.93	3.94	0.01	28.80	179.45	5.0	1.07	1.21	1.21
10.0	3.59	3.59	0.00	29.88	179.75	20.0	1.01	1.19	1.19
20.0	3.62	3.61	0.01	29.94	179.86	48.7	1.06	1.21	1.20
50.0	3.69	3.69	0.00	30.07	179.82	77.8	1.09	1.22	1.22
79.0	3.74	3.73	0.01	30.22	179.73	100.0	1.11	1.24	1.22
100.0	3.76	3.75	0.01	30.28	179.69	121.5	1.14	1.25	1.23
125.8	3.79	3.78	0.01	30.33	179.72	150.6	1.17	1.26	1.24
156.9	3.84	3.81	0.03	30.29	179.59	179.7	1.21	1.28	1.25
200.0	3.88	3.86	0.02	30.06	179.52	208.8	1.24	1.30	1.25
250.5	3.94	3.89	0.05	29.60	179.60	267.1	1.33	1.34	1.28
312.9	4.03	3.95	0.08	28.79	179.67	325.3	1.41	1.39	1.30
359.7	4.11	3.99	0.12	27.86	179.70	369.0	1.48	1.43	1.32
406.4	4.22	4.04	0.18	26.85	179.93	412.7	1.54	1.47	1.34
468.8	4.33	4.09	0.24	25.25	179.20	470.9	1.60	1.53	1.37
500.0	4.42	4.14	0.28	24.40	178.88	500.0	1.63	1.55	1.38

ZFSCJ-2-3

5 to 300MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	PHASE (Degrees) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.0	3.64	3.62	0.02	31.73	179.50	5.0	1.08	1.23	1.22
10.0	3.61	3.62	0.01	32.06	179.50	10.0	1.03	1.21	1.21
13.4	3.65	3.61	0.04	32.11	179.40	13.4	1.02	1.20	1.20
20.0	3.64	3.61	0.03	32.09	179.40	20.0	1.01	1.20	1.20
30.3	3.59	3.65	0.06	32.20	179.30	30.3	1.03	1.21	1.21
50.0	3.70	3.68	0.02	32.34	179.10	50.0	1.05	1.22	1.22
64.0	3.73	3.71	0.02	32.48	179.00	64.0	1.06	1.23	1.23
89.3	3.80	3.72	0.08	33.03	178.80	89.3	1.08	1.23	1.23
100.0	3.80	3.78	0.02	33.32	178.70	100.0	1.08	1.23	1.23
123.0	3.85	3.81	0.04	34.12	178.60	123.0	1.09	1.23	1.23
148.3	3.85	3.80	0.05	35.26	178.40	148.3	1.11	1.22	1.23
198.9	3.95	3.88	0.07	39.32	178.10	198.9	1.13	1.22	1.22
249.4	3.99	3.92	0.07	48.08	177.80	249.4	1.16	1.21	1.21
274.7	3.99	3.93	0.06	51.04	177.70	274.7	1.17	1.22	1.20
300.0	4.03	4.01	0.02	43.94	177.50	300.0	1.18	1.23	1.20

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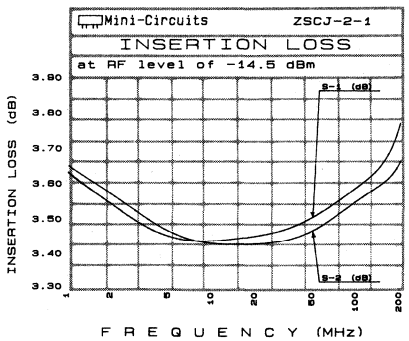
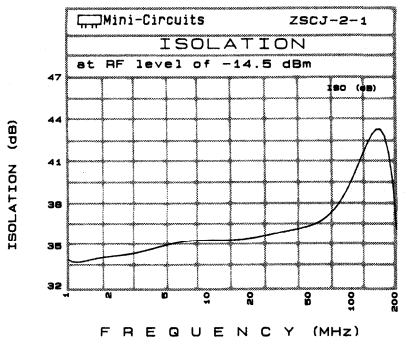
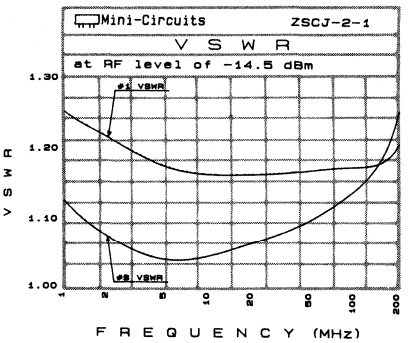
Mini-Circuits

ZMSCJ-2-1, ZSCJ-2-1 — 50 ohms — 1 to 200 MHz

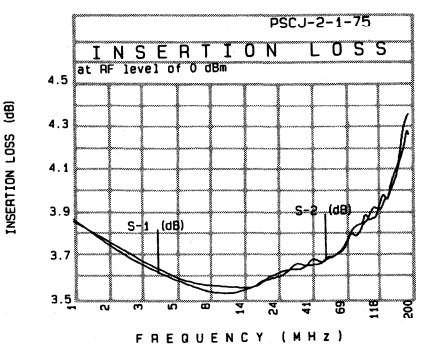


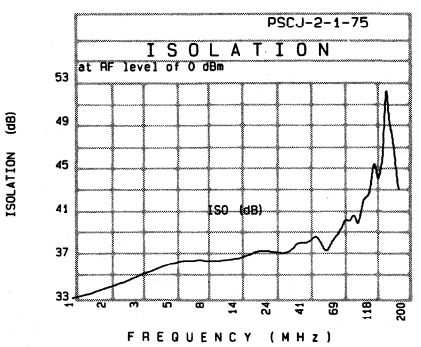


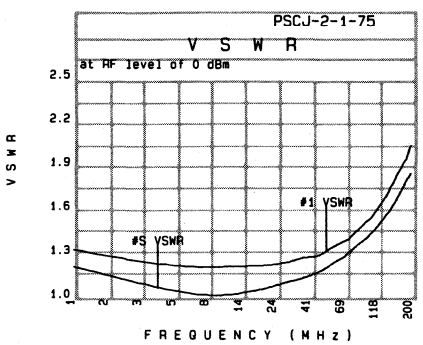


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	PHASE (Degrees) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	3.63	3.65	0.02	33.85	180.02	1.0	1.12	1.25	1.25
5.0	3.44	3.46	0.02	35.05	179.83	5.0	1.04	1.17	1.17
10.0	3.44	3.43	0.01	35.43	179.69	10.0	1.05	1.16	1.16
19.9	3.45	3.42	0.03	35.68	179.67	19.9	1.06	1.17	1.17
37.3	3.48	3.45	0.03	36.08	179.59	37.3	1.09	1.17	1.17
49.8	3.51	3.47	0.04	36.57	179.54	49.8	1.10	1.17	1.17
67.2	3.54	3.50	0.04	37.37	179.39	67.2	1.12	1.17	1.17
79.6	3.55	3.51	0.04	38.19	179.30	79.6	1.12	1.18	1.17
100.0	3.60	3.56	0.04	39.72	179.12	100.0	1.14	1.18	1.17
115.4	3.61	3.58	0.03	41.35	179.03	115.4	1.15	1.18	1.17
133.8	3.63	3.59	0.04	43.30	178.83	133.8	1.17	1.18	1.18
145.8	3.65	3.60	0.05	43.82	178.77	145.8	1.18	1.19	1.18
163.7	3.66	3.60	0.06	42.71	178.59	163.7	1.20	1.19	1.18
182.1	3.72	3.63	0.09	40.00	178.48	182.1	1.22	1.20	1.19
200.0	3.78	3.68	0.10	37.32	178.41	200.0	1.25	1.21	1.20

PSCJ-2-1-75 — 75 ohms — 1 to 200 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	PHASE (Degrees) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.000	3.87	3.88	0.01	33.14	179.95	1.000	1.21	1.33	1.33
2.000	3.73	3.70	0.03	34.46	179.93	2.000	1.12	1.26	1.26
5.000	3.58	3.58	0.00	36.84	179.68	5.000	1.03	1.21	1.21
10.000	3.57	3.52	0.05	36.42	179.85	10.000	1.01	1.21	1.20
20.000	3.60	3.60	0.00	37.62	179.89	20.000	1.06	1.22	1.22
43.000	3.66	3.70	0.04	37.97	179.54	43.000	1.16	1.28	1.28
50.000	3.66	3.66	0.00	39.06	180.00	50.000	1.19	1.30	1.30
75.000	3.77	3.76	0.01	39.53	179.66	75.000	1.31	1.40	1.41
100.000	3.90	3.85	0.05	40.57	179.62	100.000	1.41	1.53	1.51
106.000	3.85	3.87	0.02	42.33	179.87	106.000	1.44	1.54	1.54
132.000	3.93	3.98	0.05	43.58	179.86	132.000	1.55	1.68	1.68
159.000	4.04	4.06	0.02	48.85	179.67	159.000	1.67	1.83	1.83
185.000	4.18	4.28	0.10	42.52	179.46	185.000	1.80	1.94	1.96
195.000	4.28	4.33	0.05	41.63	179.69	195.000	1.83	2.02	2.03
200.000	4.25	4.34	0.09	41.48	179.50	200.000	1.85	2.04	2.05

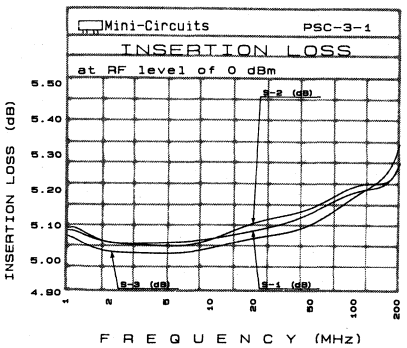
3WAY-0°

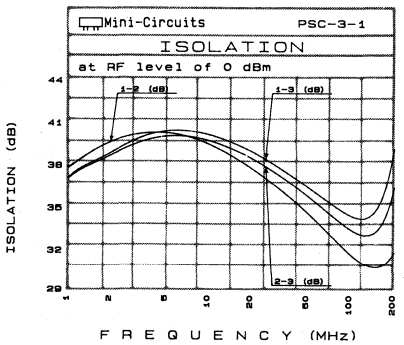
Power Splitter/Combiners

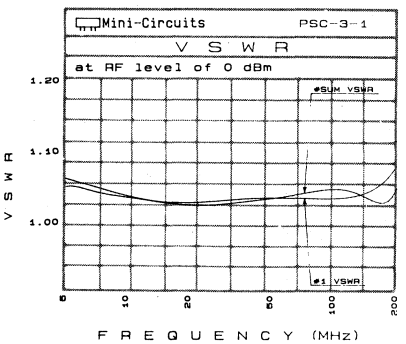
50 ohms

PSC-3-1

1 to 200 MHz



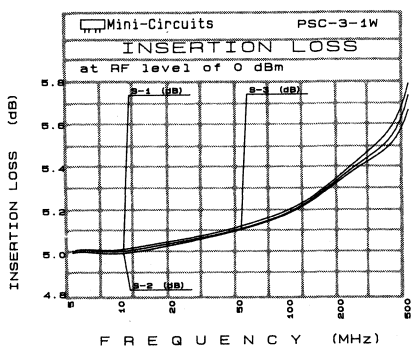


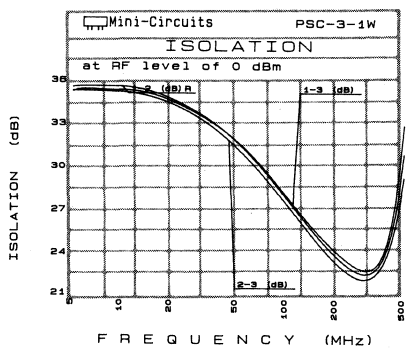


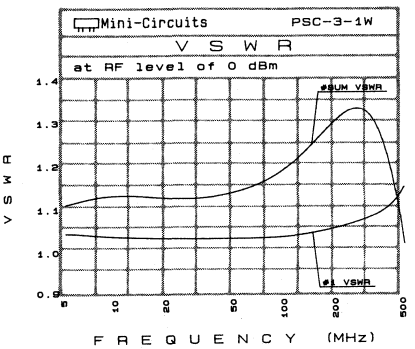
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.0	5.09	5.10	5.07	0.03	37.94	37.24	5.0	1.05	1.06	1.06	1.06
5.0	5.05	5.04	5.03	0.02	40.45	40.21	10.0	1.03	1.04	1.04	1.04
10.0	5.04	5.04	5.06	0.02	39.48	39.69	20.0	1.02	1.03	1.03	1.03
20.0	5.12	5.14	5.07	0.07	37.79	38.54	38.4	1.03	1.03	1.03	1.03
37.2	5.13	5.15	5.11	0.04	35.78	36.81	50.0	1.03	1.03	1.03	1.03
50.0	5.12	5.13	5.08	0.05	34.61	35.80	60.7	1.04	1.03	1.03	1.04
61.3	5.20	5.21	5.16	0.05	33.76	35.12	71.9	1.04	1.03	1.03	1.04
73.4	5.15	5.17	5.14	0.03	32.98	34.48	83.0	1.04	1.03	1.03	1.04
85.4	5.18	5.20	5.16	0.04	32.30	33.91	100.0	1.05	1.03	1.03	1.04
100.0	5.23	5.26	5.23	0.03	31.72	33.48	122.0	1.04	1.04	1.03	1.04
121.6	5.21	5.24	5.23	0.03	31.07	33.14	138.7	1.04	1.04	1.03	1.05
139.7	5.26	5.27	5.28	0.02	30.80	33.17	155.4	1.03	1.05	1.04	1.05
157.8	5.25	5.24	5.27	0.03	30.76	33.53	177.7	1.03	1.06	1.05	1.07
175.9	5.28	5.30	5.33	0.05	31.08	34.42	188.9	1.03	1.07	1.06	1.08
200.0	5.28	5.29	5.37	0.09	31.94	36.61	200.0	1.05	1.08	1.07	1.09

PSC-3-1W

5 to 500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
5.000	5.02	5.01	5.02	0.01	35.07	34.76	5.000	1.11	1.04	1.06	1.05
10.000	5.02	5.00	5.01	0.02	35.10	34.70	10.000	1.14	1.04	1.04	1.04
20.000	5.06	5.04	6.05	0.02	34.31	33.99	20.000	1.12	1.03	1.04	1.03
50.000	5.12	5.10	5.11	0.02	31.21	30.83	50.000	1.14	1.03	1.04	1.03
100.000	5.19	5.17	5.18	0.02	27.21	26.78	100.000	1.19	1.04	1.04	1.04
108.980	5.20	5.18	5.19	0.02	26.67	26.24	108.980	1.21	1.04	1.04	1.04
118.860	5.22	5.21	5.21	0.01	26.13	26.70	118.860	1.22	1.04	1.04	1.04
133.700	5.28	5.26	5.27	0.02	26.41	24.98	133.700	1.25	1.04	1.05	1.05
143.600	5.31	5.30	5.30	0.01	24.97	24.58	143.600	1.26	1.04	1.05	1.06
158.450	5.34	5.31	5.32	0.03	24.36	23.97	158.450	1.27	1.05	1.06	1.06
168.360	5.33	5.31	5.32	0.02	24.04	23.61	168.360	1.27	1.06	1.06	1.06
183.200	5.33	5.31	5.32	0.02	23.67	23.46	183.200	1.28	1.08	1.06	1.06
200.000	5.32	5.30	5.31	0.02	23.13	22.72	200.000	1.28	1.06	1.06	1.06
250.000	5.50	5.46	5.43	0.04	22.29	21.88	250.000	1.36	1.07	1.07	1.07
500.000	5.78	5.66	5.73	0.12	29.75	27.81	500.000	1.07	1.15	1.12	1.12

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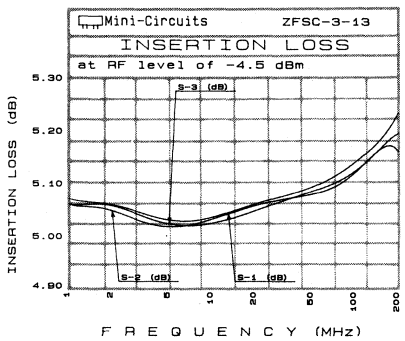
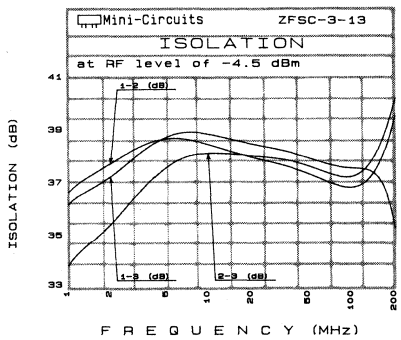
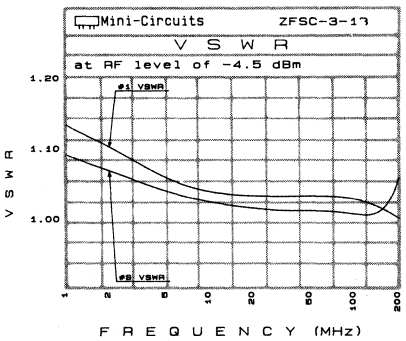
PSC-3-13, ZFSC-3-13

1 to 200MHz



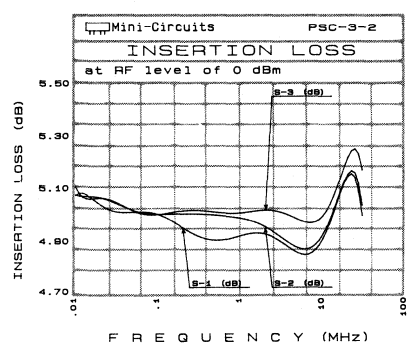


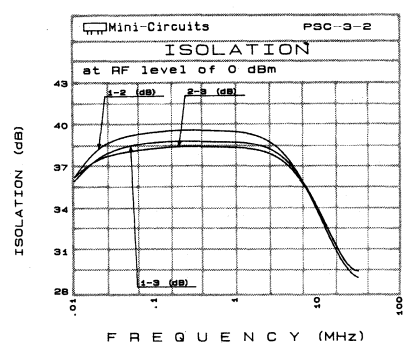


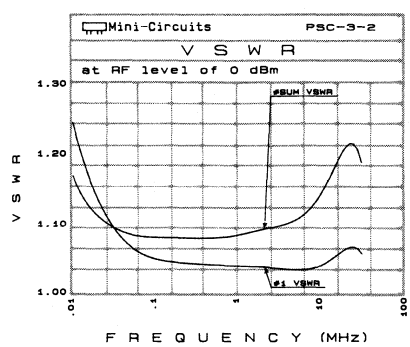
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.0	5.07	5.06	5.06	0.01	36.68	33.90	1.0	1.09	1.13	1.15	1.15
10.0	5.03	5.03	5.03	0.00	38.37	38.06	10.0	1.02	1.04	1.04	1.04
18.9	5.06	5.06	5.04	0.02	38.01	38.04	18.9	1.02	1.03	1.03	1.03
31.3	5.07	5.06	5.06	0.01	37.65	37.87	31.3	1.01	1.03	1.03	1.03
43.3	5.09	5.09	5.08	0.01	37.44	37.70	43.3	1.01	1.03	1.03	1.03
55.2	5.09	5.07	5.08	0.02	37.20	37.51	55.2	1.01	1.03	1.03	1.03
67.2	5.11	5.08	5.10	0.03	37.04	37.36	67.2	1.01	1.03	1.03	1.03
79.6	5.13	5.11	5.10	0.03	36.90	37.28	79.6	1.01	1.03	1.03	1.03
100.0	5.13	5.12	5.13	0.01	36.82	37.25	100.0	1.01	1.03	1.03	1.03
115.4	5.15	5.14	5.14	0.01	36.90	37.36	115.4	1.00	1.02	1.03	1.02
133.8	5.18	5.15	5.16	0.03	37.16	37.67	133.8	1.00	1.02	1.02	1.02
163.7	5.20	5.17	5.17	0.03	38.02	38.68	163.7	1.02	1.01	1.02	1.01
176.1	5.21	5.17	5.18	0.04	38.51	39.23	176.1	1.03	1.01	1.01	1.01
188.1	5.21	5.16	5.18	0.05	39.01	39.68	188.1	1.04	1.00	1.01	1.01
200.0	5.24	5.18	5.21	0.06	39.33	39.92	200.0	1.05	1.00	1.01	1.01

PSC-3-2, ZMSC-3-2, ZSC-3-2

0.01 to 30MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
0.01	4.98	5.00	5.00	0.02	36.10	36.00	0.01	1.17	1.28	1.29	1.29
0.1	4.85	4.85	4.85	0.00	39.00	38.00	0.1	1.07	1.06	1.05	1.05
0.5	4.82	4.82	4.82	0.00	40.00	39.00	0.5	1.02	1.02	1.01	1.02
1.1	4.84	4.85	4.84	0.01	40.10	39.00	1.1	1.03	1.02	1.02	1.03
3.1	4.88	4.89	4.89	0.01	38.00	37.00	3.1	1.07	1.05	1.05	1.05
5.0	4.90	4.90	4.90	0.00	38.93	38.72	5.0	1.08	1.05	1.05	1.05
7.3	4.94	4.94	4.94	0.00	36.19	35.97	7.3	1.10	1.07	1.07	1.07
10.0	4.99	4.97	4.98	0.02	33.99	33.78	10.0	1.11	1.08	1.07	1.08
12.5	5.01	5.00	5.01	0.01	32.52	32.23	12.5	1.11	1.08	1.08	1.08
15.5	5.06	5.05	5.05	0.01	31.03	30.79	15.5	1.11	1.09	1.09	1.09
18.6	5.10	5.08	5.09	0.02	29.90	29.68	18.6	1.11	1.09	1.09	1.10
20.7	5.12	5.11	5.11	0.01	29.33	29.12	20.7	1.11	1.10	1.10	1.10
23.8	5.16	5.14	5.14	0.02	28.66	28.47	23.8	1.11	1.11	1.11	1.11
26.9	5.22	5.20	5.20	0.02	28.18	28.01	26.9	1.12	1.12	1.12	1.12
30.0	5.25	5.23	5.24	0.02	27.85	27.00	30.0	1.13	1.13	1.13	1.13

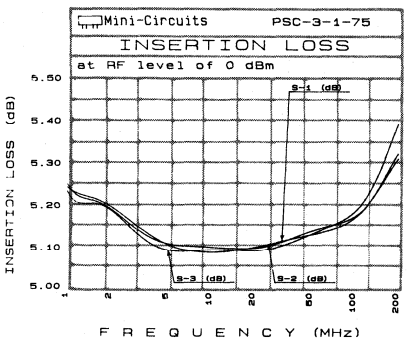
3WAY-0°

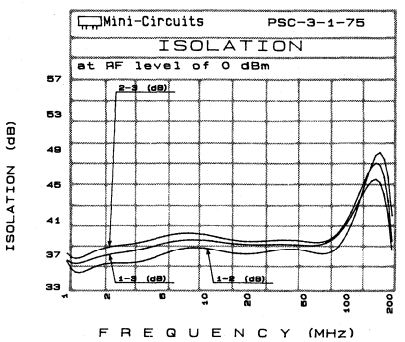
Power Splitter/Combiners

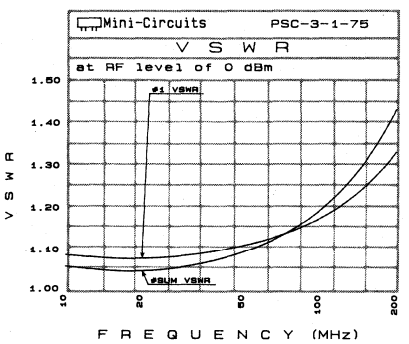
75 ohms

PSC-3-1-75 ,ZSC-3-1-75

1 to 200MHz



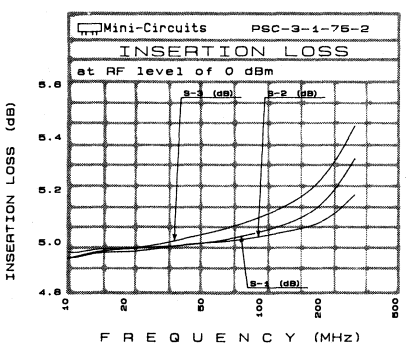


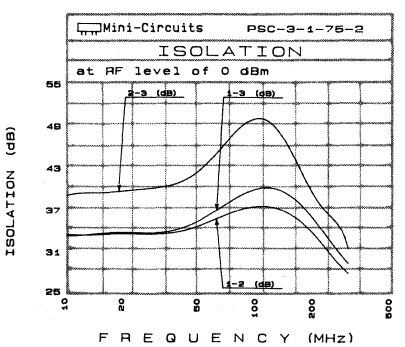


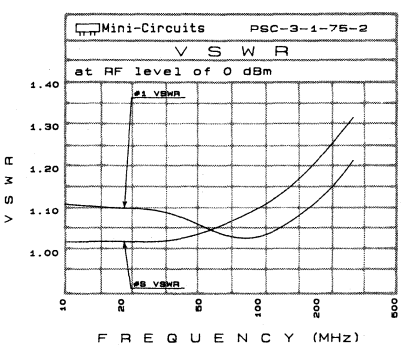
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.0	5.24	5.24	5.22	0.02	35.20	36.51	10.0	1.06	1.09	1.09	1.08
5.0	5.10	5.10	5.08	0.02	37.18	39.25	20.0	1.05	1.08	1.08	1.08
10.0	5.09	5.08	5.09	0.01	37.61	39.22	25.8	1.05	1.08	1.08	1.08
19.1	5.10	5.09	5.09	0.01	37.46	38.78	36.4	1.07	1.09	1.09	1.09
31.2	5.12	5.12	5.10	0.02	37.21	38.48	50.0	1.09	1.11	1.11	1.11
43.2	5.14	5.13	5.13	0.01	37.26	38.48	57.5	1.11	1.12	1.12	1.12
50.0	5.15	5.12	5.13	0.03	37.32	38.55	68.1	1.13	1.13	1.13	1.13
67.3	5.15	5.15	5.15	0.00	37.79	39.06	83.9	1.16	1.15	1.15	1.16
85.4	5.15	5.14	5.16	0.02	38.78	40.02	99.7	1.19	1.17	1.18	1.18
100.0	5.17	5.17	5.18	0.01	39.87	41.15	110.3	1.22	1.19	1.19	1.19
121.6	5.18	5.18	5.21	0.03	42.31	43.70	131.4	1.26	1.22	1.22	1.23
151.8	5.25	5.25	5.29	0.04	49.53	49.09	157.8	1.33	1.26	1.26	1.27
175.9	5.27	5.27	5.34	0.07	48.76	45.34	178.9	1.38	1.30	1.30	1.31
187.9	5.30	5.30	5.37	0.07	44.21	42.22	189.5	1.41	1.31	1.32	1.33
200.0	5.34	5.32	5.40	0.08	41.15	39.78	200.0	1.43	1.33	1.33	1.34

PSC-3-1-75-2

10 to 300MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
10.0	4.94	4.94	4.96	0.02	33.48	39.30	10.0	1.03	1.12	1.12	1.12
20.1	4.97	4.96	4.98	0.02	33.85	39.84	20.1	1.03	1.11	1.11	1.11
44.0	4.99	4.99	5.02	0.03	34.30	42.00	44.0	1.04	1.08	1.07	1.07
69.4	5.02	5.01	5.07	0.06	36.57	46.49	69.4	1.07	1.04	1.04	1.05
99.9	5.04	5.02	5.10	0.08	37.76	51.00	99.9	1.11	1.04	1.05	1.06
120.9	5.06	5.04	5.13	0.09	37.54	48.66	120.9	1.13	1.05	1.07	1.08
155.0	5.09	5.05	5.17	0.12	36.45	44.24	155.0	1.17	1.08	1.11	1.12
172.4	5.10	5.05	5.20	0.15	35.04	42.46	172.4	1.19	1.10	1.12	1.13
197.7	5.13	5.07	5.23	0.16	33.55	39.67	197.7	1.22	1.12	1.15	1.16
214.4	5.18	5.09	5.27	0.18	32.63	38.17	214.4	1.24	1.14	1.17	1.18
231.8	5.19	5.10	5.29	0.19	31.48	36.90	231.8	1.26	1.16	1.19	1.20
248.5	5.21	5.12	5.33	0.21	30.58	35.62	248.5	1.27	1.17	1.20	1.22
265.9	5.26	5.15	5.38	0.23	29.64	34.60	265.9	1.29	1.19	1.22	1.24
282.6	5.29	5.17	5.41	0.24	28.80	33.58	282.6	1.30	1.20	1.24	1.25
300.0	5.32	5.18	5.45	0.27	27.89	32.62	300.0	1.32	1.22	1.26	1.27

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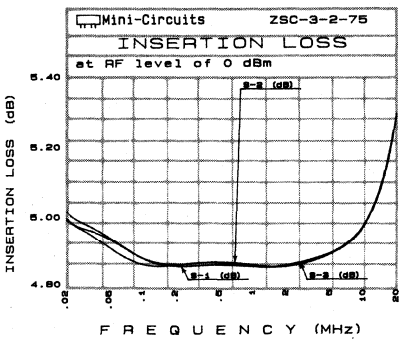
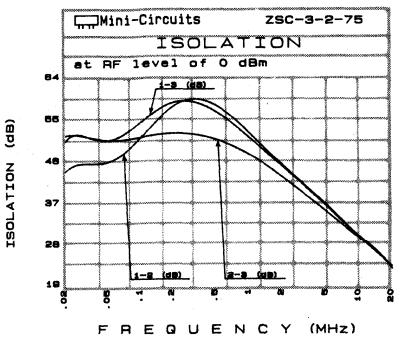
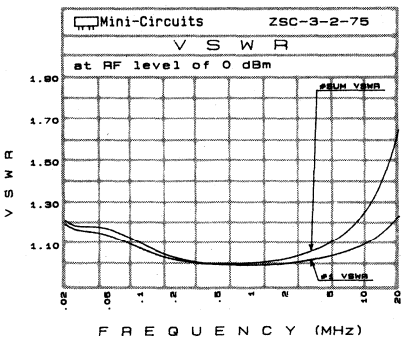
ZSC-3-2-75

0.02 to 20MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
0.02	4.99	5.01	4.99	0.02	44.31	51.62	0.02	1.21	1.20	1.20	1.21
0.1	4.91	4.91	4.88	0.03	46.77	50.07	0.1	1.16	1.13	1.13	1.14
0.2	4.86	4.87	4.87	0.01	58.93	51.89	0.2	1.04	1.03	1.03	1.03
1.0	4.87	4.87	4.87	0.00	51.53	47.09	1.0	1.02	1.00	1.01	1.01
2.0	4.86	4.86	4.86	0.00	44.91	42.25	2.0	1.04	1.02	1.02	1.01
3.3	4.88	4.88	4.88	0.00	40.35	38.45	3.3	1.07	1.03	1.03	1.03
5.0	4.89	4.90	4.89	0.01	36.29	34.93	5.0	1.12	1.05	1.05	1.05
7.1	4.92	4.94	4.92	0.02	33.00	32.02	7.1	1.18	1.07	1.08	1.08
9.1	4.96	4.97	4.95	0.02	30.71	29.97	9.1	1.24	1.10	1.10	1.10
10.0	4.99	4.98	4.99	0.01	29.77	29.14	10.0	1.27	1.11	1.11	1.11
11.0	4.99	4.98	4.99	0.01	28.89	28.33	11.0	1.29	1.12	1.12	1.12
12.9	5.05	5.04	5.06	0.02	27.35	26.98	12.9	1.36	1.15	1.15	1.15
15.5	5.12	5.11	5.12	0.01	25.56	25.37	15.5	1.46	1.18	1.18	1.18
18.1	5.24	5.22	5.23	0.02	24.08	24.05	18.1	1.57	1.21	1.22	1.22
20.0	5.28	5.29	5.29	0.01	23.06	23.12	20.0	1.65	1.24	1.24	1.24

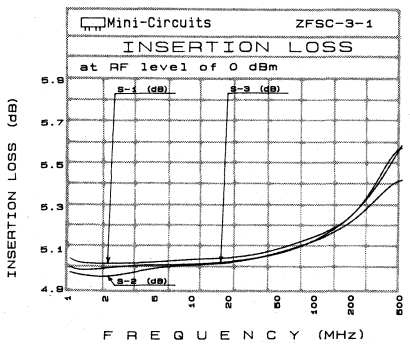
3WAY-0°

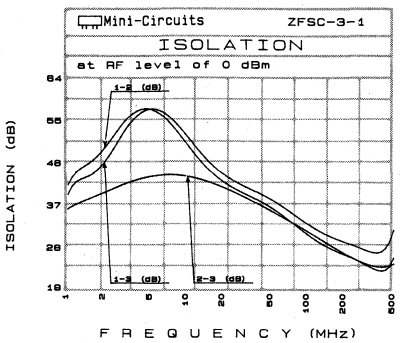
Power Splitter/Combiners

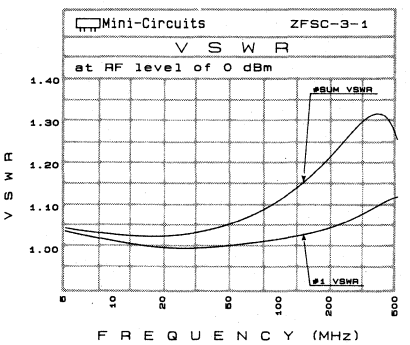
50 ohms

ZFSC-3-1

1 to 500MHz



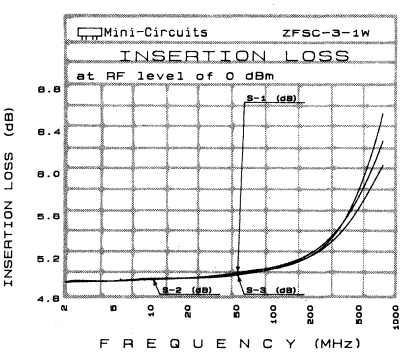


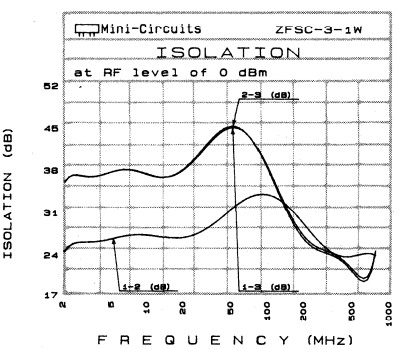


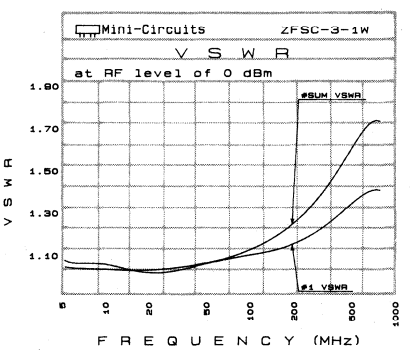
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.0	5.05	4.99	5.01	0.06	41.99	36.39	5.0	1.05	1.04	1.05	1.05
10.0	5.04	5.02	5.01	0.03	48.39	43.21	10.0	1.04	1.02	1.02	1.03
20.0	5.09	5.06	5.06	0.03	42.54	40.71	20.0	1.03	1.00	1.01	1.01
50.0	5.08	5.07	5.05	0.03	35.84	35.70	50.0	1.06	1.01	1.02	1.02
79.0	5.16	5.13	5.13	0.03	32.63	32.85	77.8	1.09	1.02	1.02	1.04
100.0	5.20	5.21	5.21	0.01	30.98	31.29	100.0	1.12	1.03	1.03	1.04
125.8	5.19	5.16	5.18	0.03	29.40	29.72	121.5	1.14	1.03	1.03	1.05
156.9	5.24	5.20	5.24	0.04	27.83	28.28	165.2	1.19	1.04	1.04	1.07
200.0	5.38	5.33	5.34	0.05	26.26	26.70	200.0	1.22	1.05	1.04	1.08
250.5	5.29	5.23	5.30	0.07	24.93	25.38	252.5	1.27	1.07	1.05	1.09
312.9	5.49	5.42	5.48	0.07	23.99	24.40	310.7	1.30	1.09	1.06	1.10
359.7	5.46	5.34	5.43	0.12	23.55	23.92	354.4	1.32	1.10	1.07	1.11
406.4	5.47	5.34	5.44	0.13	23.54	23.85	412.7	1.32	1.11	1.07	1.11
468.8	5.65	5.51	5.65	0.14	24.09	24.25	470.9	1.29	1.12	1.08	1.10
500.0	5.54	5.36	5.53	0.18	24.52	24.53	500.0	1.26	1.12	1.08	1.09

ZFSC-3-1W

2 to 750MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
2.0	4.99	4.98	4.98	0.01	25.40	36.77	5.0	1.05	1.07	1.58	1.69
5.0	4.99	4.99	4.99	0.00	26.98	37.66	50.0	1.07	1.06	1.05	1.06
50.0	5.06	5.06	5.05	0.01	31.27	46.00	100.0	1.13	1.11	1.07	1.05
100.0	5.12	5.12	5.12	0.00	34.64	35.87	163.0	1.22	1.14	1.13	1.09
142.3	5.20	5.17	5.16	0.04	31.77	31.10	200.0	1.27	1.16	1.16	1.13
200.0	5.28	5.25	5.26	0.03	28.56	27.58	253.3	1.34	1.20	1.20	1.19
259.1	5.35	5.31	5.32	0.04	26.40	25.22	298.5	1.40	1.23	1.23	1.25
305.9	5.44	5.39	5.44	0.05	25.29	23.90	366.2	1.48	1.28	1.28	1.36
399.4	5.63	5.53	5.64	0.11	24.02	22.08	411.4	1.53	1.31	1.31	1.45
446.1	5.71	5.63	5.76	0.13	23.75	21.50	500.0	1.63	1.36	1.36	1.64
500.0	5.85	5.73	5.94	0.21	23.70	21.05	569.4	1.68	1.39	1.40	1.83
563.0	5.95	5.82	6.07	0.25	23.90	20.78	614.6	1.72	1.40	1.41	1.97
609.8	6.04	5.88	6.20	0.32	24.18	20.78	659.7	1.73	1.41	1.42	2.10
656.5	6.06	5.68	5.83	0.38	24.42	20.93	704.9	1.74	1.41	1.42	2.25
750.0	6.16	5.59	5.79	0.57	24.02	21.85	750.0	1.73	1.40	1.41	2.38

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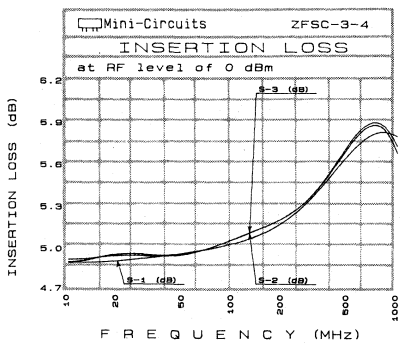
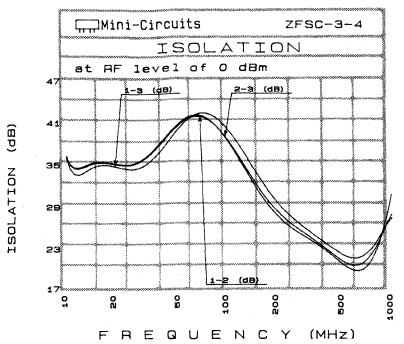
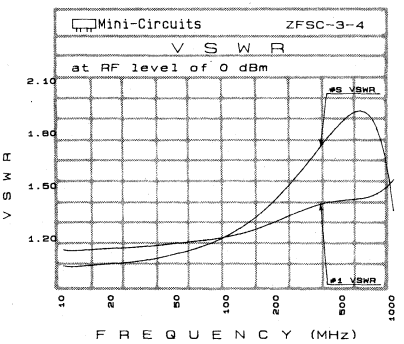
ZFSC-3-4

1 to 1000MHz



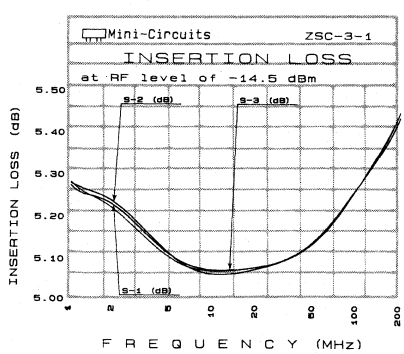


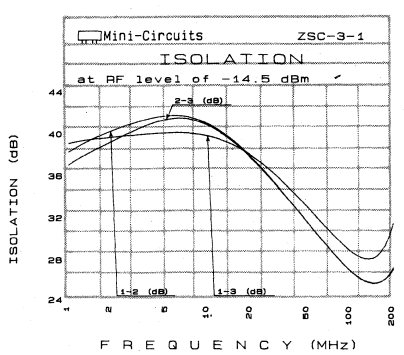


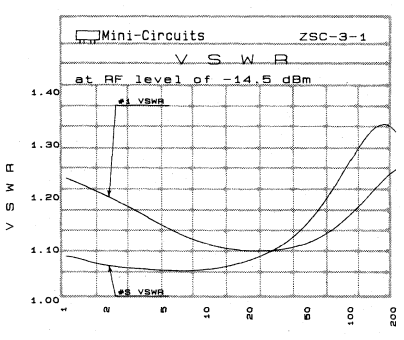
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
10.0	4.90	4.92	4.90	0.02	35.01	35.09	10.0	1.04	1.13	1.13	1.13
20.0	4.91	4.95	4.96	0.05	34.89	35.05	20.0	1.05	1.14	1.14	1.14
50.0	4.97	4.96	4.95	0.02	40.12	40.41	50.0	1.11	1.17	1.18	1.18
68.2	4.99	4.98	4.98	0.01	43.64	44.12	68.2	1.15	1.18	1.19	1.19
100.0	5.01	5.07	5.06	0.06	38.20	37.75	100.0	1.22	1.21	1.22	1.22
200.0	5.19	5.22	5.20	0.03	28.75	28.28	200.0	1.43	1.30	1.32	1.31
300.9	5.42	5.40	5.42	0.02	24.93	24.48	300.9	1.63	1.37	1.41	1.38
417.2	5.58	5.58	5.62	0.04	22.43	21.96	417.2	1.81	1.42	1.46	1.43
500.0	5.69	5.74	5.74	0.05	21.41	20.93	500.0	1.88	1.42	1.47	1.44
591.8	5.78	5.82	5.86	0.08	20.87	20.34	591.8	1.92	1.42	1.47	1.44
649.9	5.82	5.90	5.90	0.08	20.90	20.33	649.9	1.92	1.42	1.47	1.44
766.3	5.80	5.84	5.85	0.05	21.93	21.23	766.3	1.87	1.45	1.49	1.48
824.5	5.82	5.89	5.91	0.09	23.37	22.63	824.5	1.80	1.47	1.50	1.50
940.8	5.79	5.74	5.79	0.05	28.05	29.33	940.8	1.54	1.52	1.52	1.56
1000.0	5.81	5.73	5.76	0.08	25.03	28.13	1000.0	1.36	1.49	1.48	1.55

ZSC-3-1, ZMSC-3-1

1 to 200MHz





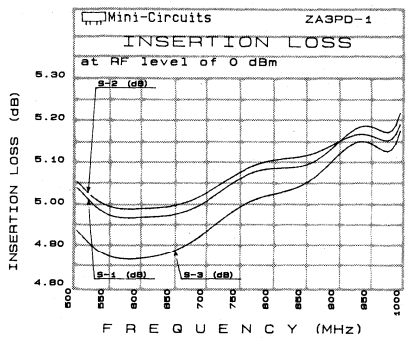


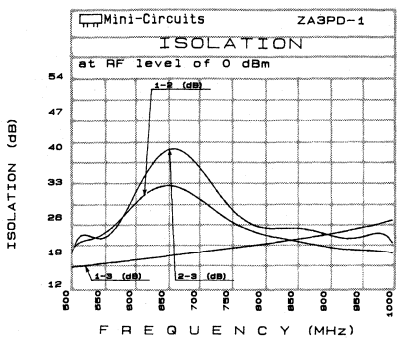
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.0	5.27	5.28	5.28	0.01	38.39	37.14	1.0	1.09	1.24	1.25	1.24
5.0	5.11	5.11	5.10	0.01	41.87	41.54	5.0	1.06	1.14	1.14	1.14
10.0	5.07	5.06	5.07	0.01	41.02	40.81	10.0	1.06	1.11	1.11	1.11
19.9	5.08	5.09	5.08	0.01	37.88	37.72	19.9	1.08	1.10	1.10	1.10
37.3	5.11	5.10	5.11	0.01	33.57	33.56	37.3	1.12	1.11	1.11	1.11
49.8	5.14	5.14	5.14	0.00	31.51	31.54	49.8	1.15	1.11	1.12	1.11
67.2	5.19	5.19	5.19	0.00	29.41	29.44	67.2	1.20	1.13	1.14	1.13
79.6	5.23	5.23	5.23	0.00	28.29	28.32	79.6	1.23	1.15	1.16	1.15
100.0	5.26	5.26	5.26	0.00	26.97	26.97	100.0	1.28	1.17	1.18	1.17
115.4	5.29	5.29	5.30	0.01	26.31	26.31	115.4	1.31	1.19	1.20	1.18
133.8	5.34	5.33	5.33	0.01	25.84	25.89	133.8	1.33	1.21	1.22	1.20
145.8	5.34	5.36	5.35	0.02	25.76	25.79	145.8	1.34	1.22	1.24	1.21
163.7	5.39	5.40	5.39	0.01	25.93	25.95	163.7	1.34	1.23	1.25	1.22
182.1	5.40	5.41	5.42	0.02	26.46	26.44	182.1	1.33	1.25	1.27	1.24
200.0	5.42	5.44	5.44	0.02	27.17	27.04	200.0	1.33	1.25	1.28	1.25

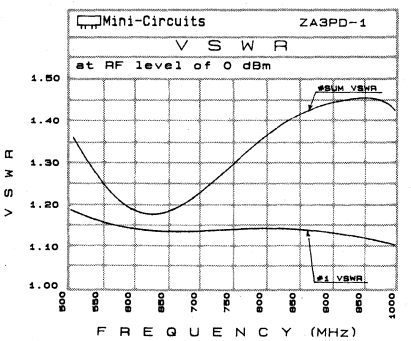
Power Splitter/Combiners 50 ohms

ZA3PD-1

0.5 to 1.0GHz



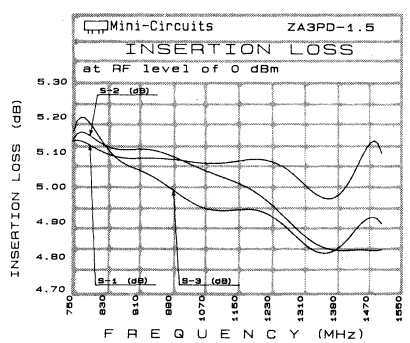


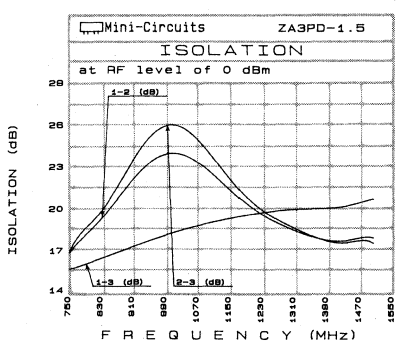


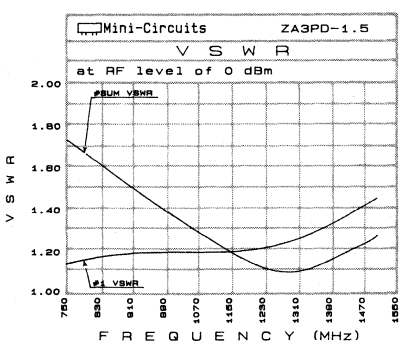
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
500.0	5.04	5.06	4.94	0.12	19.41	19.57	500.0	1.39	1.19	1.18	1.15
540.0	4.98	5.00	4.88	0.12	21.98	22.14	540.0	1.29	1.17	1.18	1.13
578.8	4.96	4.99	4.87	0.12	25.27	25.61	578.8	1.22	1.15	1.18	1.12
605.0	4.96	4.98	4.86	0.12	28.11	28.93	605.0	1.19	1.14	1.18	1.12
657.5	4.97	4.99	4.89	0.10	33.18	38.40	657.5	1.19	1.14	1.17	1.13
710.0	5.02	5.04	4.95	0.09	28.68	32.65	710.0	1.24	1.14	1.15	1.14
750.0	5.04	5.06	4.98	0.08	25.48	27.94	750.0	1.29	1.14	1.14	1.15
776.3	5.07	5.08	5.01	0.07	23.99	26.18	776.3	1.33	1.14	1.13	1.15
802.5	5.10	5.11	5.03	0.08	22.83	24.91	802.5	1.36	1.15	1.13	1.15
855.0	5.08	5.11	5.04	0.07	21.16	23.33	855.0	1.42	1.14	1.13	1.15
907.5	5.17	5.16	5.13	0.04	20.16	22.62	907.5	1.44	1.14	1.13	1.14
933.8	5.17	5.16	5.14	0.03	19.79	22.45	933.8	1.46	1.13	1.15	1.13
960.0	5.17	5.15	5.13	0.04	19.52	22.41	960.0	1.46	1.12	1.16	1.12
986.3	5.18	5.16	5.13	0.05	19.28	22.44	986.3	1.44	1.11	1.17	1.12
1000.0	5.19	5.17	5.15	0.04	19.16	22.43	1000.0	1.43	1.11	1.18	1.11

ZA3PD-1.5

0.75 to 1.5GHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
750.0	5.13	5.15	5.19	0.06	17.00	17.28	750.0	1.74	1.14	1.72	1.17
810.0	5.10	5.13	5.16	0.06	18.74	19.25	810.0	1.65	1.17	1.75	1.19
871.9	5.08	5.10	5.05	0.05	20.79	21.70	871.9	1.56	1.19	1.74	1.21
931.9	5.08	5.10	5.05	0.05	22.80	24.35	931.9	1.48	1.20	1.74	1.22
993.8	5.09	5.09	4.98	0.11	24.02	26.15	993.8	1.39	1.20	1.69	1.22
1033.1	5.07	5.07	4.96	0.11	23.94	25.91	1033.1	1.34	1.20	1.67	1.22
1095.0	5.06	5.04	4.93	0.13	22.71	23.97	1095.0	1.26	1.20	1.62	1.21
1155.0	5.08	5.01	4.93	0.15	21.22	21.93	1155.0	1.19	1.20	1.57	1.22
1200.0	5.07	4.98	4.95	0.12	20.20	20.65	1200.0	1.15	1.21	1.52	1.22
1256.3	5.04	4.92	4.88	0.16	19.16	19.42	1256.3	1.11	1.23	1.48	1.25
1318.1	5.02	4.86	4.84	0.18	18.37	18.46	1318.1	1.11	1.27	1.44	1.28
1378.1	4.95	4.82	4.80	0.15	17.83	17.82	1378.1	1.15	1.32	1.42	1.33
1440.0	5.07	4.82	4.89	0.25	17.81	17.63	1440.0	1.21	1.39	1.42	1.41
1479.4	5.13	4.82	4.91	0.31	17.95	17.70	1479.4	1.25	1.43	1.44	1.45
1500.0	5.12	4.82	4.91	0.30	18.07	17.78	1500.0	1.27	1.46	1.45	1.47

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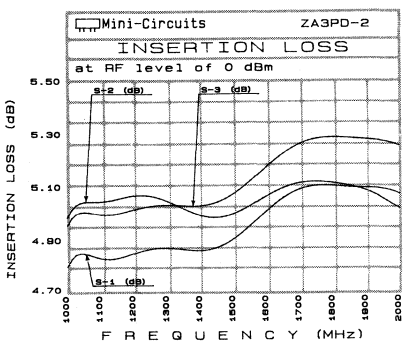
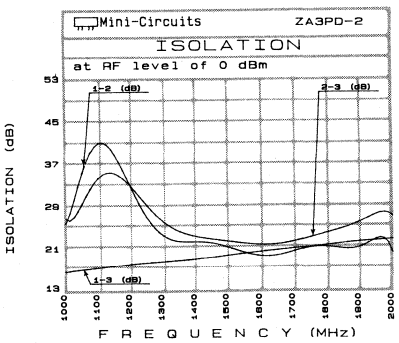
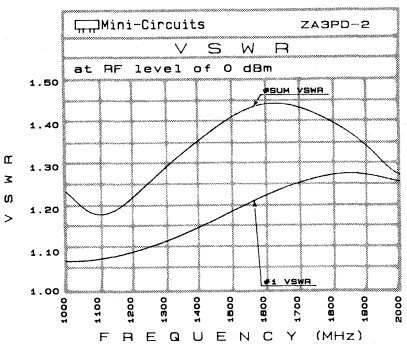
Distribution Centers NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

ZA3PD-2

1 to 2.0GHz



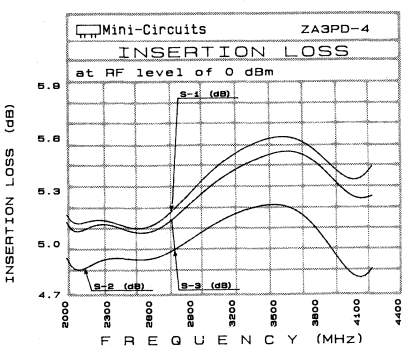


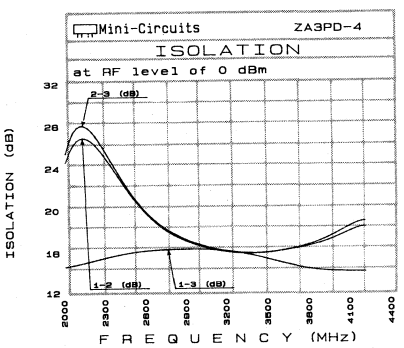


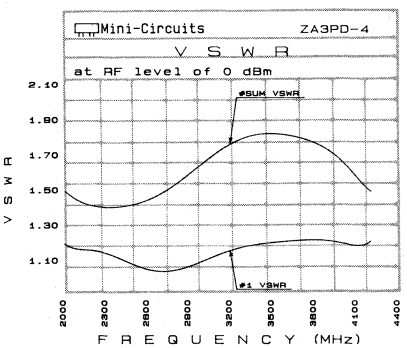
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1000.0	4.83	5.01	4.98	0.18	27.50	25.72	1000.0	1.25	1.08	1.24	1.12
1080.0	4.84	5.04	5.00	0.20	38.28	32.03	1080.0	1.19	1.08	1.20	1.12
1135.0	4.84	5.06	5.01	0.22	40.87	36.47	1135.0	1.19	1.09	1.17	1.13
1190.0	4.84	5.06	5.00	0.22	31.38	33.06	1190.0	1.22	1.10	1.13	1.13
1270.0	4.86	5.05	5.02	0.19	25.97	27.59	1270.0	1.27	1.11	1.07	1.15
1352.5	4.89	5.03	5.05	0.16	23.05	24.48	1352.5	1.33	1.14	1.02	1.16
1460.0	4.87	4.99	5.04	0.17	21.08	22.49	1460.0	1.40	1.18	1.09	1.20
1500.0	4.89	4.99	5.06	0.17	20.72	22.16	1500.0	1.42	1.19	1.12	1.21
1540.0	4.94	5.02	5.11	0.17	20.47	21.95	1540.0	1.44	1.21	1.16	1.22
1647.5	5.09	5.12	5.25	0.16	20.27	22.01	1647.5	1.44	1.25	1.27	1.25
1757.5	5.11	5.13	5.29	0.18	20.72	23.12	1757.5	1.42	1.27	1.37	1.27
1810.0	5.10	5.11	5.28	0.18	21.14	24.08	1810.0	1.41	1.29	1.44	1.28
1865.0	5.12	5.12	5.31	0.19	21.61	25.34	1865.0	1.36	1.28	1.47	1.27
1920.0	5.08	5.06	5.26	0.20	22.02	26.72	1920.0	1.34	1.28	1.53	1.27
2000.0	5.07	5.01	5.25	0.24	22.24	27.72	2000.0	1.28	1.27	1.59	1.25

ZA3PD-4

2 to 4.2GHz







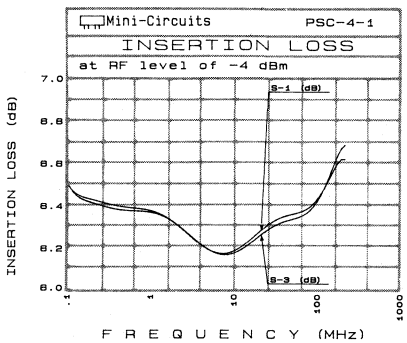
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
2000.0	5.14	4.88	5.09	0.26	24.98	25.94	2000.0	1.49	1.18	1.64	1.18
2253.0	5.13	4.90	5.11	0.23	25.78	26.45	2253.0	1.40	1.14	1.54	1.15
2440.0	5.11	4.93	5.09	0.18	22.14	22.35	2440.0	1.41	1.10	1.46	1.11
2627.0	5.09	4.89	5.06	0.20	19.31	19.40	2627.0	1.45	1.04	1.32	1.06
2753.5	5.20	4.97	5.14	0.23	18.03	18.18	2753.5	1.51	1.03	1.24	1.03
2880.0	5.25	5.01	5.20	0.24	17.14	17.28	2880.0	1.58	1.06	1.16	1.05
3001.0	5.34	5.05	5.26	0.29	16.54	16.64	3001.0	1.65	1.10	1.10	1.09
3067.0	5.42	5.09	5.33	0.33	16.34	16.43	3067.0	1.69	1.12	1.07	1.11
3320.0	5.56	5.21	5.47	0.35	15.91	15.97	3320.0	1.80	1.18	1.03	1.19
3446.5	5.52	5.14	5.43	0.38	15.92	15.94	3446.5	1.82	1.20	1.06	1.22
3507.0	5.56	5.17	5.47	0.39	16.02	16.04	3507.0	1.82	1.20	1.07	1.23
3760.0	5.55	5.13	5.49	0.42	16.62	16.53	3760.0	1.79	1.22	1.14	1.30
4002.0	5.37	4.85	5.30	0.52	17.93	17.54	4002.0	1.66	1.20	1.16	1.30
4073.5	5.37	4.82	5.27	0.55	18.38	17.91	4073.5	1.60	1.19	1.15	1.29
4200.0	5.39	4.80	5.23	0.59	19.03	18.50	4200.0	1.49	1.20	1.13	1.28

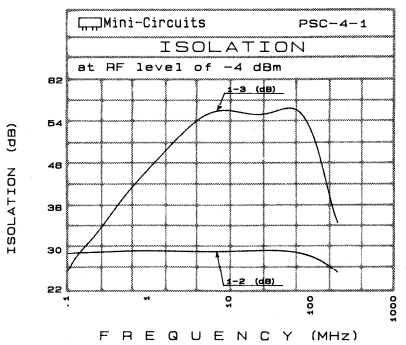
4 WAY-0°

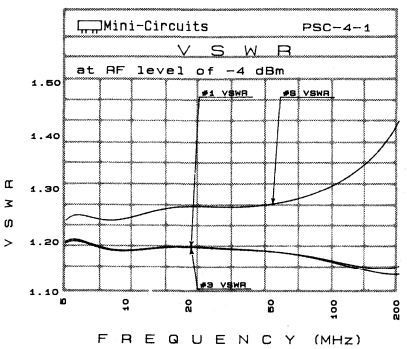
Power Splitter/Combiners 50 ohms

PSC-4-1

0.1 to 200MHz



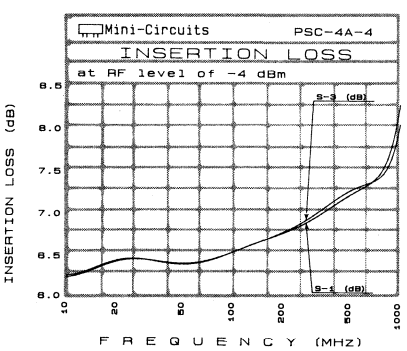


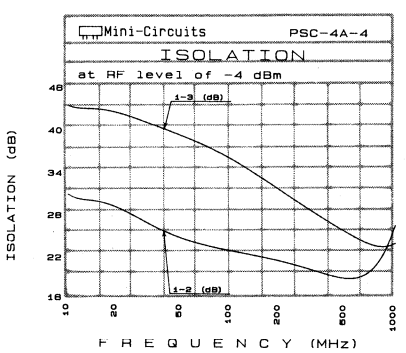


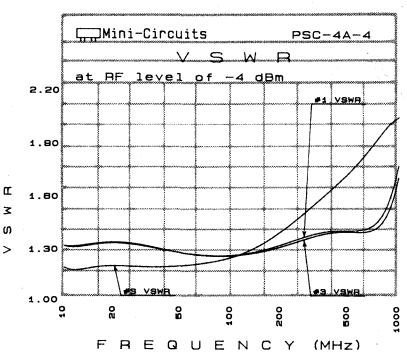
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.1	6.48	6.47	6.48	6.50	0.03	29.44	26.57	28.60	5.0	1.25	1.21	1.21	1.20	1.21
0.5	6.40	6.38	6.39	6.39	0.02	29.80	39.84	29.37	10.6	1.25	1.18	1.18	1.18	1.19
1.0	6.38	6.36	6.36	6.36	0.02	29.90	45.33	29.56	16.1	1.27	1.19	1.20	1.19	1.20
10.0	6.11	6.12	6.11	6.11	0.01	29.87	56.00	30.03	32.9	1.26	1.19	1.19	1.19	1.19
20.0	6.42	6.42	6.38	6.42	0.04	29.92	56.00	30.12	44.0	1.27	1.19	1.19	1.19	1.19
40.1	6.43	6.44	6.41	6.44	0.03	29.95	56.00	30.25	60.7	1.29	1.19	1.19	1.19	1.19
50.0	6.26	6.28	6.25	6.28	0.03	29.91	56.00	30.27	71.9	1.28	1.17	1.17	1.17	1.18
60.1	6.45	6.45	6.42	6.45	0.03	29.70	56.00	30.13	83.0	1.30	1.17	1.17	1.17	1.18
80.1	6.46	6.46	6.43	6.48	0.05	29.29	56.00	29.83	99.7	1.32	1.17	1.17	1.17	1.18
100.0	6.46	6.47	6.47	6.51	0.05	28.80	51.54	29.43	110.9	1.32	1.16	1.16	1.16	1.17
120.0	6.45	6.47	6.45	6.52	0.07	28.21	46.60	28.93	133.1	1.35	1.15	1.15	1.16	1.17
140.0	6.45	6.48	6.47	6.52	0.07	27.65	42.96	28.35	149.9	1.35	1.14	1.14	1.15	1.16
160.0	6.50	6.52	6.52	6.58	0.08	27.02	39.86	27.71	166.6	1.37	1.14	1.13	1.15	1.15
180.0	6.52	6.54	6.56	6.64	0.12	26.40	37.39	26.98	183.3	1.40	1.14	1.13	1.15	1.16
200.0	6.56	6.58	6.63	6.68	0.12	25.84	35.09	26.22	200.0	1.43	1.14	1.14	1.16	1.17

PSC-4A-4

10 to 1000MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.26	6.27	6.24	6.41	0.17	30.75	43.51	31.15	10.0	1.18	1.31	1.31	1.31	1.32
50.0	6.35	6.39	6.38	6.53	0.18	24.85	39.19	24.53	50.0	1.20	1.27	1.27	1.27	1.27
100.0	6.64	6.63	6.61	6.73	0.12	23.09	35.89	22.72	100.0	1.26	1.28	1.27	1.27	1.27
155.4	6.75	6.76	6.75	6.87	0.12	22.21	33.08	21.81	155.4	1.35	1.31	1.29	1.30	1.30
200.0	6.82	6.81	6.83	6.92	0.11	21.78	31.54	21.28	200.0	1.40	1.32	1.31	1.31	1.31
300.9	6.83	6.80	6.86	6.88	0.08	20.59	28.81	19.98	300.9	1.52	1.37	1.34	1.36	1.35
359.1	6.94	6.93	7.00	7.01	0.08	20.04	27.69	19.32	359.1	1.59	1.39	1.36	1.38	1.37
446.3	7.27	7.28	7.32	7.31	0.05	19.49	26.29	18.49	446.3	1.71	1.43	1.39	1.42	1.41
500.0	7.02	7.00	7.07	7.06	0.07	19.21	25.57	18.08	446.3	1.71	1.40	1.37	1.39	1.39
591.8	7.29	7.26	7.33	7.30	0.07	19.41	24.82	17.85	500.0	1.78	1.39	1.37	1.39	1.38
708.1	7.33	7.30	7.33	7.34	0.04	20.17	23.99	17.68	591.8	1.85	1.42	1.39	1.40	1.39
795.4	7.61	7.54	7.53	7.57	0.08	21.53	23.77	17.68	708.1	2.00	1.51	1.48	1.46	1.45
882.6	7.72	7.65	7.60	7.69	0.12	23.58	23.78	18.23	882.6	2.00	1.58	1.54	1.53	1.51
940.8	8.05	7.99	7.87	8.00	0.18	25.31	24.19	18.52	940.8	2.03	1.67	1.62	1.61	1.58
1000.0	8.13	8.10	7.91	8.10	0.22	26.08	24.56	18.79	1000.0	1.96	1.71	1.65	1.67	1.64

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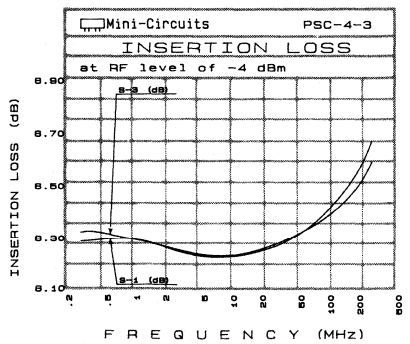
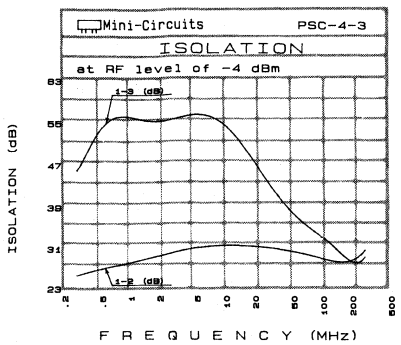
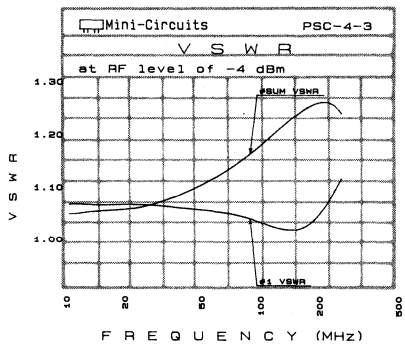
PSC-4-3

0.25 to 250MHz



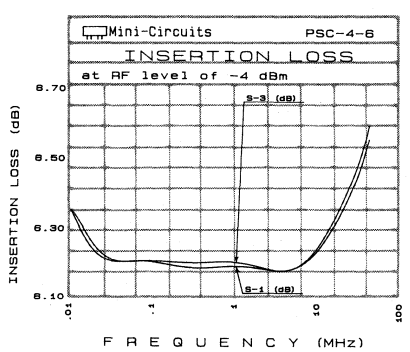


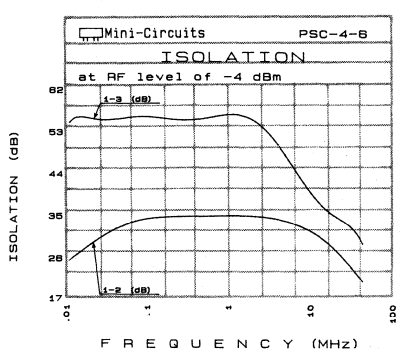


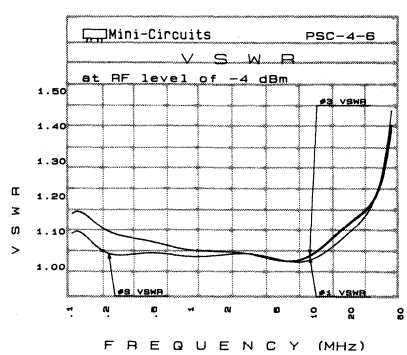
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.25	6.29	6.33	6.33	6.33	0.04	26.10	45.98	26.52	10.0	1.05	1.07	1.07	1.07	1.07
0.5	6.30	6.32	6.32	6.32	0.02	27.59	56.00	28.23	16.6	1.06	1.07	1.07	1.06	1.06
1.0	6.30	6.30	6.29	6.31	0.02	28.65	56.00	29.49	20.2	1.06	1.07	1.06	1.06	1.06
5.0	6.23	6.23	6.23	6.24	0.01	31.51	56.00	32.39	30.4	1.07	1.06	1.06	1.06	1.06
10.0	6.23	6.23	6.23	6.22	0.01	31.79	56.00	32.52	44.2	1.10	1.06	1.06	1.05	1.06
25.2	6.27	6.26	6.27	6.26	0.01	31.35	43.48	31.61	58.0	1.12	1.06	1.06	1.05	1.05
50.0	6.30	6.30	6.30	6.29	0.01	30.51	37.79	30.06	78.4	1.15	1.05	1.05	1.04	1.05
75.2	6.38	6.35	6.34	6.35	0.04	29.76	34.60	28.77	100.0	1.18	1.03	1.03	1.03	1.03
100.0	6.51	6.45	6.46	6.46	0.06	29.16	32.41	27.76	119.8	1.21	1.02	1.03	1.02	1.02
125.1	6.47	6.43	6.44	6.44	0.04	28.77	30.94	27.03	147.4	1.24	1.02	1.02	1.02	1.02
150.1	6.44	6.40	6.40	6.40	0.04	28.77	29.92	26.66	167.8	1.25	1.03	1.02	1.03	1.02
175.1	6.56	6.50	6.49	6.50	0.07	28.93	29.20	26.67	188.2	1.26	1.04	1.04	1.05	1.03
200.0	6.63	6.57	6.56	6.58	0.07	29.28	28.76	27.04	202.0	1.26	1.06	1.04	1.06	1.05
225.0	6.64	6.56	6.57	6.61	0.08	30.09	28.66	28.00	229.6	1.26	1.09	1.08	1.09	1.08
250.0	6.63	6.58	6.56	6.63	0.07	30.88	28.94	29.77	250.0	1.24	1.12	1.10	1.12	1.10

PSC-4-6

0.01 to 40MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.01	6.35	6.40	6.36	6.36	0.05	25.59	56.00	26.01	0.1	1.11	1.17	1.17	1.17	1.16
0.1	6.20	6.20	6.21	6.19	0.02	34.62	56.00	34.42	1.0	1.04	1.06	1.05	1.05	1.05
1.0	6.18	6.18	6.21	6.19	0.03	35.15	56.00	34.80	2.6	1.03	1.03	1.03	1.03	1.03
2.0	6.19	6.19	6.19	6.17	0.02	34.95	56.00	34.64	5.0	1.03	1.03	1.03	1.03	1.03
5.0	6.20	6.18	6.20	6.19	0.02	33.78	45.61	33.47	7.6	1.03	1.03	1.03	1.03	1.03
8.3	6.20	6.20	6.21	6.20	0.01	32.32	41.23	32.04	10.1	1.02	1.04	1.04	1.04	1.04
10.0	6.20	6.22	6.22	6.21	0.02	31.58	39.66	31.30	12.6	1.03	1.06	1.06	1.06	1.06
13.8	6.33	6.32	6.35	6.32	0.03	29.88	37.45	29.65	16.3	1.09	1.11	1.11	1.11	1.12
17.9	6.35	6.36	6.38	6.37	0.03	28.13	35.54	27.94	20.0	1.13	1.16	1.16	1.16	1.16
20.0	6.35	6.33	6.36	6.36	0.03	27.27	34.74	27.08	21.3	1.15	1.16	1.16	1.17	1.17
24.8	6.35	6.33	6.38	6.36	0.05	25.43	33.08	25.28	26.3	1.15	1.16	1.16	1.17	1.17
29.0	6.45	6.43	6.47	6.49	0.06	24.13	32.14	23.97	30.0	1.18	1.18	1.18	1.18	1.18
31.7	6.52	6.51	6.54	6.53	0.03	23.38	31.67	23.22	32.5	1.23	1.22	1.22	1.23	1.23
35.9	6.54	6.51	6.57	6.56	0.06	22.21	30.99	22.05	36.3	1.35	1.31	1.32	1.32	1.33
40.0	6.48	6.50	6.52	6.51	0.04	21.02	30.30	20.86	40.0	1.43	1.38	1.38	1.39	1.39

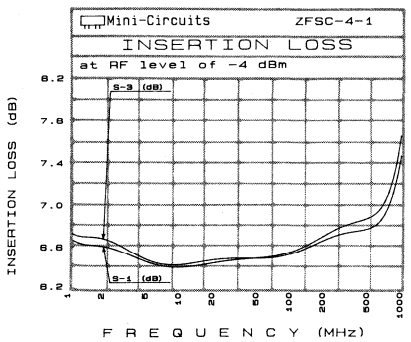
4WAY-0°

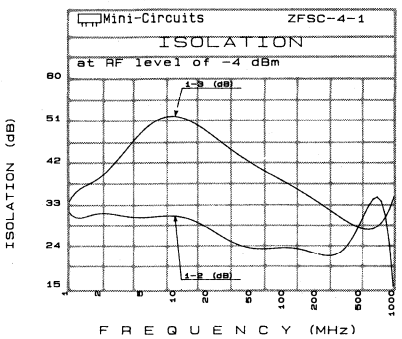
Power Splitter/Combiners

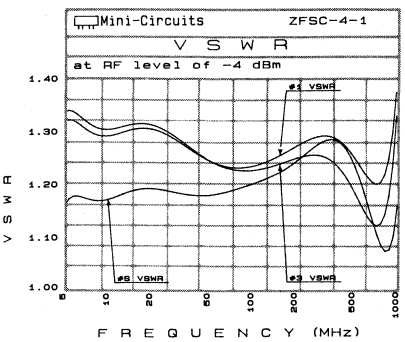
50 ohms

ZFSC-4-1

1 to 1000MHz



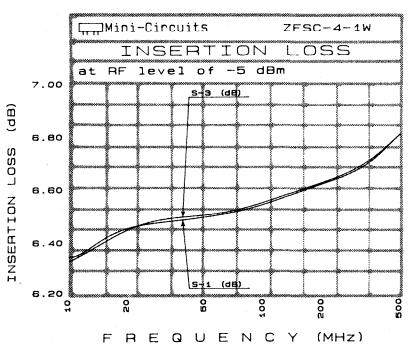


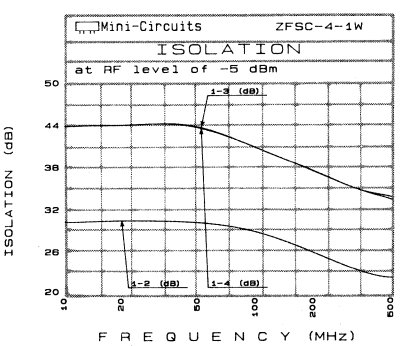


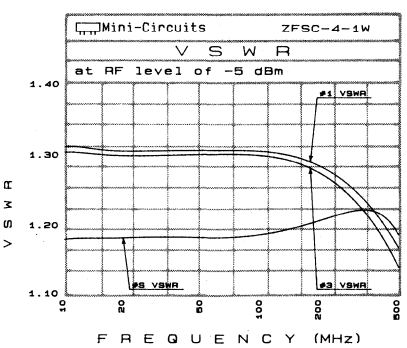
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1.0	6.67	6.64	6.73	6.70	0.09	30.34	33.51	29.96	5.0	1.17	1.33	1.33	1.34	1.34
5.0	6.49	6.44	6.50	6.49	0.06	30.25	47.61	30.43	20.0	1.19	1.31	1.31	1.32	1.32
50.0	6.44	6.42	6.43	6.43	0.02	23.55	41.88	23.52	95.4	1.20	1.25	1.24	1.24	1.24
100.0	6.63	6.59	6.59	6.60	0.04	22.76	37.89	22.74	155.6	1.23	1.26	1.25	1.25	1.25
162.0	6.63	6.64	6.62	6.63	0.02	22.64	34.87	22.74	200.0	1.24	1.26	1.25	1.24	1.25
200.0	6.74	6.68	6.66	6.69	0.08	22.63	33.42	22.82	246.0	1.26	1.28	1.26	1.25	1.26
290.8	6.83	6.83	6.75	6.80	0.08	22.85	30.89	23.12	336.4	1.28	1.29	1.27	1.25	1.26
387.3	6.90	6.98	6.84	6.92	0.14	23.69	29.08	24.02	426.7	1.28	1.28	1.26	1.23	1.25
451.7	6.90	6.92	6.80	6.91	0.12	24.87	28.25	25.14	486.9	1.26	1.27	1.24	1.20	1.22
500.0	6.81	6.85	6.72	6.82	0.13	26.01	27.73	26.36	517.1	1.23	1.24	1.21	1.18	1.20
612.7	6.92	6.99	6.80	6.94	0.19	32.05	27.02	31.37	637.5	1.16	1.20	1.16	1.12	1.15
709.3	7.02	7.07	6.87	7.07	0.20	44.83	27.07	32.16	727.9	1.10	1.19	1.15	1.11	1.15
805.9	7.09	7.20	7.02	7.19	0.18	28.42	27.88	25.57	818.3	1.07	1.23	1.19	1.16	1.20
902.4	7.41	7.36	7.25	7.41	0.16	22.72	29.95	21.13	908.6	1.07	1.28	1.23	1.22	1.25
1000.0	7.71	7.58	7.52	7.64	0.19	19.13	34.90	18.09	1000.0	1.18	1.33	1.28	1.28	1.31

ZFSC-4-1W

10 to 500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.34	6.33	6.33	6.33	0.01	30.21	44.00	30.08	10.0	1.18	1.31	1.31	1.30	1.31
50.4	6.50	6.50	6.50	6.50	0.00	30.05	42.88	29.81	50.4	1.18	1.31	1.31	1.30	1.30
99.4	6.55	6.55	6.56	6.56	0.01	28.76	40.64	28.37	99.4	1.19	1.31	1.31	1.30	1.30
121.5	6.55	6.55	6.55	6.55	0.00	28.06	39.15	27.65	121.5	1.19	1.30	1.30	1.30	1.30
149.7	6.60	6.59	6.60	6.60	0.01	27.24	38.35	26.71	149.7	1.20	1.30	1.30	1.29	1.29
199.9	6.63	6.62	6.63	6.63	0.01	25.86	37.08	25.34	199.9	1.21	1.28	1.29	1.27	1.27
219.5	6.63	6.62	6.64	6.64	0.02	25.40	36.54	24.85	219.5	1.21	1.28	1.28	1.27	1.27
247.7	6.63	6.62	6.63	6.63	0.01	24.75	35.95	24.21	247.7	1.22	1.27	1.27	1.26	1.26
275.8	6.67	6.64	6.67	6.66	0.03	24.22	35.51	23.71	275.8	1.22	1.26	1.27	1.25	1.25
317.5	6.69	6.66	6.70	6.70	0.04	23.58	34.91	23.10	317.5	1.22	1.24	1.25	1.23	1.23
360.4	6.69	6.67	6.71	6.70	0.04	23.06	34.48	22.59	360.4	1.22	1.23	1.24	1.21	1.21
402.0	6.74	6.70	6.75	6.75	0.05	22.68	34.13	22.25	402.0	1.22	1.21	1.23	1.19	1.19
443.7	6.77	6.73	6.78	6.78	0.05	22.41	34.09	22.07	443.7	1.21	1.19	1.21	1.17	1.17
471.8	6.79	6.76	6.80	6.80	0.04	22.33	34.13	22.01	471.8	1.20	1.18	1.20	1.15	1.16
500.0	6.80	6.75	6.80	6.81	0.06	22.27	34.39	22.02	500.0	1.19	1.17	1.19	1.14	1.15

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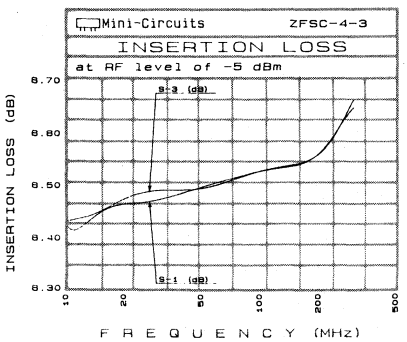
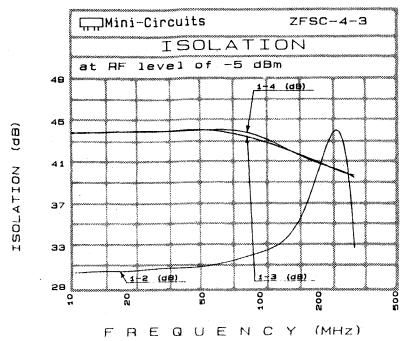
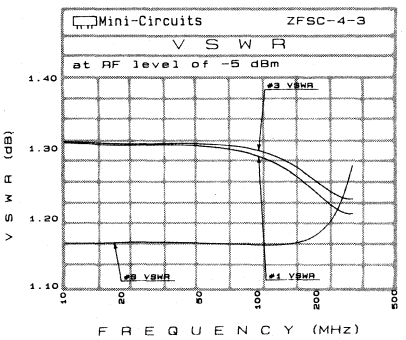
Mini-Circuits

ZFSC-4-3

10 to 300MHz



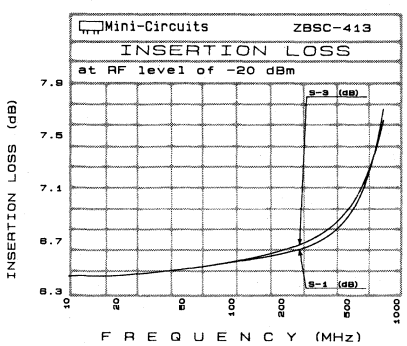


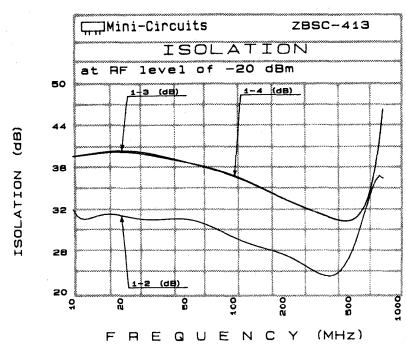


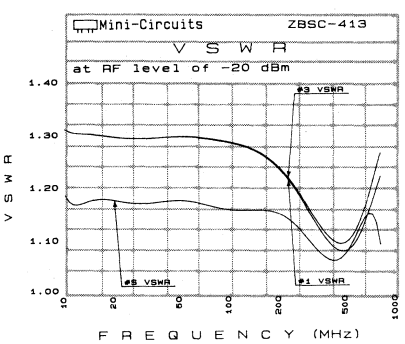
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.41	6.40	6.43	6.43	0.03	30.60	44.00	30.26	10.0	1.16	1.31	1.31	1.31	1.31
18.0	6.46	6.45	6.46	6.47	0.02	30.72	44.00	30.54	18.0	1.16	1.30	1.30	1.31	1.31
20.2	6.47	6.47	6.48	6.47	0.01	30.70	44.00	30.60	20.2	1.17	1.30	1.30	1.31	1.30
34.7	6.47	6.48	6.49	6.49	0.02	30.93	44.00	30.89	34.7	1.17	1.30	1.30	1.31	1.30
49.9	6.50	6.50	6.50	6.51	0.01	31.18	44.00	31.31	49.9	1.16	1.30	1.30	1.31	1.31
60.0	6.51	6.51	6.51	6.50	0.01	31.31	44.00	31.46	60.0	1.16	1.30	1.30	1.30	1.30
76.0	6.50	6.50	6.50	6.50	0.00	31.64	42.84	31.89	76.0	1.16	1.29	1.29	1.30	1.30
99.9	6.52	6.52	6.53	6.52	0.01	32.51	43.46	32.52	99.9	1.16	1.29	1.28	1.29	1.29
126.0	6.54	6.53	6.54	6.54	0.01	33.55	42.41	33.48	126.0	1.16	1.27	1.27	1.28	1.28
150.7	6.54	6.53	6.54	6.53	0.01	35.01	41.68	34.70	150.7	1.16	1.26	1.26	1.27	1.27
200.7	6.55	6.54	6.56	6.55	0.02	40.32	41.07	38.77	200.7	1.18	1.23	1.22	1.25	1.25
225.3	6.58	6.57	6.59	6.58	0.02	44.00	41.35	43.31	225.3	1.19	1.22	1.21	1.24	1.24
250.0	6.62	6.60	6.62	6.60	0.02	44.00	40.96	44.00	250.0	1.21	1.21	1.19	1.23	1.23
275.4	6.63	6.60	6.61	6.61	0.03	39.86	40.91	44.00	275.4	1.24	1.20	1.18	1.23	1.22
300.0	6.67	6.64	6.66	6.65	0.03	35.01	40.69	39.63	300.0	1.27	1.20	1.18	1.22	1.22

ZBSC-413

10 to 800MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.44	6.44	6.44	6.43	0.01	31.12	39.73	32.08	10.0	1.17	1.31	1.31	1.31	1.32
20.0	6.44	6.45	6.44	6.44	0.01	31.02	40.33	31.99	20.0	1.17	1.29	1.29	1.30	1.30
50.0	6.49	6.49	6.49	6.48	0.01	30.29	38.61	30.95	50.0	1.17	1.29	1.29	1.30	1.30
100.0	6.54	6.55	6.54	6.54	0.01	28.26	36.44	28.41	100.0	1.16	1.28	1.29	1.30	1.30
154.0	6.58	6.58	6.59	6.58	0.01	26.23	34.67	26.07	154.0	1.15	1.26	1.26	1.27	1.27
200.0	6.62	6.63	6.65	6.64	0.03	24.95	33.45	24.68	200.0	1.14	1.23	1.23	1.24	1.25
249.0	6.64	6.66	6.68	6.66	0.04	23.96	32.59	23.58	249.0	1.13	1.19	1.20	1.21	1.21
345.0	6.71	6.74	6.76	6.74	0.05	23.13	31.03	22.50	345.0	1.09	1.12	1.13	1.14	1.15
400.0	6.77	6.80	6.82	6.80	0.05	23.26	30.45	22.48	400.0	1.06	1.09	1.10	1.11	1.11
465.0	6.87	6.91	6.92	6.88	0.05	24.12	30.41	22.89	465.0	1.05	1.07	1.09	1.09	1.09
500.0	6.90	6.95	6.95	6.92	0.05	24.87	30.44	23.29	500.0	1.06	1.07	1.09	1.09	1.08
608.0	7.12	7.20	7.15	7.09	0.11	29.16	31.93	25.57	608.0	1.13	1.12	1.14	1.12	1.11
680.0	7.28	7.39	7.30	7.22	0.17	35.65	34.77	27.98	680.0	1.16	1.15	1.18	1.15	1.12
752.0	7.52	7.66	7.49	7.38	0.28	38.03	41.71	32.39	752.0	1.12	1.19	1.23	1.17	1.15
800.0	7.73	7.90	7.64	7.51	0.39	29.23	43.38	41.15	800.0	1.10	1.23	1.28	1.21	1.18

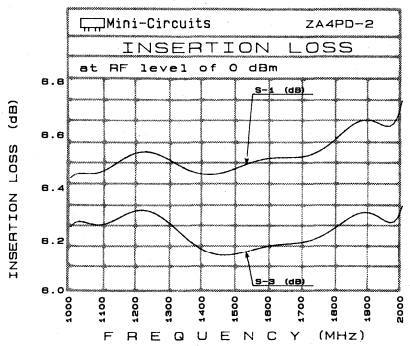
4WAY-0°

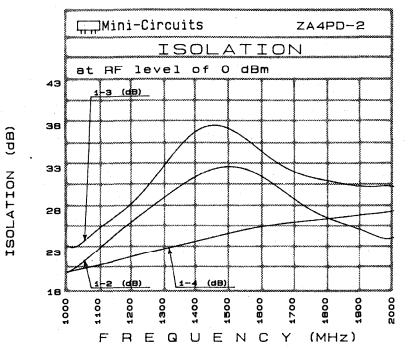
Power Splitter/Combiners

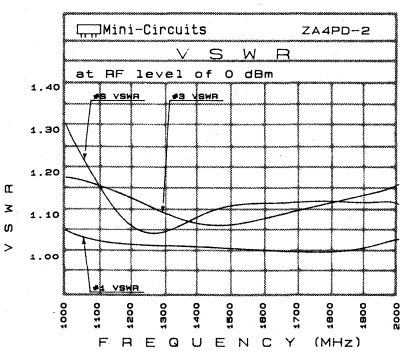
50 ohms

ZA4PD-2

1 to 2.0GHz



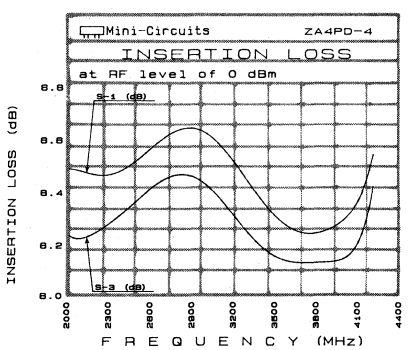


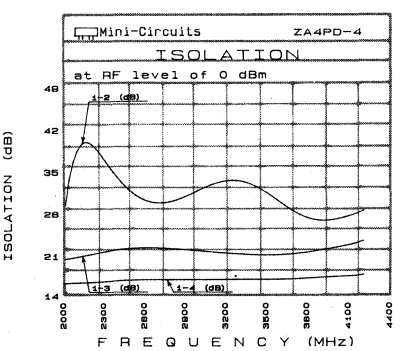


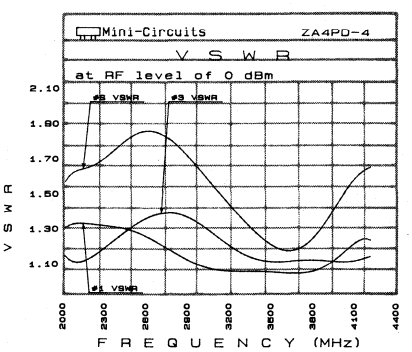
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1000.0	6.45	6.23	6.27	6.47	0.24	20.58	25.91	20.83	1000.0	1.31	1.06	1.20	1.19	1.03
1080.0	6.46	6.23	6.26	6.47	0.24	22.92	27.93	23.42	1080.0	1.19	1.04	1.18	1.18	1.05
1157.5	6.49	6.25	6.28	6.52	0.27	25.33	27.77	26.07	1157.5	1.11	1.03	1.16	1.15	1.06
1210.0	6.54	6.29	6.32	6.55	0.26	26.99	26.89	27.82	1210.0	1.07	1.03	1.14	1.14	1.06
1262.5	6.52	6.27	6.30	6.52	0.25	28.58	25.96	29.34	1262.5	1.05	1.03	1.11	1.12	1.06
1315.0	6.52	6.25	6.26	6.50	0.27	30.11	25.23	30.82	1315.0	1.07	1.03	1.10	1.10	1.06
1395.0	6.43	6.13	6.15	6.39	0.30	31.51	24.37	32.00	1395.0	1.10	1.02	1.07	1.08	1.05
1472.5	6.46	6.13	6.13	6.40	0.33	33.30	24.29	33.79	1472.5	1.12	1.02	1.05	1.08	1.05
1552.5	6.52	6.17	6.18	6.45	0.35	32.87	24.59	33.21	1552.5	1.13	1.02	1.05	1.09	1.04
1605.0	6.51	6.18	6.19	6.44	0.33	31.69	24.96	31.91	1605.0	1.13	1.02	1.06	1.09	1.04
1685.0	6.49	6.17	6.18	6.40	0.32	29.68	25.84	29.84	1685.0	1.13	1.02	1.08	1.11	1.03
1762.5	6.57	6.21	6.21	6.48	0.36	27.92	27.14	28.00	1762.5	1.13	1.01	1.09	1.12	1.03
1842.5	6.61	6.27	6.29	6.52	0.34	26.43	28.98	26.45	1842.5	1.13	1.02	1.11	1.14	1.04
1920.0	6.64	6.27	6.27	6.53	0.37	25.34	31.35	25.32	1920.0	1.13	1.03	1.12	1.15	1.06
2000.0	6.67	6.27	6.27	6.55	0.40	24.43	34.33	24.32	2000.0	1.13	1.04	1.14	1.17	1.08

ZA4PD-4

2 to 4.2GHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
2000.0	6.47	6.23	6.21	6.49	0.28	32.33	28.25	31.73	2000.0	1.60	1.32	1.12	1.14	1.30
2126.5	6.47	6.26	6.23	6.49	0.26	40.00	25.01	40.35	2126.5	1.64	1.33	1.12	1.11	1.31
2313.5	6.46	6.31	6.28	6.47	0.19	35.88	22.55	37.66	2313.5	1.74	1.32	1.24	1.21	1.32
2500.5	6.60	6.45	6.44	6.64	0.20	31.57	21.55	32.35	2500.5	1.81	1.28	1.35	1.32	1.29
2627.0	6.60	6.44	6.44	6.66	0.22	30.42	21.38	31.05	2627.0	1.85	1.24	1.40	1.38	1.25
2819.5	6.62	6.46	6.48	6.71	0.25	30.47	21.90	31.18	2819.5	1.79	1.16	1.40	1.38	1.17
3001.0	6.61	6.36	6.40	6.72	0.36	31.88	23.30	32.90	3001.0	1.62	1.08	1.32	1.31	1.10
3067.0	6.62	6.36	6.40	6.74	0.38	32.67	23.97	33.86	3067.0	1.54	1.07	1.28	1.28	1.09
3259.5	6.41	6.17	6.22	6.53	0.36	34.14	25.54	36.42	3259.5	1.34	1.05	1.16	1.17	1.09
3446.5	6.35	6.11	6.17	6.45	0.34	32.20	25.02	34.50	3446.5	1.24	1.07	1.10	1.11	1.09
3573.0	6.28	6.09	6.15	6.39	0.30	30.06	23.39	32.08	3573.0	1.14	1.06	1.11	1.12	1.08
3820.5	6.25	6.05	6.13	6.35	0.30	27.41	20.49	29.01	3820.5	1.29	1.07	1.11	1.12	1.08
4002.0	6.33	6.05	6.15	6.42	0.37	27.20	19.17	28.74	4002.0	1.49	1.17	1.07	1.11	1.17
4073.5	6.34	6.09	6.19	6.43	0.34	27.54	18.81	29.21	4073.5	1.57	1.21	1.07	1.12	1.20
4200.0	6.52	6.27	6.38	6.58	0.31	28.74	18.49	30.86	4200.0	1.67	1.26	1.09	1.14	1.25

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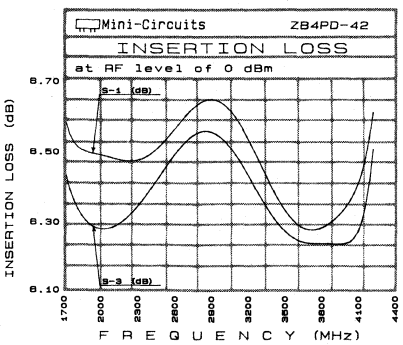
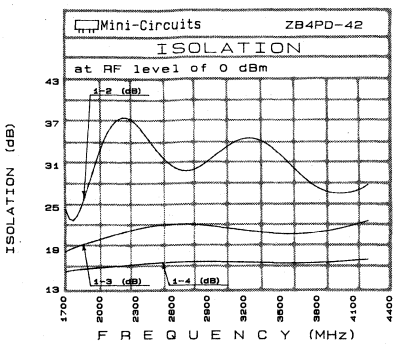
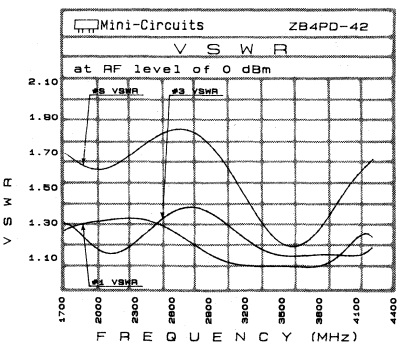
Mini-Circuits

ZB4PD-42

1.7 to 4.2GHz



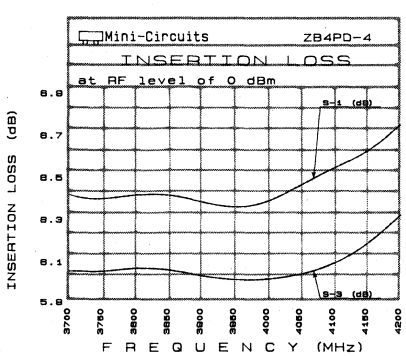


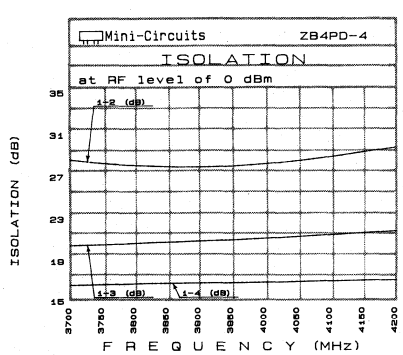


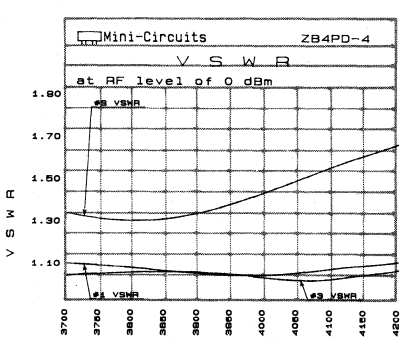
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1700.0	6.57	6.39	6.43	6.62	0.23	22.52	35.47	22.22	1700.0	1.69	1.26	1.27	1.30	1.22
1850.0	6.53	6.30	6.34	6.55	0.25	26.61	36.73	26.15	1850.0	1.61	1.29	1.19	1.22	1.24
2000.0	6.48	6.24	6.28	6.50	0.26	32.60	28.24	32.06	2000.0	1.61	1.32	1.12	1.14	1.26
2212.5	6.50	6.32	6.34	6.53	0.21	39.41	23.64	42.62	2212.5	1.66	1.32	1.17	1.15	1.27
2500.0	6.59	6.44	6.50	6.62	0.18	31.84	21.70	32.74	2500.0	1.80	1.28	1.35	1.32	1.23
2656.3	6.61	6.44	6.52	6.69	0.25	30.86	21.64	31.57	2656.3	1.83	1.23	1.40	1.38	1.19
2950.0	6.63	6.40	6.53	6.75	0.35	32.16	23.20	32.98	2950.0	1.68	1.10	1.34	1.33	1.11
3100.0	6.64	6.37	6.53	6.77	0.40	33.99	24.71	35.28	3100.0	1.54	1.06	1.25	1.26	1.11
3318.8	6.37	6.11	6.30	6.48	0.37	35.02	26.05	37.78	3318.8	1.31	1.06	1.13	1.15	1.13
3500.0	6.35	6.11	6.29	6.46	0.35	32.24	24.70	34.77	3500.0	1.17	1.06	1.10	1.11	1.12
3687.5	6.29	6.07	6.24	6.40	0.33	29.02	22.11	30.97	3687.5	1.20	1.04	1.12	1.12	1.08
3906.3	6.28	6.07	6.24	6.38	0.31	27.06	19.86	28.64	3906.3	1.40	1.11	1.09	1.12	1.09
4000.0	6.37	6.06	6.22	6.46	0.40	27.07	19.19	28.66	4000.0	1.50	1.16	1.07	1.11	1.13
4125.0	6.46	6.18	6.35	6.54	0.36	27.51	18.62	29.31	4125.0	1.61	1.23	1.08	1.13	1.19
4200.0	6.58	6.30	6.44	6.62	0.32	28.13	18.42	30.10	4200.0	1.66	1.26	1.10	1.15	1.21

ZB4PD-4

3.7 to 4.2GHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
3700.0	6.41	6.16	6.06	6.43	0.37	28.68	22.06	28.90	3700.0	1.34	1.10	1.07	1.04	1.11
3740.0	6.39	6.16	6.05	6.42	0.37	28.40	21.57	28.54	3740.0	1.32	1.09	1.07	1.05	1.11
3778.8	6.41	6.17	6.07	6.45	0.38	28.18	21.13	28.28	3778.8	1.30	1.08	1.07	1.06	1.10
3818.8	6.42	6.17	6.07	6.47	0.40	28.07	20.72	28.12	3818.8	1.30	1.07	1.07	1.06	1.09
3857.5	6.41	6.17	6.06	6.47	0.41	27.97	20.30	27.95	3857.5	1.31	1.06	1.07	1.06	1.09
3883.8	6.40	6.17	6.06	6.46	0.40	27.95	20.05	27.90	3883.8	1.33	1.05	1.06	1.06	1.08
3910.0	6.39	6.16	6.04	6.44	0.40	27.95	19.80	27.88	3910.0	1.35	1.05	1.06	1.06	1.08
3950.0	6.36	6.13	6.01	6.41	0.40	28.02	19.44	27.93	3950.0	1.38	1.05	1.06	1.05	1.09
3990.0	6.38	6.13	6.02	6.43	0.41	28.19	19.16	28.05	3990.0	1.42	1.04	1.05	1.04	1.09
4016.3	6.41	6.15	6.03	6.45	0.42	28.31	18.96	28.18	4016.3	1.45	1.05	1.06	1.03	1.10
4055.0	6.48	6.17	6.05	6.51	0.46	28.55	18.72	28.42	4055.0	1.50	1.06	1.07	1.02	1.11
4095.0	6.53	6.22	6.09	6.54	0.45	28.85	18.49	28.74	4095.0	1.55	1.07	1.09	1.02	1.12
4121.3	6.59	6.27	6.13	6.58	0.46	29.08	18.36	28.97	4121.3	1.58	1.08	1.10	1.03	1.13
4160.0	6.65	6.35	6.21	6.64	0.44	29.42	18.17	29.37	4160.0	1.62	1.09	1.12	1.05	1.14
4200.0	6.75	6.46	6.32	6.71	0.43	29.76	18.00	29.78	4200.0	1.66	1.11	1.14	1.07	1.15

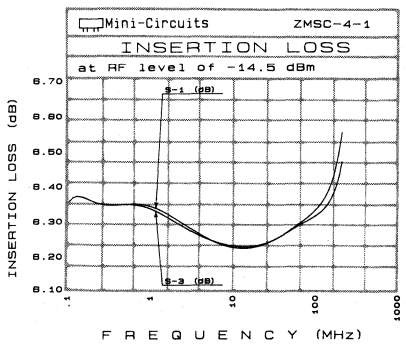
4WAY-0°

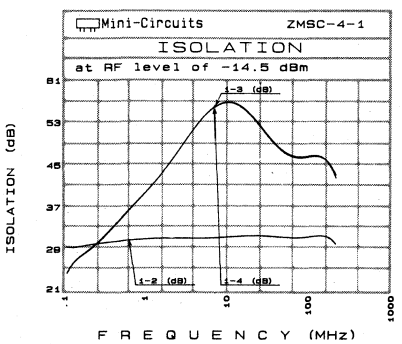
Power Splitter/Combiners

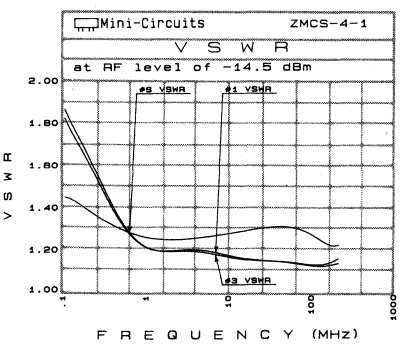
ZMSC-4-1, ZSC-4-1

50 ohms

0.1 to 200MHz





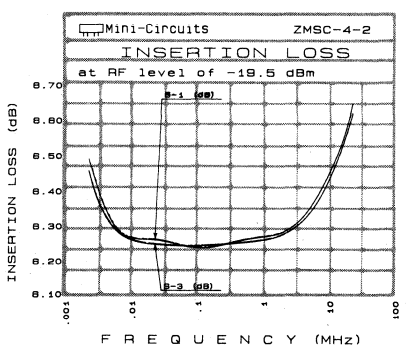


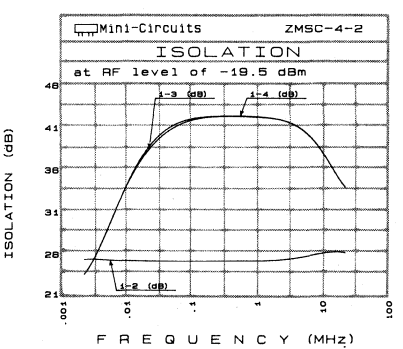
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.1	6.41	6.41	6.50	6.49	0.09	26.03	24.94	26.98	0.1	1.42	1.93	1.93	1.94	1.94
0.6	6.42	6.41	6.44	6.44	0.03	28.44	36.22	28.36	0.6	1.25	1.28	1.27	1.28	1.28
2.1	6.37	6.36	6.37	6.35	0.02	29.26	47.39	29.16	2.1	1.26	1.20	1.19	1.19	1.19
10.1	6.29	6.28	6.29	6.27	0.02	29.44	51.61	29.29	10.1	1.25	1.18	1.20	1.20	1.21
20.1	6.28	6.29	6.29	6.29	0.01	29.71	50.48	29.46	20.1	1.25	1.16	1.17	1.17	1.17
40.1	6.30	6.32	6.32	6.32	0.02	30.15	47.95	29.61	40.1	1.24	1.15	1.15	1.15	1.14
50.1	6.32	6.33	6.33	6.35	0.03	30.37	46.96	29.71	50.1	1.23	1.15	1.14	1.14	1.14
73.6	6.36	6.37	6.38	6.38	0.02	30.89	45.24	29.77	73.6	1.21	1.14	1.13	1.13	1.13
100.1	6.41	6.42	6.43	6.43	0.02	31.74	44.30	29.98	100.1	1.18	1.12	1.12	1.11	1.11
113.5	6.46	6.45	6.48	6.49	0.04	32.24	44.25	30.15	113.5	1.16	1.13	1.12	1.11	1.11
133.5	6.50	6.50	6.53	6.54	0.04	32.92	45.06	30.49	133.5	1.14	1.12	1.11	1.10	1.10
153.5	6.55	6.55	6.59	6.61	0.06	33.18	46.99	30.86	153.5	1.13	1.13	1.12	1.10	1.10
173.5	6.64	6.63	6.68	6.72	0.09	32.63	51.02	31.03	173.5	1.16	1.14	1.13	1.11	1.10
193.5	6.76	6.76	6.82	6.84	0.08	31.16	56.89	30.78	193.5	1.21	1.15	1.14	1.11	1.11
200.0	6.80	6.79	6.86	6.89	0.10	30.55	53.40	30.56	200.0	1.23	1.16	1.15	1.12	1.12

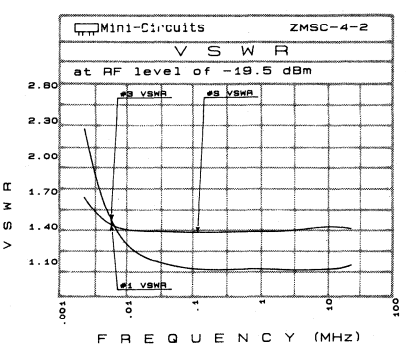
ZMSC-4-2, ZSC-4-2

50 ohms

0.002 to 20MHz



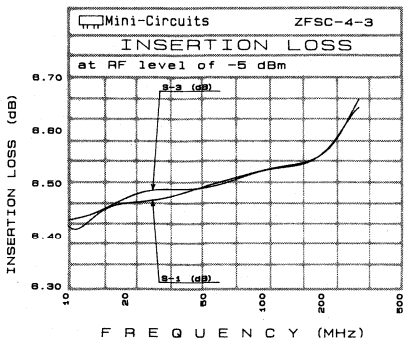


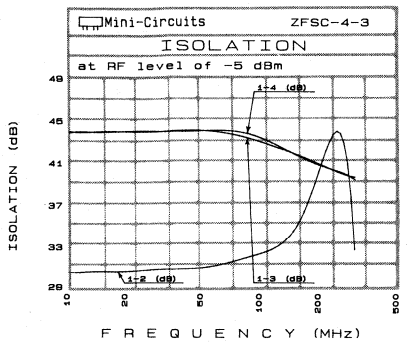


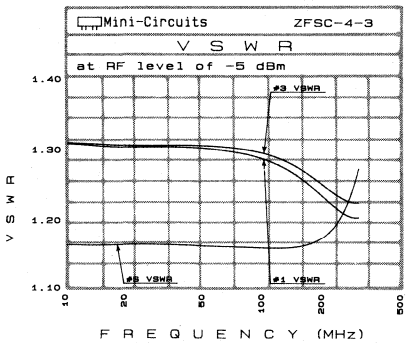
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.002	6.49	6.50	6.45	6.46	0.05	25.49	23.63	26.33	0.002	1.64	2.21	2.22	2.28	2.28
0.003	6.39	6.39	6.36	6.36	0.03	25.48	25.68	27.35	0.003	1.51	1.82	1.82	1.87	1.87
0.01	6.26	6.26	6.26	6.26	0.00	25.27	34.92	29.42	0.01	1.36	1.20	1.20	1.22	1.22
0.02	6.27	6.25	6.25	6.25	0.02	25.27	38.71	29.63	0.02	1.35	1.11	1.10	1.13	1.13
0.1	6.24	6.25	6.25	6.24	0.01	25.23	41.91	29.65	0.1	1.34	1.03	1.03	1.07	1.07
0.2	6.25	6.25	6.25	6.25	0.00	25.27	42.21	29.73	0.2	1.34	1.02	1.02	1.07	1.07
1.0	6.27	6.27	6.27	6.26	0.01	25.33	42.11	29.79	1.0	1.34	1.02	1.02	1.07	1.07
2.0	6.29	6.29	6.28	6.28	0.01	25.39	42.02	29.96	2.0	1.35	1.02	1.01	1.06	1.06
5.0	6.37	6.37	6.35	6.36	0.02	25.65	40.42	30.63	5.0	1.37	1.01	1.01	1.06	1.06
7.5	6.43	6.42	6.41	6.41	0.02	26.10	39.17	30.90	7.5	1.37	1.01	1.01	1.06	1.06
10.0	6.48	6.47	6.45	6.45	0.03	26.24	37.57	31.04	10.0	1.38	1.02	1.02	1.05	1.05
12.6	6.52	6.52	6.52	6.50	0.02	26.36	36.26	31.11	12.6	1.38	1.02	1.02	1.06	1.06
15.6	6.57	6.56	6.55	6.56	0.02	26.36	35.16	31.11	15.6	1.37	1.03	1.03	1.06	1.06
18.4	6.62	6.62	6.60	6.59	0.03	26.26	34.30	31.06	18.4	1.36	1.04	1.04	1.06	1.06
20.0	6.65	6.64	6.62	6.62	0.03	26.21	33.84	31.00	20.0	1.35	1.04	1.04	1.07	1.07

Mini-Circuits™ P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

ZMSC-4-3, ZSC-4-3 — 50 ohms — 0.25 to 250MHz

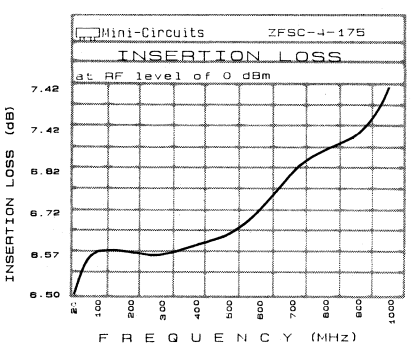


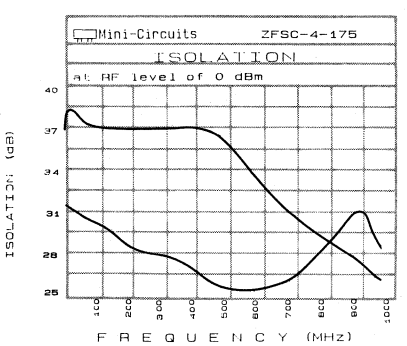


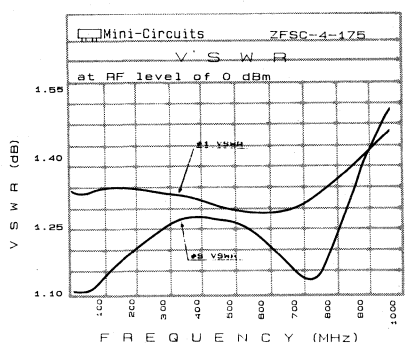


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.25	6.35	6.38	6.38	6.38	0.03	25.15	50.85	26.87	0.25	1.23	1.38	1.38	1.35	1.35
0.5	6.33	6.36	6.36	6.36	0.03	27.67	50.90	29.42	0.5	1.13	1.22	1.22	1.21	1.20
1.0	6.34	6.35	6.36	6.36	0.02	29.04	50.78	30.51	1.0	1.09	1.17	1.17	1.16	1.16
5.0	6.25	6.24	6.25	6.25	0.01	31.59	50.05	31.90	5.0	1.05	1.09	1.09	1.08	1.08
10.0	6.25	6.25	6.24	6.24	0.01	31.74	48.80	31.71	10.0	1.05	1.07	1.07	1.07	1.07
20.0	6.28	6.27	6.28	6.27	0.01	31.11	45.32	30.91	20.0	1.06	1.07	1.07	1.07	1.07
33.6	6.28	6.27	6.27	6.28	0.01	29.98	42.15	29.70	33.6	1.09	1.07	1.08	1.08	1.07
50.0	6.32	6.33	6.32	6.33	0.01	28.72	39.38	28.38	50.0	1.12	1.07	1.08	1.08	1.08
75.2	6.38	6.39	6.39	6.39	0.01	27.10	36.59	26.71	75.2	1.15	1.07	1.09	1.10	1.08
100.0	6.43	6.45	6.43	6.45	0.02	26.05	34.88	25.63	100.0	1.17	1.07	1.10	1.11	1.08
150.1	6.47	6.49	6.50	6.48	0.03	25.56	33.18	25.13	150.1	1.17	1.05	1.09	1.10	1.07
175.1	6.50	6.53	6.52	6.51	0.03	26.21	33.08	25.85	175.1	1.13	1.04	1.08	1.09	1.05
200.0	6.50	6.54	6.54	6.51	0.04	27.54	33.57	27.46	200.0	1.10	1.05	1.08	1.09	1.05
225.0	6.53	6.57	6.56	6.54	0.04	29.03	34.68	30.13	225.0	1.13	1.10	1.11	1.12	1.09
250.0	6.64	6.70	6.67	6.64	0.06	28.42	36.51	31.57	250.0	1.24	1.17	1.18	1.18	1.15

ZFSC-4-175 — 75 ohms — 10 to 1000MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.52	6.53	6.51	6.52	0.02	31.36	37.03	31.72	10.0	1.11	1.34	1.34	1.34	1.34
19.9	6.55	6.55	6.55	6.54	0.01	31.20	38.46	31.67	19.9	1.10	1.33	1.33	1.33	1.33
39.7	6.56	6.58	6.57	6.58	0.02	31.15	38.52	31.36	39.7	1.10	1.33	1.33	1.34	1.34
69.4	6.58	6.60	6.60	6.60	0.02	30.89	37.72	31.15	69.4	1.11	1.34	1.34	1.34	1.34
99.1	6.60	6.61	6.62	6.62	0.02	30.76	37.30	31.05	99.1	1.13	1.35	1.34	1.35	1.35
156.0	6.60	6.61	6.61	6.62	0.02	29.93	37.28	30.24	156.0	1.16	1.34	1.34	1.35	1.35
272.4	6.58	6.59	6.61	6.60	0.03	28.13	37.29	28.49	272.4	1.24	1.33	1.32	1.34	1.34
329.3	6.59	6.60	6.62	6.62	0.03	27.25	37.16	27.57	329.3	1.26	1.32	1.30	1.34	1.34
418.4	6.61	6.61	6.64	6.64	0.03	26.15	37.46	26.24	418.4	1.28	1.31	1.28	1.33	1.33
500.1	6.66	6.68	6.71	6.69	0.05	25.39	36.55	25.27	500.1	1.27	1.29	1.26	1.32	1.33
591.6	6.72	6.75	6.78	6.77	0.06	25.10	33.73	24.50	591.6	1.21	1.28	1.25	1.31	1.32
708.0	6.85	6.91	6.93	6.91	0.08	25.75	30.92	24.49	708.0	1.14	1.29	1.27	1.31	1.33
913.4	7.12	7.28	7.26	7.20	0.16	30.58	26.87	26.90	913.4	1.39	1.41	1.42	1.40	1.44
970.3	7.31	7.51	7.45	7.39	0.20	30.24	26.24	26.46	970.3	1.49	1.45	1.46	1.43	1.47
1000.0	7.44	7.65	7.60	7.51	0.21	28.68	25.91	25.52	1000.0	1.55	1.47	1.48	1.45	1.49

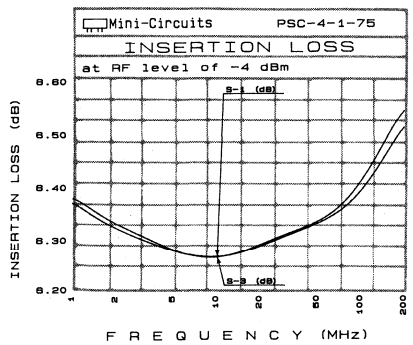
4WAY-0°

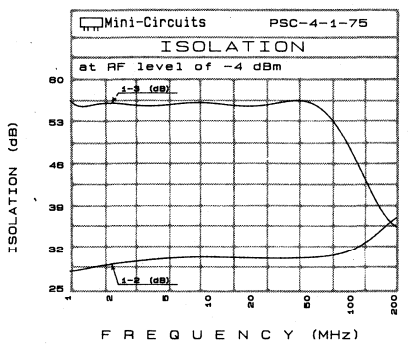
Power Splitter/Combiners

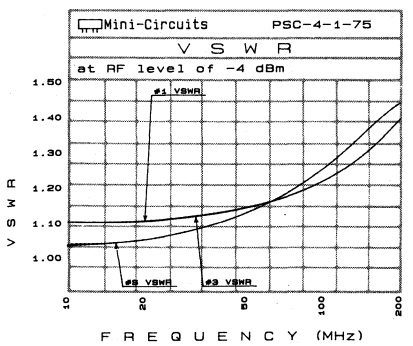
75 ohms

PSC-4-1-75, ZSC-4-1-75

1 to 200MHz



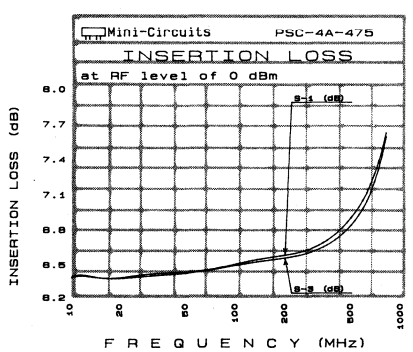


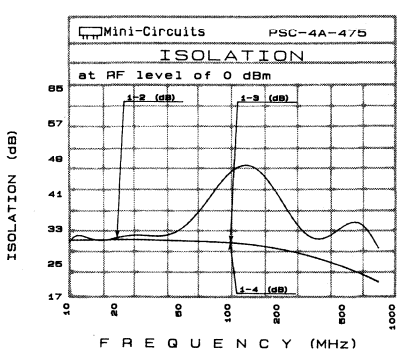


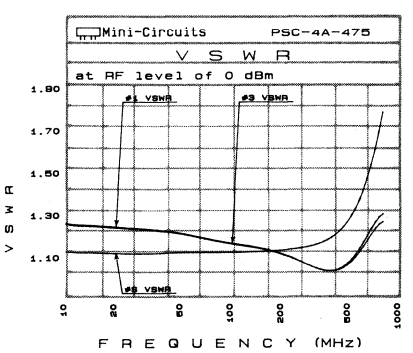
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1.0	6.37	6.38	6.38	6.38	0.01	28.31	56.00	27.46	10.0	1.04	1.10	1.10	1.10	1.10
10.0	6.28	6.27	6.26	6.29	0.03	30.67	56.00	30.62	20.0	1.05	1.11	1.11	1.11	1.11
20.0	6.30	6.31	6.30	6.30	0.01	30.56	56.00	30.63	31.7	1.08	1.12	1.12	1.12	1.12
31.2	6.32	6.31	6.33	6.31	0.02	30.49	56.00	30.58	42.6	1.11	1.14	1.14	1.13	1.13
43.2	6.32	6.33	6.32	6.33	0.01	30.55	56.00	30.66	53.4	1.14	1.15	1.15	1.15	1.15
55.3	6.33	6.33	6.33	6.34	0.01	30.74	56.00	30.81	64.3	1.17	1.16	1.16	1.16	1.16
73.4	6.35	6.36	6.36	6.37	0.02	31.11	56.00	31.12	75.1	1.19	1.18	1.18	1.18	1.18
85.4	6.37	6.38	6.39	6.40	0.03	31.46	51.05	31.42	86.0	1.22	1.20	1.20	1.20	1.20
100.0	6.39	6.39	6.43	6.44	0.05	32.02	47.52	31.89	100.0	1.26	1.22	1.22	1.22	1.22
115.6	6.43	6.43	6.44	6.44	0.01	32.75	45.06	32.51	118.6	1.30	1.25	1.25	1.25	1.25
139.7	6.46	6.47	6.49	6.52	0.06	34.05	41.73	33.61	140.3	1.34	1.29	1.29	1.29	1.29
151.8	6.48	6.46	6.50	6.50	0.04	34.88	39.99	34.20	151.1	1.37	1.31	1.31	1.31	1.31
169.9	6.49	6.49	6.52	6.53	0.04	36.01	38.14	35.15	167.4	1.40	1.34	1.34	1.34	1.34
187.9	6.50	6.50	6.51	6.52	0.02	36.81	36.33	35.82	189.1	1.43	1.38	1.38	1.38	1.38
200.0	6.53	6.52	6.55	6.56	0.04	36.97	35.26	36.05	200.0	1.44	1.39	1.39	1.39	1.40

PSC-4A-475

10 to 800MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.0	6.41	6.40	6.40	6.39	0.02	31.09	30.48	30.75	10.0	1.13	1.26	1.26	1.26	1.26
20.0	6.38	6.39	6.38	6.37	0.02	30.90	30.68	30.54	20.0	1.12	1.24	1.24	1.25	1.25
50.0	6.44	6.46	6.45	6.44	0.02	33.83	30.46	33.99	50.0	1.12	1.21	1.21	1.21	1.21
79.7	6.47	6.48	6.46	6.47	0.02	39.72	30.20	41.18	79.7	1.13	1.18	1.18	1.18	1.18
100.0	6.50	6.51	6.49	6.49	0.02	45.19	30.02	54.00	100.0	1.13	1.17	1.16	1.17	1.17
149.4	6.54	6.53	6.53	6.52	0.02	45.58	29.40	43.11	149.4	1.13	1.14	1.14	1.14	1.14
200.0	6.58	6.56	6.56	6.55	0.03	38.21	28.68	35.87	200.0	1.13	1.11	1.11	1.12	1.12
265.6	6.64	6.62	6.60	6.61	0.04	34.43	27.72	32.12	265.6	1.15	1.08	1.08	1.08	1.09
312.1	6.68	6.65	6.65	6.65	0.03	33.11	27.04	30.59	312.1	1.16	1.06	1.05	1.06	1.06
405.0	6.78	6.74	6.72	6.72	0.06	31.88	25.73	28.87	405.0	1.20	1.02	1.04	1.02	1.02
500.0	6.89	6.83	6.83	6.81	0.08	32.39	24.50	28.39	500.0	1.28	1.08	1.10	1.09	1.07
590.9	7.07	7.01	7.00	6.99	0.08	34.59	23.39	29.28	590.9	1.39	1.14	1.17	1.16	1.14
707.1	7.34	7.26	7.24	7.21	0.13	33.56	22.10	33.22	707.1	1.59	1.22	1.25	1.25	1.23
753.5	7.49	7.39	7.40	7.35	0.14	30.08	21.65	34.48	753.5	1.68	1.25	1.29	1.29	1.27
800.0	7.58	7.59	7.60	7.56	0.04	26.74	21.17	32.34	800.0	1.78	1.29	1.33	1.32	1.31

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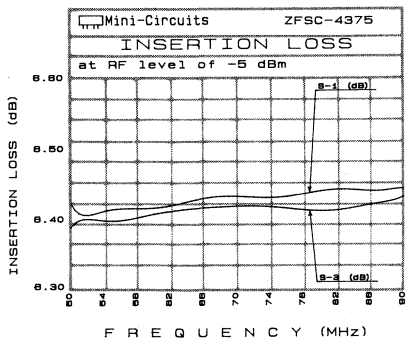
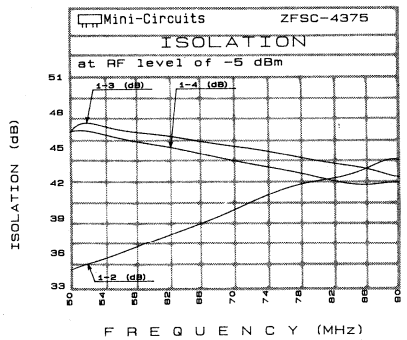
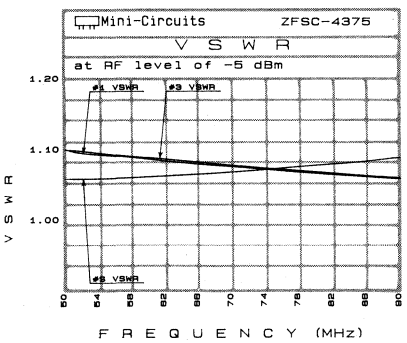
ZFSC-4375

50 to 90MHz



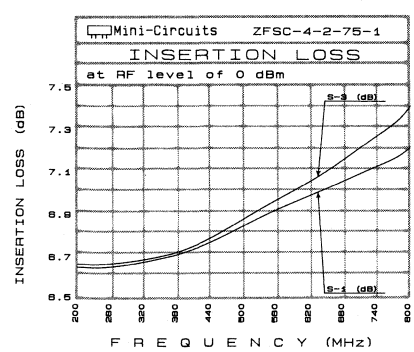


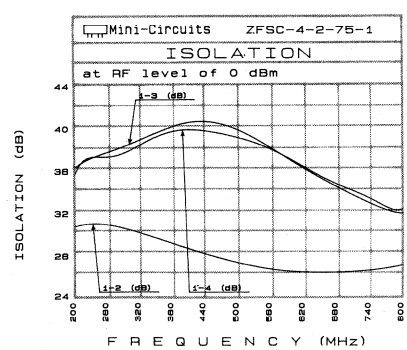


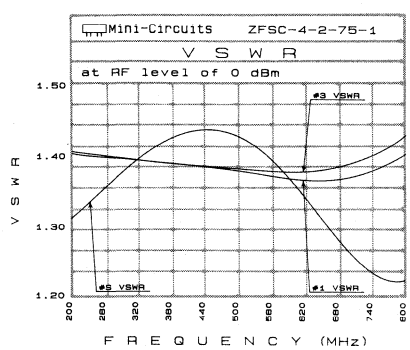
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
50.0	6.41	6.41	6.39	6.41	0.02	34.64	46.97	34.51	50.0	1.06	1.10	1.09	1.10	1.10
52.1	6.40	6.40	6.40	6.41	0.01	35.03	48.14	34.83	52.1	1.06	1.09	1.09	1.10	1.10
55.1	6.43	6.40	6.41	6.41	0.03	35.77	47.64	35.48	55.1	1.06	1.09	1.09	1.09	1.09
57.2	6.40	6.40	6.40	6.42	0.02	36.25	47.48	35.92	57.2	1.06	1.09	1.09	1.09	1.09
60.3	6.42	6.42	6.41	6.41	0.01	37.03	47.11	36.61	60.3	1.06	1.08	1.08	1.09	1.09
63.3	6.42	6.40	6.42	6.42	0.02	37.79	46.87	37.34	63.3	1.06	1.08	1.08	1.08	1.09
65.4	6.41	6.41	6.42	6.42	0.01	38.31	46.72	37.82	65.4	1.06	1.08	1.08	1.08	1.08
70.5	6.43	6.41	6.41	6.41	0.02	39.71	46.17	39.06	70.5	1.07	1.07	1.07	1.08	1.08
72.6	6.43	6.41	6.41	6.41	0.02	40.34	45.84	39.59	72.6	1.07	1.07	1.07	1.07	1.08
75.6	6.42	6.42	6.40	6.42	0.02	41.25	45.51	40.40	75.6	1.07	1.07	1.07	1.07	1.07
77.7	6.44	6.42	6.42	6.42	0.02	41.87	45.34	40.93	77.7	1.08	1.07	1.07	1.07	1.07
80.8	6.44	6.41	6.41	6.41	0.03	41.86	44.91	41.74	80.8	1.08	1.07	1.06	1.07	1.07
85.9	6.46	6.44	6.41	6.44	0.05	43.08	44.29	42.02	85.9	1.08	1.06	1.06	1.06	1.06
87.9	6.43	6.41	6.41	6.41	0.02	43.52	43.85	42.34	87.9	1.08	1.06	1.06	1.06	1.06
90.0	6.45	6.43	6.43	6.43	0.02	43.97	43.63	42.66	90.0	1.09	1.06	1.05	1.06	1.06

ZFSC-4-2-75-1

200 to 800MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
200.0	6.65	6.64	6.67	6.66	0.03	30.74	36.90	36.14	200.0	1.31	1.40	1.39	1.41	1.40
216.5	6.65	6.63	6.66	6.65	0.03	31.03	37.21	36.50	216.5	1.32	1.40	1.39	1.41	1.40
249.5	6.66	6.64	6.67	6.67	0.03	30.99	37.93	36.83	249.5	1.35	1.40	1.38	1.40	1.39
300.5	6.66	6.64	6.68	6.68	0.04	30.51	39.02	36.75	300.5	1.38	1.40	1.37	1.40	1.38
350.0	6.70	6.67	6.71	6.72	0.05	29.75	40.33	36.32	350.0	1.41	1.39	1.36	1.39	1.38
399.5	6.72	6.68	6.74	6.74	0.06	28.86	40.42	35.72	399.5	1.43	1.39	1.34	1.39	1.37
450.5	6.78	6.73	6.80	6.81	0.08	28.10	39.31	35.17	450.5	1.44	1.39	1.33	1.39	1.37
500.0	6.85	6.80	6.88	6.89	0.09	27.41	39.85	34.66	500.0	1.43	1.38	1.32	1.38	1.36
549.5	6.92	6.86	6.97	6.98	0.12	26.84	37.98	34.47	549.5	1.40	1.37	1.31	1.38	1.36
600.5	6.97	6.90	7.03	7.05	0.15	26.56	35.91	34.67	600.5	1.36	1.37	1.30	1.38	1.36
650.5	7.03	6.96	7.11	7.13	0.17	26.42	34.48	35.07	650.0	1.31	1.37	1.29	1.38	1.36
699.5	7.09	7.02	7.20	7.23	0.21	26.56	33.17	35.44	699.5	1.27	1.37	1.30	1.39	1.38
750.5	7.14	7.07	7.29	7.31	0.24	26.73	32.19	35.77	750.5	1.23	1.38	1.32	1.41	1.40
783.5	7.19	7.11	7.36	7.38	0.27	26.99	31.68	35.57	783.5	1.22	1.40	1.33	1.42	1.41
800.0	7.21	7.14	7.41	7.42	0.28	27.14	31.35	35.29	800.0	1.23	1.40	1.34	1.43	1.42

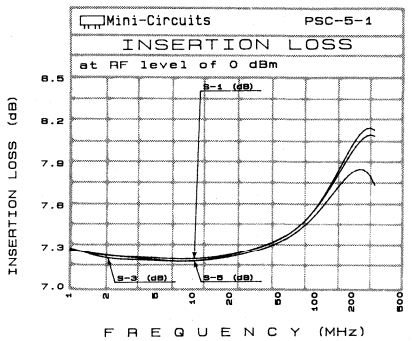
5WAY-0°

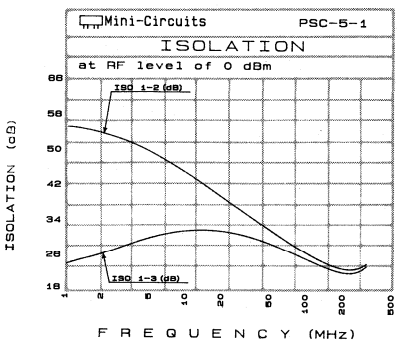
Power Splitter/Combiners

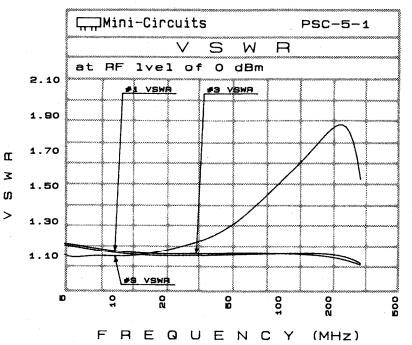
PSC-5-1, ZFSC-5-1

50 ohms

1 to 300MHz





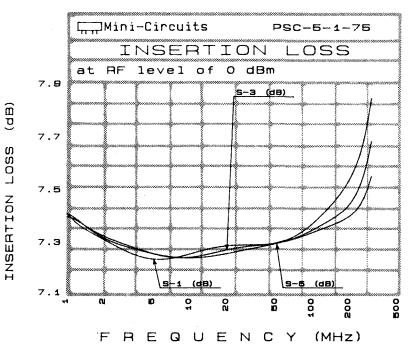


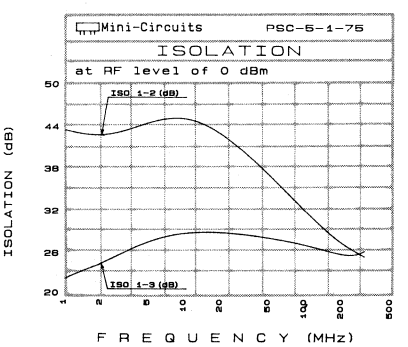
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-5	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-3	(dB) 2-3	(dB) 3-5	(dB) 4-5	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	7.29	7.30	7.30	7.30	7.29	0.01	55.23	24.07	42.62	23.72	39.80	5.0	1.10	1.17
10.0	7.19	7.19	7.18	7.19	7.18	0.01	44.51	31.68	41.44	31.41	40.99	10.0	1.10	1.12
20.0	7.20	7.20	7.20	7.20	7.16	0.04	39.03	31.44	37.27	31.12	37.15	20.0	1.13	1.10
38.4	7.23	7.23	7.23	7.23	7.21	0.02	33.66	29.65	32.51	29.16	32.45	39.7	1.23	1.11
50.0	7.30	7.30	7.30	7.30	7.27	0.03	31.52	28.54	30.46	27.95	30.41	50.0	1.28	1.11
66.4	7.37	7.38	7.37	7.36	7.34	0.04	29.33	27.15	28.37	26.51	28.30	83.1	1.45	1.12
85.1	7.46	7.49	7.46	7.46	7.41	0.08	27.52	25.86	26.55	25.16	26.48	100.0	1.53	1.12
100.0	7.53	7.56	7.55	7.53	7.48	0.08	26.35	24.99	25.39	24.25	25.34	135.2	1.66	1.12
122.5	7.66	7.69	7.66	7.65	7.58	0.11	25.05	23.92	24.11	23.14	24.03	152.5	1.71	1.12
150.5	7.80	7.88	7.84	7.80	7.72	0.16	23.91	22.97	22.98	22.15	22.89	169.9	1.76	1.12
178.5	7.92	8.01	7.97	7.91	7.80	0.21	23.22	22.35	22.25	21.49	22.16	200.0	1.83	1.11
200.0	8.02	8.12	8.06	7.99	7.86	0.26	22.92	22.09	21.95	21.22	21.82	230.6	1.85	1.11
243.9	8.07	8.21	8.13	8.05	7.85	0.36	22.94	22.13	21.83	21.19	21.72	265.3	1.78	1.09
281.3	8.08	8.27	8.15	8.04	7.78	0.49	23.59	22.91	22.24	21.83	22.06	282.7	1.67	1.08
300.0	8.09	8.31	8.18	8.05	7.78	0.53	24.07	23.65	22.47	22.41	22.25	300.0	1.56	1.07

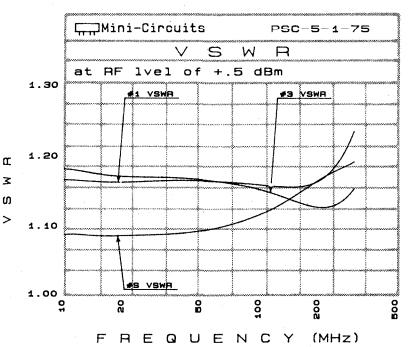
PSC-5-1-75

75 ohms

1 to 300MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-5	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-3	(dB) 2-3	(dB) 3-5	(dB) 4-5	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	7.40	7.42	7.40	7.41	7.41	0.02	43.47	22.47	44.90	22.10	36.42	10.0	1.09	1.17
10.0	7.24	7.24	7.24	7.26	7.24	0.02	45.39	28.95	48.20	28.76	41.61	27.4	1.09	1.16
20.0	7.27	7.26	7.26	7.26	7.24	0.03	42.90	28.98	43.39	28.90	40.15	44.1	1.09	1.16
38.4	7.29	7.31	7.31	7.31	7.29	0.02	38.98	28.42	38.22	28.40	36.70	52.8	1.09	1.16
50.0	7.30	7.28	7.28	7.28	7.26	0.04	37.09	28.16	36.08	28.05	34.94	78.2	1.11	1.16
75.8	7.33	7.33	7.33	7.31	7.32	0.02	34.03	27.65	32.76	27.41	31.98	95.6	1.11	1.16
100.0	7.33	7.36	7.36	7.36	7.32	0.04	31.90	27.11	30.52	26.76	29.91	112.2	1.12	1.16
122.5	7.38	7.40	7.40	7.38	7.33	0.07	30.46	26.74	29.03	26.22	28.45	137.6	1.14	1.15
150.5	7.37	7.45	7.45	7.43	7.38	0.08	29.11	26.37	27.60	25.63	27.00	155.0	1.15	1.16
178.5	7.42	7.54	7.51	7.49	7.39	0.15	28.00	25.99	26.43	25.11	25.82	180.4	1.16	1.16
200.0	7.45	7.57	7.56	7.49	7.42	0.15	27.36	25.83	25.73	24.78	25.13	200.0	1.17	1.16
225.3	7.47	7.65	7.60	7.55	7.43	0.22	26.73	25.72	25.08	24.54	24.42	231.9	1.17	1.18
253.3	7.56	7.74	7.69	7.66	7.49	0.25	26.21	25.80	24.49	24.36	23.75	257.2	1.18	1.20
281.3	7.62	7.84	7.78	7.69	7.51	0.33	25.80	26.02	23.98	24.34	23.22	274.6	1.18	1.21
300.0	7.67	7.91	7.82	7.75	7.55	0.36	25.54	26.27	23.67	24.38	22.87	300.0	1.19	1.23

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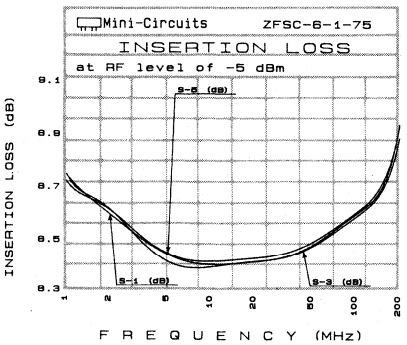
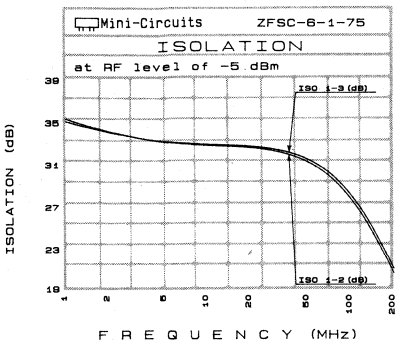
Mini-Circuits

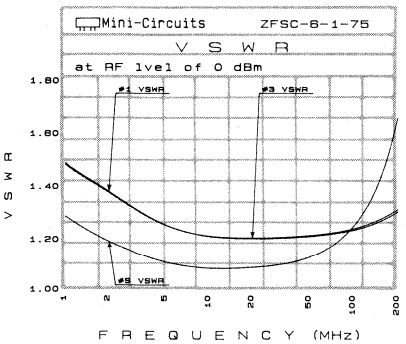
ZFSC-6-1-75

75 ohms

1 to 200MHz



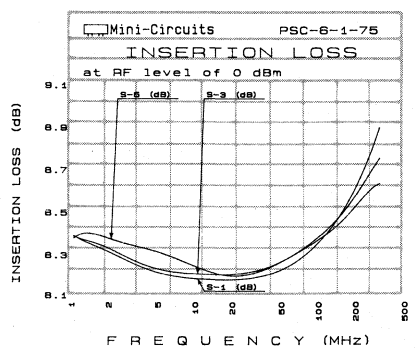


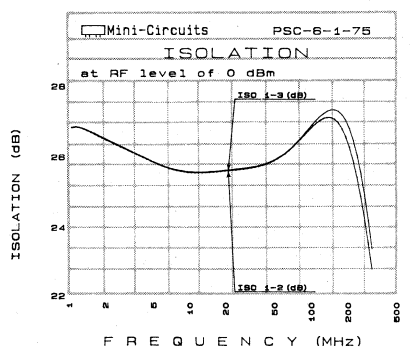


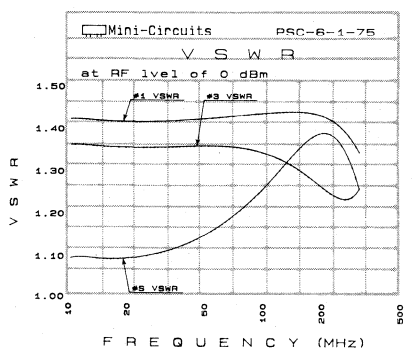
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
1.0	8.74	0.03	35.36	49.00	1.28	1.49
2.0	8.59	0.02	34.14	49.00	1.19	1.38
5.0	8.44	0.03	33.11	49.00	1.11	1.25
10.0	8.41	0.01	32.81	49.00	1.09	1.21
20.0	8.42	0.02	32.56	49.00	1.09	1.20
37.2	8.44	0.01	31.96	49.00	1.11	1.21
50.0	8.50	0.04	31.22	49.00	1.13	1.21
79.4	8.57	0.00	29.29	49.00	1.19	1.23
100.0	8.58	0.02	27.77	49.05	1.25	1.23
121.6	8.63	0.04	26.14	47.72	1.32	1.25
133.7	8.66	0.04	25.21	47.04	1.36	1.26
151.8	8.69	0.05	23.90	46.16	1.43	1.27
175.9	8.81	0.06	22.24	45.50	1.54	1.29
187.9	8.84	0.05	21.44	45.27	1.59	1.30
200.0	8.96	0.08	20.69	45.04	1.65	1.30

PSC-6-1-75

1 to 300MHz







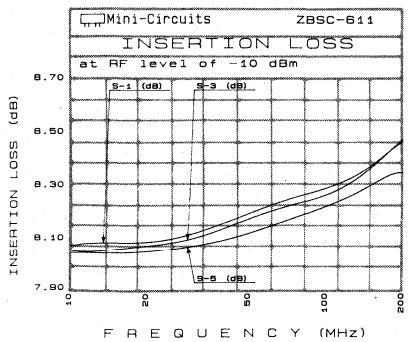
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
1.0	8.39	0.04	26.90	30.03	1.10	1.42
2.0	8.31	0.10	26.50	31.48	1.09	1.42
5.0	8.21	0.09	25.77	33.43	1.10	1.42
10.0	8.19	0.12	25.58	34.11	1.11	1.42
20.0	8.18	0.04	25.55	34.23	1.15	1.43
50.0	8.23	0.05	25.97	34.27	1.22	1.43
75.8	8.31	0.03	26.45	34.68	1.27	1.44
100.0	8.35	0.03	26.82	35.20	1.31	1.44
150.5	8.51	0.05	27.11	36.97	1.38	1.44
178.5	8.60	0.10	26.75	38.15	1.39	1.43
200.0	8.63	0.08	26.18	39.01	1.39	1.42
225.3	8.70	0.13	25.36	40.17	1.37	1.41
253.3	8.78	0.19	24.39	40.81	1.33	1.39
272.0	8.85	0.22	23.80	40.95	1.30	1.37
300.0	8.89	0.22	23.06	40.25	1.30	1.37

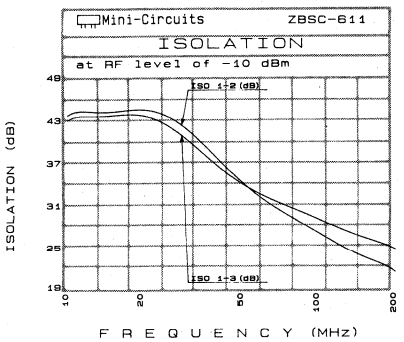
6WAY-0°

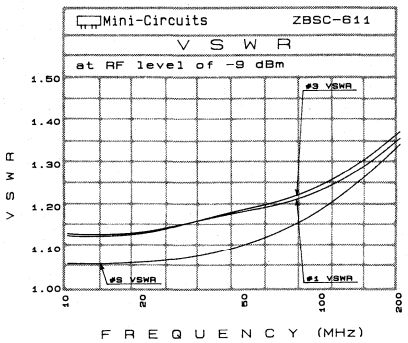
Power Splitter/Combiners 50 ohms

ZBSC-611

10 to 200MHz



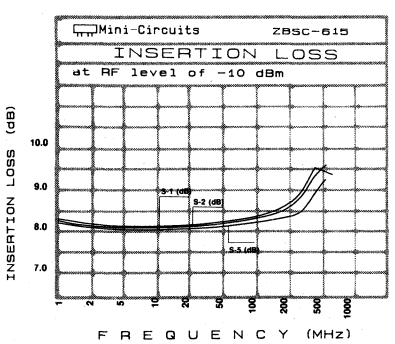


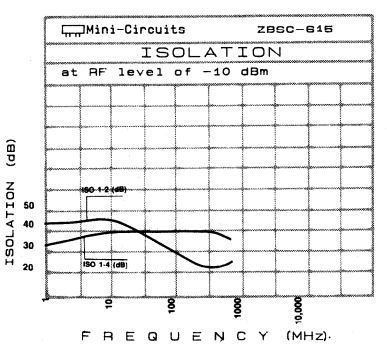


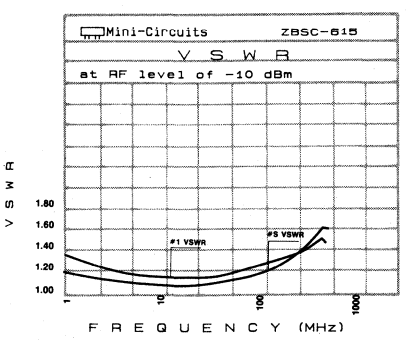
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
10.0	8.07	0.05	44.03	35.75	1.06	1.13
13.4	8.08	0.05	44.25	35.97	1.06	1.13
17.1	8.08	0.06	44.31	36.06	1.06	1.13
22.4	8.08	0.05	44.21	36.10	1.07	1.14
28.69	8.11	0.06	42.65	36.10	1.07	1.15
36.73	8.14	0.08	38.66	36.03	1.08	1.17
47.92	8.18	0.07	34.58	35.96	1.10	1.18
61.35	8.22	0.08	31.73	35.85	1.12	1.19
78.54	8.26	0.09	29.21	35.79	1.15	1.21
100.5	8.28	0.06	26.92	35.69	1.19	1.23
102.4	8.28	0.06	24.68	35.67	1.19	1.24
131.2	8.33	0.07	23.66	36.15	1.24	1.27
167.9	8.41	0.09	22.85	36.11	1.30	1.32
174.4	8.40	0.08	22.58	36.05	1.30	1.32
200.0	8.47	0.13	21.66	36.05	1.34	1.35

ZBSC-615

1 to 500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
1.0	8.26	0.07	40.22	30.14	1.18	1.24
2.2	8.18	0.06	41.83	32.43	1.08	1.17
4.9	8.09	0.05	43.18	34.47	1.06	1.13
10.0	8.07	0.05	44.03	35.75	1.07	1.14
22.4	8.08	0.05	44.21	36.10	1.10	1.18
47.92	8.18	0.07	34.58	35.96	1.19	1.23
100.0	8.28	0.06	26.92	35.69	1.30	1.32
167.9	8.41	0.09	22.85	36.11	1.34	1.35
199.2	8.47	0.13	21.66	36.05	1.43	1.44
280.5	8.80	0.37	19.83	35.72	1.54	1.49
359.1	9.22	0.67	18.86	35.50	1.60	1.50
402.5	9.45	0.84	18.71	35.33	1.65	1.50
468.6	9.64	0.85	18.85	34.59	1.16	1.12
477.6	9.63	0.84	18.93	34.46	1.64	1.50
500.0	9.52	0.37	20.25	33.08	1.64	1.50

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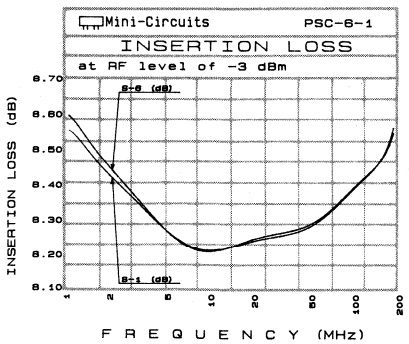
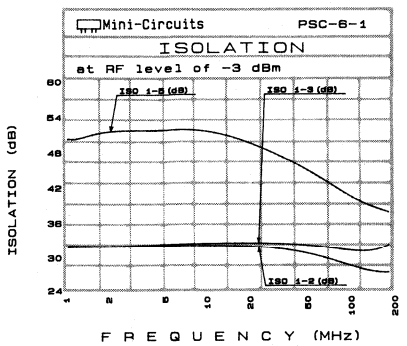
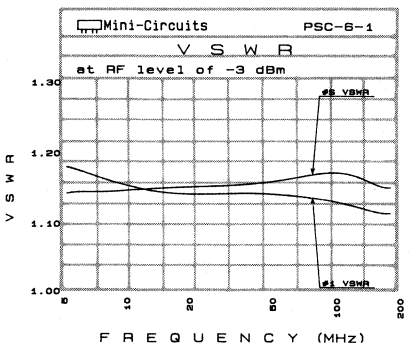
PSC-6-1, ZFSC-6-1

1 to 175MHz



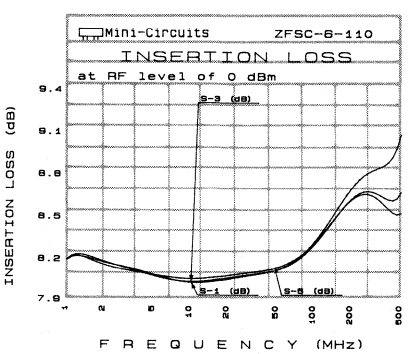


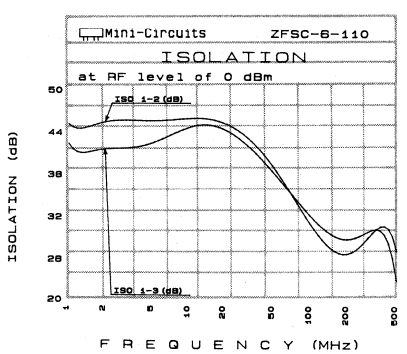


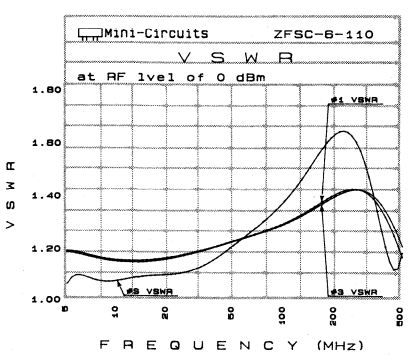
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
1.0	8.56	0.05	31.89	50.14	1.14	1.18
2.0	8.42	0.04	31.96	51.66	1.15	1.15
5.0	8.26	0.03	32.26	51.82	1.15	1.14
10.0	8.20	0.01	32.39	51.50	1.15	1.14
20.0	8.28	0.02	32.42	49.07	1.16	1.14
32.6	8.24	0.02	32.28	47.14	1.16	1.14
50.0	8.28	0.03	32.00	44.61	1.17	1.14
64.3	8.32	0.03	31.68	43.03	1.17	1.14
74.8	8.37	0.03	31.43	41.88	1.17	1.13
100.0	8.38	0.05	31.07	40.16	1.17	1.13
111.7	8.45	0.05	31.00	39.51	1.17	1.12
122.3	8.42	0.05	30.99	39.18	1.16	1.12
143.4	8.44	0.06	31.25	38.38	1.16	1.12
164.5	8.50	0.07	31.70	37.86	1.15	1.12
175.0	8.57	0.08	31.96	37.71	1.15	1.12

ZFSC-6-110

1 to 500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	VSWR S	VSWR OUTPUTS
1.0	8.22	0.01	44.56	29.35	1.09	1.19
2.0	8.19	0.06	45.29	32.10	1.09	1.19
5.0	8.08	0.02	45.99	35.37	1.09	1.19
10.0	8.04	0.04	45.73	37.50	1.08	1.15
20.0	8.06	0.02	45.13	38.38	1.10	1.16
50.0	8.13	0.04	38.35	42.11	1.21	1.22
79.0	8.22	0.04	33.08	49.00	1.31	1.26
100.0	8.33	0.02	30.94	53.19	1.39	1.29
125.8	8.38	0.06	29.30	50.27	1.46	1.31
200.0	8.63	0.09	26.99	42.12	1.62	1.38
250.5	8.70	0.13	26.89	39.63	1.62	1.40
375.3	8.61	0.29	32.00	36.25	1.31	1.34
422.0	8.57	0.39	32.64	35.57	1.10	1.27
468.8	8.64	0.48	27.82	35.22	1.13	1.22
500.0	8.76	0.54	24.76	35.16	1.25	1.19

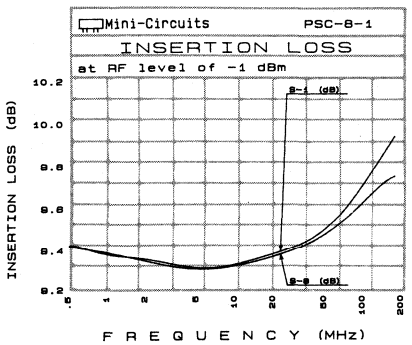
8WAY-0°

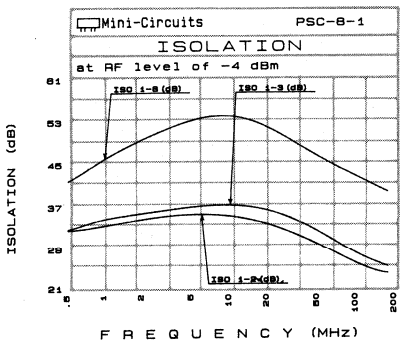
Power Splitter/Combiners

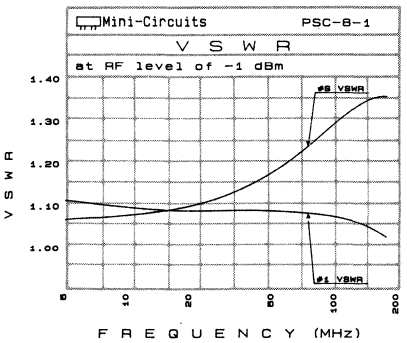
50 ohms

PSC-8-1, ZFSC-8-1

0.5 to 175MHz



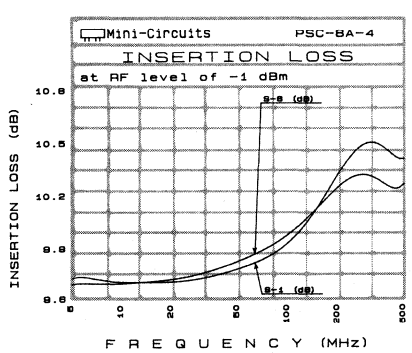


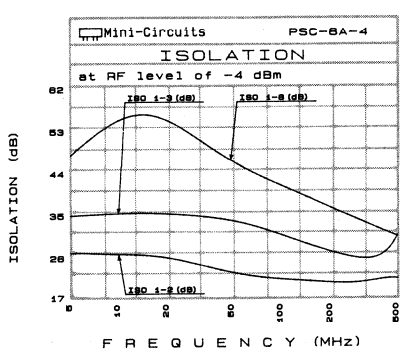


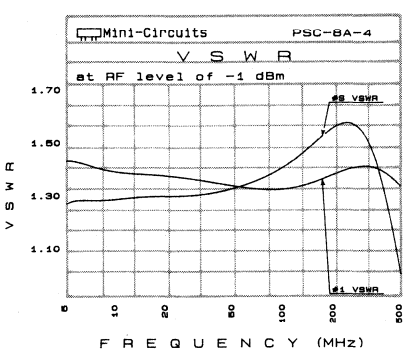
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
0.5	9.43	9.43	9.43	9.44	9.43	9.42	0.02	32.59	41.92	31.98	34.17	5.0	1.07	1.11	1.12
5.0	9.31	9.31	9.31	9.30	9.30	9.30	0.04	35.65	53.40	36.09	37.48	10.0	1.08	1.10	1.10
10.0	9.31	9.33	9.33	9.31	9.33	9.32	0.03	35.33	54.32	35.66	37.74	20.0	1.10	1.09	1.09
20.0	9.39	9.39	9.37	9.37	9.37	9.37	0.02	33.68	51.96	33.73	36.97	34.1	1.14	1.09	1.09
33.2	9.41	9.43	9.43	9.41	9.41	9.41	0.02	31.80	49.30	31.55	35.44	43.9	1.17	1.09	1.09
44.1	9.48	9.48	9.47	9.45	9.47	9.45	0.03	30.49	47.16	30.08	34.05	53.6	1.19	1.09	1.09
55.0	9.53	9.52	9.50	9.50	9.52	9.51	0.03	29.33	46.02	28.83	32.86	68.1	1.23	1.09	1.08
71.4	9.61	9.58	9.56	9.56	9.54	9.56	0.07	27.97	44.68	27.37	31.36	87.6	1.28	1.08	1.08
87.8	9.66	9.63	9.63	9.62	9.61	9.59	0.08	26.81	43.39	26.13	30.11	100.0	1.30	1.08	1.07
100.0	9.72	9.67	9.66	9.62	9.62	9.61	0.11	26.15	42.80	25.45	29.35	111.9	1.32	1.07	1.06
115.0	9.88	9.86	9.83	9.80	9.79	9.79	0.12	25.55	42.00	24.72	28.62	131.3	1.34	1.06	1.05
131.4	9.80	9.75	9.72	9.69	9.67	9.68	0.15	24.96	41.23	24.06	27.98	145.9	1.35	1.05	1.04
147.7	9.84	9.79	9.73	9.70	9.69	9.70	0.17	24.58	40.57	23.60	27.45	155.6	1.36	1.04	1.03
164.1	9.91	9.83	9.77	9.72	9.72	9.74	0.22	24.33	40.07	23.26	27.07	165.3	1.36	1.04	1.03
175.0	9.95	9.86	9.81	9.74	9.76	9.77	0.22	24.21	39.77	23.10	26.90	175.0	1.36	1.03	1.02

PSC-8A-4

5 to 500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
5.0	9.74	9.76	9.75	9.76	9.73	9.70	0.14	27.23	48.22	25.51	36.07	5.0	1.28	1.44	1.40
10.0	9.71	9.72	9.72	9.72	9.70	9.70	0.12	26.95	56.00	25.95	36.34	10.0	1.29	1.39	1.37
20.0	9.71	9.73	9.73	9.72	9.72	9.72	0.13	26.25	56.00	25.68	35.99	20.0	1.30	1.37	1.36
34.1	9.74	9.78	9.77	9.77	9.77	9.77	0.13	24.27	50.04	23.94	35.22	35.0	1.31	1.35	1.34
50.0	9.78	9.84	9.84	9.84	9.83	9.83	0.16	22.89	46.50	22.64	34.02	50.0	1.32	1.33	1.32
77.8	9.84	9.90	9.90	9.90	9.89	9.89	0.16	21.87	43.16	21.75	31.99	80.0	1.37	1.32	1.31
100.0	9.93	10.01	9.98	10.01	9.99	9.97	0.17	21.43	41.39	21.38	30.60	100.0	1.41	1.33	1.31
150.6	10.15	10.18	10.17	10.16	10.16	10.13	0.13	20.99	38.49	21.12	28.20	155.0	1.50	1.35	1.32
200.0	10.32	10.32	10.31	10.30	10.27	10.25	0.13	20.83	36.74	21.16	26.74	200.0	1.55	1.38	1.34
252.5	10.45	10.41	10.41	10.39	10.33	10.32	0.13	20.68	35.10	21.26	25.64	245.0	1.57	1.40	1.34
310.7	10.55	10.48	10.47	10.45	10.37	10.36	0.20	20.85	33.60	21.75	25.10	305.0	1.53	1.41	1.33
354.4	10.47	10.40	10.37	10.36	10.23	10.26	0.25	21.12	32.75	22.29	25.05	350.0	1.45	1.40	1.32
398.1	10.45	10.42	10.37	10.37	10.22	10.27	0.23	21.40	31.92	22.94	25.25	395.0	1.33	1.39	1.29
456.3	10.42	10.41	10.34	10.34	10.17	10.25	0.25	21.69	31.10	24.09	26.29	455.0	1.14	1.36	1.24
500.0	10.41	10.44	10.36	10.36	10.19	10.26	0.25	21.40	30.60	24.75	27.77	500.0	1.03	1.34	1.20

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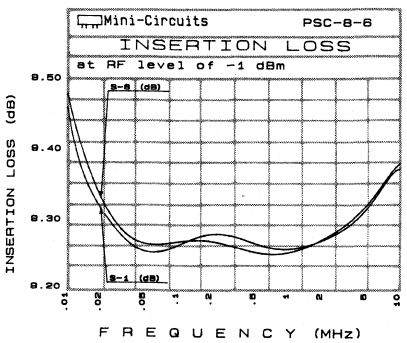
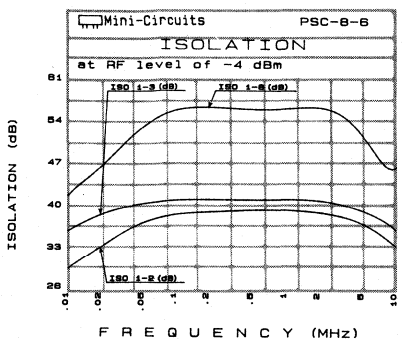
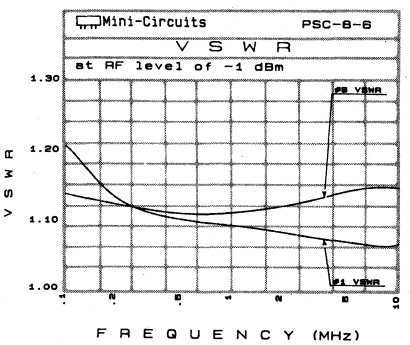
PSC-8-6, ZFSC-8-6

0.01 to 10MHz







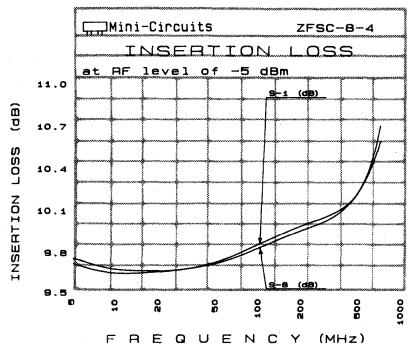
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
0.01	9.44	9.44	9.45	9.44	9.47	9.47	0.03	29.42	41.64	27.29	34.31	0.1	1.14	1.21	1.18
0.1	9.25	9.26	9.26	9.25	9.26	9.27	0.02	38.40	56.00	42.55	38.99	0.5	1.11	1.10	1.08
0.5	9.27	9.26	9.26	9.25	9.28	9.26	0.03	39.17	56.00	45.57	39.12	1.0	1.11	1.09	1.07
1.0	9.28	9.25	9.27	9.26	9.26	9.26	0.03	39.15	56.00	45.59	39.15	2.0	1.12	1.08	1.07
2.0	9.28	9.27	9.28	9.28	9.28	9.28	0.01	38.79	56.00	44.78	39.17	3.0	1.13	1.08	1.06
3.2	9.28	9.31	9.30	9.31	9.29	9.29	0.03	38.20	56.00	43.23	38.96	3.6	1.14	1.08	1.06
4.5	9.32	9.31	9.32	9.32	9.32	9.31	0.01	37.23	51.57	41.44	38.55	4.5	1.14	1.07	1.06
5.0	9.33	9.34	9.34	9.34	9.34	9.34	0.02	36.91	50.75	40.73	38.32	5.0	1.14	1.07	1.06
5.5	9.33	9.33	9.35	9.33	9.33	9.33	0.02	36.56	50.14	40.14	38.30	5.6	1.15	1.07	1.05
6.1	9.34	9.33	9.33	9.33	9.33	9.33	0.01	36.08	49.37	39.40	38.00	6.2	1.15	1.07	1.05
7.1	9.34	9.33	9.32	9.34	9.33	9.33	0.02	35.37	47.54	38.27	37.53	7.1	1.15	1.07	1.05
8.1	9.35	9.34	9.36	9.35	9.36	9.36	0.03	34.68	46.77	37.32	37.01	8.0	1.15	1.07	1.05
9.0	9.36	9.36	9.37	9.37	9.38	9.38	0.02	33.90	45.96	36.30	36.55	8.8	1.15	1.07	1.05
9.7	9.39	9.39	9.39	9.37	9.39	9.37	0.02	33.46	45.54	35.68	36.24	9.7	1.15	1.07	1.05
10.0	9.37	9.38	9.40	9.38	9.38	9.38	0.03	33.35	45.52	35.55	36.10	10.0	1.15	1.07	1.05

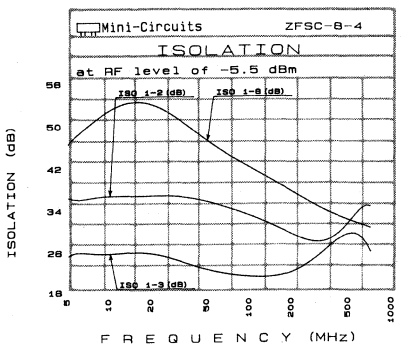
8WAY-0°

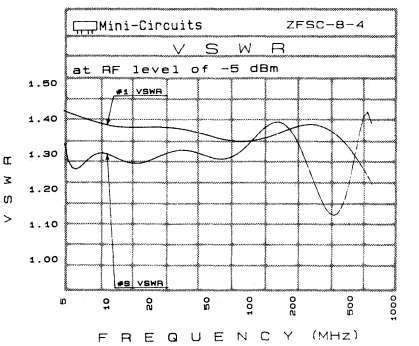
Power Splitter/Combiners 50 ohms

ZFSC-8-4

5 to 700MHz



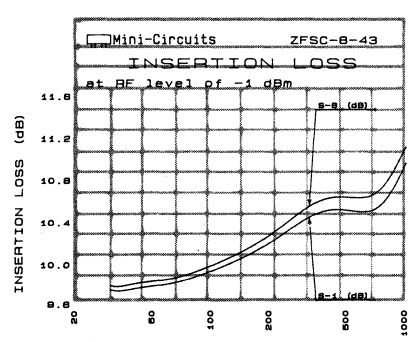


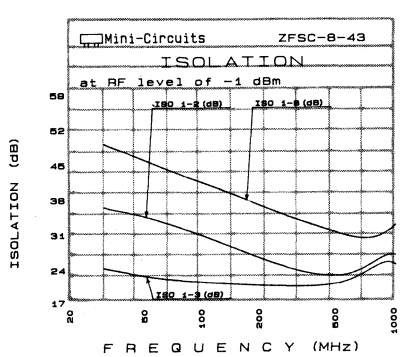


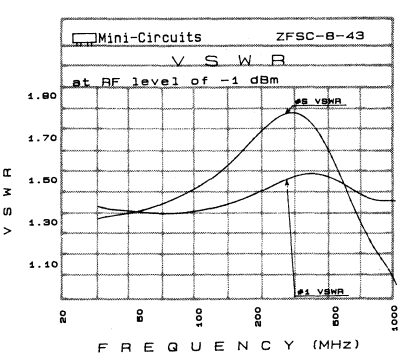
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
5.0	9.76	9.78	9.76	9.74	9.70	9.72	0.08	36.12	46.91	36.16	26.69	5.0	1.28	1.42	1.46
10.0	9.68	9.68	9.67	9.67	9.67	9.65	0.03	36.72	53.57	36.85	26.58	10.0	1.28	1.38	1.39
20.0	9.68	9.69	9.68	9.66	9.67	9.68	0.04	36.90	54.49	37.09	26.28	20.0	1.29	1.37	1.37
50.0	9.72	9.73	9.74	9.73	9.72	9.72	0.02	35.74	47.00	36.19	22.96	50.0	1.29	1.35	1.35
100.0	9.88	9.83	9.84	9.80	9.82	9.82	0.08	32.96	42.10	33.67	21.70	100.0	1.33	1.33	1.33
152.4	9.93	9.92	9.90	9.90	9.90	9.91	0.03	30.70	39.24	31.51	21.94	152.4	1.36	1.35	1.35
200.0	9.99	9.94	9.95	9.96	9.93	9.96	0.06	29.34	37.39	30.10	22.63	200.0	1.35	1.37	1.37
257.7	10.04	10.02	10.01	10.04	10.01	10.02	0.04	28.40	35.65	29.00	23.96	257.7	1.29	1.38	1.38
299.9	10.07	10.04	10.06	10.10	10.06	10.07	0.07	28.14	34.71	28.57	25.27	299.9	1.22	1.38	1.38
342.0	10.09	10.04	10.03	10.07	10.03	10.06	0.06	28.18	33.92	28.36	26.81	342.0	1.13	1.37	1.37
405.2	10.13	10.08	10.11	10.16	10.10	10.10	0.08	28.92	32.98	28.52	29.59	405.2	1.03	1.34	1.35
447.3	10.15	10.15	10.15	10.22	10.17	10.15	0.08	29.81	32.43	28.83	31.57	447.3	1.13	1.32	1.33
500.0	10.28	10.23	10.28	10.32	10.29	10.26	0.11	31.38	31.92	29.39	34.51	500.0	1.26	1.30	1.31
615.8	10.47	10.49	10.53	10.61	10.50	10.43	0.21	34.91	31.14	30.45	42.82	615.8	1.42	1.25	1.25
700.0	10.68	10.70	10.72	10.81	10.65	10.57	0.25	33.59	30.58	30.04	27.47	700.0	1.31	1.19	1.17

ZFSC-8-43

10 to 1000MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
10.0	9.75	9.76	9.76	9.78	9.78	9.79	0.04	36.51	49.17	36.60	23.35	10.0	1.32	1.37	1.37
59.1	9.82	9.82	9.82	9.85	9.85	9.86	0.04	33.98	44.84	34.18	21.64	57.7	1.36	1.34	1.34
100.3	9.94	9.94	9.94	9.96	9.98	9.99	0.05	30.82	41.31	31.09	21.04	100.0	1.46	1.34	1.35
199.8	10.21	10.21	10.23	10.23	10.27	10.28	0.08	26.40	36.89	26.66	20.49	200.0	1.70	1.43	1.44
258.0	10.35	10.36	10.38	10.37	10.43	10.44	0.12	25.01	35.38	25.22	20.39	251.5	1.78	1.47	1.48
342.8	10.48	10.47	10.51	10.49	10.58	10.58	0.16	23.66	33.67	23.79	20.39	334.5	1.81	1.51	1.49
430.1	10.52	10.52	10.58	10.53	10.64	10.64	0.20	23.01	32.39	23.03	20.62	445.3	1.65	1.51	1.49
500.5	10.54	10.52	10.61	10.54	10.66	10.66	0.25	22.87	31.37	22.70	21.04	500.0	1.54	1.48	1.46
599.9	10.48	10.45	10.58	10.46	10.62	10.62	0.31	23.25	30.66	22.89	21.89	583.7	1.39	1.44	1.40
658.1	10.48	10.47	10.59	10.47	10.64	10.63	0.31	23.82	30.33	23.22	22.53	639.1	1.31	1.42	1.37
713.9	10.53	10.52	10.66	10.52	10.70	10.68	0.34	24.46	30.23	23.68	23.26	722.1	1.22	1.40	1.33
801.2	10.66	10.62	10.79	10.60	10.85	10.81	0.40	25.53	30.39	24.32	24.08	805.2	1.14	1.39	1.32
886.0	10.76	10.73	10.91	10.66	10.98	10.93	0.46	26.43	31.01	24.71	24.39	888.3	1.06	1.38	1.32
970.9	10.92	10.93	11.07	10.79	11.15	11.07	0.48	26.95	32.05	24.74	23.10	971.3	1.02	1.38	1.34
1000.0	10.98	11.02	11.12	10.84	11.21	11.13	0.49	27.05	32.51	24.69	22.29	1000.0	1.01	1.38	1.34

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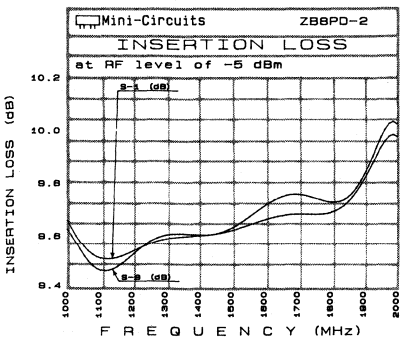
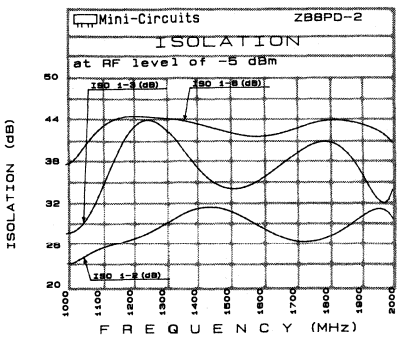
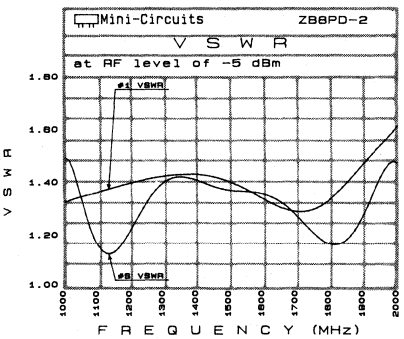
Mini-Circuits

ZB8PD-2

1 to 2.0GHz



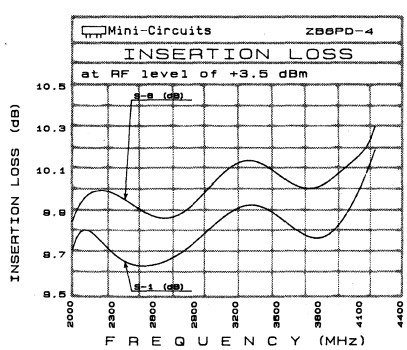


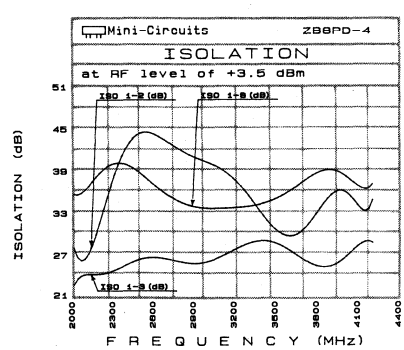


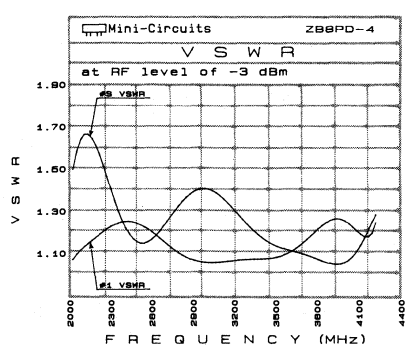
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
1000.0	9.68	9.42	9.40	9.77	9.41	9.65	0.37	23.03	37.42	23.30	27.25	1000.0	1.53	1.33	1.29
1055.0	9.56	9.32	9.29	9.65	9.28	9.52	0.37	24.32	39.69	24.77	29.67	1052.5	1.32	1.34	1.31
1107.5	9.49	9.20	9.18	9.58	9.20	9.46	0.40	25.35	42.74	25.96	32.77	1105.0	1.16	1.37	1.32
1215.0	9.54	9.26	9.26	9.66	9.28	9.55	0.40	26.95	44.00	27.93	39.45	1210.0	1.24	1.40	1.36
1325.0	9.62	9.33	9.35	9.76	9.37	9.63	0.43	29.09	43.82	30.40	36.77	1315.0	1.41	1.43	1.40
1377.5	9.60	9.30	9.33	9.73	9.38	9.61	0.43	30.35	43.57	31.54	34.88	1367.5	1.42	1.43	1.41
1460.0	9.60	9.27	9.28	9.71	9.32	9.60	0.44	31.44	42.00	31.63	33.48	1447.5	1.39	1.42	1.42
1500.0	9.62	9.28	9.28	9.75	9.32	9.63	0.47	30.85	42.99	30.29	33.06	1500.0	1.36	1.40	1.42
1595.0	9.68	9.31	9.30	9.82	9.37	9.73	0.52	28.07	41.27	27.01	33.90	1605.0	1.35	1.33	1.38
1702.5	9.65	9.27	9.25	9.84	9.35	9.74	0.59	26.37	42.39	25.18	38.19	1710.0	1.27	1.29	1.36
1757.5	9.71	9.27	9.23	9.87	9.33	9.75	0.64	26.31	42.70	25.09	44.00	1762.5	1.19	1.30	1.38
1810.0	9.70	9.27	9.23	9.87	9.32	9.73	0.64	27.04	42.87	25.69	44.00	1815.0	1.15	1.35	1.43
1865.0	9.74	9.29	9.28	9.92	9.35	9.77	0.64	28.47	43.33	26.92	39.40	1867.5	1.21	1.41	1.49
1920.0	9.86	9.40	9.38	10.03	9.43	9.88	0.65	30.25	43.28	28.74	34.41	1920.0	1.34	1.50	1.58
2000.0	9.99	9.49	9.49	10.16	9.53	10.04	0.67	29.63	40.72	29.66	30.79	2000.0	1.50	1.61	1.70

ZB8PD-4

2 to 4.2GHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
2000.0	9.74	9.64	9.61	9.68	9.69	9.86	0.25	25.56	35.13	24.97	24.41	2000.0	1.56	1.08	1.06
2187.0	9.80	9.64	9.59	9.71	9.69	10.03	0.44	31.15	38.43	29.99	25.42	2187.0	1.61	1.19	1.19
2379.5	9.66	9.41	9.42	9.65	9.53	9.96	0.55	41.53	40.23	37.52	26.38	2379.5	1.19	1.25	1.25
2500.5	9.67	9.47	9.50	9.69	9.56	9.91	0.44	46.21	38.82	43.03	27.17	2500.5	1.14	1.23	1.22
2753.5	9.70	9.47	9.47	9.72	9.53	9.90	0.43	40.79	34.85	42.66	26.86	2753.5	1.28	1.12	1.11
2880.0	9.75	9.52	9.55	9.81	9.57	9.91	0.39	38.60	34.04	40.73	26.29	2880.0	1.38	1.05	1.04
3001.0	9.81	9.57	9.63	9.92	9.62	9.97	0.40	41.53	33.65	42.55	26.18	3001.0	1.44	1.03	1.03
3133.0	9.95	9.71	9.83	10.18	9.93	10.21	0.50	41.55	33.73	36.86	27.02	3133.0	1.33	1.09	1.08
3320.0	9.80	9.54	9.69	10.05	9.76	10.04	0.51	32.92	33.98	30.72	28.90	3320.0	1.20	1.09	1.11
3501.5	9.96	9.69	9.70	10.04	9.70	10.09	0.40	30.17	35.04	29.40	29.14	3501.5	1.15	1.04	1.08
3633.5	9.83	9.60	9.63	10.02	9.57	10.10	0.53	30.91	36.42	30.41	26.96	3633.5	1.09	1.15	1.17
3820.5	9.79	9.59	9.62	10.08	9.49	9.94	0.59	33.98	39.41	32.10	24.87	3820.5	1.08	1.24	1.28
4002.0	9.89	9.71	9.81	10.36	9.59	10.14	0.77	34.98	37.56	31.30	25.79	4002.0	1.06	1.23	1.28
4139.5	10.09	9.80	9.84	10.47	9.79	10.21	0.68	34.72	36.94	38.58	27.92	4139.5	1.20	1.20	1.26
4200.0	10.20	9.87	9.91	10.59	9.90	10.30	0.72	31.52	36.06	34.86	28.84	4200.0	1.30	1.18	1.24

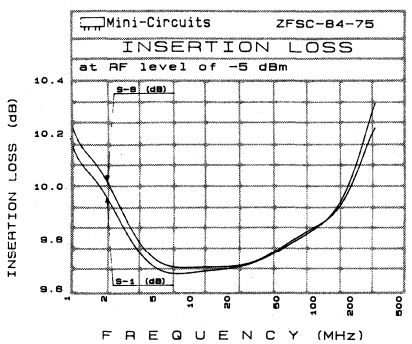
8WAY-0°

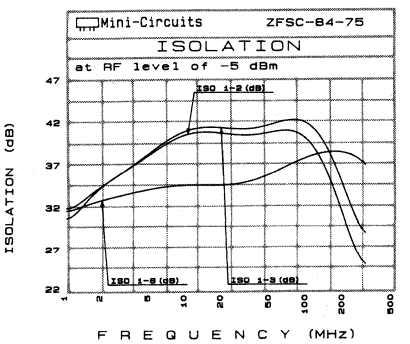
Power Splitter/Combiners

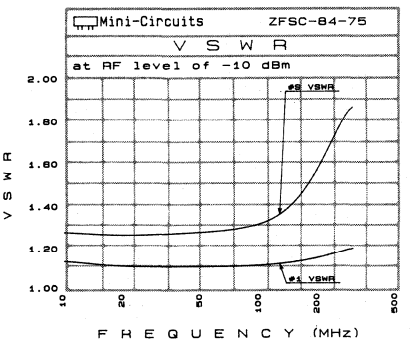
75 ohms

ZFSC-84-75, PSC-8A-4-75

1 to 300MHz



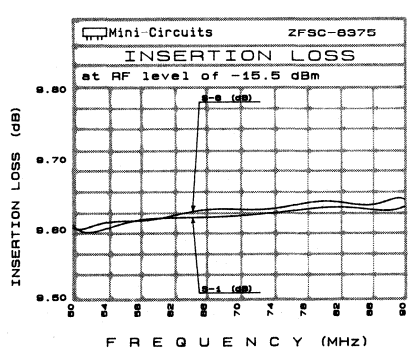


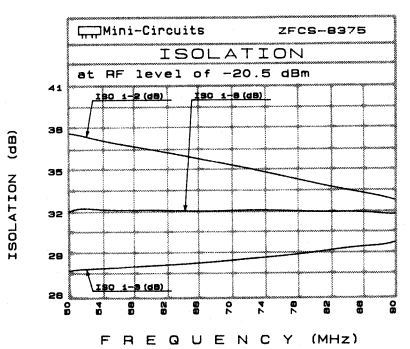


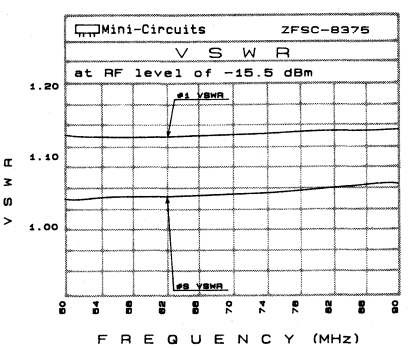
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-5	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
1.0	10.16	10.15	10.15	10.15	10.23	10.23	0.08	30.46	31.56	30.53	30.81	10.0	1.28	1.14	1.13
5.0	9.67	9.68	9.67	9.67	9.70	9.70	0.04	38.31	34.17	38.41	37.41	20.0	1.26	1.11	1.11
10.0	9.67	9.68	9.68	9.67	9.69	9.69	0.02	40.46	34.56	40.52	40.14	26.6	1.27	1.11	1.11
20.0	9.69	9.69	9.68	9.68	9.70	9.70	0.03	40.78	34.61	40.80	40.87	50.0	1.28	1.11	1.11
50.0	9.76	9.75	9.76	9.75	9.76	9.76	0.01	40.67	35.95	40.91	40.80	76.3	1.29	1.11	1.11
75.8	9.81	9.80	9.82	9.82	9.83	9.83	0.04	41.03	37.11	41.43	41.10	100.0	1.32	1.12	1.12
100.0	9.86	9.86	9.86	9.86	9.87	9.87	0.02	40.15	37.83	40.79	40.64	117.8	1.35	1.12	1.12
122.5	9.86	9.84	9.86	9.85	9.87	9.85	0.05	38.45	38.22	39.06	39.59	142.6	1.40	1.13	1.13
150.5	9.92	9.91	9.95	9.92	9.92	9.91	0.04	35.44	38.46	35.97	37.75	167.4	1.47	1.14	1.14
178.5	10.03	9.99	10.04	10.01	10.02	10.00	0.05	32.68	38.53	33.12	35.72	192.3	1.56	1.15	1.15
200.0	10.07	10.04	10.09	10.05	10.06	10.03	0.06	30.71	38.41	31.09	34.13	208.9	1.62	1.16	1.15
225.3	10.12	10.09	10.16	10.11	10.09	10.08	0.08	28.84	38.23	29.15	32.48	233.7	1.70	1.17	1.16
253.3	10.19	10.16	10.21	10.18	10.17	10.14	0.07	27.04	37.79	27.36	30.72	258.6	1.78	1.18	1.17
272.0	10.25	10.21	10.27	10.23	10.21	10.17	0.10	26.01	37.52	26.34	29.76	275.1	1.83	1.19	1.18
300.0	10.32	10.27	10.35	10.31	10.26	10.23	0.12	24.66	36.99	24.97	28.64	300.0	1.86	1.20	1.18

ZFSC-8375

50 to 90MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-5	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
50.0	9.60	9.60	9.60	9.60	9.60	9.60	0.01	37.75	32.22	36.84	27.75	50.0	1.04	1.13	1.12
54.1	9.60	9.61	9.62	9.62	9.60	9.61	0.02	37.17	32.32	36.43	27.94	54.1	1.04	1.13	1.12
57.2	9.61	9.60	9.62	9.61	9.62	9.61	0.02	36.76	32.18	35.97	28.10	57.2	1.04	1.13	1.12
60.3	9.61	9.62	9.63	9.62	9.63	9.61	0.02	36.69	32.24	35.48	28.19	60.3	1.04	1.12	1.13
63.3	9.62	9.62	9.64	9.62	9.62	9.63	0.02	36.14	32.21	35.18	28.30	63.3	1.04	1.13	1.13
65.4	9.62	9.61	9.62	9.62	9.62	9.62	0.02	35.89	32.12	34.86	28.50	65.4	1.04	1.13	1.13
68.5	9.62	9.63	9.63	9.64	9.64	9.63	0.02	35.63	32.23	34.77	28.66	68.5	1.05	1.13	1.13
70.5	9.63	9.62	9.64	9.64	9.64	9.63	0.02	35.25	32.30	34.52	28.66	70.5	1.05	1.13	1.13
73.6	9.63	9.63	9.65	9.64	9.64	9.63	0.02	35.08	32.21	34.02	28.93	73.6	1.05	1.13	1.13
75.6	9.62	9.63	9.64	9.64	9.63	9.62	0.03	34.74	32.22	33.70	29.13	75.6	1.05	1.14	1.13
78.7	9.63	9.62	9.64	9.64	9.63	9.63	0.03	34.39	32.16	33.14	29.38	78.7	1.05	1.14	1.14
80.8	9.63	9.63	9.64	9.65	9.64	9.64	0.02	34.21	32.05	33.27	29.46	80.8	1.06	1.14	1.14
85.9	9.63	9.63	9.66	9.65	9.65	9.64	0.03	33.57	32.13	32.56	29.92	85.9	1.06	1.14	1.14
89.0	9.63	9.63	9.65	9.65	9.65	9.64	0.03	33.04	31.95	32.07	30.16	89.0	1.06	1.14	1.15
90.0	9.63	9.64	9.66	9.66	9.65	9.65	0.03	33.04	32.00	31.96	30.49	90.0	1.06	1.14	1.14

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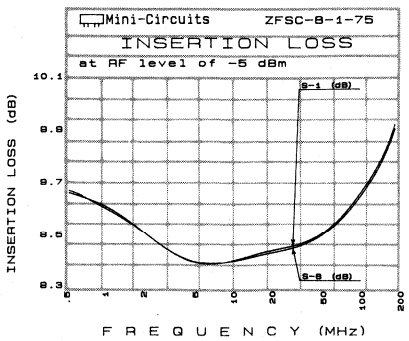
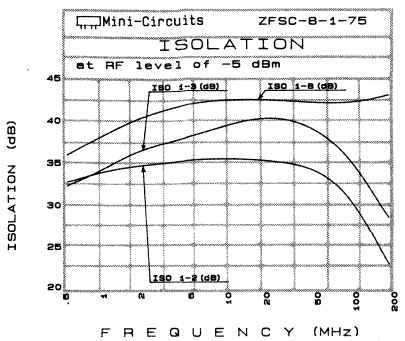
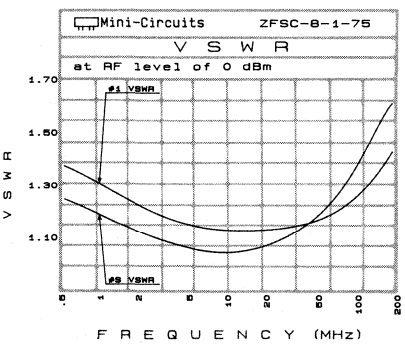
ZFSC-8-1-75, PSC-8-1-75

0.5 to 175MHz



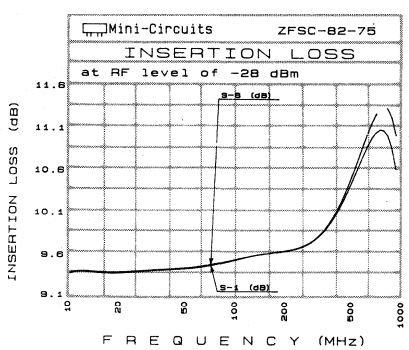


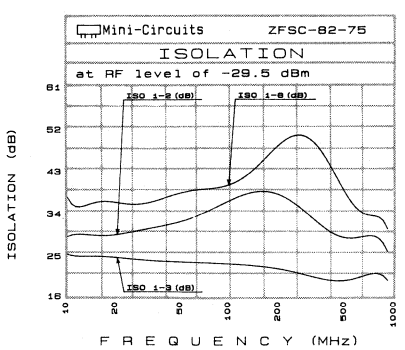


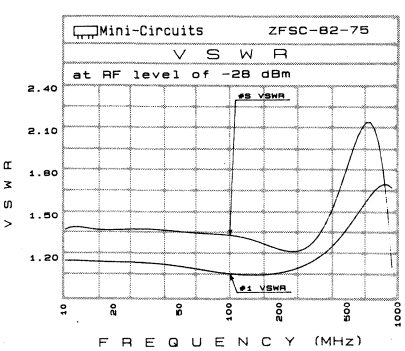
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
0.5	9.67	9.67	9.65	9.66	9.65	9.66	0.03	32.75	35.97	34.21	32.47	0.5	1.25	1.38	1.35
5.0	9.38	9.39	9.39	9.39	9.38	9.38	0.02	35.25	42.03	35.90	37.98	4.9	1.06	1.14	1.13
10.0	9.42	9.42	9.40	9.42	9.41	9.41	0.02	35.38	42.31	35.74	38.84	10.1	1.04	1.13	1.11
20.0	9.45	9.45	9.45	9.44	9.45	9.44	0.01	35.12	42.29	35.32	38.97	20.1	1.07	1.13	1.11
38.7	9.48	9.47	9.48	9.48	9.48	9.48	0.01	34.37	42.10	34.40	38.13	38.9	1.15	1.16	1.48
50.0	9.50	9.51	9.52	9.51	9.51	9.50	0.02	33.66	41.97	33.58	37.38	49.8	1.20	1.17	1.16
65.9	9.56	9.57	9.58	9.57	9.56	9.55	0.03	32.48	41.97	32.30	36.20	65.9	1.26	1.20	1.18
82.3	9.61	9.61	9.61	9.63	9.62	9.60	0.03	30.88	42.03	30.64	34.83	82.5	1.33	1.24	1.21
100.0	9.68	9.68	9.70	9.69	9.68	9.66	0.04	29.17	42.14	28.91	33.37	104.3	1.42	1.28	1.26
115.0	9.71	9.70	9.74	9.72	9.72	9.68	0.06	27.77	42.48	27.46	32.16	120.5	1.47	1.32	1.30
131.4	9.78	9.76	9.81	9.79	9.79	9.78	0.05	26.29	42.40	25.96	30.86	131.4	1.51	1.34	1.32
142.3	9.78	9.79	9.82	9.80	9.78	9.78	0.04	25.33	42.51	24.98	30.08	142.3	1.54	1.36	1.35
153.2	9.83	9.81	9.87	9.85	9.82	9.81	0.06	24.42	42.68	24.07	29.40	153.2	1.57	1.38	1.37
164.1	9.89	9.87	9.94	9.89	9.90	9.87	0.07	23.57	42.78	23.24	28.77	164.1	1.59	1.41	1.38
175.0	9.90	9.90	9.96	9.92	9.91	9.89	0.07	22.75	42.90	22.41	28.20	175.0	1.61	1.43	1.40

ZFSC-82-75

10 to 900MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
10.0	9.40	9.41	9.41	9.41	9.42	9.41	0.02	29.52	36.05	29.51	25.17	10.0	1.42	1.18	1.18
69.8	9.48	9.49	9.49	9.48	9.49	9.50	0.02	34.13	38.89	34.42	23.71	69.8	1.37	1.10	1.10
128.3	9.59	9.60	9.60	9.60	9.59	9.59	0.02	38.29	42.62	37.90	23.28	128.3	1.32	1.07	1.06
200.3	9.67	9.68	9.66	9.68	9.67	9.65	0.04	38.05	46.47	38.03	22.53	200.3	1.25	1.08	1.07
247.5	9.74	9.73	9.74	9.75	9.73	9.73	0.05	36.02	51.70	35.74	21.95	247.5	1.24	1.11	1.10
306.0	9.84	9.85	9.85	9.87	9.84	9.84	0.08	33.18	50.48	33.23	21.22	306.0	1.29	1.16	1.14
366.8	9.98	10.00	10.01	10.03	9.98	9.97	0.13	31.21	45.06	30.97	20.73	366.8	1.42	1.23	1.21
400.5	10.10	10.15	10.14	10.15	10.10	10.09	0.12	30.35	42.54	30.06	20.50	400.5	1.52	1.27	1.24
450.0	10.34	10.37	10.38	10.39	10.31	10.29	0.18	29.37	40.07	28.95	20.41	450.0	1.68	1.33	1.30
499.5	10.60	10.65	10.63	10.66	10.57	10.52	0.23	28.91	38.20	28.26	20.50	499.5	1.84	1.41	1.36
573.8	10.94	10.99	10.99	11.02	10.87	10.82	0.31	28.69	36.01	27.82	21.22	573.8	2.06	1.51	1.45
632.3	11.17	11.25	11.23	11.27	11.07	10.99	0.40	28.96	35.06	27.64	22.20	632.3	2.17	1.58	1.51
722.3	11.34	11.48	11.40	11.49	11.18	11.11	0.55	29.20	33.18	27.66	24.58	722.3	2.09	1.67	1.57
810.0	11.23	11.41	11.31	11.41	11.03	10.91	0.73	28.45	32.47	27.44	26.83	810.0	1.72	1.70	1.57
900.0	11.26	11.52	11.34	11.47	10.99	10.86	0.97	26.08	32.11	26.08	26.29	900.0	1.26	1.69	1.54

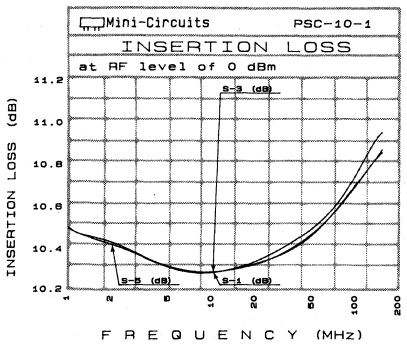
10WAY-0°

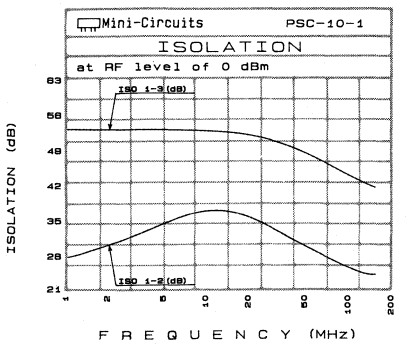
Power Splitter/Combiners

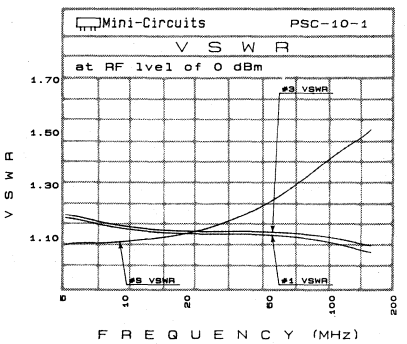
50 ohr

PSC-10-1

1 to 150MHz



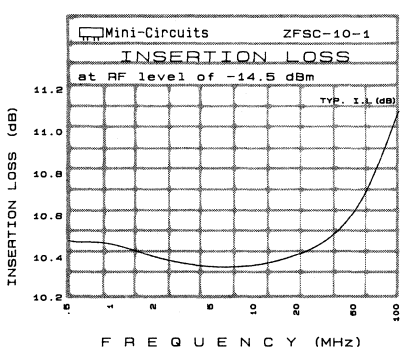


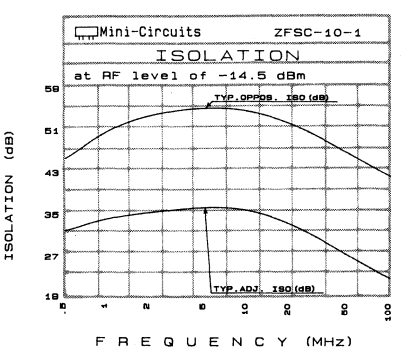


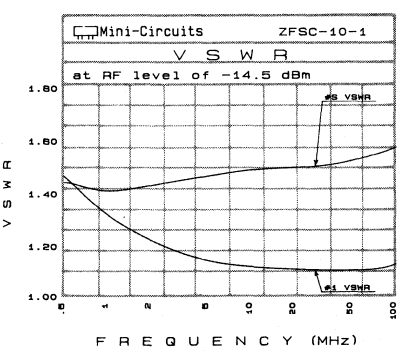
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	10.49	0.01	27.80	32.83	5.00	1.08	1.08
5.0	10.32	0.01	34.56	35.43	10.0	1.09	1.06
10.0	10.29	0.02	37.26	26.24	20.0	1.12	1.06
14.5	10.32	0.01	36.89	36.22	25.7	1.14	1.06
20.0	10.33	0.02	35.61	35.86	34.0	1.18	1.06
37.1	10.46	0.02	31.87	34.18	50.0	1.24	1.05
50.0	10.51	0.03	29.89	32.86	63.0	1.30	1.05
59.7	10.54	0.04	28.77	31.96	75.4	1.34	1.05
73.2	10.62	0.06	27.42	30.93	92.0	1.39	1.04
86.8	10.69	0.08	26.39	30.11	100.0	1.42	1.04
100.0	10.75	0.12	25.61	29.53	112.7	1.45	1.04
109.4	10.82	0.14	25.17	29.21	121.0	1.46	1.03
122.9	10.87	0.16	24.68	28.94	129.3	1.47	1.03
136.5	10.90	0.19	24.35	38.83	137.6	1.48	1.03
150.0	10.98	0.23	24.17	28.95	150.0	1.52	1.02

ZFSC-10-1

0.5 to 100MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.5	10.48	0.19	32.03	45.77	0.5	1.45	1.47
1.0	10.47	0.15	34.31	50.96	1.0	1.41	1.32
2.0	10.40	0.12	35.53	54.05	2.0	1.43	1.22
5.0	10.35	0.08	36.46	55.59	5.0	1.47	1.14
10.0	10.36	0.08	35.93	54.99	10.0	1.49	1.12
15.7	10.39	0.06	34.48	53.16	15.7	1.49	1.11
24.6	10.44	0.04	32.24	51.48	24.6	1.50	1.11
30.8	10.47	0.04	30.86	49.89	30.8	1.50	1.11
42.8	10.57	0.04	28.57	48.00	42.8	1.52	1.11
50.2	10.62	0.07	27.48	46.87	50.2	1.52	1.11
55.1	10.69	0.10	26.84	46.24	55.1	1.53	1.11
75.7	10.89	0.25	24.73	44.26	75.7	1.56	1.11
85.3	10.96	0.31	23.96	43.53	85.3	1.56	1.12
93.6	11.05	0.37	23.42	42.88	93.6	1.57	1.12
100.0	11.10	0.39	23.07	42.61	100.0	1.57	1.13

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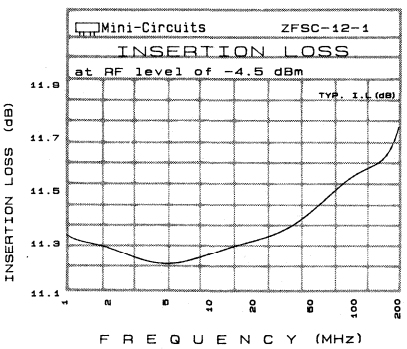
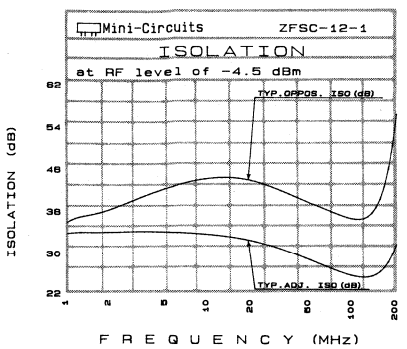
Mini-Circuits

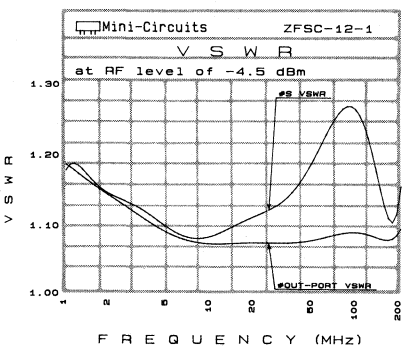
PSC-12-1, ZFSC-12-1

50 ohms

1 to 200MHz



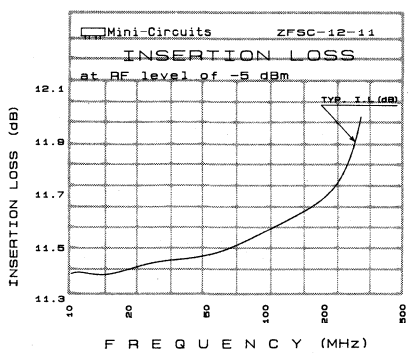


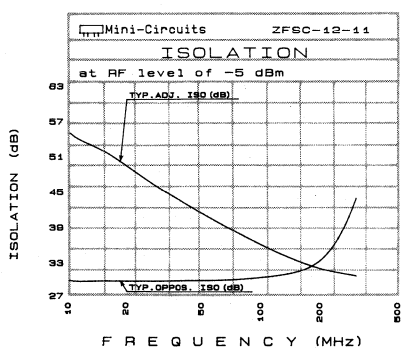


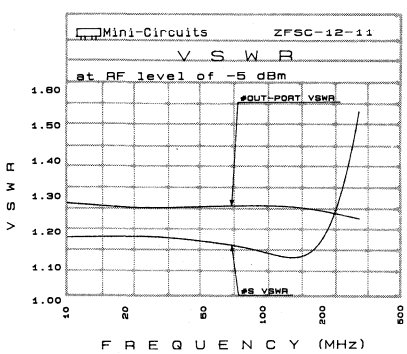
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	11.40	0.02	34.74	51.08	1.0	1.16	1.14
5.0	11.21	0.02	34.82	56.62	5.0	1.06	1.07
10.0	11.23	0.00	34.16	54.77	10.0	1.03	1.07
19.9	11.28	0.01	33.32	52.11	19.9	1.03	1.07
32.3	11.33	0.00	32.57	51.94	32.3	1.05	1.06
49.8	11.40	0.01	31.56	50.39	49.8	1.10	1.06
63.2	11.45	0.01	30.98	49.40	63.2	1.13	1.05
75.6	11.50	0.04	30.41	48.98	75.6	1.17	1.05
100.0	11.59	0.05	29.54	48.19	100.0	1.22	1.05
112.9	11.63	0.07	29.22	47.62	112.9	1.24	1.05
131.4	11.69	0.09	28.99	47.45	131.4	1.27	1.06
150.3	11.76	0.15	28.87	47.60	150.3	1.29	1.06
175.1	11.83	0.21	29.09	48.07	175.1	1.29	1.06
187.6	11.89	0.24	29.38	48.01	187.6	1.29	1.07
200.0	11.94	0.27	29.74	48.35	200.0	1.28	1.07

ZFSC-12-11

10 to 300MHz







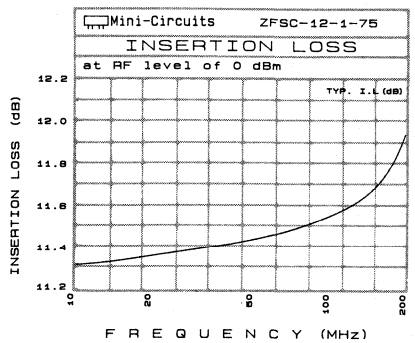
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
10.0	11.41	0.03	54.87	29.90	10.0	1.19	1.28
34.9	11.46	0.07	44.20	29.95	34.7	1.18	1.27
50.0	11.49	0.02	41.26	30.05	49.9	1.17	1.27
84.6	11.53	0.04	37.18	30.32	84.7	1.15	1.27
100.0	11.57	0.04	35.93	30.50	99.9	1.14	1.27
134.3	11.62	0.04	34.04	31.15	134.0	1.12	1.27
150.9	11.63	0.03	33.34	31.59	150.7	1.12	1.26
167.4	11.66	0.03	32.83	32.16	167.3	1.14	1.26
184.0	11.67	0.02	32.33	32.84	184.0	1.16	1.26
200.0	11.68	0.01	31.98	33.69	200.0	1.19	1.25
233.7	11.77	0.00	31.50	36.12	234.0	1.28	1.25
250.3	11.83	0.03	31.29	37.84	250.0	1.33	1.24
266.9	11.87	0.01	31.12	39.97	266.7	1.39	1.24
283.4	11.88	0.05	30.97	42.10	283.3	1.46	1.24
300.0	12.00	0.04	30.83	42.80	300.0	1.54	1.23

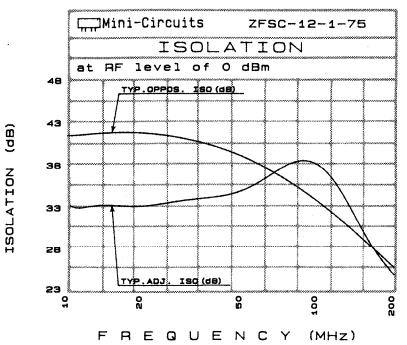
12WAY-0°

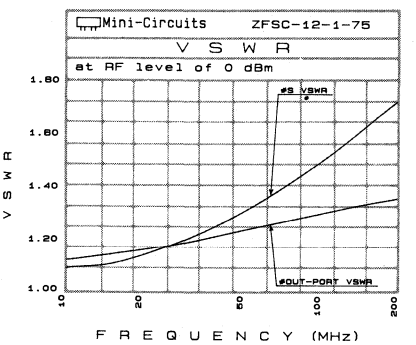
Power Splitter/Combiners 75 ohms

ZFSC-12-1-75

10 to 200MHz



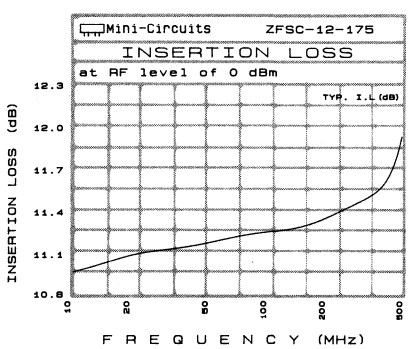


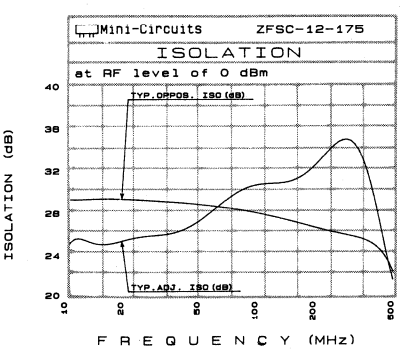


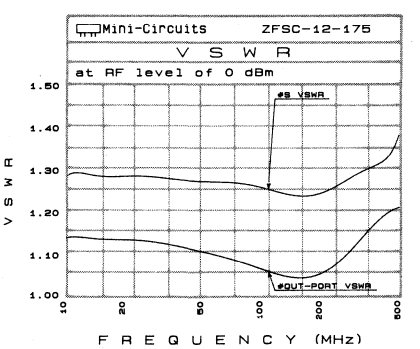
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
10.0	11.32	0.01	33.20	41.53	10.0	1.09	1.12
15.2	11.34	0.01	33.24	41.92	15.4	1.10	1.14
20.5	11.36	0.01	33.41	41.83	20.8	1.14	1.16
30.9	11.41	0.01	33.86	41.06	31.7	1.21	1.19
49.9	11.45	0.00	35.21	39.15	50.0	1.31	1.24
62.7	11.48	0.01	36.44	37.75	64.1	1.37	1.26
78.4	11.51	0.03	38.08	36.05	80.8	1.43	1.28
99.8	11.56	0.04	38.54	33.92	99.7	1.49	1.30
115.5	11.59	0.06	36.37	32.42	113.2	1.53	1.31
125.9	11.61	0.06	34.50	31.46	123.8	1.56	1.32
142.1	11.65	0.07	31.74	30.09	140.7	1.60	1.33
163.0	11.74	0.06	28.76	28.43	162.2	1.65	1.35
179.1	11.80	0.07	26.90	27.28	178.8	1.69	1.35
189.6	11.88	0.05	25.86	26.59	189.8	1.70	1.36
200.0	11.94	0.04	24.94	25.93	200.0	1.72	1.36

ZFSC-12-175

10 to 500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
10.0	10.97	0.01	25.31	29.33	10.0	1.29	1.14
19.8	11.09	0.00	25.36	29.40	19.8	1.29	1.14
50.4	11.18	0.01	27.55	28.86	50.4	1.28	1.11
79.8	11.24	0.00	29.70	28.37	79.8	1.27	1.08
99.4	11.26	0.01	30.52	28.04	99.4	1.26	1.07
149.7	11.29	0.02	31.43	27.32	149.7	1.24	1.05
199.9	11.36	0.04	32.08	26.69	199.9	1.25	1.05
234.2	11.38	0.05	33.17	26.37	234.2	1.26	1.08
290.5	11.47	0.09	35.39	25.94	290.5	1.28	1.12
317.5	11.49	0.10	35.73	25.76	317.5	1.30	1.14
360.4	11.54	0.14	32.76	25.49	360.4	1.31	1.16
415.5	11.62	0.19	27.82	24.80	415.5	1.32	1.19
458.4	11.74	0.21	24.74	23.90	458.4	1.33	1.20
486.5	11.87	0.22	22.91	23.01	486.5	1.38	1.21
500.0	11.97	0.21	22.06	22.49	500.0	1.41	1.21

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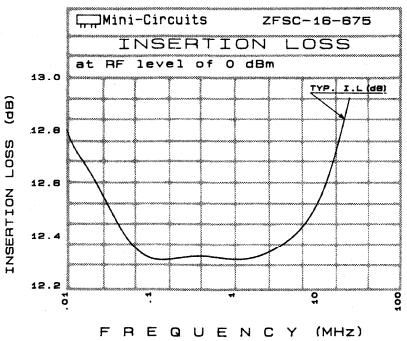
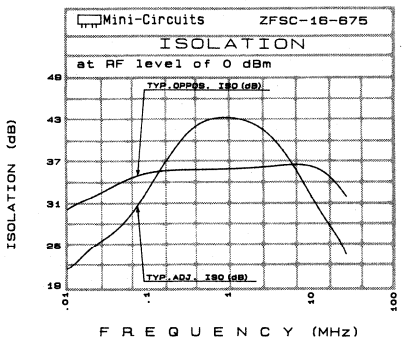
Mini-Circuits

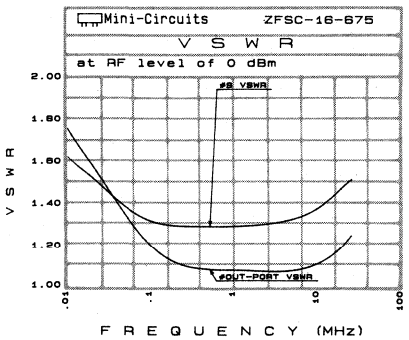
ZFSC-16-675

75 ohms

0.01 to 25MHz



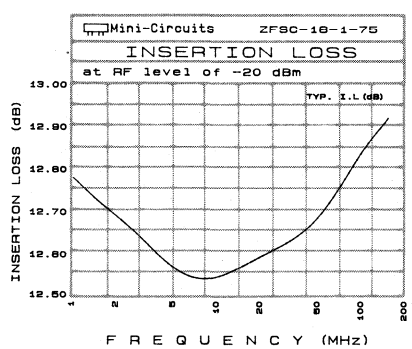


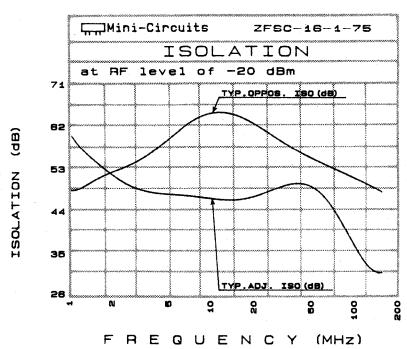


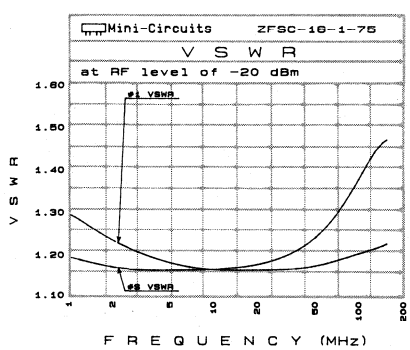
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.01	12.79	0.07	21.62	30.34	0.01	1.62	1.75
0.2	12.31	0.01	39.28	35.84	0.2	1.29	1.10
0.5	12.33	0.01	42.79	35.88	0.5	1.29	1.09
1.0	12.30	0.00	43.35	35.99	1.0	1.30	1.08
2.4	12.33	0.01	41.78	36.27	2.4	1.30	1.08
3.9	12.38	0.01	39.15	36.49	4.1	1.31	1.08
6.3	12.44	0.00	35.74	36.66	6.4	1.35	1.09
7.8	12.44	0.00	33.90	36.57	8.1	1.35	1.10
10.0	12.51	0.01	31.84	36.32	10.0	1.37	1.11
12.5	12.60	0.00	29.95	35.81	12.9	1.41	1.14
14.9	12.66	0.02	28.49	35.22	15.3	1.43	1.16
18.0	12.75	0.01	26.93	34.29	18.6	1.47	1.19
20.3	12.79	0.02	25.96	33.58	20.2	1.48	1.20
22.7	12.89	0.02	25.13	32.88	22.6	1.50	1.22
25.0	12.93	0.03	24.38	32.18	25.0	1.51	1.24

ZFSC-16-1-75

1 to 150MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	12.78	0.02	59.51	48.20	1.0	1.19	1.29
2.1	12.68	0.02	50.39	52.95	2.1	1.17	1.23
5.1	12.57	0.02	47.29	58.44	5.1	1.16	1.18
9.9	12.55	0.00	46.42	65.01	9.9	1.17	1.17
18.9	12.59	0.01	46.59	63.36	18.9	1.18	1.16
32.7	12.62	0.03	48.93	57.78	32.7	1.20	1.17
50.2	12.71	0.01	49.25	54.67	50.2	1.25	1.18
55.0	12.72	0.01	49.14	53.37	55.0	1.26	1.18
73.3	12.76	0.00	42.40	52.47	73.3	1.31	1.19
82.2	12.79	0.00	40.20	52.00	82.2	1.34	1.20
100.1	12.85	0.00	36.15	52.55	100.1	1.39	1.21
118.3	12.87	0.01	33.27	50.30	118.3	1.43	1.21
132.1	12.90	0.02	31.80	49.10	132.1	1.45	1.22
141.1	12.91	0.00	30.92	48.82	141.1	1.46	1.22
150.0	12.90	0.02	30.17	48.80	150.0	1.47	1.23

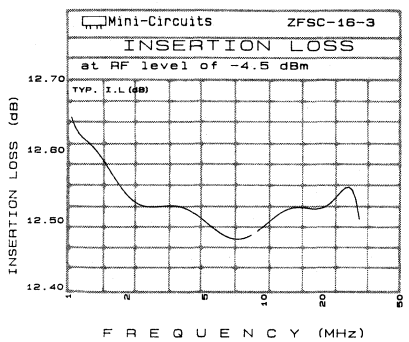
16WAY-0°

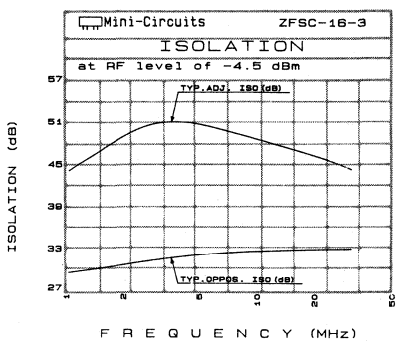
Power Splitter/Combiners

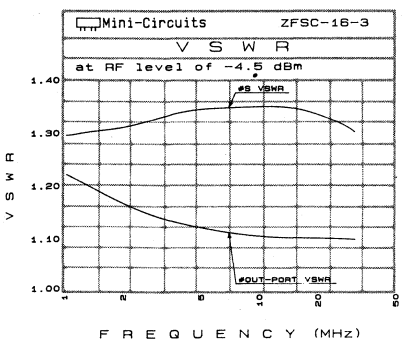
50 ohms

ZFSC-16-3

1 to 30MHz



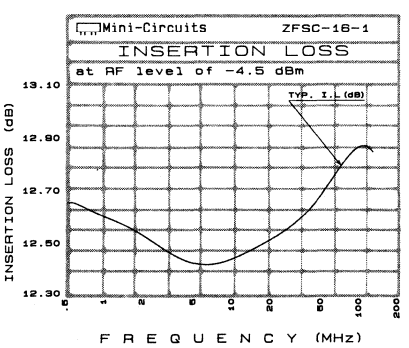


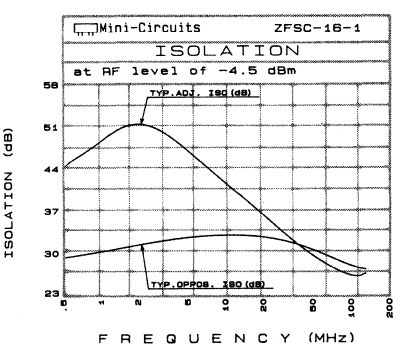


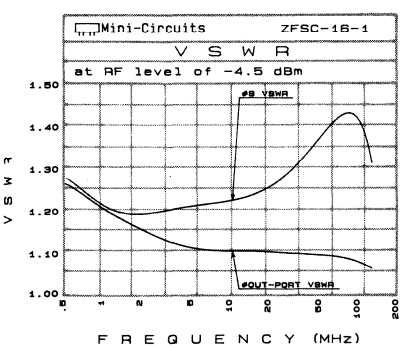
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	12.64	0.03	44.14	29.56	1.0	1.30	1.22
2.0	12.54	0.02	49.18	30.71	2.0	1.31	1.17
4.3	12.52	0.01	50.76	31.92	4.3	1.34	1.12
5.1	12.51	0.01	50.48	32.11	5.1	1.35	1.12
7.6	12.47	0.01	49.27	32.45	7.6	1.35	1.11
10.0	12.53	0.05	48.43	32.61	10.0	1.35	1.10
12.6	12.49	0.04	47.62	32.73	12.6	1.35	1.11
15.9	12.49	0.02	46.86	32.79	15.9	1.35	1.10
18.4	12.49	0.01	46.34	32.83	18.4	1.34	1.09
20.9	12.51	0.01	45.86	32.86	20.9	1.32	1.10
22.5	12.56	0.02	45.56	32.92	22.5	1.32	1.11
24.2	12.53	0.02	45.26	32.88	24.2	1.32	1.09
26.7	12.51	0.02	44.87	32.91	26.7	1.30	1.11
28.3	12.53	0.03	44.53	32.93	28.3	1.31	1.10
30.0	12.51	0.00	44.23	32.94	30.0	1.31	1.09

ZFSC-16-1

0.5 to 125MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.5	12.66	0.01	44.58	29.35	0.5	1.28	1.27
2.1	12.52	0.01	52.00	31.48	2.1	1.19	1.15
4.9	12.41	0.00	47.05	32.63	4.9	1.22	1.11
8.3	12.43	0.00	42.86	32.96	8.3	1.22	1.11
16.1	12.50	0.00	37.73	32.85	16.1	1.24	1.10
23.8	12.54	0.02	34.63	32.36	23.8	1.28	1.10
31.6	12.57	0.02	32.54	31.81	31.6	1.31	1.10
47.2	12.65	0.01	29.72	30.60	47.2	1.37	1.10
55.0	12.75	0.00	28.80	30.08	55.0	1.39	1.10
62.8	12.74	0.01	28.00	29.52	62.8	1.41	1.09
78.3	12.80	0.01	26.92	28.64	78.3	1.43	1.09
90.1	12.85	0.00	26.45	28.13	90.1	1.43	1.09
100.1	12.85	0.01	26.21	27.75	100.1	1.41	1.08
113.5	12.88	0.00	26.21	27.45	113.5	1.37	1.07
125.0	12.84	0.01	26.39	27.22	125.0	1.32	1.07

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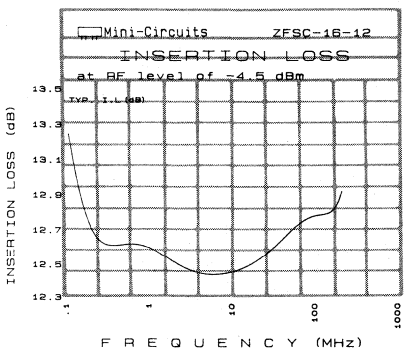
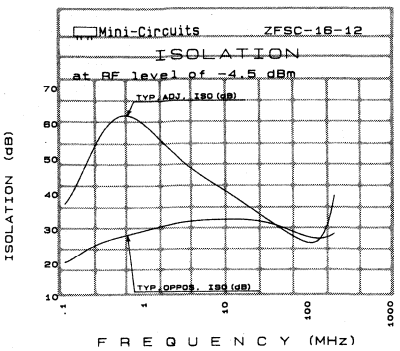
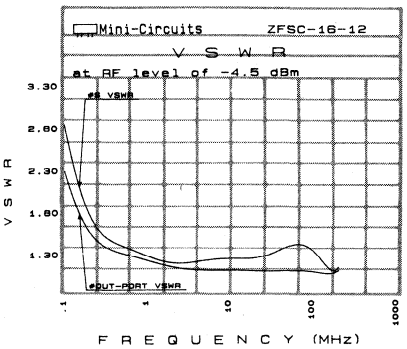
ZFSC-16-12

0.1 to 200MHz



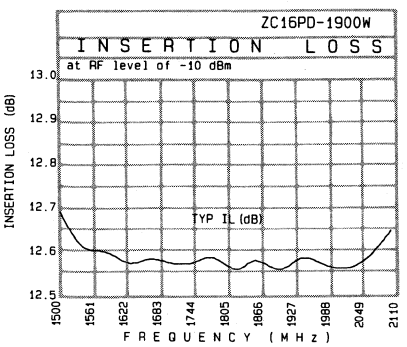


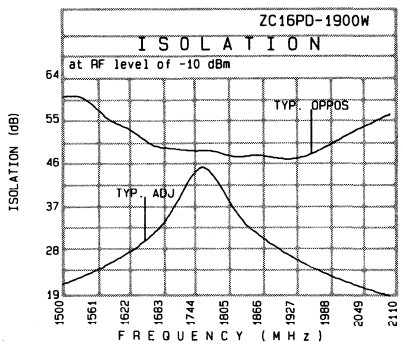


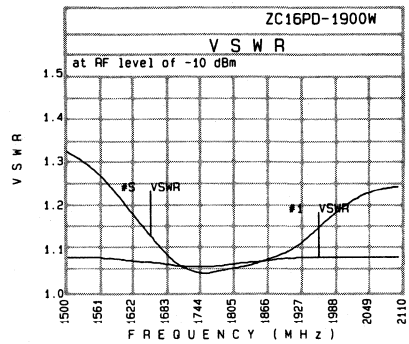
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.1	13.24	0.25	37.26	20.44	0.10	2.83	2.27
0.2	12.70	0.10	49.72	24.56	0.20	1.77	1.57
0.6	12.63	0.03	61.37	27.90	0.60	1.40	1.32
2.1	12.51	0.01	51.07	31.23	2.10	1.21	1.15
10.1	12.45	0.00	40.40	32.59	10.10	1.25	1.10
20.1	12.55	0.01	35.62	32.26	26.59	1.30	1.10
32.6	12.61	0.01	32.06	31.38	40.08	1.35	1.10
45.1	12.65	0.01	29.79	30.36	50.08	1.37	1.10
58.1	12.73	0.00	28.22	29.44	66.57	1.40	1.10
84.1	12.79	0.01	26.50	27.99	93.55	1.39	1.09
100.1	12.80	0.02	26.13	27.44	113.54	1.32	1.08
122.5	12.79	0.03	26.40	27.03	140.03	1.17	1.07
155.0	12.79	0.06	28.68	27.17	173.51	1.05	1.07
174.0	12.84	0.06	31.71	27.58	193.50	1.18	1.09
200.0	12.95	0.06	42.17	28.16	200.0	1.22	1.10

ZC16PD-1900W

1500 to 2100 MHz





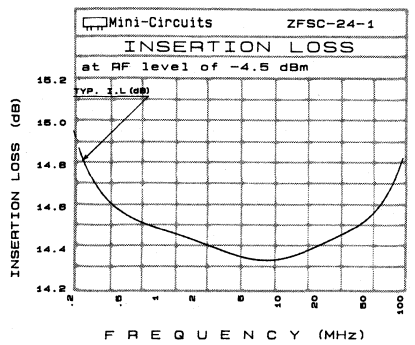


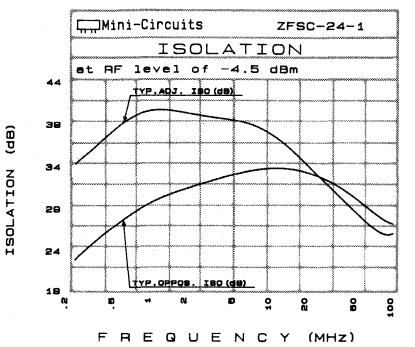
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1500.000	12.70	0.19	21.85	60.19	1500.000	1.33	1.09
1542.000	12.60	0.19	23.60	60.85	1542.000	1.30	1.09
1582.500	12.62	0.19	25.75	55.05	1582.500	1.25	1.09
1624.500	12.57	0.17	28.37	54.07	1624.500	1.18	1.08
1665.000	12.60	0.14	31.60	49.78	1665.000	1.12	1.08
1699.500	12.58	0.14	35.77	49.82	1699.500	1.07	1.07
1749.000	12.58	0.15	46.49	48.82	1749.000	1.05	1.07
1774.500	12.61	0.14	45.83	49.55	1774.500	1.06	1.07
1825.500	12.55	0.15	35.46	47.33	1825.500	1.07	1.08
1851.000	12.61	0.14	32.95	48.68	1851.000	1.08	1.08
1900.500	12.55	0.15	28.98	47.46	1900.500	1.10	1.09
1935.000	12.61	0.17	26.81	47.46	1935.000	1.13	1.09
1975.500	12.58	0.19	24.47	49.37	1975.500	1.18	1.09
2038.500	12.56	0.24	21.67	53.64	2038.500	1.24	1.09
2100.000	12.66	0.19	19.66	56.81	2100.000	1.25	1.09

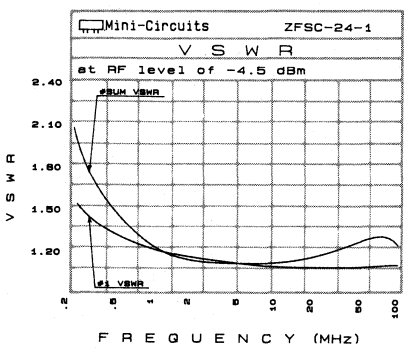
Power Splitter/Combiners 50 ohms

ZFSC-24-1

0.2 to 100MHz



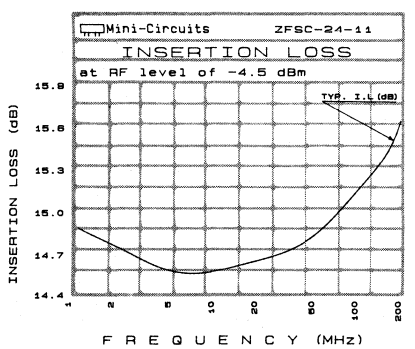


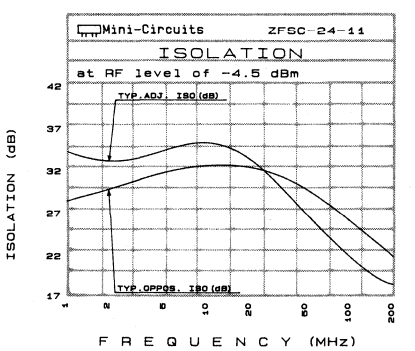


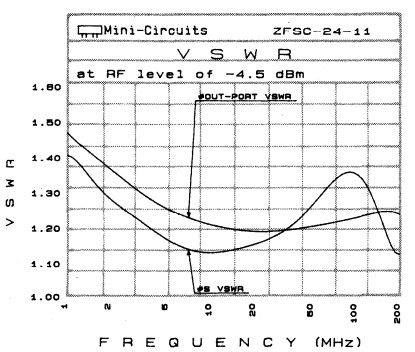
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.2	14.96	0.01	33.37	21.91	0.2	2.23	1.65
0.6	14.54	0.02	39.28	27.79	0.6	1.40	1.29
1.1	14.50	0.03	41.12	30.21	1.1	1.21	1.21
2.1	14.43	0.02	40.21	31.51	2.1	1.15	1.17
5.1	14.37	0.01	39.68	33.23	5.1	1.12	1.12
10.1	14.36	0.02	37.83	33.89	10.1	1.13	1.10
20.1	14.44	0.02	34.36	33.44	20.1	1.17	1.10
29.1	14.45	0.01	32.03	32.48	29.1	1.21	1.10
42.1	14.50	0.02	29.64	31.04	42.1	1.26	1.10
50.1	14.54	0.02	28.57	30.26	50.1	1.29	1.10
61.3	14.60	0.03	27.46	29.29	61.3	1.31	1.11
71.0	14.63	0.04	26.77	28.58	71.0	1.32	1.11
80.8	14.69	0.04	26.30	28.04	80.8	1.31	1.12
90.3	14.77	0.06	26.06	27.62	90.3	1.29	1.12
100.0	14.83	0.06	25.95	27.24	100.0	1.26	1.12

ZFSC-24-11

1 to 200MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.0	14.92	0.03	34.27	28.56	1.0	1.42	1.47
5.0	14.58	0.01	34.41	31.97	5.0	1.17	1.25
12.9	14.63	0.02	35.13	32.76	12.9	1.13	1.20
24.9	14.70	0.03	32.14	32.17	24.9	1.17	1.19
37.3	14.75	0.04	29.30	31.14	37.3	1.21	1.21
55.2	14.86	0.03	26.29	29.48	55.2	1.29	1.21
73.1	14.99	0.03	24.20	28.05	73.1	1.34	1.22
100.0	15.16	0.04	22.02	26.27	100.0	1.36	1.23
109.5	15.20	0.04	21.45	25.74	109.5	1.35	1.24
121.4	15.25	0.05	20.83	25.11	121.4	1.32	1.24
139.8	15.32	0.05	20.05	24.27	139.8	1.27	1.24
151.7	15.36	0.07	19.66	23.77	151.7	1.22	1.25
169.7	15.47	0.07	19.22	23.12	169.7	1.15	1.25
182.1	15.55	0.08	18.98	22.71	182.1	1.13	1.25
200.0	15.63	0.09	18.71	22.10	200.0	1.17	1.24

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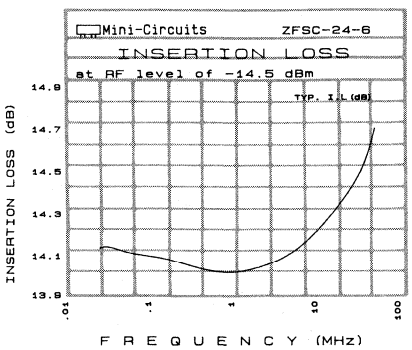
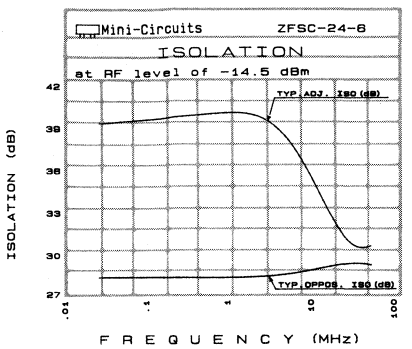
Mini-Circuits

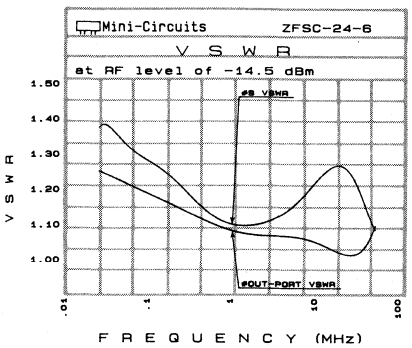
ZFSC-24-6

50 ohms

0.025 to 50MHz





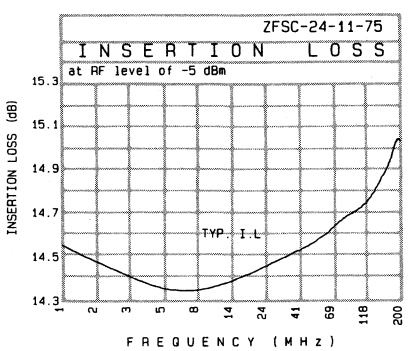


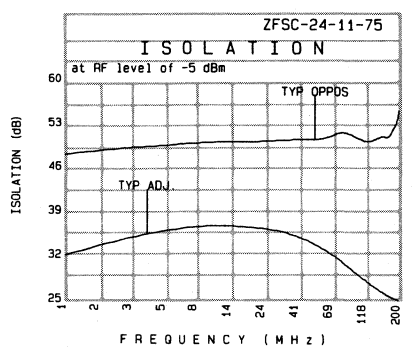
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
0.025	14.15	0.01	39.37	28.38	0.03	1.39	1.25
1.0	14.01	0.00	40.07	28.32	1.0	1.09	1.08
1.5	14.03	0.01	40.07	28.32	1.5	1.09	1.08
2.0	14.04	0.00	39.83	28.35	2.0	1.11	1.07
2.9	14.07	0.01	39.52	28.43	2.9	1.11	1.07
6.0	14.12	0.01	37.53	28.60	6.0	1.16	1.06
10.3	14.23	0.01	35.14	28.83	10.3	1.22	1.05
14.8	14.28	0.01	33.25	29.01	14.8	1.26	1.03
20.5	14.37	0.01	31.84	29.18	20.5	1.27	1.02
25.2	14.40	0.01	31.10	29.23	25.2	1.26	1.00
31.1	14.48	0.01	30.62	29.26	31.1	1.22	1.02
35.5	14.51	0.01	30.47	29.27	35.5	1.17	1.03
41.3	14.57	0.03	30.51	29.21	41.3	1.10	1.06
45.5	14.64	0.03	30.55	29.19	45.5	1.09	1.07
50.0	14.73	0.05	30.50	29.21	50.0	1.17	1.08

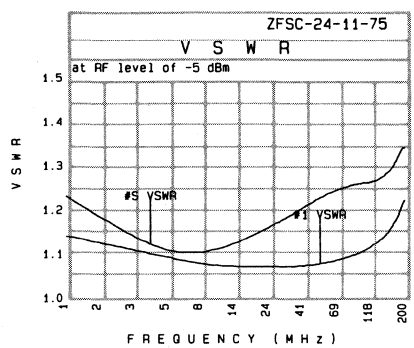
ZFSC-24-11-75

75 ohms

1 to 200 MHz







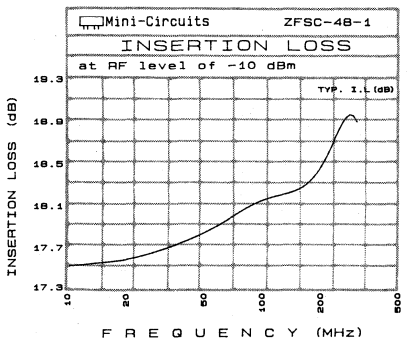
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.000	14.57	0.06	32.39	48.53	1.000	1.24	1.15
2.784	14.43	0.07	35.24	49.66	2.784	1.15	1.12
5.008	14.36	0.05	36.40	49.90	5.008	1.11	1.10
10.523	14.36	0.05	37.40	50.59	10.523	1.11	1.08
24.953	14.48	0.05	36.80	50.51	24.953	1.17	1.08
39.776	14.54	0.07	35.74	50.98	39.776	1.21	1.08
62.319	14.61	0.06	33.43	50.69	62.319	1.25	1.09
79.364	14.69	0.06	31.75	52.37	79.364	1.26	1.10
99.339	14.72	0.08	29.94	51.48	99.339	1.27	1.11
124.343	14.77	0.11	28.11	50.12	124.343	1.27	1.13
150.356	14.88	0.17	26.80	51.69	150.356	1.29	1.15
169.676	14.94	0.15	26.08	50.94	169.676	1.31	1.18
178.699	15.01	0.16	25.80	52.51	178.699	1.33	1.19
191.479	15.06	0.19	25.58	53.20	191.479	1.35	1.22
200.000	15.04	0.19	25.43	55.56	200.000	1.35	1.23

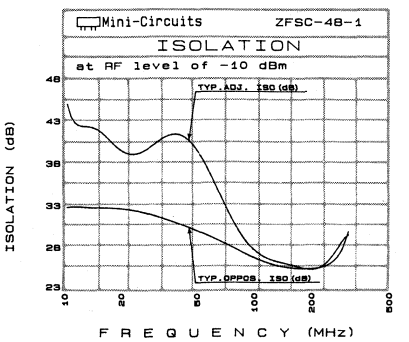
Power Splitter/Combiners

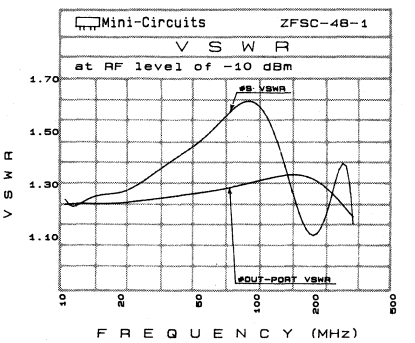
ZFSC-48-1

50 ohms

10 to 300MHz





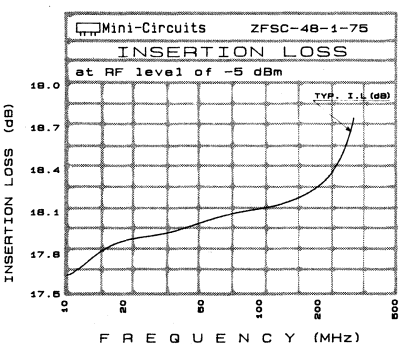


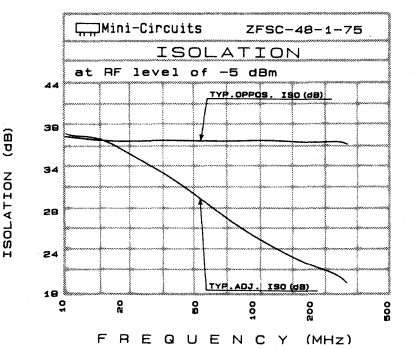
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
10.0	17.53	0.00	43.84	32.90	10.0	1.22	1.23
20.0	17.61	0.03	39.93	32.62	20.0	1.28	1.23
35.6	17.74	0.04	40.49	31.21	35.6	1.38	1.26
50.0	17.83	0.07	39.60	29.83	50.0	1.48	1.27
78.2	18.03	0.11	30.36	27.73	78.2	1.60	1.30
100.0	18.15	0.10	27.79	26.64	100.0	1.58	1.32
112.4	18.23	0.08	26.95	26.24	112.4	1.54	1.33
120.9	18.21	0.07	26.44	25.97	120.9	1.49	1.33
137.9	18.22	0.07	25.86	25.62	137.9	1.37	1.34
155.0	18.24	0.04	25.54	25.42	155.0	1.23	1.34
200.0	18.51	0.10	25.57	25.53	200.0	1.12	1.31
231.8	18.76	0.12	26.22	25.89	231.8	1.30	1.27
250.0	18.86	0.09	26.93	26.15	250.0	1.35	1.25
274.4	18.93	0.03	28.31	27.38	274.4	1.33	1.21
300.0	18.97	0.07	29.68	30.05	300.0	1.25	1.19

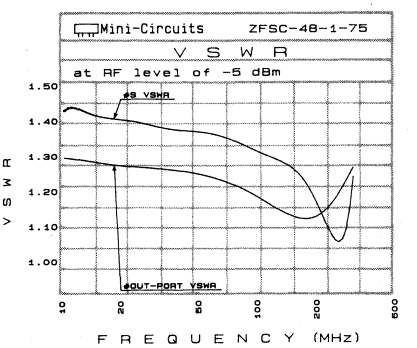
ZFSC-48-1-75

75 ohms

10 to 300MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
10.0	17.64	0.05	38.23	37.93	10.0	1.44	1.30
20.2	17.90	0.05	35.98	37.46	20.2	1.40	1.27
49.9	18.02	0.05	30.93	37.71	49.9	1.37	1.25
60.0	18.05	0.06	29.45	37.30	60.0	1.36	1.24
76.0	18.08	0.04	27.89	37.54	76.0	1.34	1.22
101.4	18.12	0.06	26.08	37.47	101.4	1.31	1.18
126.0	18.12	0.06	24.80	37.36	126.0	1.29	1.14
142.7	18.19	0.10	24.23	37.85	142.7	1.26	1.13
150.7	18.18	0.08	23.98	37.32	150.7	1.25	1.13
176.0	18.25	0.09	23.31	37.28	176.0	1.21	1.12
200.7	18.29	0.11	22.81	37.71	200.7	1.16	1.13
225.3	18.37	0.12	22.41	37.30	225.3	1.10	1.15
250.0	18.46	0.11	21.97	37.99	250.0	1.03	1.19
275.4	18.58	0.10	21.46	37.17	275.4	1.10	1.23
300.0	18.77	0.10	20.91	37.16	300.0	1.23	1.27

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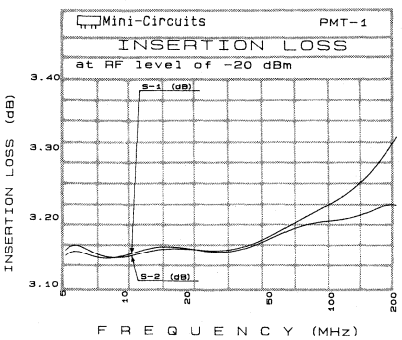
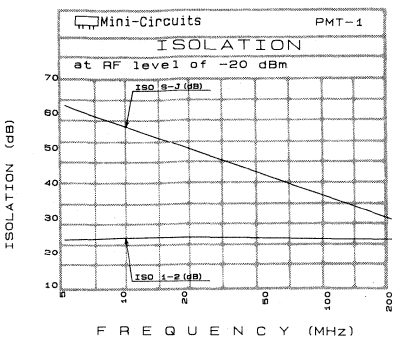
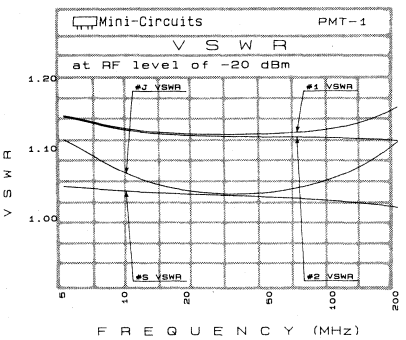
Mini-Circuits

PMT-1 50 ohms 5 to 200MHz

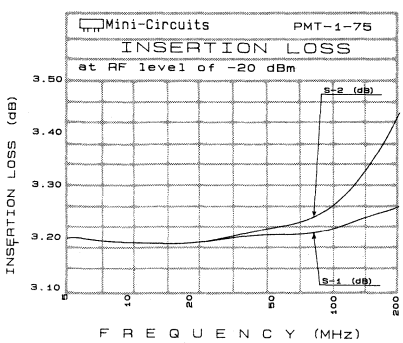


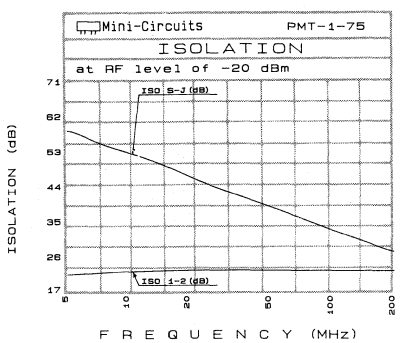


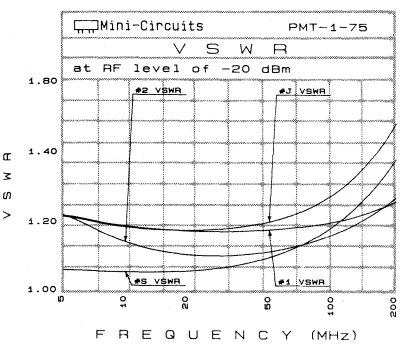


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) (S-1) − (S-2)	INSERTION LOSS (dB) J-1	INSERTION LOSS (dB) J-2	AMPLITUDE UNBALANCE (dB) (J-1) − (J-2)	ISOLATION (dB) 1-2	ISOLATION (dB) S-J	PHASE UNBALANCE (Degrees) S-2	PHASE UNBALANCE (Degrees) J-2	VSWR S	VSWR 1	VSWR 2
5.0	3.15	3.16	.01	3.76	3.76	0.00	23.77	61.92	.05	179.94	1.05	1.15	1.15
10.0	3.14	3.14	0.00	3.69	3.69	0.00	24.36	55.90	.12	179.88	1.04	1.13	1.13
20.0	3.16	3.16	0.00	3.70	3.70	0.00	24.57	49.97	.27	179.65	1.03	1.12	1.12
27.5	3.15	3.15	0.00	3.69	3.69	0.00	24.49	27.50	.31	179.55	1.03	1.12	1.12
44.0	3.17	3.17	0.00	3.74	3.73	.01	24.43	43.13	.54	179.34	1.03	1.12	1.12
50.0	3.17	3.17	0.00	3.74	3.73	.01	24.40	42.48	.63	179.23	1.03	1.12	1.12
66.5	3.18	3.19	.01	3.78	3.77	.01	24.33	39.40	.81	178.94	1.03	1.12	1.11
88.5	3.19	3.21	.02	3.81	3.78	.03	24.26	37.01	1.00	178.67	1.03	1.13	1.11
94.0	3.20	3.22	.02	3.82	3.79	.03	24.25	36.61	1.11	178.51	1.03	1.13	1.11
100.0	3.20	3.23	.03	3.84	3.80	.04	24.25	35.88	1.20	178.43	1.02	1.13	1.12
122.0	3.22	3.25	.03	3.87	3.82	.05	24.20	34.34	1.44	178.13	1.02	1.13	1.11
133.0	3.20	3.25	.05	3.87	3.81	.06	24.22	33.48	1.54	177.91	1.02	1.14	1.11
150.0	3.21	3.27	.06	3.90	3.82	.08	24.15	32.36	1.69	177.60	1.02	1.14	1.11
177.5	3.22	3.30	.08	3.95	3.82	.13	24.18	30.91	1.99	177.28	1.02	1.15	1.11
200.0	3.22	3.31	.09	3.97	3.81	.16	24.20	29.79	2.30	176.84	1.02	1.16	1.11

PMT-1-75 75 ohms 5 to 200MHz







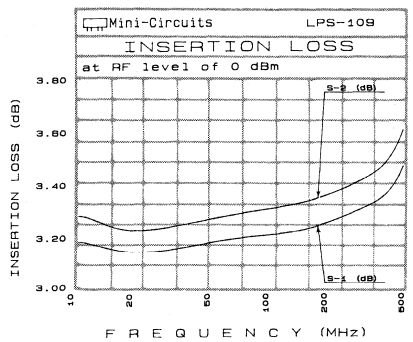
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) (S-1) − (S-2)	INSERTION LOSS (dB) J-1	INSERTION LOSS (dB) J-2	AMPLITUDE UNBALANCE (dB) (J-1) − (J-2)	ISOLATION (dB) 1-2	ISOLATION (dB) S-J	PHASE UNBALANCE (Degrees) S-2	PHASE UNBALANCE (Degrees) J-2	VSWR S	VSWR 1	VSWR 2
5.0	3.20	3.20	0.00	4.15	4.15	0.00	21.37	58.57	.09	179.87	1.06	1.22	1.22
10.0	3.19	3.19	0.00	4.03	4.03	0.00	22.20	52.38	.21	179.76	1.06	1.19	1.14
20.0	3.19	3.19	0.00	4.00	4.00	0.00	22.54	46.33	.38	179.50	1.06	1.17	1.11
27.5	3.20	3.20	0.00	4.00	4.00	0.00	22.63	43.29	.62	179.34	1.07	1.17	1.10
44.0	3.20	3.21	.01	4.02	4.02	0.00	22.57	39.73	.89	178.90	1.09	1.17	1.11
50.0	3.21	3.22	.01	4.03	4.04	.01	22.55	38.61	.98	178.74	1.10	1.18	1.12
66.5	3.20	3.23	.03	4.04	4.05	.01	22.54	36.34	1.26	178.35	1.13	1.18	1.13
88.5	3.21	3.25	.04	4.07	4.07	0.00	22.52	33.84	1.68	177.84	1.17	1.19	1.15
94.0	3.21	3.26	.05	4.07	4.08	.01	22.48	33.22	1.80	177.73	1.18	1.20	1.16
100.0	3.22	3.26	.04	4.07	4.08	.01	22.46	32.82	1.92	177.54	1.19	1.20	1.16
122.0	3.23	3.31	.08	4.11	4.11	0.00	22.51	31.17	2.34	177.04	1.23	1.21	1.19
133.0	3.24	3.32	.08	4.11	4.13	.02	22.44	30.45	2.56	176.75	1.25	1.22	1.20
150.0	3.25	3.36	.11	4.13	4.14	.01	22.42	29.38	2.79	176.41	1.28	1.23	1.22
177.5	3.25	3.39	.14	4.14	4.14	0.00	22.42	28.04	3.28	175.78	1.34	1.24	1.25
200.0	3.26	3.45	.19	4.16	4.16	0.00	22.40	27.16	3.72	175.35	1.38	1.26	1.27

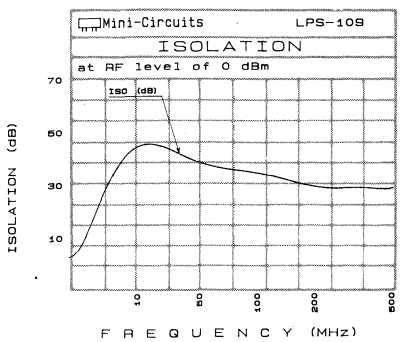
2WAY-0°

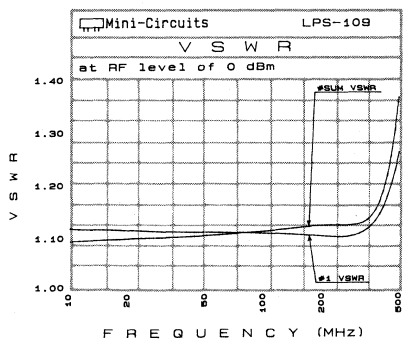
Power Splitter/Combiners 50 ohms

LPS-109

10 to 500MHz



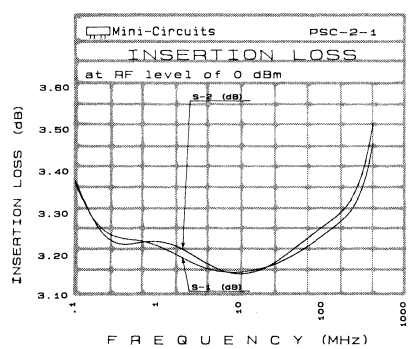


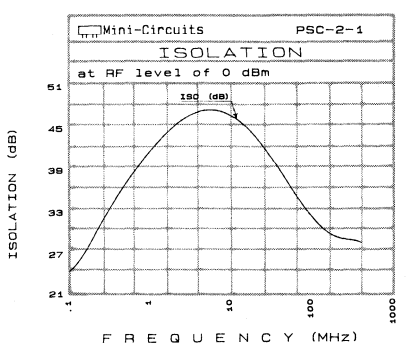


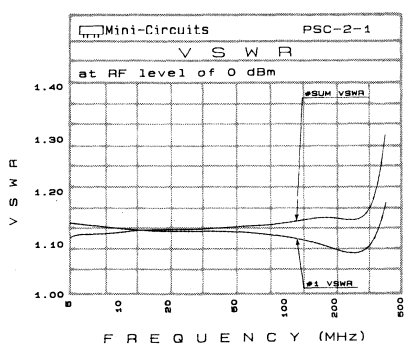
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	3.19	3.29	0.10	49.87	10.0	1.09	1.12	1.14
34.5	3.16	3.25	0.09	42.08	34.5	1.10	1.11	1.13
59.0	3.19	3.28	0.09	37.67	59.0	1.11	1.11	1.13
83.5	3.20	3.29	0.09	35.19	83.5	1.11	1.11	1.13
108.0	3.21	3.30	0.09	33.43	108.0	1.11	1.11	1.13
132.5	3.22	3.33	0.11	32.10	132.5	1.12	1.11	1.13
157.0	3.24	3.34	0.10	31.06	157.0	1.12	1.11	1.13
206.0	3.27	3.36	0.09	29.55	206.0	1.12	1.10	1.12
255.0	3.28	3.39	0.11	28.67	255.0	1.12	1.10	1.12
304.0	3.31	3.42	0.11	28.29	304.0	1.13	1.11	1.11
353.0	3.34	3.46	0.12	28.41	353.0	1.14	1.12	1.12
402.0	3.36	3.48	0.12	28.79	402.0	1.18	1.15	1.13
426.5	3.36	3.48	0.12	28.93	426.5	1.21	1.17	1.14
451.0	3.40	3.52	0.12	28.84	451.0	1.25	1.20	1.16
500.0	3.49	3.63	0.14	27.07	500.0	1.37	1.26	1.20

PSC-2-1

0.1 to 400MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.1	3.37	3.38	0.01	24.33	5.0	1.12	1.14	1.14
0.2	3.26	3.25	0.01	29.63	10.0	1.12	1.13	1.13
0.5	3.24	3.23	0.01	37.19	17.3	1.13	1.12	1.12
1.0	3.22	3.22	0.00	41.80	20.0	1.13	1.12	1.12
10.0	3.16	3.16	0.00	47.10	50.0	1.13	1.12	1.12
20.0	3.18	3.18	0.00	43.53	66.7	1.13	1.12	1.12
50.0	3.20	3.20	0.00	37.27	100.0	1.14	1.11	1.11
100.0	3.24	3.24	0.00	32.42	140.8	1.14	1.10	1.1
148.2	3.27	3.29	0.02	30.09	190.2	1.15	1.09	1.09
200.0	3.31	3.33	0.02	28.94	227.2	1.14	1.08	1.08
251.9	3.32	3.35	0.03	28.80	276.6	1.15	1.08	1.08
296.3	3.34	3.39	0.05	29.45	313.6	1.16	1.09	1.09
340.8	3.40	3.45	0.05	29.74	350.6	1.20	1.12	1.11
370.4	3.42	3.48	0.06	28.61	375.3	1.24	1.14	1.13
400.0	3.48	3.53	0.05	26.04	400.0	1.30	1.17	1.16

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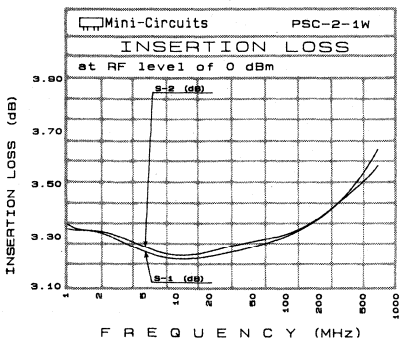
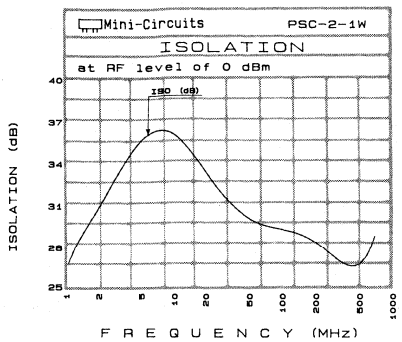
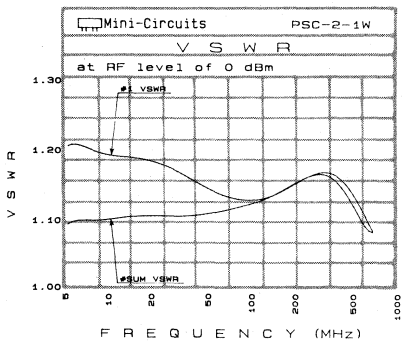
Mini-Circuits

PSC-2-1W

1 to 650MHz





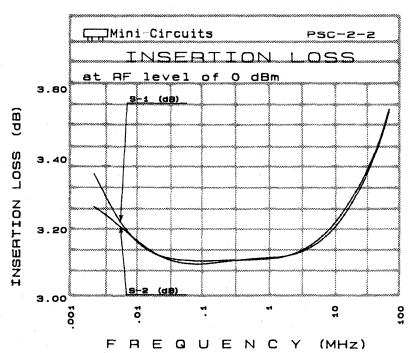


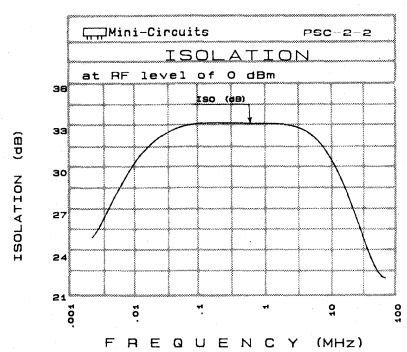
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
1.0	3.33	3.34	.01	27.14
5.0	3.24	3.27	.03	36.17
10.0	3.21	3.21	0.00	36.31
20.0	3.23	3.26	.03	33.11
50.0	3.27	3.28	.01	29.97
100.0	3.31	3.33	.02	29.30
147.6	3.33	3.34	.01	28.78
200.0	3.36	3.36	0.00	28.24
252.2	3.41	3.41	0.00	27.69
294.1	3.45	3.45	0.00	27.28
398.8	3.50	3.51	.01	26.67
461.6	3.54	3.51	-.03	26.73
500.0	3.55	3.52	-.03	26.97
566.3	3.61	3.56	-.05	27.70
650.0	3.66	3.59	-.07	28.72

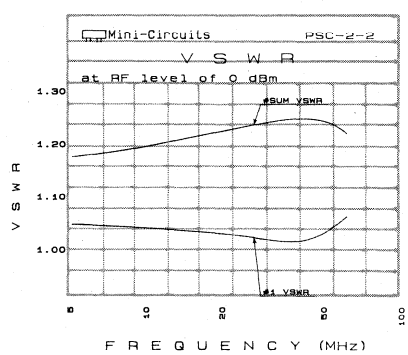
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	1.10	1.21	1.21
5.0	1.10	1.21	1.21
10.0	1.10	1.19	1.19
20.0	1.11	1.18	1.19
50.0	1.11	1.14	1.14
100.0	1.12	1.13	1.13
147.6	1.14	1.14	1.14
200.0	1.15	1.15	1.16
252.2	1.16	1.16	1.18
294.1	1.16	1.17	1.18
398.8	1.15	1.16	1.17
461.6	1.13	1.15	1.16
500.0	1.11	1.13	1.14
566.3	1.09	1.11	1.11
650.0	1.09	1.09	1.08

PSC-2-2

0.004 to 60MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.002	3.36	3.27	0.09	25.29
0.005	3.22	3.21	0.01	28.78
0.01	3.13	3.12	0.01	32.59
0.1	3.11	3.11	0.00	33.31
0.1	3.12	3.11	0.01	33.50
1.0	3.13	3.13	0.00	33.49
5.0	3.17	3.17	0.00	32.63
10.0	3.23	3.22	0.01	30.64
20.0	3.32	3.31	0.01	27.22
25.0	3.35	3.34	0.01	25.94
30.0	3.39	3.38	0.01	24.99
40.0	3.44	3.43	0.01	23.60
45.0	3.46	3.46	0.00	23.13
55.0	3.53	3.52	0.01	22.57
60.0	3.55	3.55	0.00	22.47

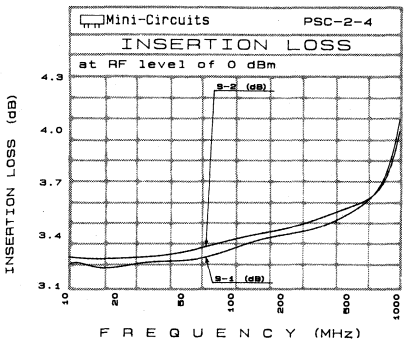
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.0	1.18	1.05	1.05
6.6	1.18	1.05	1.05
9.9	1.20	1.04	1.04
10.0	1.20	1.04	1.04
11.5	1.20	1.04	1.04
16.3	1.22	1.03	1.03
20.0	1.23	1.03	1.03
24.4	1.23	1.02	1.02
32.5	1.24	1.02	1.02
37.4	1.25	1.01	1.01
40.6	1.25	1.02	1.01
47.1	1.25	1.03	1.03
50.0	1.24	1.03	1.03
55.1	1.23	1.05	1.05
58.4	1.23	1.06	1.06

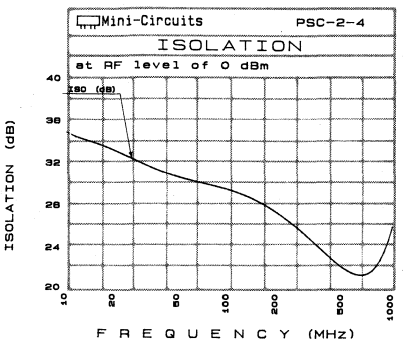
2WAY-0°

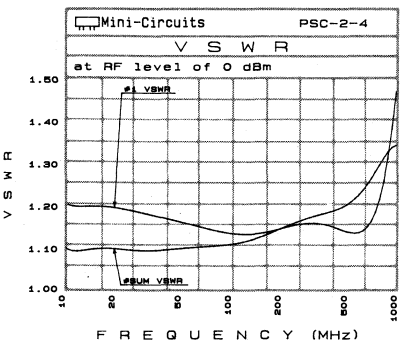
Power Splitter/Combiners 50 ohms

PSC-2-4

10 to 1000MHz





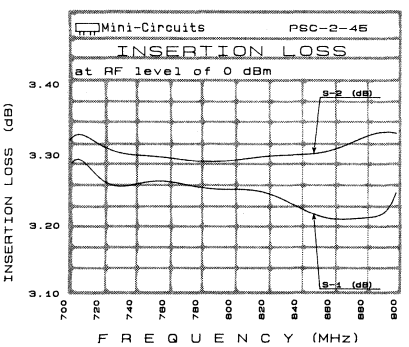


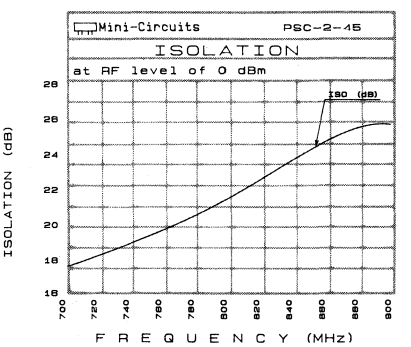
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
10.0	3.25	3.28	0.03	34.82
20.0	3.22	3.27	0.05	33.24
50.0	3.27	3.30	0.03	30.72
100.0	3.34	3.40	0.06	29.51
155.4	3.38	3.40	0.02	28.35
200.0	3.41	3.43	0.02	27.34
300.9	3.45	3.52	0.07	25.24
417.2	3.49	3.55	0.06	23.16
500.0	3.48	3.51	0.03	22.18
562.7	3.57	3.57	0.00	21.75
649.9	3.59	3.61	0.02	21.48
737.2	3.65	3.66	0.01	21.75
853.6	3.77	3.73	0.04	23.02
940.8	3.93	3.88	0.05	24.78
1000.0	4.06	4.00	0.06	25.69

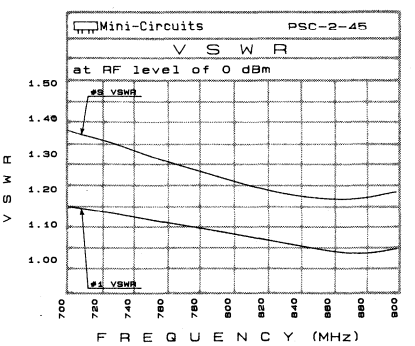
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	1.10	1.20	1.20
20.0	1.10	1.20	1.19
50.0	1.10	1.16	1.16
100.0	1.11	1.14	1.15
155.4	1.13	1.14	1.16
200.0	1.15	1.15	1.17
300.9	1.17	1.16	1.20
417.2	1.20	1.16	1.21
500.0	1.21	1.14	1.20
562.7	1.21	1.13	1.19
649.9	1.24	1.14	1.17
737.2	1.28	1.18	1.16
853.6	1.33	1.28	1.20
940.8	1.34	1.38	1.26
1000.0	1.32	1.44	1.31

PSC-2-45

700 to 900MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
700.0	3.25	3.30	0.05	17.60
711.1	3.28	3.34	0.06	17.93
722.2	3.27	3.31	0.04	18.30
733.3	3.26	3.30	0.04	18.68
750.0	3.25	3.29	0.04	19.32
761.1	3.27	3.30	0.03	19.70
777.8	3.24	3.29	0.05	20.38
800.0	3.25	3.28	0.03	21.45
811.1	3.26	3.31	0.05	22.06
822.2	3.24	3.30	0.06	22.63
850.0	3.22	3.32	0.10	24.18
861.1	3.21	3.30	0.09	24.73
877.8	3.20	3.32	0.12	25.40
888.9	3.22	3.34	0.12	25.69
900.0	3.24	3.34	0.10	25.68

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
700.0	1.37	1.15	1.18
711.1	1.35	1.14	1.17
722.2	1.34	1.14	1.17
733.3	1.33	1.13	1.16
750.0	1.29	1.11	1.14
761.1	1.27	1.10	1.13
777.8	1.26	1.09	1.12
800.0	1.23	1.07	1.10
811.1	1.21	1.06	1.09
822.2	1.20	1.05	1.09
850.0	1.17	1.03	1.06
861.1	1.17	1.02	1.05
877.8	1.17	1.02	1.04
888.9	1.18	1.02	1.03
900.0	1.19	1.03	1.03

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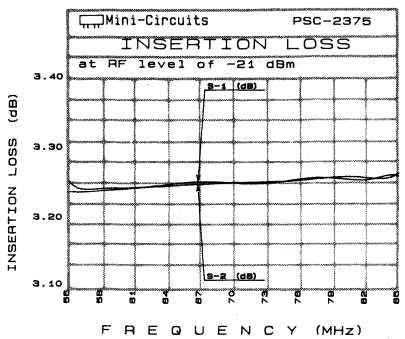
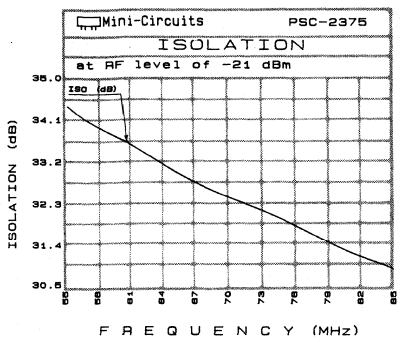
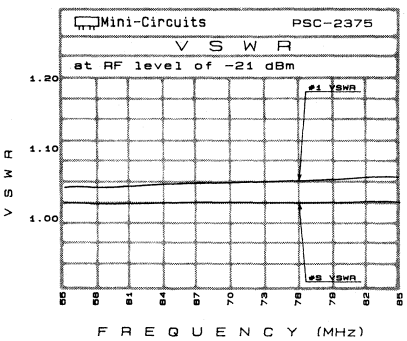
PSC-2375

55 to 85MHz



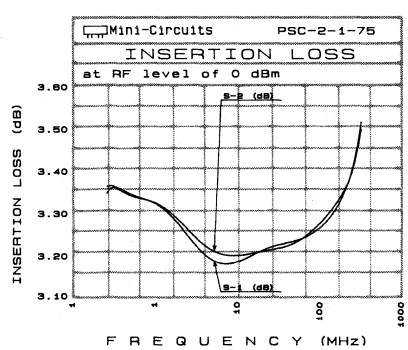


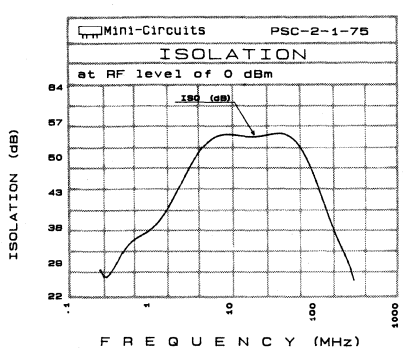


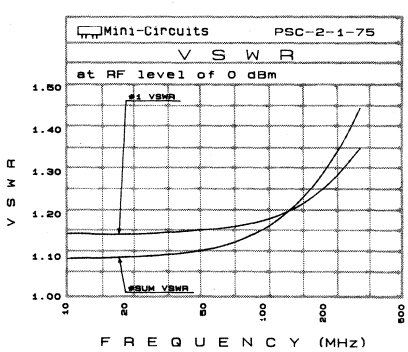
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
55.0	3.25	3.24	0.01	34.39	55.0	1.02	1.05	1.05
57.5	3.24	3.24	0.00	34.10	57.5	1.02	1.05	1.05
59.2	3.24	3.24	0.00	33.79	59.2	1.02	1.05	1.04
62.5	3.23	3.23	0.00	33.29	62.5	1.02	1.05	1.05
65.8	3.24	3.25	0.01	32.84	65.8	1.03	1.05	1.05
68.4	3.25	3.25	0.00	32.63	68.4	1.02	1.05	1.05
70.0	3.25	3.25	0.00	32.49	70.0	1.03	1.06	1.05
71.7	3.25	3.25	0.00	32.18	71.7	1.02	1.05	1.05
74.2	3.25	3.25	0.00	32.05	74.2	1.02	1.06	1.05
75.9	3.25	3.24	0.01	31.99	75.9	1.02	1.06	1.06
77.5	3.26	3.26	0.00	31.52	77.5	1.02	1.06	1.05
79.2	3.26	3.26	0.00	31.41	79.2	1.03	1.06	1.06
80.8	3.25	3.25	0.00	31.16	80.8	1.03	1.06	1.06
83.4	3.26	3.25	0.01	31.01	83.4	1.03	1.06	1.06
85.0	3.26	3.26	0.00	30.87	85.0	1.03	1.06	1.06

PSC-2-1-75

0.25 to 300MHz







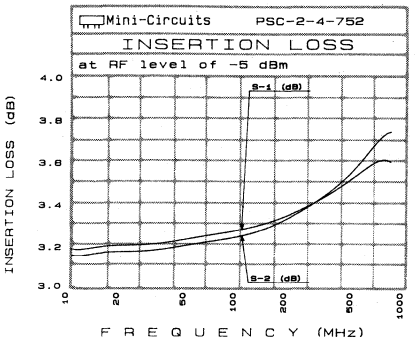
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.3	3.28	3.28	0.00	26.02	0.3	1.25	1.43	1.43
5.0	3.17	3.18	0.01	47.23	5.0	1.09	1.15	1.16
10.1	3.18	3.18	0.00	55.78	10.1	1.10	1.15	1.15
20.0	3.20	3.20	0.00	52.41	20.0	1.11	1.16	1.16
45.3	3.25	3.24	0.01	44.45	45.3	1.17	1.21	1.19
77.4	3.30	3.29	0.01	40.51	77.4	1.27	1.28	1.26
89.9	3.33	3.33	0.00	39.18	89.9	1.31	1.32	1.29
102.5	3.36	3.36	0.00	38.01	102.5	1.36	1.36	1.32
123.3	3.39	3.39	0.00	36.35	123.3	1.42	1.43	1.37
141.0	3.44	3.44	0.00	35.27	141.0	1.48	1.49	1.42
161.4	3.46	3.47	0.01	33.80	161.4	1.54	1.56	1.48
175.4	3.48	3.48	0.00	33.08	175.4	1.58	1.61	1.52
200.0	3.53	3.51	0.02	31.92	200.0	1.64	1.70	1.60
250.0	3.66	3.64	0.02	28.99	250.0	1.71	1.78	1.76
300.0	3.80	3.78	0.02	28.86	300.0	1.74	1.89	1.90

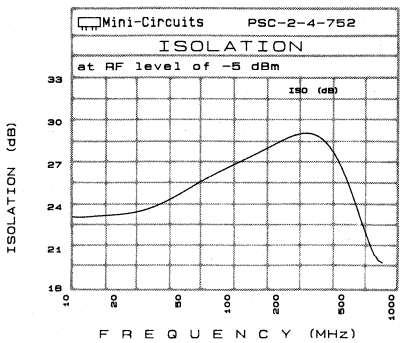
Power Splitter/Combiners

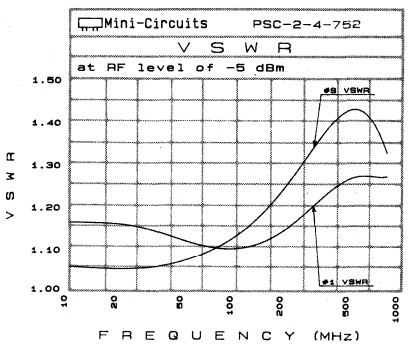
75 ohms

PSC-2-4-752

10 to 850MHz







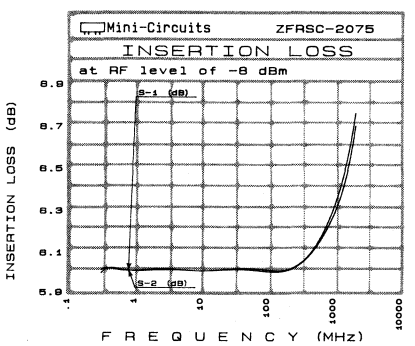
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
10.0	3.19	3.16	0.03	23.30
20.5	3.21	3.18	0.03	23.42
49.9	3.24	3.21	0.03	24.94
100.3	3.29	3.27	0.02	26.90
159.1	3.31	3.29	0.02	27.92
199.0	3.33	3.32	0.01	28.45
232.6	3.38	3.37	0.01	28.82
306.1	3.41	3.41	0.00	29.20
404.8	3.48	3.49	0.01	28.42
499.3	3.51	3.54	0.03	26.32
528.7	3.53	3.57	0.04	25.58
602.2	3.56	3.62	0.06	23.79
700.9	3.61	3.70	0.09	21.73
776.5	3.63	3.74	0.11	20.54
850.0	3.63	3.78	0.15	19.61

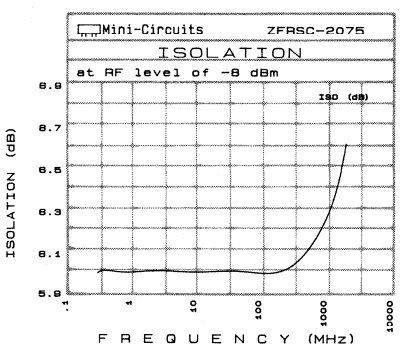
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	1.06	1.17	1.17
20.5	1.05	1.16	1.16
49.9	1.07	1.12	1.12
100.3	1.13	1.10	1.11
159.1	1.20	1.13	1.13
199.0	1.24	1.14	1.16
232.6	1.28	1.16	1.18
306.1	1.34	1.21	1.23
404.8	1.41	1.25	1.27
499.3	1.43	1.27	1.30
528.7	1.43	1.27	1.30
602.2	1.43	1.27	1.31
700.9	1.40	1.28	1.31
776.5	1.37	1.27	1.32
850.0	1.33	1.28	1.33

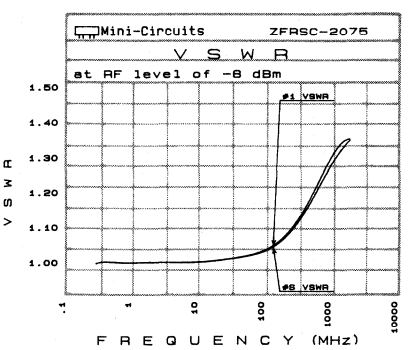
ZFRSC-2075

Resistive

DC to 2000MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.3	6.02	6.03	.01	6.03
0.5	6.02	6.02	0.00	6.02
1.0	6.02	6.02	0.01	6.01
11.9	6.02	6.02	0.00	6.02
30.0	6.03	6.02	0.01	6.03
75.3	6.02	6.03	0.01	6.02
101.6	6.03	6.02	0.01	6.03
255.3	6.03	6.03	0.00	6.03
497.8	6.11	6.12	0.01	6.11
993.3	6.35	6.36	0.01	6.34
1503.5	6.47	6.50	0.03	6.45
1611.0	6.56	6.59	0.03	6.52
1892.8	6.80	6.84	0.03	6.79
1982.0	6.79	6.83	0.04	6.76
2123.8	6.85	6.92	0.07	6.89

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.3	1.00	1.00	1.00
0.5	1.00	1.00	1.00
1.0	1.00	1.00	1.00
11.9	1.00	1.00	1.00
30.0	1.00	1.01	1.01
75.3	1.02	1.02	1.02
101.6	1.03	1.03	1.03
255.3	1.08	1.09	1.09
397.8	1.16	1.17	1.18
993.3	1.27	1.28	1.30
1503.5	1.31	1.32	1.34
1611.0	1.32	1.33	1.35
1892.8	1.35	1.37	1.38
1982.0	1.37	1.38	1.39
2123.8	1.40	1.41	1.41

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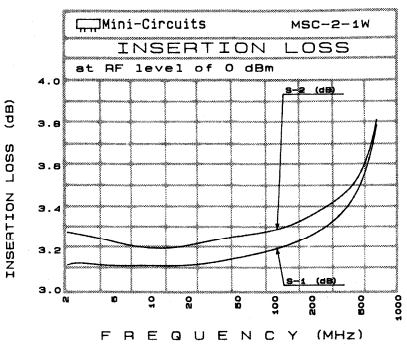
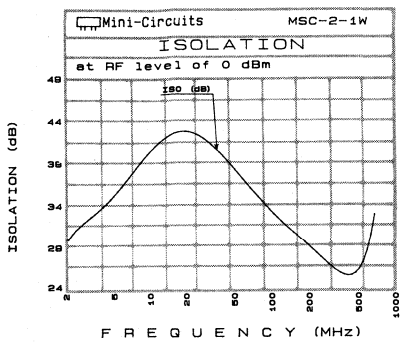
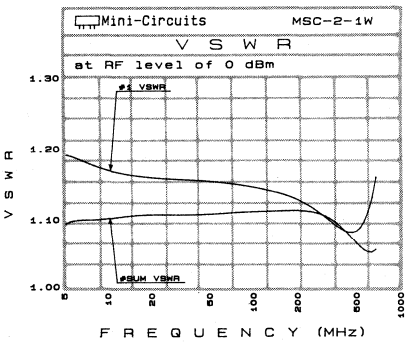
MSC-2-1W

2 to 650MHz



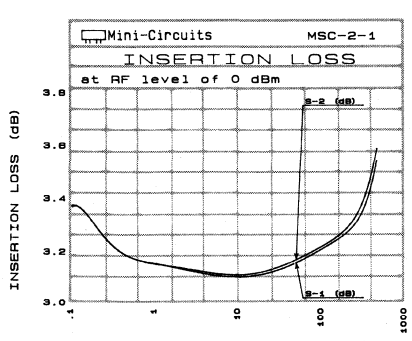


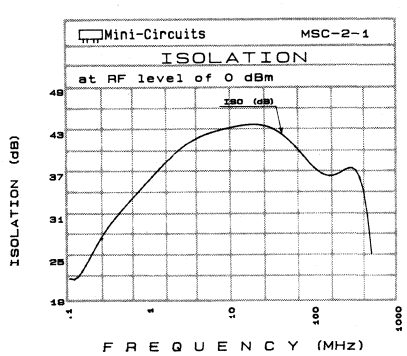


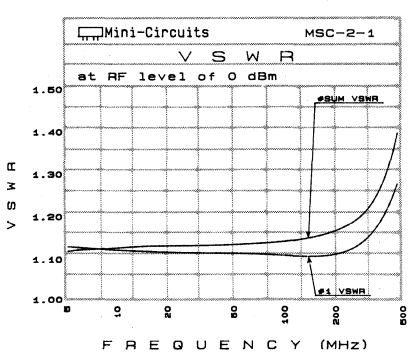
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
2.0	3.14	3.29	0.15	30.21	5.0	1.10	1.19	1.22
5.0	3.13	3.24	0.11	35.43	10.0	1.10	1.17	1.19
10.0	3.12	3.20	0.08	40.84	20.0	1.11	1.16	1.18
20.0	3.14	3.23	0.09	43.34	24.5	1.11	1.16	1.18
50.0	3.16	3.27	0.11	37.81	63.6	1.11	1.15	1.17
100.0	3.20	3.32	0.12	33.19	102.7	1.11	1.14	1.17
200.0	3.28	3.37	0.09	28.69	200.5	1.11	1.13	1.14
265.3	3.31	3.40	0.09	27.12	278.6	1.11	1.11	1.11
326.0	3.37	3.45	0.08	26.26	337.3	1.10	1.09	1.10
366.5	3.40	3.49	0.09	25.93	376.4	1.09	1.09	1.08
407.0	3.45	3.51	0.06	25.83	415.5	1.08	1.08	1.07
500.0	3.53	3.59	0.06	26.55	500.0	1.06	1.08	1.07
548.8	3.59	3.65	0.06	27.68	552.3	1.05	1.10	1.09
629.8	3.75	3.78	0.03	32.14	630.4	1.06	1.14	1.13
650.0	3.84	3.85	0.01	34.46	650.0	1.06	1.15	1.14

MSC-2-1

0.1 to 450MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.1	3.39	3.39	0.00	21.64	5.0	1.12	1.13	1.13
1.0	3.16	3.16	0.00	36.97	19.4	1.13	1.12	1.12
5.0	3.10	3.11	0.01	43.22	48.1	1.14	1.12	1.12
20.0	3.12	3.13	0.01	44.05	76.8	1.14	1.11	1.11
50.0	3.17	3.17	0.00	41.60	105.5	1.15	1.11	1.11
80.4	3.20	3.21	0.01	39.41	134.2	1.15	1.11	1.11
100.0	3.20	3.20	0.00	38.34	162.9	1.16	1.11	1.11
144.7	3.25	3.27	0.02	36.80	200.0	1.17	1.11	1.11
200.0	3.28	3.30	0.02	36.48	249.0	1.19	1.13	1.13
257.2	3.29	3.33	0.04	37.75	300.0	1.22	1.15	1.15
305.4	3.36	3.39	0.03	39.19	335.2	1.25	1.17	1.17
353.6	3.44	3.46	0.02	36.07	363.9	1.27	1.19	1.2
400.0	3.45	3.50	0.05	30.89	406.9	1.33	1.23	1.24
417.9	3.49	3.53	0.04	29.10	435.7	1.37	1.26	1.26
450.0	3.55	3.61	0.06	26.00				

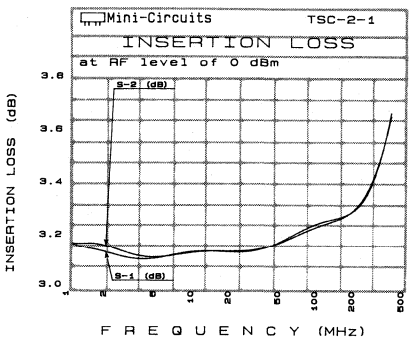
2WAY-0°

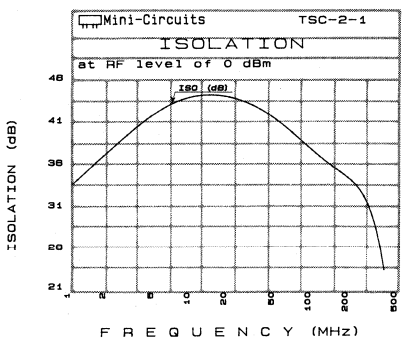
Power Splitter/Combiners

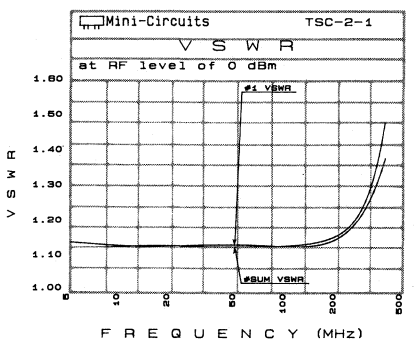
50 ohms

TSC-2-1

1 to 400MHz







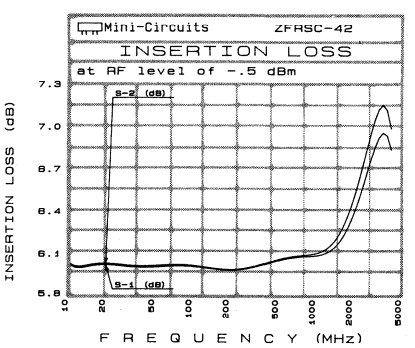
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
1.0	3.17	3.17	0.00	33.08
10.0	3.15	3.15	0.00	43.64
20.0	3.12	3.12	0.00	43.77
50.0	3.18	3.18	0.00	41.30
75.8	3.21	3.18	0.03	39.22
100.0	3.25	3.22	0.03	37.61
125.7	3.24	3.24	0.00	36.42
163.1	3.26	3.26	0.00	35.09
200.0	3.28	3.29	0.01	34.19
237.9	3.33	3.35	0.02	33.19
275.3	3.37	3.38	0.01	32.11
312.7	3.50	3.51	0.01	30.09
350.1	3.50	3.51	0.01	27.45
375.1	3.61	3.62	0.01	25.61
400.0	3.70	3.67	0.03	23.63

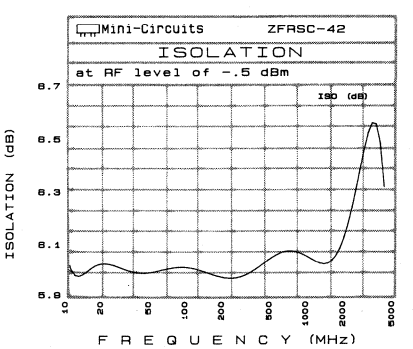
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.0	1.12	1.14	1.13
20.0	1.13	1.13	1.12
50.0	1.12	1.13	1.12
74.7	1.12	1.13	1.12
100.0	1.13	1.12	1.12
132.8	1.13	1.13	1.12
156.0	1.14	1.13	1.13
179.3	1.14	1.14	1.14
200.0	1.15	1.14	1.15
237.4	1.18	1.17	1.17
272.2	1.21	1.20	1.21
307.1	1.26	1.23	1.25
341.9	1.32	1.28	1.30
376.8	1.41	1.33	1.36
400.0	1.48	1.38	1.40

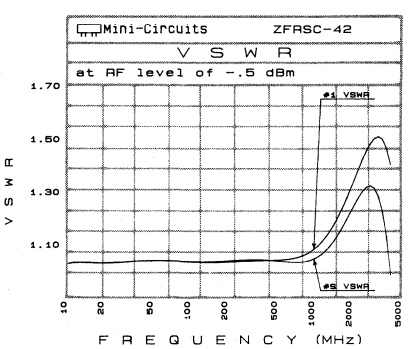
ZFRSC-42

Resistive

DC to 4200MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
10.0	6.01	6.02	0.01	6.00
51.9	6.01	6.02	0.01	6.01
104.3	5.99	6.00	0.01	5.99
198.6	5.99	6.00	0.01	5.99
502.3	6.02	6.02	0.00	6.01
1005.1	6.13	6.15	0.02	6.09
1225.1	6.16	6.18	0.02	6.10
1497.5	6.11	6.15	0.04	6.04
2042.2	6.26	6.36	0.10	6.04
2440.2	6.68	6.85	0.17	6.30
2995.4	6.92	7.09	0.17	6.59
3519.1	6.73	6.94	0.21	6.47
3791.5	6.91	7.10	0.19	6.52
4063.8	6.99	7.15	0.16	6.38
4200.0	7.01	7.17	0.16	6.34

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	1.03	1.03	1.03
51.9	1.04	1.04	1.04
104.3	1.04	1.04	1.03
198.6	1.04	1.03	1.04
502.3	1.03	1.05	1.04
1005.1	1.05	1.08	1.07
1225.1	1.08	1.12	1.10
1497.5	1.11	1.17	1.15
2042.2	1.22	1.32	1.28
2440.2	1.34	1.43	1.39
2995.4	1.33	1.50	1.42
3519.1	1.20	1.48	1.36
3791.5	1.13	1.45	1.32
4063.8	1.10	1.46	1.33
4200.0	1.09	1.50	1.37

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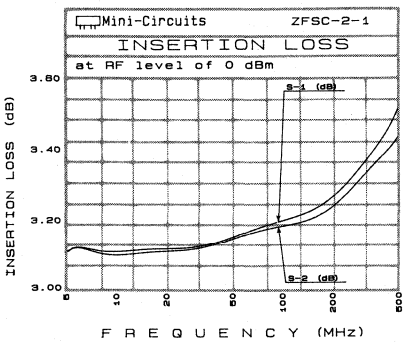
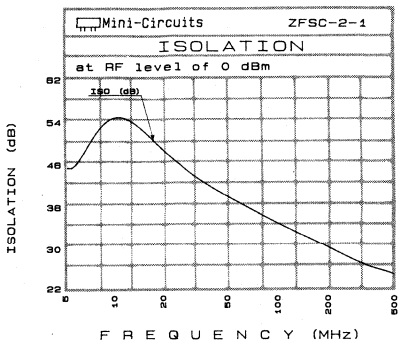
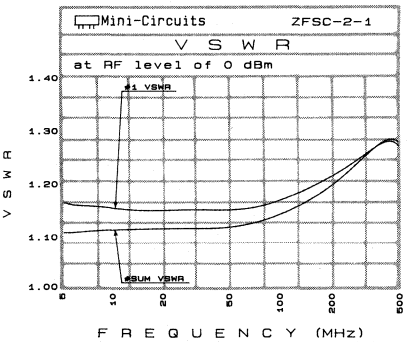
Mini-Circuits

ZFSC-2-1 — 50 ohms — 5 to 500MHz

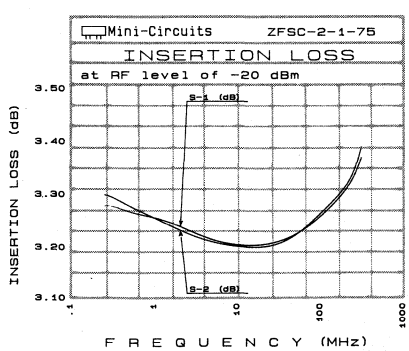


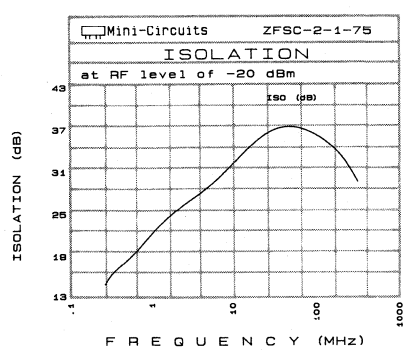


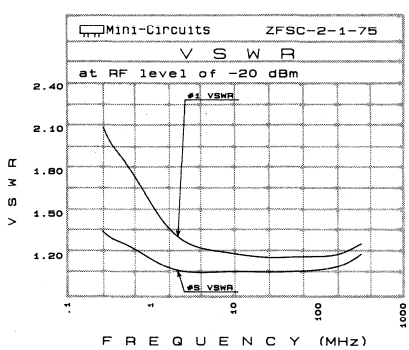


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.0	3.12	3.12	0.00	44.52	5.0	1.11	1.16	1.16
10.0	3.11	3.10	0.01	56.33	10.0	1.11	1.15	1.15
20.0	3.13	3.13	0.00	48.46	20.0	1.12	1.15	1.15
34.1	3.12	3.11	0.01	42.76	34.1	1.12	1.15	1.15
50.0	3.15	3.15	0.00	39.71	50.0	1.12	1.15	1.15
100.0	3.20	3.18	0.02	34.91	100.0	1.15	1.17	1.17
150.6	3.22	3.20	0.02	32.05	150.6	1.17	1.20	1.19
200.0	3.30	3.27	0.03	30.16	200.0	1.20	1.22	1.21
252.5	3.32	3.29	0.03	28.61	252.5	1.23	1.24	1.23
310.7	3.37	3.35	0.02	27.41	310.7	1.26	1.25	1.25
354.4	3.38	3.33	0.05	26.63	354.4	1.27	1.27	1.27
412.7	3.47	3.42	0.05	25.97	412.7	1.29	1.28	1.27
456.3	3.49	3.42	0.07	25.56	456.3	1.28	1.28	1.27
485.5	3.51	3.43	0.08	25.30	485.5	1.28	1.27	1.27
500.0	3.52	3.43	0.09	25.21	500.0	1.28	1.27	1.26

ZFSC-2-1-75 — 75 ohms — 0.25 to 300MHz







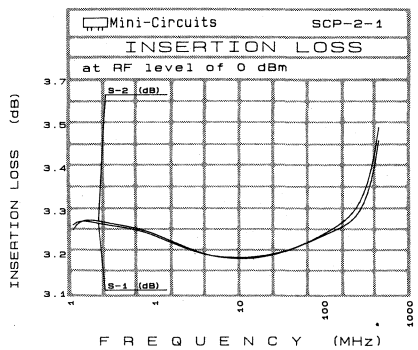
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.3	3.28	3.30	0.02	15.40	0.3	1.36	2.09	2.09
5.0	3.21	3.21	0.00	28.80	5.0	1.09	1.25	1.25
10.1	3.20	3.20	0.00	32.39	10.1	1.09	1.20	1.20
20.0	3.21	3.20	0.01	35.80	20.0	1.09	1.19	1.19
45.3	3.22	3.21	0.01	37.28	45.3	1.09	1.19	1.19
77.4	3.26	3.26	0.00	36.58	77.4	1.10	1.20	1.20
89.9	3.25	3.25	0.00	36.28	89.9	1.10	1.20	1.20
102.5	3.25	3.25	0.00	35.92	102.5	1.11	1.20	1.20
123.3	3.27	3.28	0.01	35.37	123.3	1.11	1.20	1.20
141.0	3.28	3.29	0.01	34.84	141.0	1.12	1.21	1.21
161.4	3.29	3.29	0.00	34.22	161.4	1.13	1.21	1.22
175.4	3.30	3.31	0.01	33.54	175.4	1.13	1.22	1.22
200.0	3.31	3.32	0.01	32.87	200.0	1.15	1.22	1.23
250.0	3.34	3.34	0.00	31.18	250.0	1.18	1.26	1.27
300.0	3.36	3.39	0.03	29.72	300.0	1.21	1.29	1.29

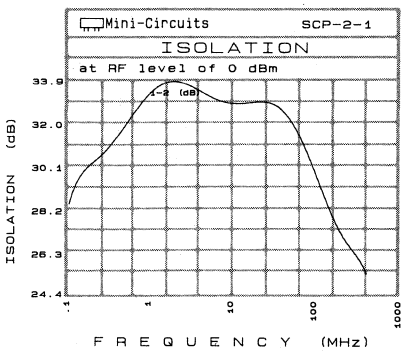
Power Splitter/Combiners

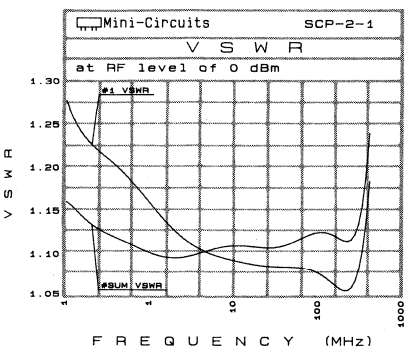
50 ohms

SCP-2-1

0.1 to 400 MHz





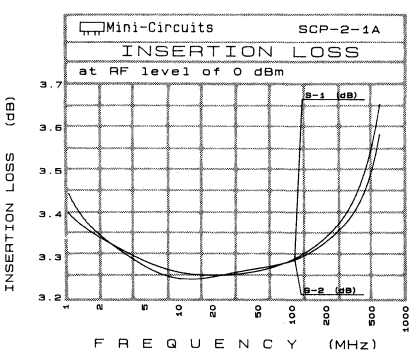


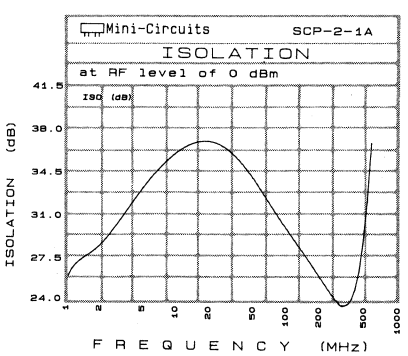
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
0.100	3.26	3.25	0.01	28.83
0.200	3.26	3.27	0.01	30.54
0.500	3.24	3.24	0.00	31.67
1.000	3.22	3.23	0.01	33.78
2.000	3.19	3.19	0.00	33.87
5.000	3.16	3.16	0.00	33.17
10.000	3.16	3.16	0.00	33.01
20.000	3.17	3.16	0.01	33.04
50.000	3.19	3.19	0.00	32.14
100.000	3.24	3.23	0.01	29.88
102.787	3.24	3.22	0.02	29.70
113.036	3.22	3.21	0.01	29.39
133.533	3.23	3.23	0.00	28.70
200.000	3.32	3.28	0.04	26.99
400.000	3.62	3.55	0.07	24.42

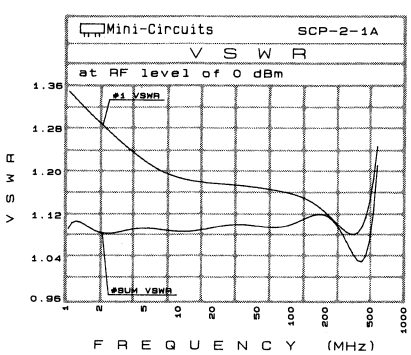
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.100	1.16	1.27	1.28
0.200	1.13	1.22	1.22
0.500	1.12	1.20	1.20
1.000	1.10	1.15	1.15
2.000	1.10	1.13	1.13
5.000	1.10	1.10	1.10
10.000	1.11	1.09	1.09
20.000	1.11	1.09	1.09
50.000	1.11	1.08	1.09
100.000	1.12	1.08	1.08
102.787	1.12	1.08	1.08
113.036	1.12	1.07	1.08
133.533	1.12	1.07	1.07
200.000	1.12	1.06	1.06
400.000	1.27	1.19	1.16

SCP-2-1A

1 to 550 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
1.000	3.35	3.39	0.04	26.45
2.000	3.29	3.29	0.00	28.70
5.000	3.24	3.23	0.01	33.26
10.000	3.21	3.19	0.02	36.59
20.000	3.21	3.21	0.00	37.33
50.000	3.22	3.23	0.01	34.01
100.000	3.27	3.24	0.03	29.89
120.000	3.27	3.26	0.01	28.73
135.000	3.27	3.29	0.02	27.97
149.000	3.25	3.26	0.01	27.34
164.000	3.29	3.28	0.01	26.85
179.000	3.31	3.30	0.01	26.23
200.000	3.32	3.33	0.01	25.81
275.000	3.33	3.33	0.00	24.35
550.000	3.64	3.56	0.08	41.47

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.000	1.11	1.35	1.35
2.000	1.09	1.29	1.29
5.000	1.09	1.22	1.22
10.000	1.10	1.19	1.19
20.000	1.10	1.18	1.18
50.000	1.10	1.17	1.17
100.000	1.11	1.16	1.16
120.000	1.11	1.16	1.16
135.000	1.11	1.15	1.15
149.000	1.12	1.14	1.15
164.000	1.11	1.14	1.14
179.000	1.11	1.13	1.13
200.000	1.12	1.12	1.13
275.000	1.10	1.10	1.10
550.000	1.23	1.25	1.21

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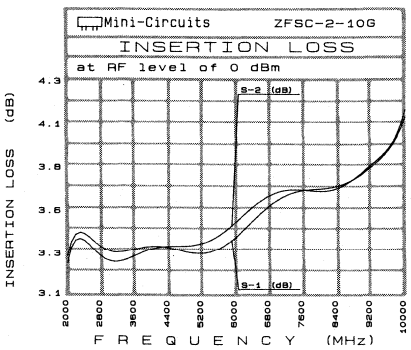
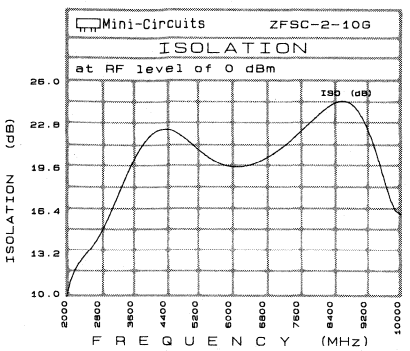
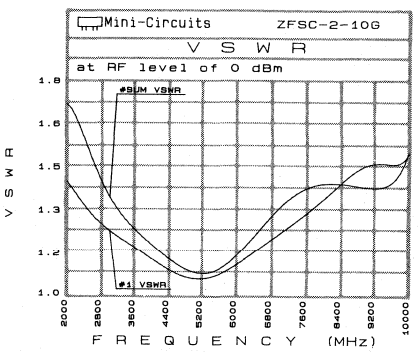
ZFSC-2-10G

2.0 to 10.0 GHz



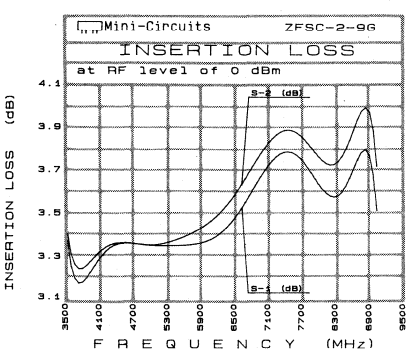


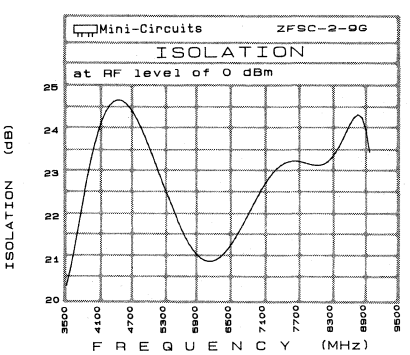


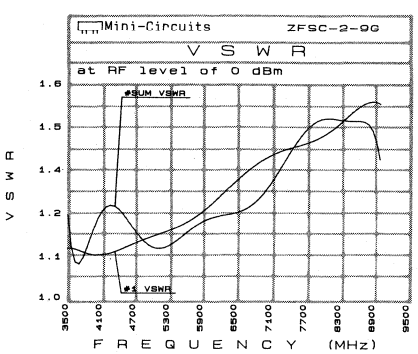
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
2000.000	3.37	3.34	0.03	10.78	2000.000	1.71	1.41	1.34
2200.000	3.37	3.33	0.04	11.69	2200.000	1.62	1.36	1.31
2420.000	3.42	3.38	0.04	12.83	2420.000	1.51	1.31	1.33
2620.000	3.38	3.33	0.05	13.84	2620.000	1.46	1.28	1.27
2820.000	3.36	3.31	0.05	14.95	2820.000	1.46	1.26	1.19
3440.000	3.28	3.22	0.06	18.78	3440.000	1.22	1.19	1.17
4000.000	3.29	3.28	0.01	21.88	4000.000	1.26	1.13	1.19
4660.000	3.41	3.46	0.05	22.52	4660.000	1.14	1.07	1.20
5000.000	3.35	3.39	0.04	21.69	5000.000	1.01	1.07	1.25
5280.000	3.14	3.16	0.02	20.66	5280.000	1.04	1.07	1.36
5480.000	3.34	3.42	0.08	20.37	5480.000	1.08	1.07	1.31
5700.000	3.37	3.44	0.07	19.91	5700.000	1.16	1.08	1.18
5900.000	3.40	3.53	0.13	19.62	5900.000	1.19	1.09	1.18
6300.000	3.47	3.54	0.07	19.56	6300.000	1.15	1.14	1.29
10000.000	4.24	4.27	0.03	16.07	10000.000	1.49	1.49	1.45

ZFSC-2-9G

3.5 to 9.0 GHz





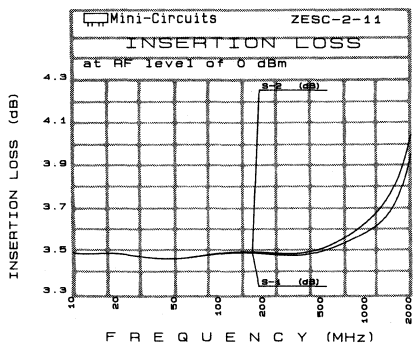


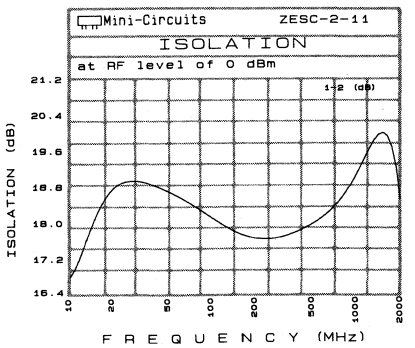
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
3500.000	3.30	3.25	0.05	19.77	3500.000	1.19	1.15	1.10
4000.000	3.29	3.26	0.03	22.93	4000.000	1.26	1.13	1.17
4480.000	3.40	3.41	0.01	24.29	4480.000	1.26	1.14	1.25
4760.000	3.42	3.43	0.01	23.90	4760.000	1.19	1.16	1.20
5000.000	3.32	3.31	0.01	23.10	5000.000	1.10	1.17	1.25
5480.000	3.38	3.43	0.05	21.63	5480.000	1.22	1.21	1.42
6000.000	3.40	3.47	0.07	20.62	6000.000	1.14	1.26	1.39
6320.000	3.47	3.57	0.10	20.47	6320.000	1.23	1.30	1.35
6600.000	3.50	3.62	0.12	20.77	6600.000	1.24	1.34	1.43
7000.000	3.60	3.71	0.11	22.03	7000.000	1.32	1.41	1.44
7300.000	3.73	3.83	0.10	22.61	7300.000	1.37	1.41	1.51
7880.000	3.65	3.77	0.12	22.57	7880.000	1.52	1.44	1.54
8440.000	3.76	3.94	0.18	23.24	8440.000	1.53	1.51	1.64
8860.000	3.77	3.97	0.20	23.64	8860.000	1.47	1.55	1.57
9000.000	3.60	3.80	0.20	23.36	9000.000	1.43	1.55	1.53

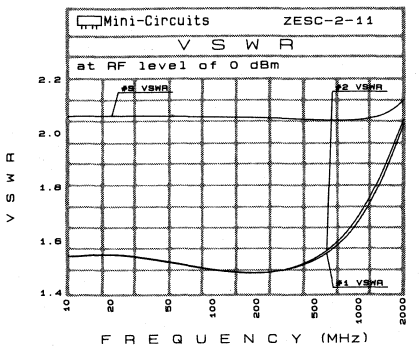
Power Splitter/Combiners 50 ohms

ZFSC-2-11, ZESC-2-11, MSC-2-11

10 to 2000 MHz





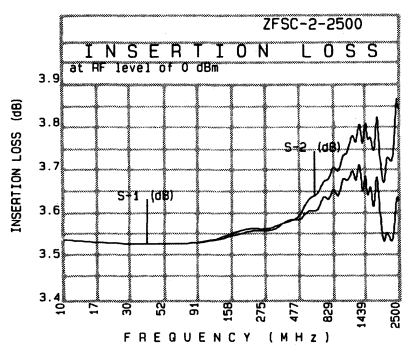


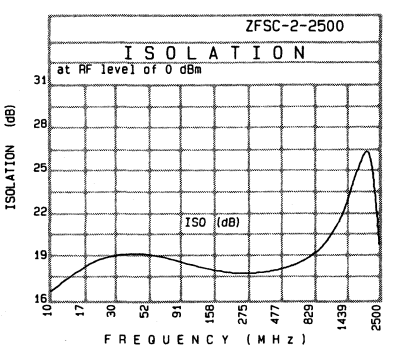
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
10.000	3.48	3.48	0.00	16.77
20.000	3.48	3.48	0.00	18.92
50.000	3.45	3.45	0.00	18.76
100.000	3.49	3.49	0.00	18.08
200.000	3.52	3.52	0.00	17.57
375.000	3.50	3.50	0.00	17.75
500.000	3.52	3.54	0.02	17.88
640.000	3.48	3.50	0.02	18.20
850.000	3.53	3.56	0.03	18.64
1000.000	3.58	3.62	0.04	18.99
1110.000	3.57	3.64	0.07	19.41
1265.000	3.57	3.65	0.08	19.81
1530.000	3.69	3.77	0.08	20.01
1790.000	3.84	3.93	0.09	19.47
2000.000	3.96	4.06	0.10	18.55

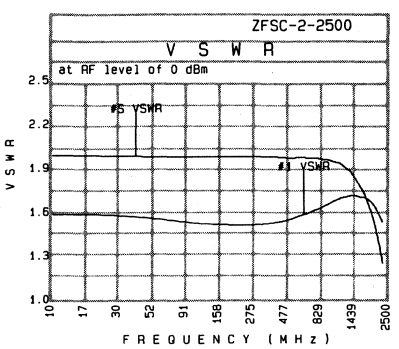
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.000	2.06	1.54	1.54
20.000	2.06	1.55	1.55
50.000	2.06	1.52	1.52
100.000	2.06	1.49	1.49
200.000	2.05	1.48	1.48
375.000	2.05	1.50	1.51
500.000	2.04	1.53	1.54
640.000	2.04	1.57	1.58
850.000	2.04	1.63	1.65
1000.000	2.04	1.68	1.70
1110.000	2.05	1.72	1.74
1265.000	2.05	1.77	1.80
1530.000	2.07	1.87	1.89
1790.000	2.10	1.96	1.99
2000.000	2.12	2.03	2.05

ZFSC-2-2500

10 to 2500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
10.000	3.54	3.54	0.00	16.74
19.340	3.53	3.53	0.00	19.30
100.260	3.53	3.53	0.00	18.54
336.810	3.56	3.57	0.01	18.08
598.260	3.61	3.64	0.03	18.56
862.820	3.67	3.72	0.05	19.40
1124.270	3.68	3.76	0.08	20.60
1248.770	3.65	3.74	0.09	21.29
1320.360	3.75	3.84	0.09	21.83
1451.090	3.72	3.84	0.12	22.83
1712.540	3.65	3.76	0.11	25.16
1998.890	3.51	3.64	0.13	27.03
2238.550	3.65	3.82	0.17	24.88
2434.640	3.48	3.73	0.25	21.18
2500.000	3.63	3.84	0.21	20.03

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.000	2.01	1.61	1.60
19.340	2.01	1.61	1.61
100.260	2.00	1.54	1.54
336.810	2.00	1.54	1.55
598.260	2.00	1.60	1.61
862.820	1.98	1.66	1.68
1124.270	1.96	1.71	1.75
1248.770	1.92	1.72	1.77
1320.360	1.91	1.73	1.77
1451.090	1.85	1.73	1.78
1712.540	1.73	1.72	1.77
1998.890	1.54	1.66	1.71
2238.550	1.31	1.56	1.62
2434.640	1.12	1.49	1.54
2500.000	1.06	1.46	1.51

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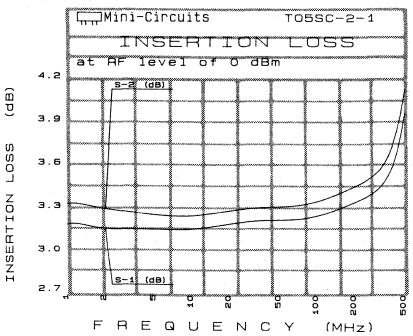
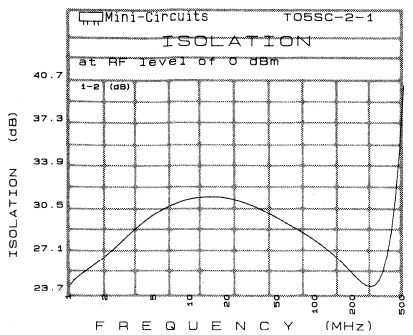
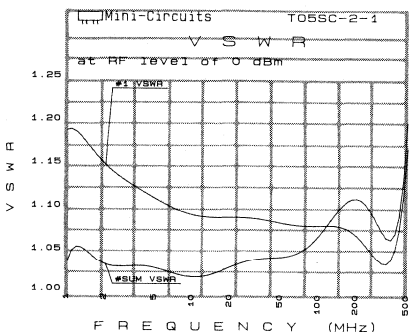
Mini-Circuits

TO5SC-2-1

1 to 500 MHz







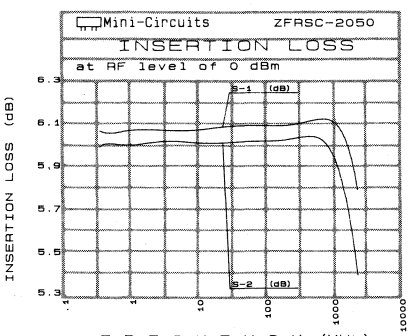
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
1.000	3.18	3.32	0.14	24.30
2.000	3.14	3.28	0.14	26.55
5.000	3.13	3.24	0.11	29.87
10.000	3.14	3.22	0.08	31.11
20.000	3.17	3.27	0.10	31.07
50.000	3.21	3.29	0.08	29.50
100.000	3.23	3.34	0.11	27.56
116.150	3.22	3.33	0.11	26.92
200.000	3.32	3.44	0.12	24.91
218.510	3.35	3.45	0.10	24.65
250.000	3.37	3.48	0.11	24.39
320.870	3.42	3.56	0.14	24.56
400.000	3.57	3.70	0.13	27.54
487.210	3.91	4.07	0.16	36.16
500.000	3.97	4.13	0.16	31.52

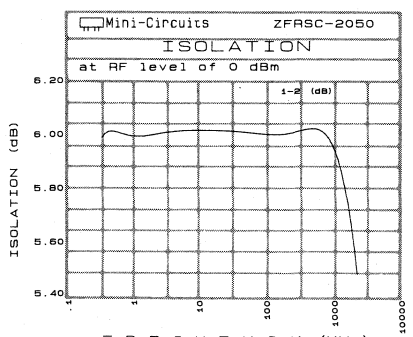
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.000	1.05	1.19	1.25
2.000	1.03	1.15	1.19
5.000	1.02	1.10	1.13
10.000	1.02	1.09	1.11
20.000	1.02	1.08	1.11
50.000	1.04	1.08	1.10
100.000	1.07	1.08	1.10
116.150	1.08	1.07	1.10
200.000	1.10	1.06	1.08
218.510	1.10	1.06	1.07
250.000	1.10	1.05	1.06
320.870	1.08	1.03	1.04
400.000	1.04	1.04	1.06
487.210	1.20	1.15	1.17
500.000	1.25	1.17	1.19

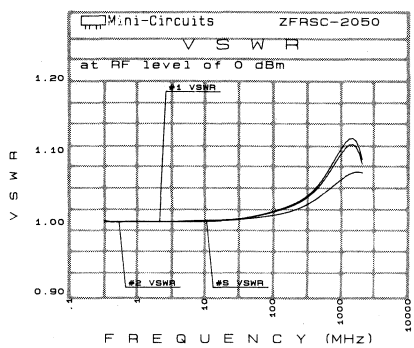
ZFRSC-2050, PRSC-2050

Resistive

DC to 2000 MHz







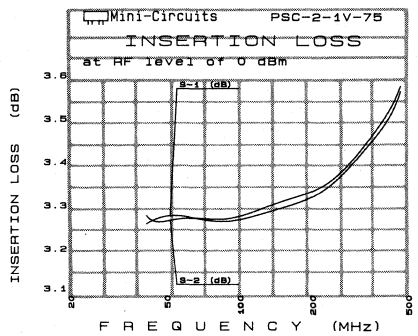
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
0.300	6.06	6.00	0.06	6.00
1.007	6.05	6.00	0.05	6.01
1.992	6.07	6.00	0.07	5.99
5.021	6.07	6.01	0.06	6.00
9.934	6.05	6.01	0.04	6.01
20.093	6.08	6.01	0.07	6.02
49.544	6.08	6.00	0.08	6.01
100.208	6.07	6.01	0.06	6.00
499.763	6.14	6.05	0.09	6.01
759.277	6.11	5.98	0.13	5.99
1010.828	6.06	5.88	0.18	5.90
1287.759	6.05	5.79	0.26	5.85
1406.286	6.02	5.71	0.31	5.79
1714.398	5.94	5.57	0.37	5.66
2000.000	5.81	5.46	0.35	5.56

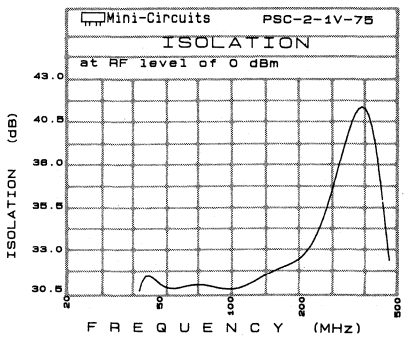
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.300	1.00	1.00	1.00
0.498	1.00	1.00	1.00
1.007	1.00	1.00	1.00
1.992	1.00	1.00	1.00
5.021	1.00	1.00	1.00
9.934	1.00	1.00	1.00
20.093	1.00	1.00	1.00
49.544	1.01	1.01	1.01
428.397	1.03	1.05	1.05
726.575	1.05	1.07	1.08
1010.828	1.06	1.10	1.11
1259.722	1.07	1.11	1.12
1406.286	1.07	1.11	1.12
1714.398	1.06	1.10	1.11
2000.000	1.08	1.09	1.09

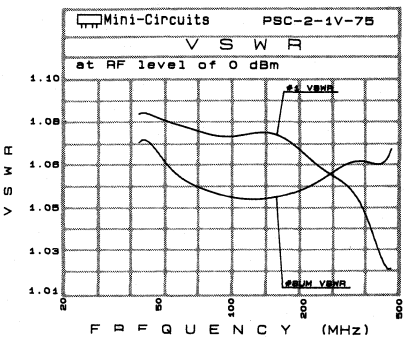
Power Splitter/Combiners 75 ohms

PSC-2-1V-75

40 to 450 MHz





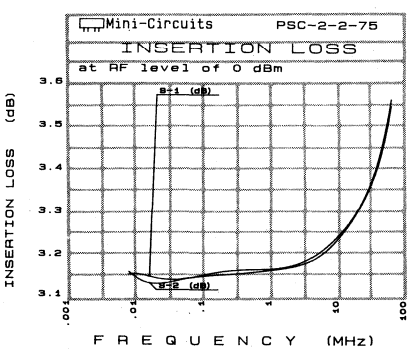


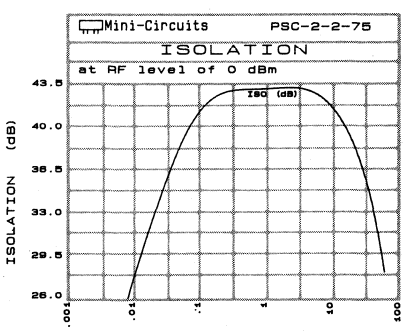
FREQUENCY (MHz)	ISOLATION LOSS (dB) S-1	ISOLATION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
40.000	3.26	3.27	0.01	31.23
50.000	3.28	3.26	0.02	31.07
100.000	3.27	3.28	0.01	30.86
114.000	3.29	3.29	0.00	31.04
124.000	3.27	3.29	0.02	31.05
134.000	3.29	3.31	0.02	31.28
150.000	3.29	3.30	0.01	31.67
156.000	3.30	3.32	0.02	31.74
166.000	3.31	3.31	0.00	31.92
176.000	3.31	3.33	0.02	32.27
188.000	3.31	3.33	0.02	32.63
200.000	3.32	3.34	0.02	33.06
224.000	3.35	3.36	0.01	34.17
400.000	3.50	3.53	0.03	37.53
450.000	3.55	3.58	0.03	33.08

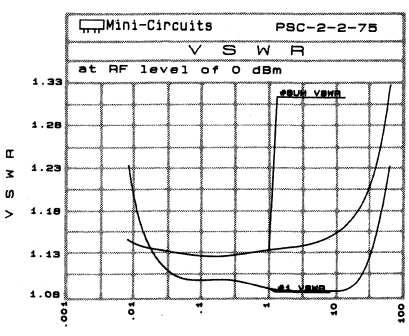
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
40.000	1.08	1.09	1.09
50.000	1.07	1.08	1.08
100.000	1.05	1.08	1.07
114.000	1.05	1.08	1.07
124.000	1.05	1.08	1.07
134.000	1.05	1.08	1.07
150.000	1.05	1.08	1.07
156.000	1.05	1.08	1.07
166.000	1.05	1.08	1.06
176.000	1.05	1.07	1.06
188.000	1.06	1.07	1.06
200.000	1.06	1.07	1.05
224.000	1.06	1.06	1.05
400.000	1.07	1.03	1.02
450.000	1.06	1.02	1.04

PSC-2-2-75, ZSC-2-2-75

0.008 to 60 MHz







FREQUENCY (MHz)	ISOLATION LOSS (dB) S-1	ISOLATION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2
0.008	3.12	3.10	0.02	25.97
0.010	3.09	3.10	0.01	27.68
0.016	3.11	3.08	0.03	31.19
0.020	3.09	3.07	0.02	32.70
0.050	3.09	3.10	0.01	38.53
0.100	3.10	3.09	0.01	41.35
0.200	3.11	3.10	0.01	42.61
1.987	3.13	3.13	0.00	43.07
10.073	3.20	3.20	0.00	41.52
11.331	3.20	3.20	0.00	41.15
13.219	3.22	3.22	0.00	40.71
15.107	3.24	3.23	0.01	40.04
16.916	3.25	3.24	0.01	39.55
30.113	3.30	3.29	0.01	36.11
60.000	3.52	3.50	0.02	28.19

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.008	1.15	1.23	1.24
0.010	1.15	1.20	1.20
0.016	1.14	1.15	1.15
0.020	1.14	1.13	1.13
0.050	1.14	1.11	1.11
0.100	1.13	1.10	1.10
0.200	1.13	1.10	1.11
1.987	1.14	1.09	1.09
10.073	1.16	1.09	1.09
11.331	1.16	1.09	1.09
13.219	1.17	1.10	1.10
15.107	1.17	1.09	1.09
16.916	1.18	1.10	1.10
30.113	1.22	1.13	1.13
60.000	1.33	1.24	1.24

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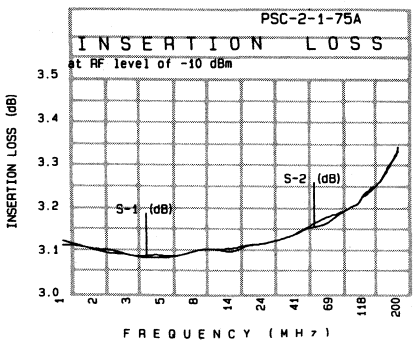
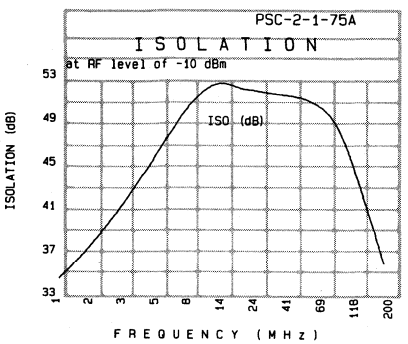
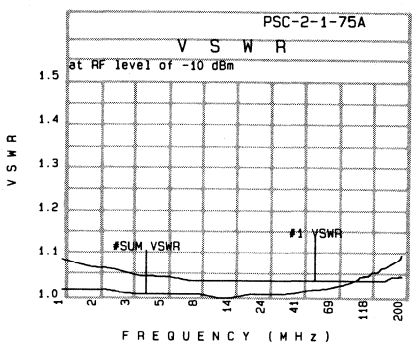
Mini-Circuits

PSC-2-1-75A

1 to 200 MHz



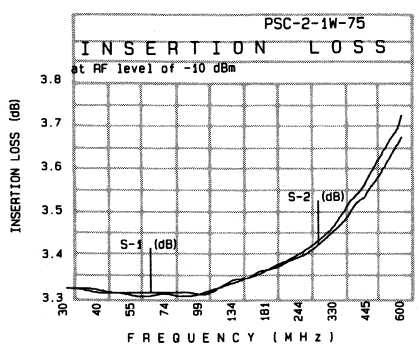


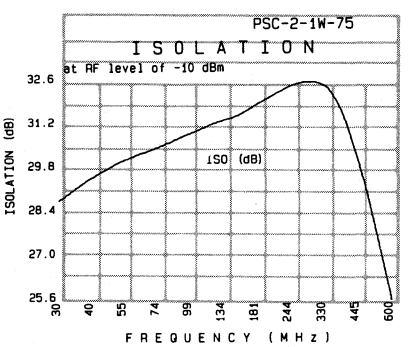


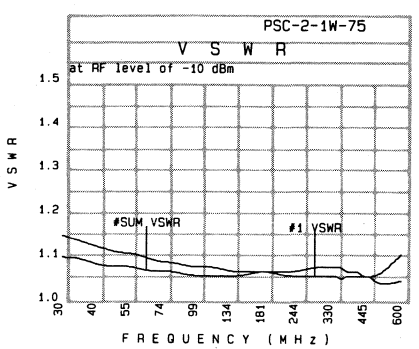
FREQUENCY (MHz)	ISOLATION LOSS (dB) S-1	ISOLATION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.00	3.13	3.12	0.01	34.68	1.00	1.02	1.09	1.09
2.07	3.10	3.11	0.00	39.32	2.07	1.02	1.07	1.07
3.38	3.09	3.09	0.00	43.19	3.38	1.01	1.05	1.05
8.90	3.11	3.11	0.00	51.03	8.90	1.01	1.04	1.04
11.29	3.11	3.11	0.00	52.43	11.29	1.00	1.04	1.04
29.69	3.13	3.13	0.00	51.63	29.69	1.01	1.04	1.04
79.13	3.19	3.19	0.00	49.52	79.13	1.03	1.04	1.04
100.44	3.21	3.21	0.01	46.40	100.44	1.04	1.04	1.04
110.20	3.22	3.22	0.00	44.93	110.20	1.05	1.04	1.04
120.90	3.24	3.23	0.01	43.34	120.90	1.05	1.04	1.04
139.87	3.25	3.25	0.00	40.59	139.87	1.06	1.04	1.04
159.67	3.29	3.28	0.01	38.07	159.67	1.07	1.04	1.04
179.89	3.31	3.30	0.01	35.86	179.89	1.08	1.05	1.05
194.77	3.33	3.32	0.00	34.40	194.77	1.09	1.05	1.05
200.00	3.33	3.34	0.01	33.86	200.00	1.10	1.05	1.05

PSC-2-1W-75

30 to 600 MHz







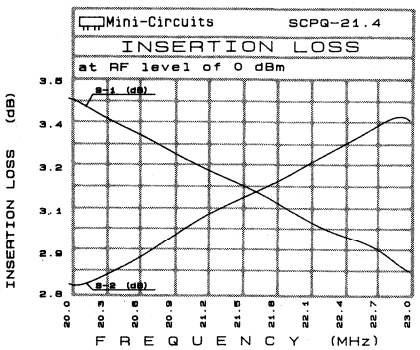
FREQUENCY (MHz)	ISOLATION LOSS (dB) S-1	ISOLATION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
30.00	3.33	3.33	0.00	28.79	30.00	1.10	1.15	1.15
49.18	3.32	3.32	0.00	29.93	49.18	1.08	1.11	1.11
62.97	3.32	3.31	0.01	30.30	62.97	1.07	1.10	1.10
91.57	3.32	3.31	0.01	30.83	91.57	1.06	1.08	1.08
150.12	3.35	3.35	0.00	31.45	150.12	1.06	1.07	1.07
246.09	3.41	3.40	0.01	32.45	246.09	1.07	1.06	1.06
277.42	3.43	3.42	0.01	32.59	277.42	1.08	1.06	1.05
315.09	3.46	3.45	0.02	32.57	315.09	1.08	1.06	1.05
344.72	3.49	3.47	0.03	32.42	344.72	1.08	1.06	1.04
371.52	3.52	3.49	0.03	31.99	371.52	1.07	1.06	1.04
428.34	3.56	3.53	0.02	30.65	428.34	1.06	1.06	1.04
486.50	3.62	3.58	0.04	28.99	486.50	1.05	1.07	1.05
544.34	3.66	3.63	0.03	27.21	544.34	1.04	1.08	1.07
586.67	3.71	3.66	0.06	25.99	586.67	1.05	1.10	1.09
600.00	3.72	3.67	0.04	25.62	600.00	1.05	1.11	1.09

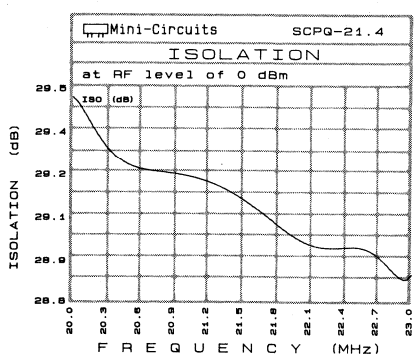
2WAY-90°

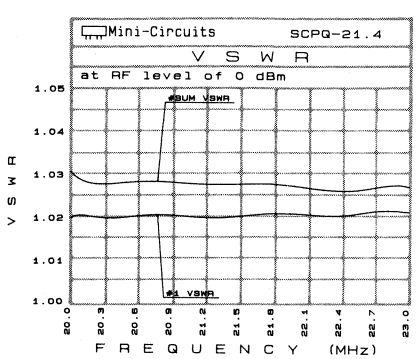
Power Splitter/Combiners 50 oh

SYPQ-21.4

SCPQ-21.4 20 to 23 MHz

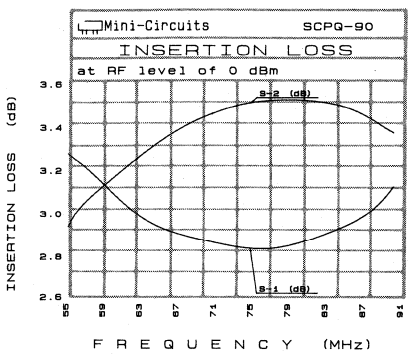


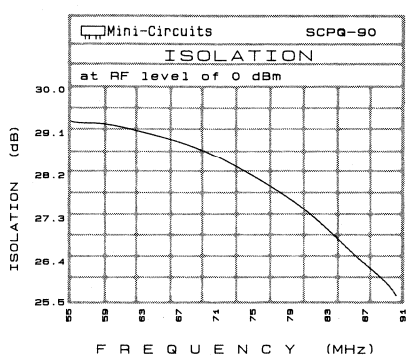


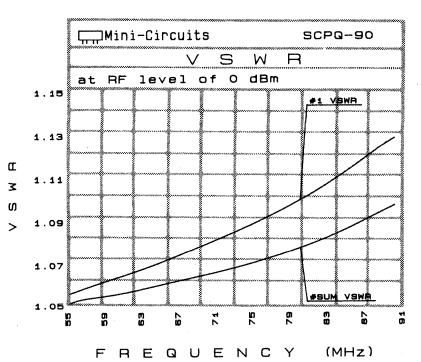


FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	ISOL. (dB)
20.000	3.45	2.80	0.65	89.81	29.39
20.075	3.43	2.79	0.64	90.10	29.50
20.150	3.40	2.77	0.63	89.89	29.40
20.225	3.40	2.83	0.57	90.00	29.29
20.300	3.39	2.84	0.55	89.76	29.40
20.375	3.38	2.83	0.55	89.65	29.12
20.450	3.33	2.83	0.50	89.62	29.27
20.550	3.32	2.87	0.45	89.88	29.20
20.625	3.34	2.91	0.43	89.73	29.31
20.700	3.28	2.90	0.38	89.46	29.24
20.775	3.27	2.92	0.35	89.83	29.16
20.850	3.29	2.96	0.33	89.78	29.24
20.925	3.25	2.95	0.30	89.89	29.22
21.000	3.23	2.98	0.25	89.61	29.09
23.000	2.83	3.37	0.54	89.82	28.77

SCPQ-90

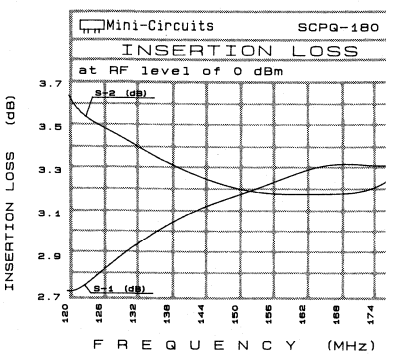


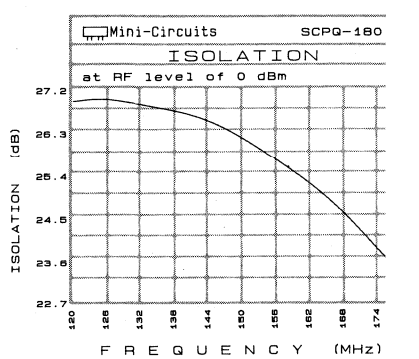


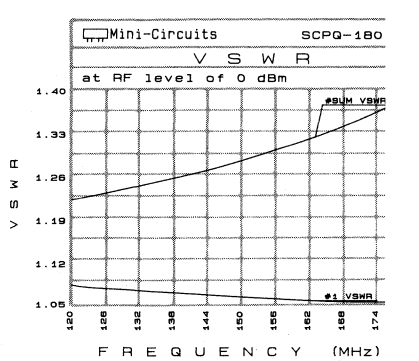


FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	ISOL. (dB)
55.000	3.28	2.95	0.33	90.07	29.35
56.000	3.25	3.01	0.24	90.14	29.30
57.000	3.21	3.05	0.16	90.25	29.30
57.692	3.18	3.08	0.10	90.09	29.26
58.590	3.16	3.13	0.03	90.12	29.39
61.282	3.05	3.19	0.14	90.20	29.17
63.974	2.94	3.29	0.35	90.36	29.11
66.667	2.92	3.39	0.47	90.27	28.88
70.000	2.87	3.46	0.59	90.49	28.80
72.051	2.85	3.49	0.64	90.50	28.47
75.000	2.84	3.52	0.68	90.69	28.21
78.333	2.85	3.53	0.68	90.75	27.75
81.026	2.87	3.53	0.66	91.09	27.38
83.718	2.92	3.52	0.60	91.11	26.89
90.000	3.12	3.38	0.26	91.82	25.71

SCPQ-180 120 to 180 MHz







FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	IS (
120.000	2.72	3.62	0.90	90.22	2
122.000	2.77	3.59	0.82	90.18	2
123.000	2.77	3.57	0.80	90.36	2
125.000	2.80	3.48	0.68	90.38	2
126.000	2.81	3.50	0.69	90.42	2
128.000	2.89	3.48	0.59	90.41	2
129.000	2.91	3.46	0.55	90.61	2
131.000	2.93	3.45	0.52	90.54	2
132.000	2.95	3.42	0.47	90.26	2
134.000	2.99	3.40	0.41	90.14	2
135.000	3.04	3.34	0.30	90.25	2
137.000	3.03	3.37	0.34	90.47	2
138.000	3.04	3.33	0.29	90.73	2
140.000	3.08	3.30	0.22	90.40	2
180.000	3.33	3.31	0.02	91.59	2

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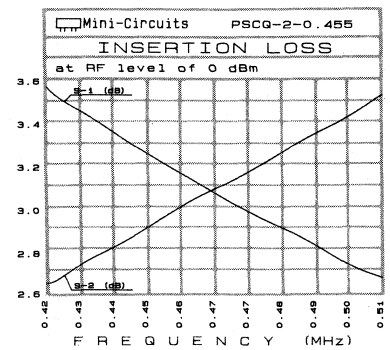
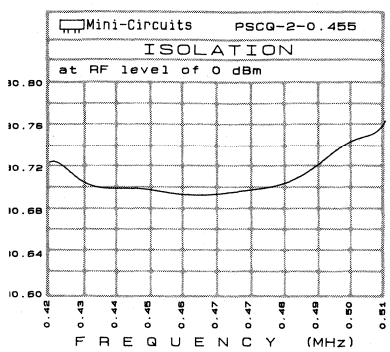
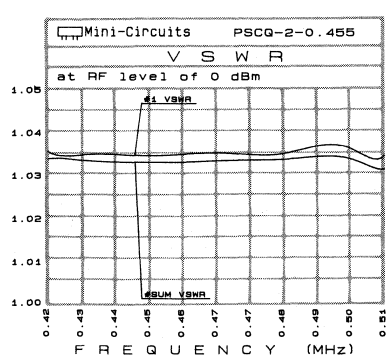
CQ-2-0.455 0.42 to 0.51 MHz

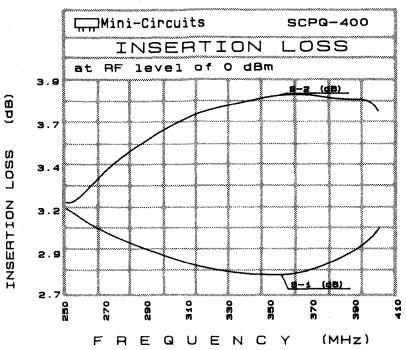


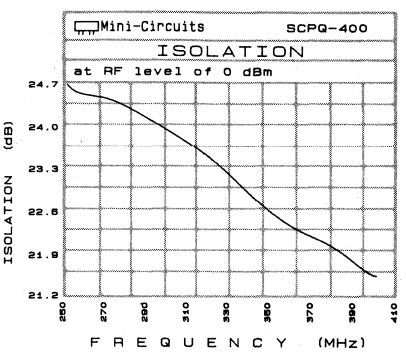


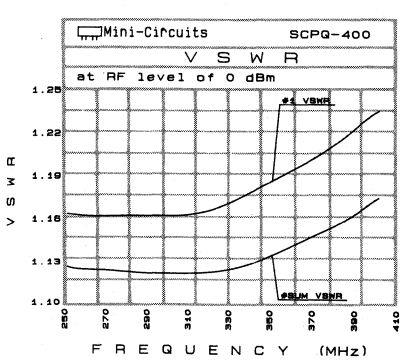


FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	ISOL. (dB)
.420	3.52	2.65	0.87	89.97	30.73
.427	3.43	2.72	0.71	89.96	30.70
.434	3.37	2.78	0.59	90.00	30.71
.441	3.29	2.84	0.45	89.94	30.69
.448	3.22	2.91	0.31	89.99	30.69
.455	3.16	2.97	0.19	89.93	30.68
.462	3.08	3.05	0.03	89.91	30.70
.468	3.03	3.10	0.07	89.98	30.70
.475	2.97	3.16	0.19	90.02	30.68
.482	2.90	3.22	0.32	89.95	30.72
.501	2.73	3.37	0.64	90.27	30.75
.503	2.73	3.43	0.70	89.97	30.74
.505	2.72	3.45	0.73	90.01	30.75
.508	2.70	3.47	0.77	89.98	30.76
.510	2.68	3.49	0.81	89.99	30.76

SCPQ-400 250 to 400 MHz

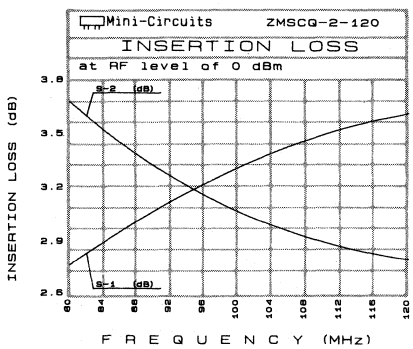


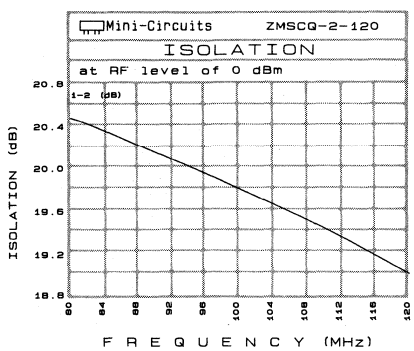


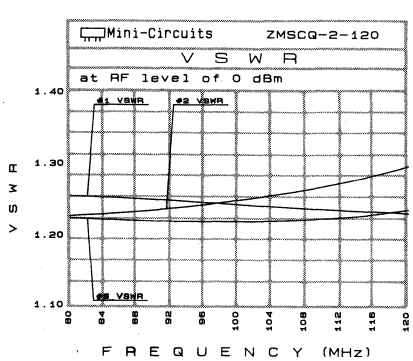


FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	ISOL. (dB)
250.000	3.18	3.20	0.02	89.39	24.67
254.000	3.12	3.20	0.08	89.40	24.65
258.000	3.10	3.25	0.15	89.38	24.56
262.000	3.07	3.29	0.22	89.48	24.53
265.000	3.04	3.32	0.28	89.52	24.44
269.000	3.04	3.39	0.35	89.31	24.51
273.000	3.01	3.43	0.42	89.31	24.41
277.000	2.97	3.45	0.48	89.41	24.39
281.000	2.95	3.50	0.55	89.47	24.38
285.000	2.94	3.52	0.58	89.39	24.31
288.000	2.92	3.53	0.61	89.27	24.17
292.000	2.91	3.58	0.67	89.41	24.04
296.000	2.88	3.62	0.74	89.45	24.10
308.000	2.86	3.68	0.82	89.57	23.79
400.000	3.03	3.75	0.72	89.01	21.52

ZMSCQ-2-120 80 to 120 MHz







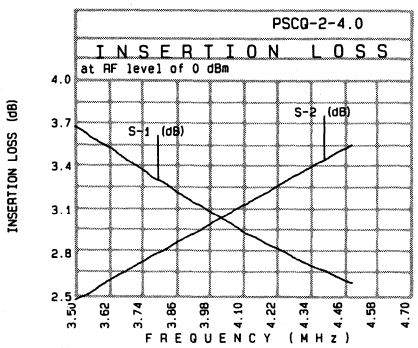
FREQ. (MHz)	INSERT. LOSS S-1 (dB)	INSERT. LOSS S-2 (dB)	AMP. UNBAL. (dB)	PHASE (Deg) 1-2	ISOL. (dB)
80.000	2.77	3.67	.90	87.45	20.48
82.000	2.83	3.59	.76	87.42	20.43
84.000	2.90	3.52	.62	87.46	20.38
86.000	2.95	3.45	.50	87.44	20.29
90.500	3.08	3.31	.23	87.54	20.15
92.500	3.13	3.25	.12	87.46	20.08
96.500	3.23	3.14	.09	87.34	19.96
100.500	3.32	3.06	.26	87.31	19.78
102.500	3.36	3.02	.34	87.34	19.73
107.500	3.46	2.93	.53	87.28	19.55
109.500	3.49	2.91	.58	87.36	19.47
114.000	3.55	2.85	.70	87.24	19.27
116.000	3.57	2.83	.74	87.48	19.21
118.000	3.59	2.81	.78	87.39	19.11
120.000	3.62	2.80	.82	87.33	19.03

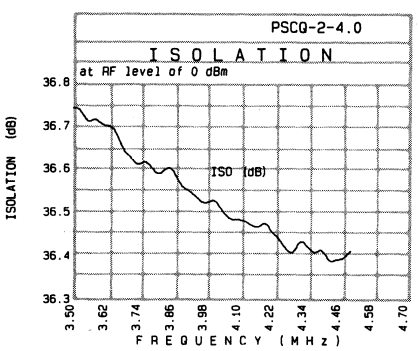
In Stock...Immediate Delivery

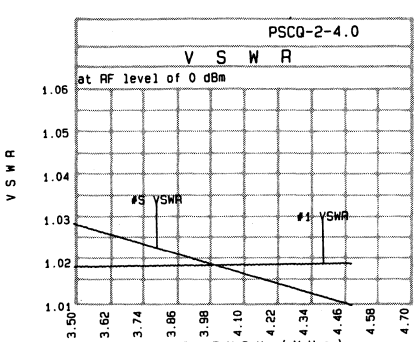
Power Splitter/Combiners

50 oh

PSCQ-2-4.0 3.5 to 4.5 MHz

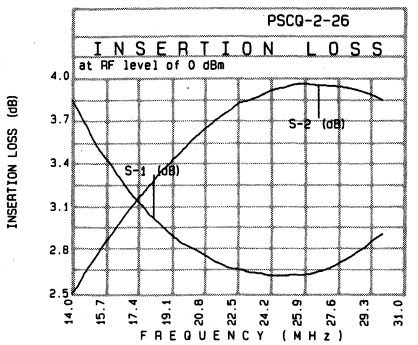


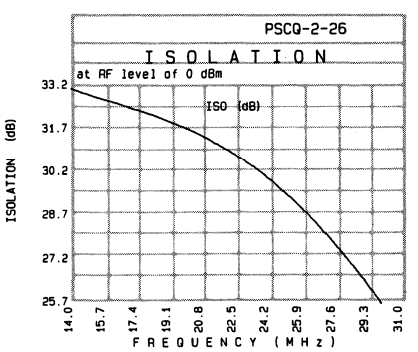


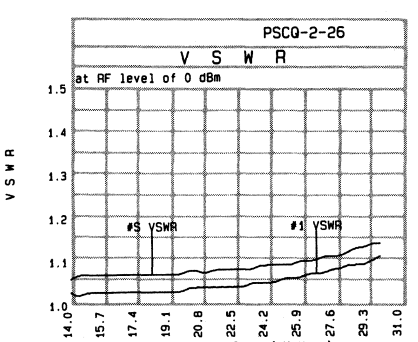


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2	ISOL. (dB) 1-2
3.500	3.71	2.51	1.20	89.61	36.75
3.578	3.61	2.59	1.02	89.63	36.73
3.655	3.52	2.68	0.84	89.64	36.70
3.730	3.42	2.76	0.66	89.61	36.61
3.808	3.33	2.84	0.49	89.59	36.59
3.885	3.23	2.92	0.31	89.58	36.57
3.962	3.15	3.00	0.15	89.58	36.53
4.037	3.06	3.08	0.02	89.59	36.51
4.115	2.96	3.16	0.20	89.57	36.49
4.193	2.89	3.24	0.35	89.60	36.49
4.270	2.82	3.33	0.51	89.59	36.42
4.345	2.76	3.41	0.65	89.58	36.43
4.423	2.68	3.49	0.81	89.58	36.39
4.475	2.63	3.54	0.91	89.58	36.40
4.500	2.62	3.57	0.95	89.58	36.42

PSCQ-2-26 14 to 30 MHz

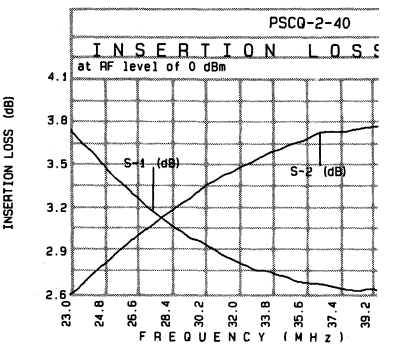


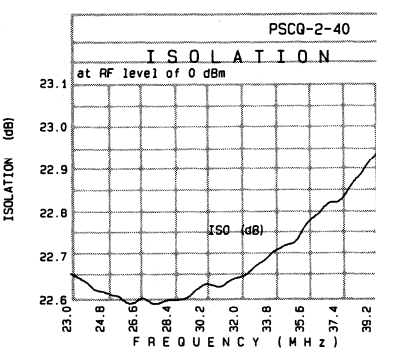


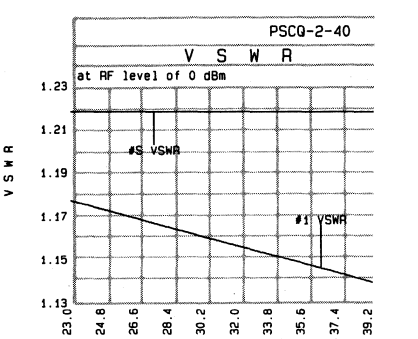


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2	ISOL. (dB) 1-2
14.000	3.86	2.52	1.34	88.68	33.19
14.840	3.66	2.71	0.95	88.61	33.00
16.040	3.41	2.93	0.48	88.60	32.76
17.680	3.14	3.22	0.08	88.54	32.41
19.320	2.92	3.46	0.54	88.53	32.00
20.960	2.79	3.67	0.88	88.54	31.51
21.800	2.73	3.76	1.03	88.57	31.18
22.600	2.70	3.84	1.14	88.63	30.87
24.240	2.65	3.92	1.27	88.74	30.08
25.880	2.66	3.97	1.31	88.98	29.08
27.520	2.72	3.96	1.24	89.36	27.90
27.960	2.75	3.95	1.20	89.41	27.54
29.160	2.85	3.91	1.06	89.80	26.52
29.600	2.91	3.89	0.98	90.01	26.13
30.000	2.94	3.86	0.92	90.16	25.75

PSCQ-2-40 23 to 40 MH







FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2
23.000	3.76	2.63	1.13	90.33
24.318	3.60	2.78	0.82	90.37
25.635	3.41	2.93	0.48	90.48
26.910	3.27	3.06	0.21	90.58
28.227	3.13	3.19	0.06	90.64
29.545	3.01	3.29	0.28	90.75
30.863	2.94	3.42	0.48	90.78
32.138	2.85	3.51	0.66	90.95
33.455	2.80	3.59	0.79	91.01
34.773	2.76	3.66	0.90	91.14
36.090	2.71	3.73	1.02	91.24
37.365	2.67	3.74	1.07	91.41
38.682	2.66	3.78	1.12	91.36
39.575	2.67	3.79	1.12	91.47
40.000	2.67	3.80	1.13	91.50

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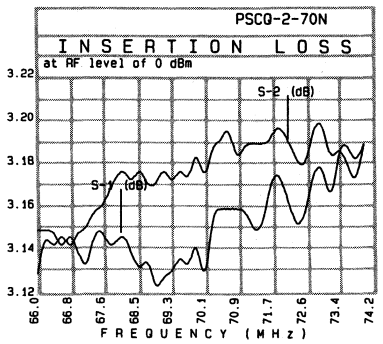
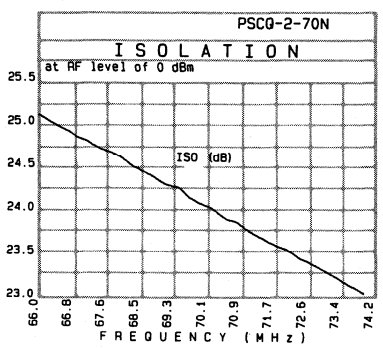
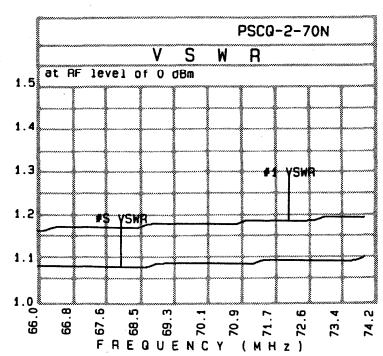
Mini-Circuits

CQ-2-70N 66 to 74 MHz

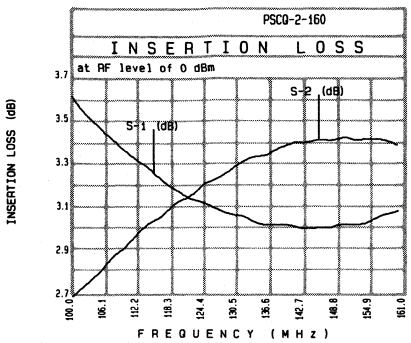


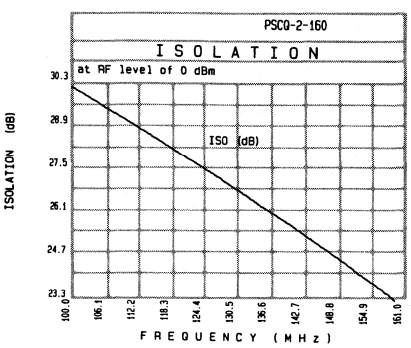


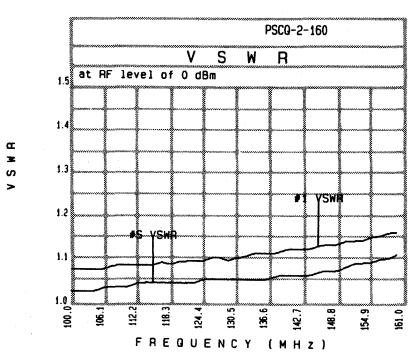


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2	ISOL. (dB) 1-2
66.000	3.15	3.13	0.02	89.62	25.12
66.600	3.14	3.15	0.01	89.66	24.96
67.200	3.13	3.15	0.02	89.75	24.82
67.800	3.14	3.17	0.03	89.70	24.68
68.500	3.13	3.18	0.05	89.74	24.48
69.100	3.13	3.18	0.05	89.77	24.31
69.700	3.13	3.17	0.04	89.87	24.16
70.300	3.16	3.19	0.03	89.84	24.04
70.900	3.16	3.18	0.02	89.95	23.89
71.500	3.15	3.19	0.04	89.94	23.70
72.200	3.16	3.19	0.03	90.00	23.56
72.800	3.18	3.20	0.02	90.10	23.39
73.400	3.19	3.19	0.00	90.08	23.24
73.800	3.18	3.17	0.01	89.96	23.14
74.000	3.19	3.19	0.00	90.13	23.07

PSCQ-2-160 100 to 160 MHz

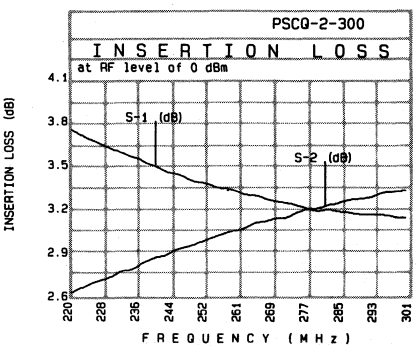


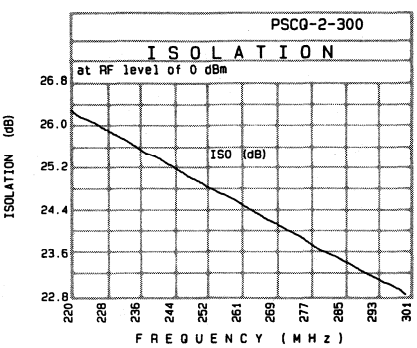


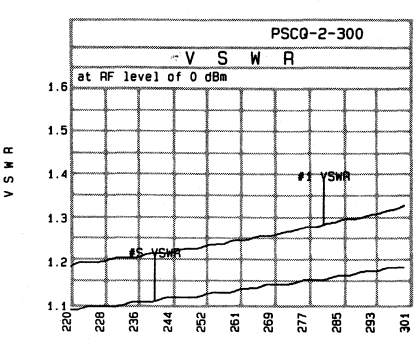


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2	ISOL. (dB) 1-2
100.00	3.62	2.70	0.92	90.37	30.08
104.65	3.49	2.80	0.69	90.40	29.62
109.30	3.38	2.91	0.47	90.44	29.14
113.80	3.30	3.03	0.27	90.50	28.69
118.45	3.20	3.11	0.09	90.54	28.18
123.10	3.14	3.18	0.04	90.66	27.69
127.75	3.09	3.25	0.16	90.67	27.18
132.25	3.07	3.32	0.25	90.71	26.70
136.90	3.03	3.35	0.32	90.79	26.16
141.55	3.02	3.41	0.39	90.82	25.64
146.20	3.02	3.42	0.40	90.93	25.07
150.70	3.03	3.43	0.40	91.01	24.52
155.35	3.05	3.42	0.37	91.13	23.94
158.50	3.08	3.41	0.33	91.21	23.54
160.00	3.09	3.39	0.30	91.27	23.33

PSCQ-2-300 220 to 300 MHz







FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.) 1-2	ISOL. (dB) 1-2
220.00	3.77	2.65	1.12	89.82	26.33
226.00	3.69	2.73	0.96	89.85	26.08
232.50	3.61	2.81	0.80	89.82	25.79
238.50	3.53	2.87	0.66	89.83	25.49
244.50	3.47	2.94	0.53	89.66	25.26
251.00	3.41	3.00	0.41	89.80	24.98
257.00	3.37	3.06	0.31	89.79	24.73
263.00	3.32	3.12	0.20	89.67	24.47
269.00	3.28	3.17	0.11	89.60	24.23
275.50	3.24	3.22	0.02	89.58	23.95
281.50	3.23	3.26	0.03	89.59	23.67
287.50	3.20	3.29	0.09	89.51	23.44
294.00	3.19	3.34	0.15	89.41	23.16
298.00	3.17	3.35	0.18	89.51	23.03
300.00	3.17	3.36	0.19	89.56	22.90

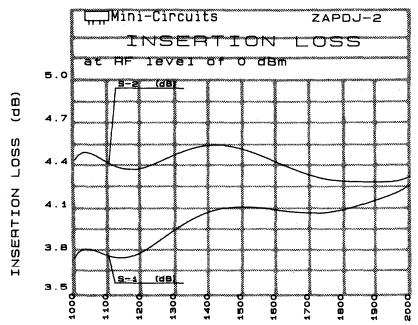
Power Splitter/Combiners

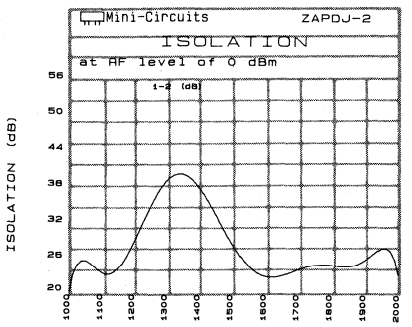
50 ohr

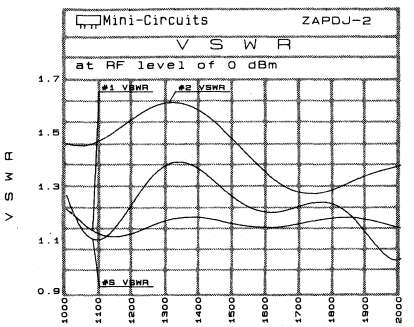
ZAPDJ-2

2 WAY-180°

1000 to 2000 MHz







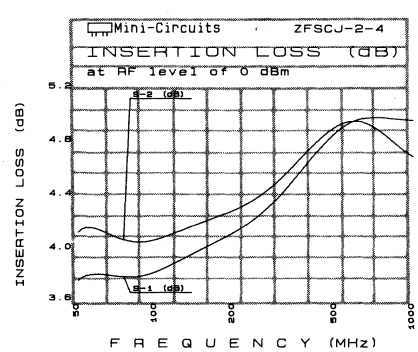
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	PHASE (Degrees) 1-2
1000.000	3.73	4.44	0.71	23.25	177.00
1052.500	3.84	4.49	0.65	23.44	176.37
1102.500	3.68	4.36	0.68	24.00	176.19
1155.000	3.73	4.33	0.60	25.32	176.19
1205.000	3.79	4.34	0.55	27.46	175.69
1257.500	3.86	4.45	0.59	31.22	175.41
1307.500	3.88	4.40	0.52	38.36	175.79
1360.000	4.06	4.52	0.46	46.08	174.92
1410.000	4.02	4.53	0.51	33.69	175.04
1500.000	4.23	4.60	0.37	26.92	174.50
1615.000	4.06	4.33	0.27	23.53	174.82
1717.500	3.95	4.24	0.29	23.00	174.96
1795.000	4.10	4.27	0.17	23.88	174.29
1897.500	4.13	4.24	0.11	25.82	174.52
2000.000	4.23	4.29	0.06	25.37	174.36

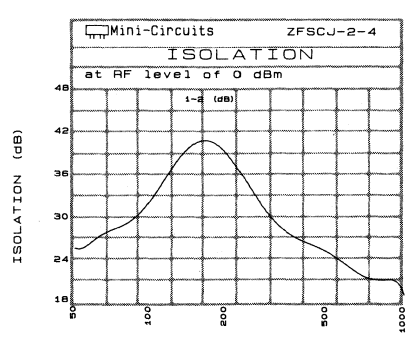
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1000.000	1.25	1.22	1.46
1052.500	1.14	1.16	1.45
1102.500	1.09	1.12	1.47
1155.000	1.16	1.11	1.51
1205.000	1.26	1.13	1.56
1257.500	1.34	1.16	1.60
1307.500	1.38	1.18	1.61
1360.000	1.38	1.18	1.60
1410.000	1.36	1.18	1.57
1500.000	1.26	1.16	1.47
1615.000	1.20	1.15	1.33
1717.500	1.24	1.17	1.27
1795.000	1.23	1.18	1.29
1897.500	1.13	1.18	1.34
2000.000	1.04	1.14	1.37

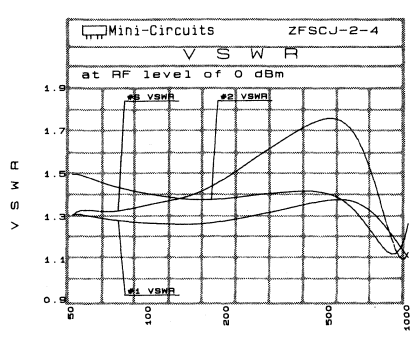
ZFSCJ-2-4

2 WAY-180°

50 to 1000 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB) 1-2	PHASE (Degrees) 1-2
50.000	3.77	4.14	0.37	25.19	176.98
75.000	3.79	4.07	0.28	28.45	177.52
100.000	3.77	4.00	0.23	32.03	177.98
200.000	4.04	4.21	0.17	38.42	178.80
292.500	4.47	4.62	0.15	30.81	179.40
367.500	4.45	4.53	0.08	27.62	179.75
415.000	4.79	4.87	0.08	26.48	179.94
500.000	4.70	4.71	0.01	24.52	179.68
585.000	4.89	4.91	0.02	23.33	179.45
660.000	4.98	4.94	0.04	22.46	179.14
732.500	4.96	4.87	0.09	21.76	179.03
805.000	4.98	4.83	0.15	21.24	178.89
877.500	4.88	4.69	0.19	20.74	178.95
952.500	5.00	4.74	0.26	20.49	179.00
1000.000	4.90	4.66	0.24	20.27	179.39

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
50.000	1.32	1.31	1.50
75.000	1.33	1.28	1.44
100.000	1.35	1.27	1.40
200.000	1.48	1.28	1.38
292.500	1.61	1.32	1.40
367.500	1.70	1.35	1.42
415.000	1.73	1.36	1.42
500.000	1.75	1.37	1.39
585.000	1.71	1.37	1.35
660.000	1.62	1.35	1.29
732.500	1.49	1.31	1.22
805.000	1.33	1.26	1.14
877.500	1.15	1.19	1.11
952.500	1.07	1.13	1.18
1000.000	1.20	1.12	1.25

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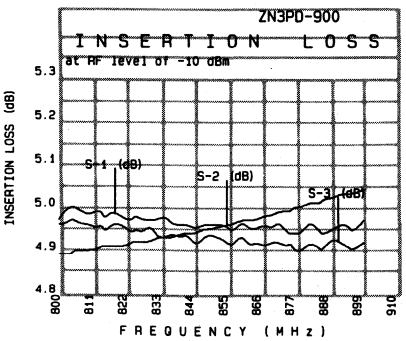
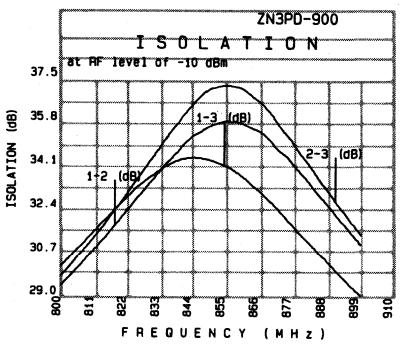
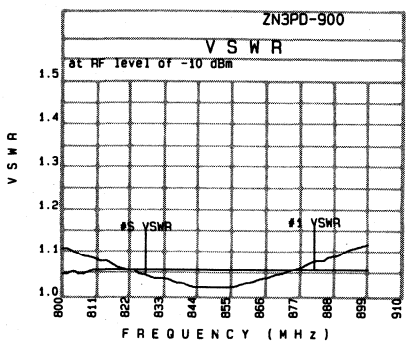
Mini-Circuits

ZN3PD-900 — 3 WAY-0° — 800 to 900 MHz



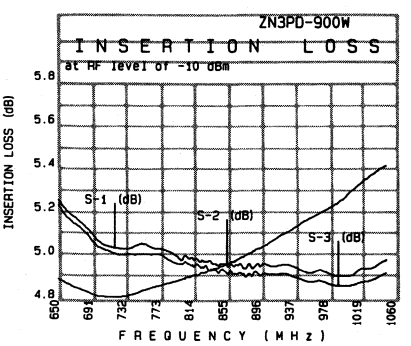


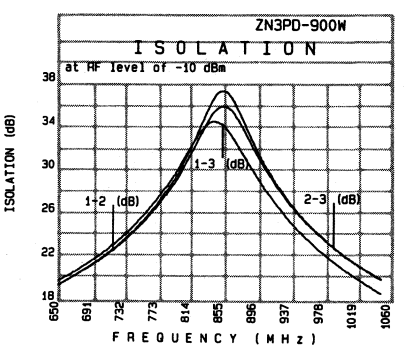


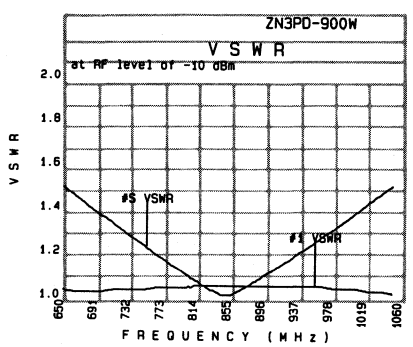
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3
800.00	4.97	4.89	4.96	0.08	29.34	29.71
807.00	4.99	4.90	4.96	0.10	30.20	30.67
815.00	4.97	4.91	4.94	0.07	31.25	31.77
824.00	4.97	4.92	4.94	0.05	32.52	33.23
827.00	4.97	4.92	4.94	0.05	32.95	33.71
832.00	4.97	4.93	4.93	0.05	33.62	34.51
842.00	4.96	4.94	4.94	0.02	34.95	36.11
855.00	4.96	4.96	4.92	0.04	35.80	37.18
865.00	4.95	4.97	4.92	0.05	35.47	36.69
867.00	4.96	4.98	4.91	0.06	35.39	36.51
875.00	4.94	4.99	4.91	0.08	34.47	35.32
882.00	4.97	5.01	4.92	0.08	33.54	34.24
890.00	4.95	5.02	4.93	0.09	32.42	32.96
896.00	4.94	5.03	4.90	0.13	31.57	32.01
900.00	4.97	5.04	4.92	0.12	31.01	31.40

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
800.00	1.11	1.05	1.05	1.06
807.00	1.09	1.05	1.05	1.06
815.00	1.08	1.06	1.05	1.06
824.00	1.06	1.06	1.05	1.06
827.00	1.05	1.06	1.05	1.06
832.00	1.04	1.06	1.05	1.07
842.00	1.02	1.06	1.04	1.07
855.00	1.02	1.06	1.04	1.07
865.00	1.04	1.06	1.04	1.07
867.00	1.04	1.06	1.04	1.07
875.00	1.06	1.06	1.04	1.07
882.00	1.08	1.06	1.04	1.07
890.00	1.09	1.06	1.04	1.07
896.00	1.11	1.06	1.05	1.07
900.00	1.12	1.06	1.05	1.07

ZN3PD-900W — 3 WAY-0° — 650 to 1050 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3
650.00	5.25	4.89	5.23	0.37	19.32	19.35
712.00	5.04	4.81	5.02	0.23	22.19	22.30
763.00	5.03	4.85	5.00	0.18	25.67	25.85
804.00	5.00	4.89	4.97	0.10	29.83	30.23
815.00	4.97	4.91	4.94	0.07	31.25	31.77
827.00	4.97	4.92	4.94	0.05	32.95	33.71
842.00	4.96	4.94	4.94	0.02	34.95	36.11
860.00	4.97	4.97	4.94	0.03	35.75	37.11
875.00	4.94	4.99	4.91	0.08	34.47	35.32
886.00	4.94	5.01	4.90	0.11	32.95	33.56
900.00	4.97	5.04	4.92	0.12	31.01	31.40
958.00	4.91	5.17	4.87	0.30	25.13	25.23
1019.00	4.95	5.33	4.88	0.44	21.46	21.49
1040.00	4.96	5.39	4.90	0.49	20.45	20.50
1050.00	4.98	5.41	4.92	0.50	20.06	20.07

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
650.00	1.51	1.04	1.03	1.04
712.00	1.34	1.04	1.04	1.04
763.00	1.20	1.05	1.05	1.05
804.00	1.10	1.06	1.05	1.06
815.00	1.08	1.06	1.05	1.06
827.00	1.05	1.06	1.05	1.06
842.00	1.02	1.06	1.04	1.07
860.00	1.03	1.06	1.04	1.07
875.00	1.06	1.06	1.04	1.07
886.00	1.08	1.06	1.04	1.07
900.00	1.12	1.06	1.05	1.07
958.00	1.26	1.06	1.06	1.06
1019.00	1.43	1.04	1.10	1.05
1040.00	1.49	1.04	1.11	1.04
1050.00	1.52	1.03	1.12	1.04

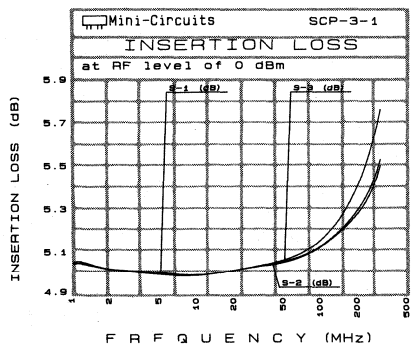
3WAY-0°

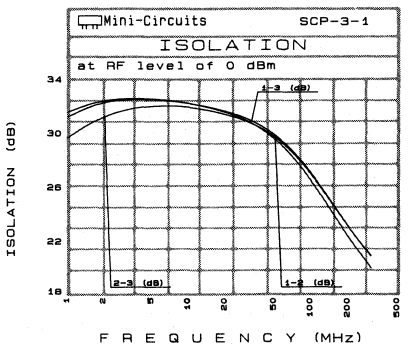
Power Splitter/Combiners

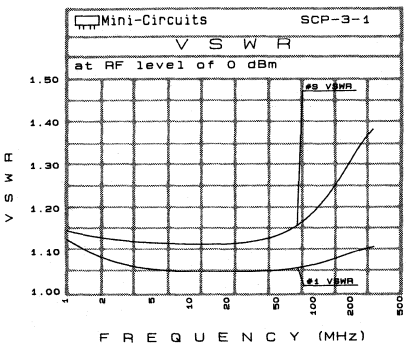
50 ohms

SCP-3-1

1 to 300 MHz





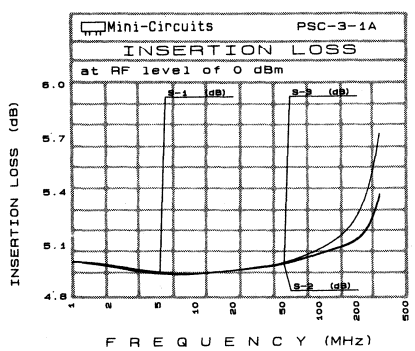


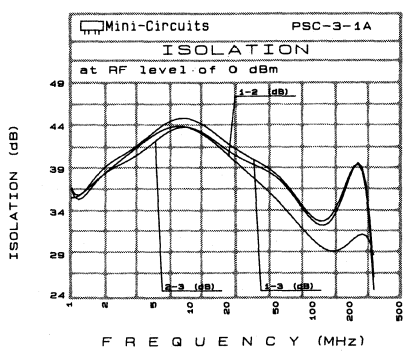
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3
1.000	5.06	5.05	5.05	0.01	31.61	29.75
2.000	5.02	5.02	5.02	0.00	32.47	31.32
5.000	5.00	4.99	4.99	0.01	32.54	32.07
10.000	4.99	4.99	4.99	0.00	32.21	31.92
20.000	5.01	5.01	5.01	0.00	31.54	31.38
40.000	5.05	5.04	5.05	0.01	30.23	30.28
50.000	5.06	5.06	5.07	0.01	29.55	29.71
80.000	5.09	5.09	5.11	0.02	27.56	27.94
100.000	5.10	5.10	5.13	0.03	26.37	26.86
150.000	5.25	5.24	5.31	0.07	24.01	24.66
182.000	5.26	5.25	5.36	0.11	22.79	23.54
200.000	5.27	5.25	5.39	0.14	22.25	22.98
221.000	5.29	5.27	5.44	0.17	21.64	22.41
269.000	5.50	5.47	5.69	0.22	20.60	21.44
300.000	5.44	5.42	5.68	0.26	20.00	20.92

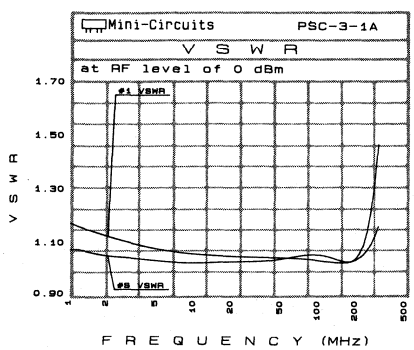
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.000	1.15	1.13	1.14	1.14
2.000	1.13	1.08	1.09	1.09
5.000	1.12	1.06	1.06	1.06
10.000	1.12	1.05	1.05	1.05
20.000	1.12	1.05	1.05	1.05
40.000	1.13	1.05	1.06	1.05
50.000	1.14	1.05	1.06	1.05
80.000	1.17	1.06	1.07	1.05
100.000	1.19	1.07	1.07	1.04
150.000	1.25	1.08	1.09	1.04
182.000	1.29	1.09	1.10	1.03
200.000	1.31	1.09	1.10	1.03
221.000	1.33	1.10	1.11	1.03
269.000	1.36	1.11	1.12	1.02
300.000	1.38	1.11	1.12	1.01

PSC-3-1A

1 to 300 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3
1.000	5.01	5.01	5.01	0.00	35.37	35.33
2.000	4.99	4.99	4.98	0.01	38.61	38.23
5.000	4.94	4.93	4.93	0.01	43.42	42.67
10.000	4.94	4.94	4.94	0.00	43.85	43.61
20.000	4.95	4.95	4.95	0.00	40.81	41.69
40.000	4.99	4.98	4.98	0.01	36.49	38.35
50.000	5.00	4.99	5.00	0.01	35.02	37.16
80.000	5.02	5.02	5.04	0.02	32.05	34.78
100.000	5.04	5.04	5.07	0.03	30.81	33.78
127.000	5.09	5.08	5.13	0.05	29.74	33.17
150.000	5.08	5.08	5.15	0.07	29.29	33.26
174.000	5.10	5.10	5.19	0.09	29.34	34.19
200.000	5.15	5.14	5.29	0.15	30.01	36.72
253.000	5.21	5.20	5.44	0.24	32.47	39.79
300.000	5.45	5.43	5.80	0.37	27.11	26.82

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.000	1.08	1.17	1.17	1.17
2.000	1.05	1.12	1.12	1.12
5.000	1.03	1.08	1.08	1.08
10.000	1.03	1.06	1.06	1.06
20.000	1.03	1.05	1.05	1.05
40.000	1.04	1.05	1.05	1.05
50.000	1.04	1.04	1.05	1.05
80.000	1.05	1.04	1.04	1.05
100.000	1.06	1.04	1.03	1.05
127.000	1.05	1.03	1.03	1.06
150.000	1.04	1.03	1.03	1.07
174.000	1.02	1.03	1.03	1.09
200.000	1.04	1.04	1.05	1.12
253.000	1.19	1.09	1.10	1.19
300.000	1.47	1.16	1.17	1.28

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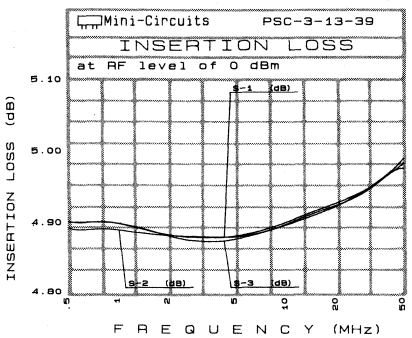
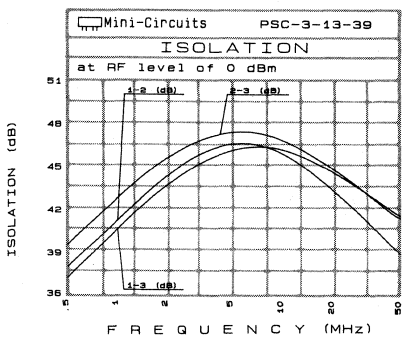
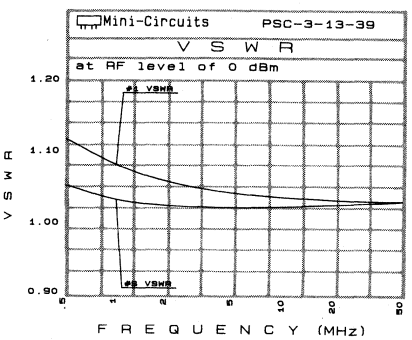
Mini-Circuits

PSC-3-13-39

0.5 to 50 MHz



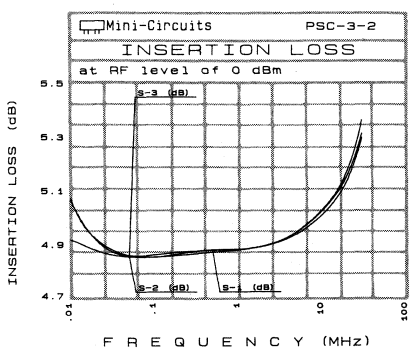


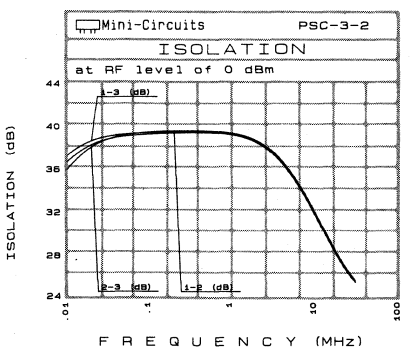


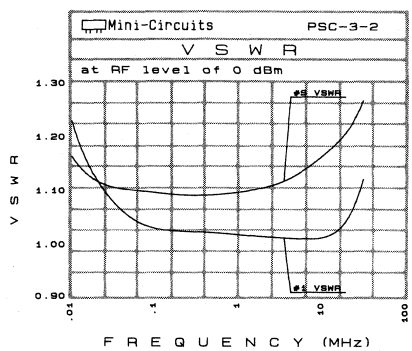
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
0.500	4.90	4.89	4.90	0.01	38.07	39.60	0.500	1.05	1.12	1.11	1.11
1.000	4.90	4.89	4.90	0.01	41.26	42.85	1.000	1.03	1.08	1.08	1.08
2.000	4.88	4.88	4.88	0.00	44.51	45.78	2.000	1.02	1.06	1.05	1.06
4.250	4.88	4.88	4.87	0.01	46.59	47.35	4.250	1.02	1.04	1.04	1.04
5.000	4.88	4.88	4.88	0.00	46.70	47.55	5.000	1.02	1.04	1.04	1.04
6.750	4.88	4.88	4.88	0.00	46.59	47.43	6.750	1.02	1.04	1.04	1.04
10.000	4.90	4.90	4.90	0.00	45.97	46.78	10.000	1.02	1.04	1.04	1.04
14.500	4.91	4.91	4.91	0.00	44.72	45.93	14.500	1.03	1.03	1.03	1.03
20.000	4.93	4.92	4.92	0.01	43.33	44.91	20.000	1.03	1.03	1.03	1.03
25.000	4.94	4.93	4.93	0.01	42.34	44.10	25.000	1.03	1.03	1.03	1.03
29.750	4.95	4.94	4.95	0.01	41.51	43.45	29.750	1.03	1.03	1.03	1.03
34.750	4.95	4.95	4.96	0.01	40.80	42.79	34.750	1.03	1.03	1.03	1.04
39.750	4.96	4.96	4.96	0.00	40.13	42.27	39.750	1.03	1.03	1.03	1.04
45.000	4.97	4.97	4.98	0.01	39.51	41.78	45.000	1.03	1.03	1.03	1.04
50.000	4.98	4.97	4.99	0.02	38.96	41.42	50.000	1.03	1.03	1.03	1.04

PSC-3-2

0.01 to 30 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
0.010	4.92	5.06	5.06	0.14	36.72	36.00	0.010	1.16	1.22	1.22	1.25
0.020	4.88	4.91	4.91	0.03	38.38	38.19	0.020	1.11	1.11	1.12	1.12
0.050	4.85	4.85	4.86	0.01	39.13	39.26	0.050	1.10	1.05	1.05	1.05
0.100	4.86	4.87	4.85	0.02	39.28	39.47	0.100	1.09	1.03	1.03	1.03
0.201	4.86	4.87	4.87	0.01	39.36	39.54	0.201	1.09	1.02	1.02	1.02
0.498	4.87	4.88	4.88	0.01	39.38	39.56	0.498	1.09	1.02	1.02	1.02
0.998	4.89	4.89	4.89	0.00	39.21	39.33	0.998	1.10	1.02	1.02	1.02
1.982	4.88	4.88	4.88	0.00	38.56	38.74	1.982	1.11	1.01	1.01	1.01
4.952	4.94	4.93	4.95	0.02	35.69	35.93	4.952	1.13	1.01	1.01	1.01
10.027	5.03	5.01	5.03	0.02	31.70	31.93	10.027	1.16	1.01	1.01	1.01
14.964	5.09	5.07	5.09	0.02	29.11	29.37	14.964	1.19	1.02	1.02	1.02
17.915	5.12	5.11	5.14	0.03	28.03	28.27	17.915	1.20	1.04	1.04	1.04
20.103	5.16	5.14	5.17	0.03	27.29	27.53	20.103	1.22	1.05	1.05	1.05
25.102	5.23	5.21	5.26	0.05	26.21	26.42	25.102	1.24	1.08	1.08	1.08
30.000	5.32	5.30	5.36	0.06	25.52	25.69	30.000	1.27	1.12	1.12	1.12

In Stock...Immediate Delivery

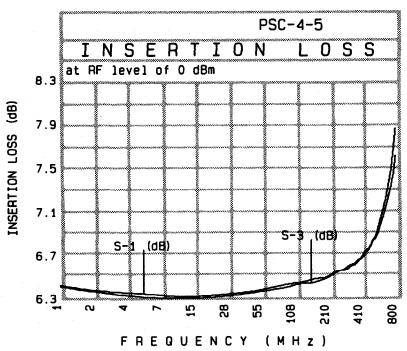
4 WAY-0°

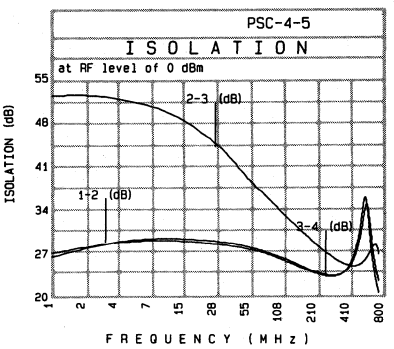
Power Splitter/Combiners

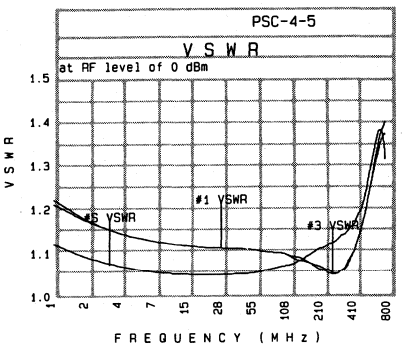
50 ohms

PSC-4-5

1 to 800 MHz





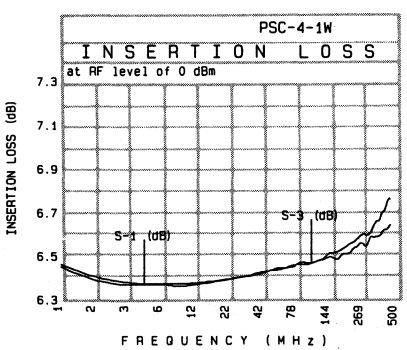


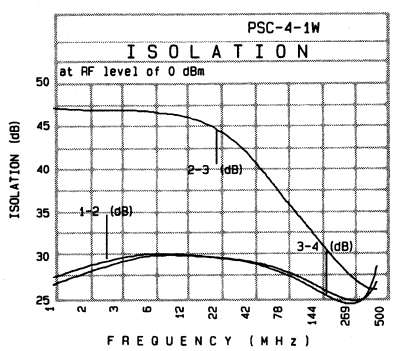
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4
1.0	6.46	6.44	6.45	6.46	0.02	27.74	52.72	27.19
2.0	6.40	6.38	6.39	6.39	0.02	28.98	53.04	28.83
5.0	6.39	6.36	6.35	6.36	0.04	29.67	51.87	29.94
10.0	6.35	6.34	6.34	6.34	0.01	29.78	50.48	30.10
20.0	6.37	6.36	6.35	6.35	0.02	29.50	47.13	29.91
50.0	6.41	6.41	6.40	6.40	0.01	28.65	40.22	29.02
100.0	6.48	6.45	6.45	6.46	0.03	27.08	35.01	27.31
200.0	6.53	6.52	6.52	6.54	0.02	24.70	29.75	24.96
267.0	6.60	6.61	6.60	6.62	0.02	24.06	27.88	24.25
400.0	6.71	6.73	6.71	6.81	0.10	25.29	25.96	25.05
467.0	6.80	6.83	6.78	6.94	0.16	27.97	25.73	27.25
500.0	6.84	6.89	6.84	6.95	0.11	30.36	25.86	29.12
667.0	7.28	7.35	7.20	7.32	0.15	26.13	28.98	28.19
778.0	7.78	7.85	7.53	7.56	0.32	20.67	26.01	22.67
800.0	7.90	8.00	7.65	7.64	0.36	20.29	24.44	22.44

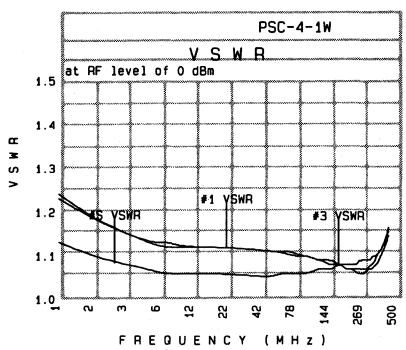
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1.0	1.13	1.22	1.22	1.23	1.23
2.0	1.09	1.17	1.17	1.17	1.17
5.0	1.07	1.14	1.14	1.14	1.14
10.0	1.06	1.13	1.13	1.13	1.13
20.0	1.06	1.12	1.13	1.12	1.12
50.0	1.06	1.12	1.12	1.12	1.12
100.0	1.08	1.11	1.11	1.11	1.11
200.0	1.12	1.08	1.08	1.07	1.08
267.0	1.13	1.06	1.07	1.06	1.07
400.0	1.17	1.11	1.12	1.11	1.11
467.0	1.21	1.17	1.18	1.17	1.16
500.0	1.24	1.20	1.21	1.20	1.20
667.0	1.39	1.37	1.38	1.35	1.35
778.0	1.25	1.41	1.42	1.37	1.38
800.0	1.16	1.42	1.42	1.37	1.38

PSC-4-1W

1 to 500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4
1.0	6.48	6.47	6.47	6.46	0.02	28.08	47.42	27.23
2.0	6.40	6.40	6.38	6.38	0.02	29.74	47.13	29.07
5.0	6.39	6.39	6.39	6.38	0.01	30.71	47.21	30.45
10.0	6.39	6.39	6.38	6.39	0.01	30.77	46.85	30.64
20.0	6.41	6.40	6.41	6.39	0.02	30.43	45.46	30.41
50.0	6.45	6.45	6.46	6.43	0.03	29.74	40.71	29.60
100.0	6.48	6.47	6.48	6.49	0.02	28.37	35.55	27.96
120.0	6.50	6.50	6.50	6.50	0.00	27.84	34.22	27.36
200.0	6.53	6.55	6.56	6.59	0.06	26.20	30.39	25.65
220.0	6.53	6.55	6.58	6.61	0.08	25.96	29.76	25.44
250.0	6.56	6.56	6.60	6.63	0.07	25.65	28.94	25.15
320.0	6.62	6.59	6.63	6.73	0.14	25.50	27.53	25.29
400.0	6.64	6.63	6.72	6.80	0.17	26.40	26.77	26.91
486.0	6.70	6.70	6.82	6.95	0.25	28.81	26.92	31.71
500.0	6.74	6.73	6.88	6.97	0.24	29.31	27.06	32.84

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1.0	1.14	1.24	1.24	1.25	1.25
2.0	1.10	1.18	1.17	1.18	1.18
5.0	1.08	1.14	1.14	1.14	1.14
10.0	1.07	1.13	1.13	1.13	1.13
20.0	1.07	1.13	1.12	1.13	1.12
50.0	1.06	1.12	1.12	1.12	1.12
100.0	1.07	1.11	1.11	1.11	1.11
120.0	1.08	1.10	1.10	1.10	1.10
200.0	1.09	1.08	1.09	1.08	1.08
220.0	1.09	1.08	1.08	1.08	1.08
250.0	1.09	1.07	1.08	1.08	1.08
320.0	1.10	1.08	1.09	1.09	1.09
400.0	1.13	1.12	1.13	1.13	1.13
486.0	1.20	1.19	1.20	1.21	1.20
500.0	1.22	1.20	1.22	1.22	1.21

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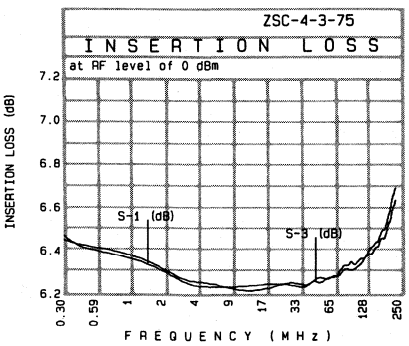
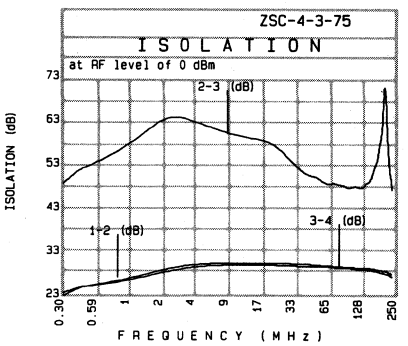
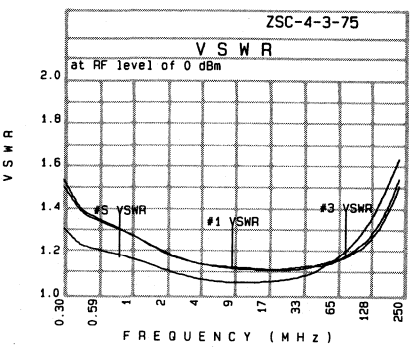
Mini-Circuits

ZSC-4-3-75

0.25 to 250 MHz





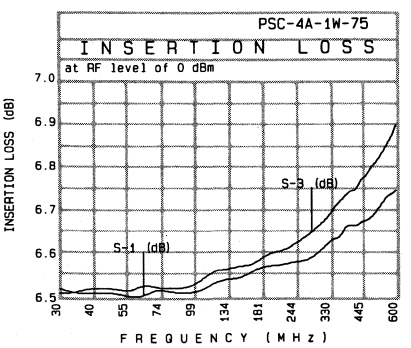


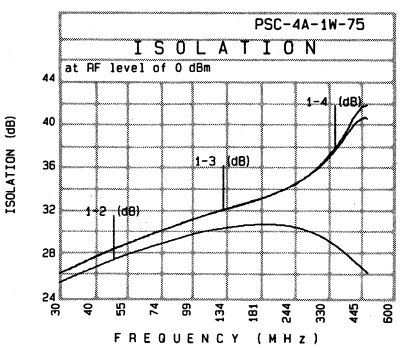
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4
0.3	6.47	6.49	6.49	6.48	0.02	23.39	49.10	24.07
0.5	6.44	6.43	6.42	6.42	0.02	26.02	53.54	25.82
2.0	6.34	6.32	6.33	6.31	0.03	29.34	64.57	28.72
3.5	6.27	6.29	6.26	6.25	0.04	30.29	64.41	29.64
5.0	6.28	6.25	6.25	6.24	0.04	30.72	62.70	30.25
10.0	6.22	6.23	6.25	6.24	0.03	30.99	59.64	30.56
20.0	6.25	6.25	6.27	6.24	0.03	30.83	59.19	30.49
50.0	6.30	6.28	6.26	6.29	0.04	30.54	50.86	30.09
95.1	6.33	6.33	6.38	6.37	0.05	30.04	48.19	29.81
100.0	6.33	6.32	6.34	6.36	0.04	29.94	48.20	29.75
125.0	6.39	6.35	6.38	6.38	0.04	29.88	48.21	29.41
183.6	6.47	6.46	6.51	6.54	0.08	29.31	59.37	28.82
200.0	6.55	6.53	6.59	6.61	0.08	29.08	72.18	28.53
243.7	6.73	6.70	6.79	6.83	0.13	28.13	44.95	27.49
250.0	6.72	6.71	6.81	6.85	0.14	27.86	43.93	27.36

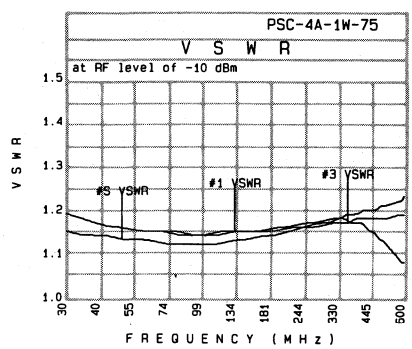
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
0.3	1.32	1.54	1.54	1.51	1.51
0.5	1.22	1.36	1.36	1.35	1.35
2.0	1.13	1.20	1.20	1.21	1.21
3.5	1.10	1.17	1.17	1.17	1.17
5.0	1.08	1.15	1.15	1.15	1.15
10.0	1.07	1.13	1.13	1.14	1.14
20.0	1.08	1.13	1.13	1.13	1.14
50.0	1.14	1.15	1.15	1.16	1.16
95.1	1.26	1.21	1.21	1.22	1.22
100.0	1.27	1.22	1.21	1.23	1.23
125.0	1.34	1.26	1.26	1.27	1.28
183.6	1.51	1.39	1.38	1.41	1.42
200.0	1.56	1.43	1.42	1.46	1.46
243.7	1.66	1.54	1.54	1.58	1.58
250.0	1.68	1.56	1.56	1.59	1.60

PSC-4A-1W-75

30 to 600 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4
30.00	6.53	6.54	6.52	6.54	0.02	25.70	26.49	25.82
49.18	6.52	6.52	6.53	6.53	0.02	27.77	28.75	27.79
62.97	6.51	6.52	6.54	6.54	0.03	28.64	29.72	28.61
91.57	6.52	6.54	6.53	6.55	0.03	29.79	31.08	29.65
150.12	6.55	6.56	6.58	6.58	0.03	30.82	32.62	30.48
246.09	6.59	6.58	6.63	6.61	0.05	30.84	34.44	30.18
277.42	6.59	6.60	6.65	6.62	0.05	30.51	35.15	29.78
315.09	6.62	6.62	6.68	6.64	0.06	29.96	36.14	29.19
344.72	6.64	6.64	6.71	6.66	0.07	29.43	37.09	28.60
371.52	6.65	6.65	6.73	6.68	0.08	28.94	38.12	28.02
428.34	6.67	6.66	6.76	6.70	0.11	27.70	40.10	26.75
486.50	6.69	6.68	6.81	6.73	0.13	26.55	41.14	25.53
544.34	6.73	6.70	6.85	6.74	0.14	25.47	39.06	24.42
586.67	6.75	6.73	6.88	6.77	0.15	24.81	36.88	23.73
600.00	6.75	6.72	6.90	6.78	0.18	24.64	36.12	23.56

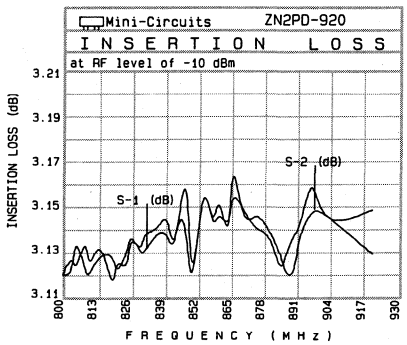
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
30.00	1.16	1.20	1.20	1.20	1.20
49.18	1.14	1.17	1.17	1.17	1.17
62.97	1.14	1.16	1.16	1.16	1.16
91.57	1.13	1.15	1.15	1.15	1.15
150.12	1.14	1.16	1.16	1.16	1.16
246.09	1.17	1.18	1.17	1.17	1.17
277.42	1.18	1.18	1.17	1.17	1.17
315.09	1.18	1.19	1.18	1.18	1.18
344.72	1.19	1.19	1.18	1.18	1.18
371.52	1.18	1.20	1.19	1.18	1.19
428.34	1.17	1.21	1.19	1.19	1.19
486.50	1.14	1.22	1.20	1.19	1.20
544.34	1.11	1.22	1.21	1.20	1.21
586.67	1.09	1.23	1.22	1.20	1.22
600.00	1.09	1.24	1.22	1.20	1.23

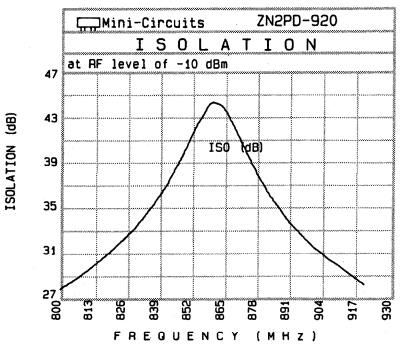
2 way
Power Splitter/Combiners

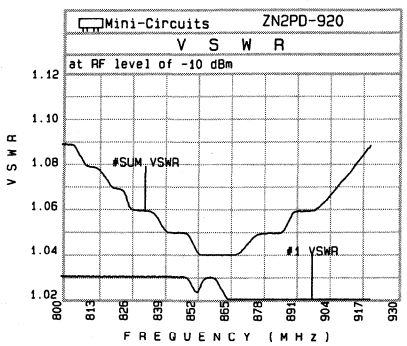
ZN2PD-920

2 way - 0°

800 to 920 MHz







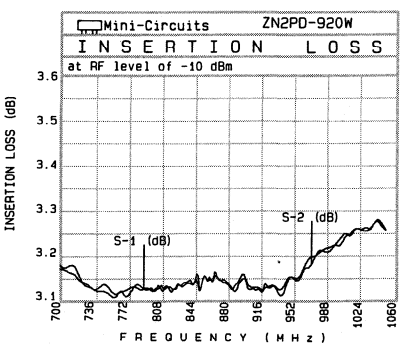
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2
800.00	3.12	3.12	0.00	27.79
809.38	3.12	3.14	0.02	29.21
819.88	3.13	3.11	0.02	31.09
826.00	3.14	3.14	0.00	32.45
831.25	3.13	3.14	0.01	33.71
836.50	3.14	3.14	0.01	35.17
845.25	3.15	3.15	0.00	38.51
853.13	3.15	3.15	0.00	42.19
860.13	3.15	3.16	0.01	45.00
865.38	3.16	3.18	0.02	44.13
869.75	3.15	3.14	0.01	42.38
884.63	3.12	3.13	0.02	35.88
891.63	3.14	3.14	0.00	33.77
900.00	3.14	3.15	0.00	31.65
920.00	3.15	3.13	0.02	28.29

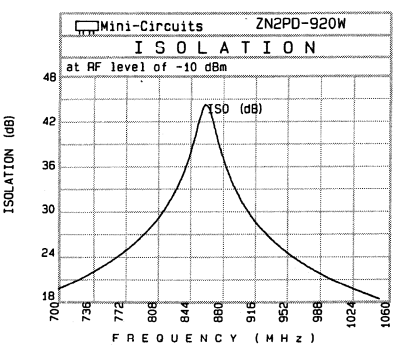
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
800.00	1.09	1.03	1.02
809.38	1.08	1.03	1.02
819.88	1.07	1.03	1.02
826.00	1.06	1.03	1.02
831.25	1.06	1.03	1.02
836.50	1.06	1.03	1.03
845.25	1.05	1.03	1.02
853.13	1.04	1.02	1.02
860.13	1.04	1.03	1.02
865.38	1.04	1.02	1.02
869.75	1.04	1.02	1.02
884.63	1.05	1.02	1.02
891.63	1.06	1.02	1.02
900.00	1.06	1.02	1.02
920.00	1.09	1.02	1.02

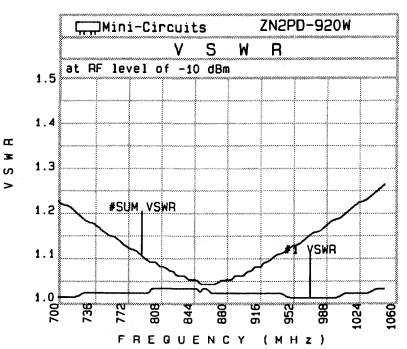
ZN2PD-920W

2 way - 0°

700 to 1050 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2
700.00	3.17	3.18	0.01	19.51
738.50	3.12	3.12	0.01	21.84
777.00	3.12	3.13	0.01	25.07
805.00	3.14	3.12	0.02	28.48
826.00	3.14	3.14	0.00	32.45
847.88	3.17	3.14	0.03	39.57
860.13	3.15	3.16	0.01	45.00
865.38	3.16	3.18	0.02	44.13
891.63	3.14	3.14	0.00	33.77
918.75	3.11	3.12	0.01	28.40
952.00	3.15	3.15	0.00	24.51
989.63	3.22	3.21	0.01	21.49
1028.13	3.27	3.26	0.01	19.27
1044.75	3.27	3.28	0.00	18.46
1050.00	3.26	3.26	0.00	18.20

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
700.00	1.23	1.01	1.01
738.50	1.18	1.02	1.02
777.00	1.12	1.02	1.02
805.00	1.09	1.03	1.02
826.00	1.06	1.03	1.02
847.88	1.05	1.03	1.02
860.13	1.04	1.03	1.02
865.38	1.04	1.02	1.02
891.63	1.06	1.02	1.02
918.75	1.08	1.02	1.02
952.00	1.13	1.01	1.01
989.63	1.18	1.01	1.01
1028.13	1.23	1.02	1.02
1044.75	1.26	1.03	1.03
1050.00	1.27	1.03	1.03

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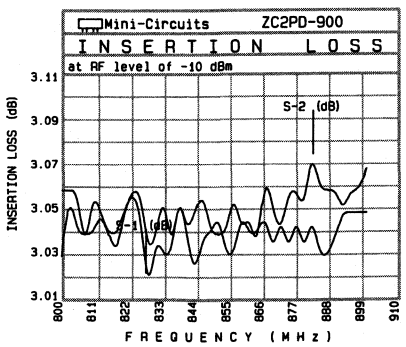
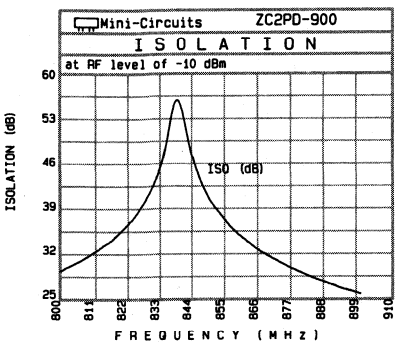
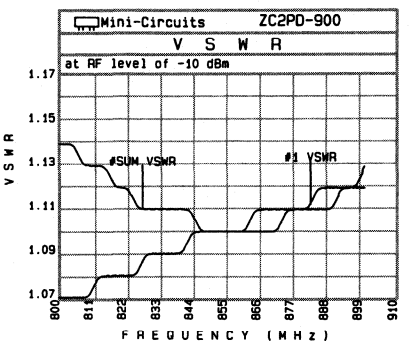
Mini-Circuits

ZC2PD-900 2 way - 0° 800 to 900 MHz



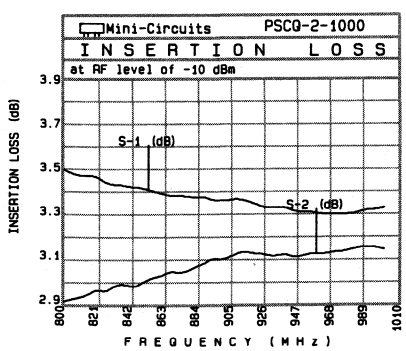


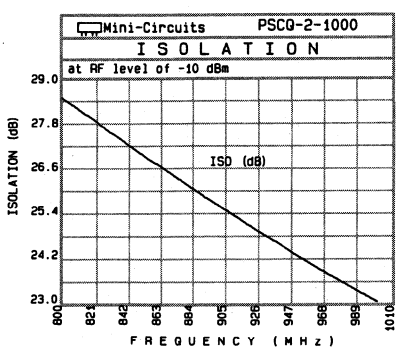


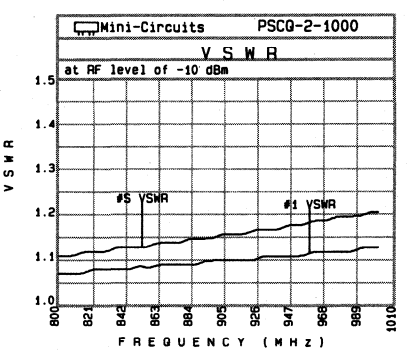
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2
800.00	3.03	3.06	0.02	29.24
807.75	3.04	3.03	0.01	31.07
815.50	3.04	3.04	0.00	33.52
823.00	3.06	3.06	0.00	36.73
830.75	3.04	3.04	0.00	42.26
838.50	3.06	3.06	0.00	57.44
846.25	3.04	3.06	0.02	44.99
853.75	3.03	3.04	0.01	38.44
861.50	3.04	3.05	0.00	34.51
869.25	3.03	3.05	0.02	31.81
877.00	3.05	3.06	0.02	29.79
884.50	3.03	3.06	0.03	28.19
892.25	3.05	3.05	0.00	26.82
897.50	3.05	3.06	0.01	26.03
900.00	3.05	3.07	0.02	25.61

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
800.00	1.14	1.07	1.06
807.75	1.13	1.07	1.07
815.50	1.13	1.08	1.07
823.00	1.12	1.08	1.08
830.75	1.11	1.09	1.08
838.50	1.11	1.09	1.09
846.25	1.10	1.10	1.09
853.75	1.10	1.10	1.09
861.50	1.10	1.10	1.10
869.25	1.10	1.11	1.10
877.00	1.11	1.11	1.11
884.50	1.11	1.12	1.11
892.25	1.12	1.12	1.11
897.50	1.12	1.12	1.12
900.00	1.13	1.12	1.12

PSCQ-2-1000 2 way - 90° 800 to 1000 MHz







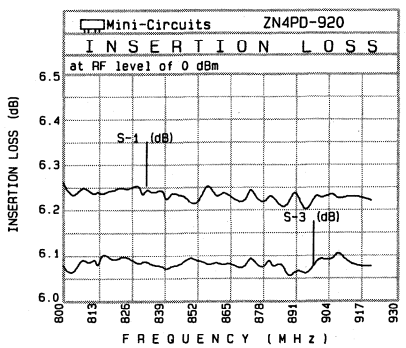
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	AMPLITUDE UNBALANCE (dB)	PHASE (DEGREE)	ISOLATION (dB) 1-2
800.00	3.51	2.91	0.61	88.85	28.60
815.50	3.48	2.94	0.54	88.84	28.12
831.00	3.44	2.98	0.46	88.96	27.64
846.00	3.43	2.98	0.45	88.95	27.20
861.50	3.40	3.03	0.37	88.83	26.77
877.00	3.39	3.05	0.33	88.94	26.31
892.50	3.37	3.11	0.27	88.90	25.87
907.50	3.38	3.13	0.25	88.82	25.46
923.00	3.34	3.13	0.22	88.91	25.01
938.50	3.34	3.13	0.21	89.04	24.63
954.00	3.32	3.13	0.19	88.96	24.19
969.00	3.31	3.14	0.17	89.00	23.80
984.50	3.32	3.16	0.16	88.96	23.43
995.00	3.33	3.16	0.18	88.98	23.19
1000.00	3.34	3.15	0.19	89.20	23.06

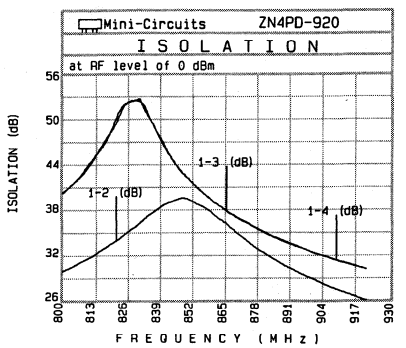
4 way - 0°

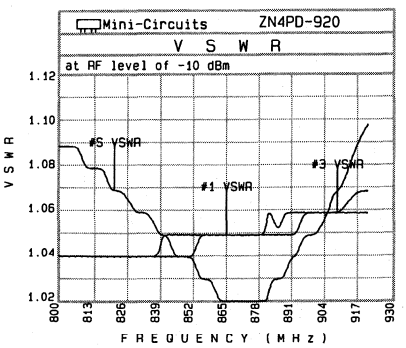
Power Splitter/Combiners

ZN4PD-920

800 to 920 MHz



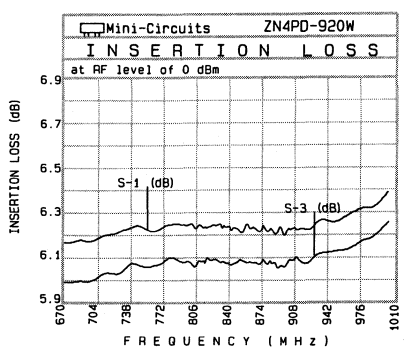


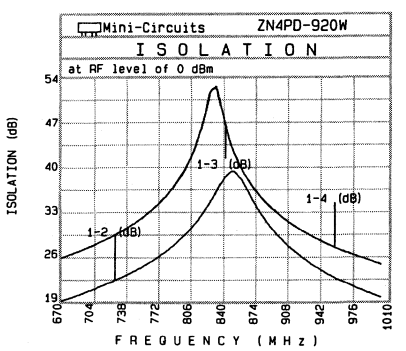


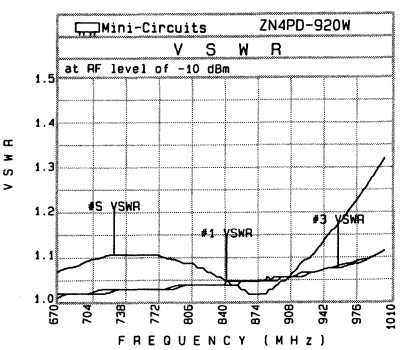
FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
800.00	6.27	6.10	6.08	6.22	0.19	29.94	40.73	30.18	800.00	1.09	1.04	1.04	1.04	1.04
810.25	6.25	6.12	6.08	6.21	0.17	31.71	44.37	32.09	810.25	1.08	1.04	1.05	1.04	1.04
817.68	6.25	6.10	6.10	6.23	0.15	33.27	48.28	33.71	817.68	1.08	1.04	1.05	1.04	1.04
830.05	6.27	6.12	6.08	6.22	0.19	36.26	53.67	37.10	830.05	1.06	1.04	1.05	1.04	1.04
839.13	6.26	6.12	6.08	6.21	0.18	38.65	47.70	39.59	839.13	1.05	1.04	1.05	1.04	1.04
847.38	6.24	6.10	6.09	6.21	0.15	40.05	43.62	40.44	847.38	1.04	1.05	1.05	1.04	1.04
854.80	6.25	6.10	6.09	6.22	0.16	39.01	40.90	39.41	854.80	1.03	1.05	1.05	1.05	1.04
856.45	6.27	6.13	6.08	6.21	0.19	38.82	40.23	39.13	856.45	1.03	1.05	1.05	1.05	1.05
869.65	6.22	6.10	6.07	6.23	0.16	35.12	37.25	35.05	869.65	1.02	1.05	1.06	1.05	1.05
877.90	6.22	6.07	6.07	6.19	0.16	33.01	35.69	32.93	877.90	1.02	1.05	1.06	1.05	1.05
885.33	6.21	6.11	6.09	6.20	0.12	31.54	34.51	31.27	885.33	1.03	1.05	1.06	1.05	1.05
895.23	6.20	6.09	6.06	6.21	0.15	29.68	33.15	29.54	895.23	1.05	1.06	1.06	1.06	1.06
906.78	6.23	6.11	6.12	6.23	0.12	27.94	31.79	27.79	906.78	1.07	1.06	1.07	1.06	1.06
915.03	6.24	6.11	6.08	6.21	0.17	26.87	30.93	26.72	915.03	1.09	1.07	1.07	1.06	1.06
920.00	6.23	6.12	6.08	6.21	0.15	26.22	30.46	26.11	920.00	1.10	1.07	1.07	1.06	1.06

ZN4PD-920W

670 to 1000 MHz







FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
670.00	6.17	6.02	5.99	6.15	0.18	19.09	26.01	19.10	670.00	1.07	1.02	1.02	1.01	1.01
721.15	6.21	6.06	6.03	6.17	0.18	22.02	29.36	22.08	721.15	1.11	1.03	1.03	1.02	1.02
771.48	6.25	6.11	6.08	6.22	0.16	26.13	34.77	26.29	771.48	1.11	1.03	1.04	1.03	1.03
805.30	6.24	6.09	6.07	6.21	0.16	30.79	42.50	31.05	805.30	1.09	1.04	1.04	1.04	1.04
817.68	6.25	6.10	6.10	6.23	0.15	33.27	48.28	33.71	817.68	1.08	1.04	1.05	1.04	1.04
832.53	6.26	6.11	6.09	6.23	0.17	37.05	52.53	37.74	832.53	1.06	1.04	1.05	1.04	1.04
847.38	6.24	6.10	6.09	6.21	0.15	40.05	43.62	40.44	847.38	1.04	1.05	1.05	1.04	1.04
862.23	6.25	6.11	6.08	6.23	0.17	37.20	38.99	37.17	862.23	1.02	1.05	1.06	1.05	1.05
877.90	6.22	6.07	6.07	6.19	0.16	33.01	35.69	32.93	877.90	1.02	1.05	1.06	1.05	1.05
890.28	6.26	6.12	6.07	6.22	0.19	30.58	33.71	30.42	890.28	1.04	1.06	1.06	1.05	1.05
906.78	6.23	6.11	6.12	6.23	0.12	27.94	31.79	27.79	906.78	1.07	1.06	1.07	1.06	1.06
940.60	6.27	6.13	6.13	6.27	0.14	24.11	28.71	23.96	940.60	1.15	1.08	1.08	1.08	1.07
982.68	6.33	6.21	6.19	6.32	0.13	20.91	26.00	20.79	982.68	1.27	1.10	1.11	1.10	1.10
991.75	6.36	6.25	6.23	6.34	0.13	20.35	25.54	20.25	991.75	1.30	1.11	1.12	1.11	1.11
1000.00	6.41	6.28	6.27	6.38	0.14	19.87	25.10	19.76	1000.00	1.33	1.12	1.12	1.12	1.11

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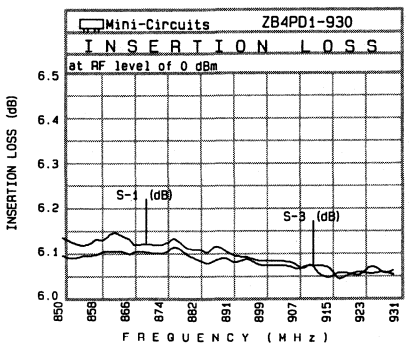
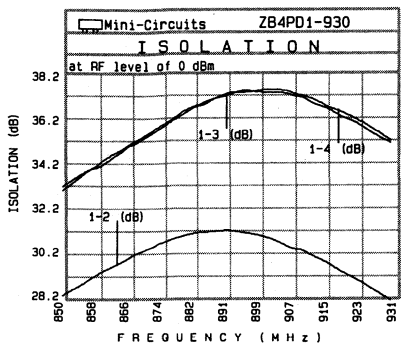
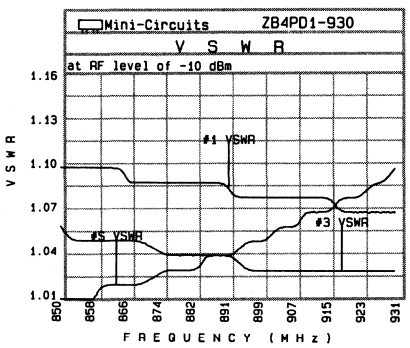
Mini-Circuits

ZB4PD1-930

850 to 930 MHz



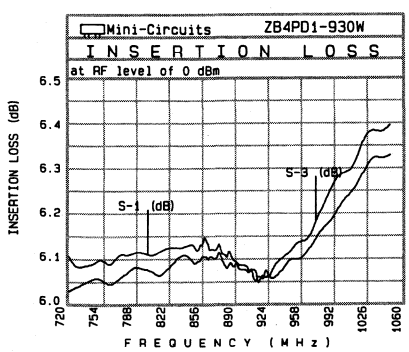


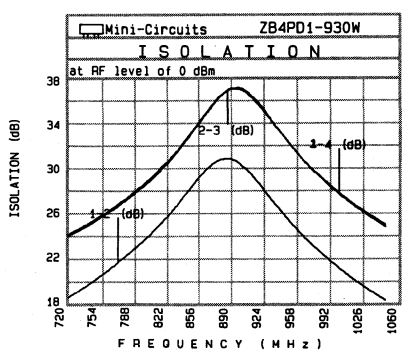


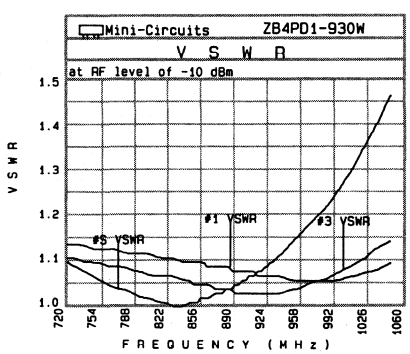
FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
850.00	6.14	6.11	6.10	6.13	0.04	28.39	33.26	27.78	850.00	1.01	1.10	1.06	1.06	1.10
857.44	6.13	6.09	6.10	6.09	0.04	29.23	34.16	28.57	857.44	1.01	1.10	1.06	1.05	1.10
862.31	6.16	6.12	6.11	6.12	0.05	29.70	34.73	28.96	862.31	1.02	1.10	1.06	1.05	1.10
867.19	6.12	6.10	6.11	6.09	0.04	30.23	35.31	29.44	867.19	1.02	1.09	1.06	1.05	1.09
876.94	6.15	6.12	6.13	6.11	0.03	30.97	36.38	30.21	876.94	1.03	1.09	1.05	1.04	1.09
885.06	6.10	6.09	6.08	6.08	0.03	31.29	36.88	30.57	885.06	1.04	1.09	1.05	1.04	1.09
886.69	6.13	6.10	6.09	6.09	0.04	31.31	37.08	30.60	886.69	1.04	1.09	1.05	1.04	1.09
891.56	6.10	6.09	6.08	6.07	0.03	31.38	37.36	30.70	891.56	1.04	1.08	1.04	1.04	1.08
899.69	6.09	6.08	6.08	6.06	0.03	31.11	37.41	30.49	899.69	1.05	1.08	1.04	1.03	1.08
907.00	6.08	6.08	6.07	6.05	0.03	30.52	37.21	30.02	907.00	1.06	1.08	1.04	1.03	1.08
911.88	6.06	6.06	6.08	6.06	0.02	30.19	36.93	29.68	911.88	1.07	1.08	1.03	1.03	1.08
920.00	6.06	6.07	6.07	6.04	0.03	29.34	36.13	28.90	920.00	1.08	1.07	1.03	1.03	1.07
924.88	6.06	6.07	6.09	6.04	0.05	28.82	35.64	28.37	924.88	1.09	1.07	1.03	1.03	1.07
927.31	6.07	6.05	6.06	6.03	0.04	28.52	35.30	28.12	927.31	1.09	1.07	1.03	1.03	1.07
930.00	6.06	6.07	6.07	6.03	0.05	28.22	35.11	27.88	930.00	1.10	1.07	1.03	1.03	1.07

ZB4PD1-930W

725 to 1050 MHz







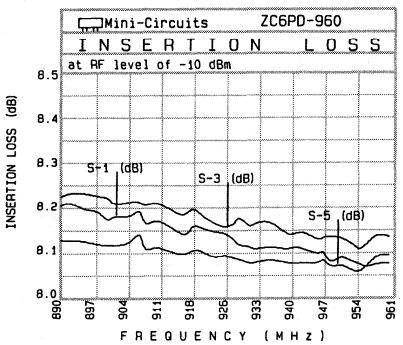
FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
725.00	6.11	6.00	6.03	6.07	0.11	18.72	24.23	18.34	725.00	1.10	1.14	1.12	1.11	1.14
766.44	6.08	6.01	6.04	6.07	0.07	21.15	26.43	20.76	766.44	1.05	1.13	1.10	1.09	1.13
808.69	6.11	6.08	6.08	6.08	0.03	24.33	29.29	23.82	808.69	1.02	1.12	1.08	1.07	1.12
850.13	6.14	6.11	6.10	6.13	0.04	28.39	33.26	27.78	850.13	1.01	1.10	1.06	1.06	1.10
859.88	6.13	6.09	6.11	6.11	0.04	29.51	34.40	28.76	859.88	1.02	1.10	1.06	1.05	1.10
869.63	6.13	6.11	6.11	6.09	0.04	30.41	35.56	29.66	869.63	1.02	1.09	1.05	1.05	1.09
885.06	6.10	6.09	6.08	6.08	0.03	31.29	36.88	30.57	885.06	1.04	1.09	1.05	1.04	1.09
897.25	6.09	6.08	6.08	6.08	0.02	31.21	37.59	30.51	897.25	1.05	1.08	1.04	1.03	1.08
908.63	6.07	6.09	6.08	6.05	0.04	30.55	37.27	29.97	908.63	1.07	1.08	1.04	1.03	1.08
920.00	6.06	6.07	6.07	6.04	0.03	29.34	36.13	28.90	920.00	1.08	1.07	1.03	1.03	1.07
933.00	6.06	6.08	6.09	6.05	0.04	27.89	34.72	27.50	933.00	1.10	1.07	1.03	1.03	1.07
975.25	6.15	6.19	6.19	6.14	0.06	23.64	30.27	23.41	975.25	1.20	1.06	1.05	1.06	1.06
1016.69	6.27	6.33	6.33	6.26	0.07	20.57	27.21	20.33	1016.69	1.33	1.07	1.10	1.10	1.06
1041.88	6.33	6.40	6.39	6.30	0.10	19.07	25.70	18.81	1041.88	1.44	1.09	1.13	1.14	1.08
1050.00	6.34	6.42	6.41	6.32	0.09	18.59	25.29	18.35	1050.00	1.48	1.10	1.15	1.15	1.09

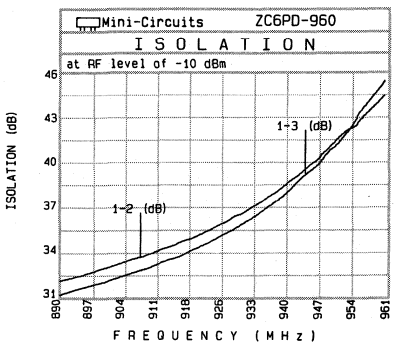
6 way - 0°

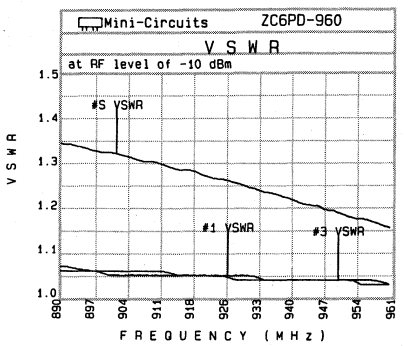
Power Splitter/Combiners

ZC6PD-960

890 to 960 MHz



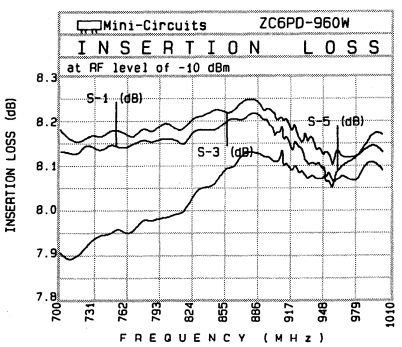


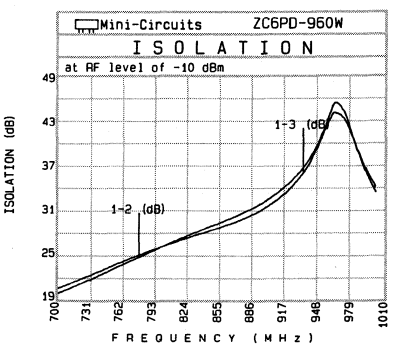


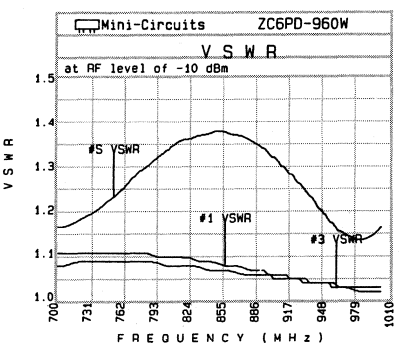
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-4	VSWR S	VSWR 1
890.00	8.21	0.10	32.09	30.06	1.35	1.07
898.00	8.20	0.11	32.76	30.38	1.33	1.06
904.75	8.18	0.10	33.45	30.69	1.32	1.06
910.00	8.18	0.10	33.98	30.91	1.31	1.06
915.25	8.15	0.10	34.56	31.10	1.29	1.05
916.75	8.14	0.09	34.85	31.10	1.29	1.05
922.75	8.15	0.07	35.60	31.26	1.27	1.05
928.00	8.12	0.10	36.55	31.44	1.26	1.05
934.75	8.12	0.09	37.70	31.56	1.24	1.04
942.25	8.11	0.07	39.43	31.72	1.21	1.04
945.25	8.10	0.06	40.32	31.71	1.21	1.04
948.25	8.08	0.07	41.14	31.78	1.20	1.04
953.50	8.08	0.06	42.52	31.72	1.18	1.04
957.25	8.08	0.08	43.89	31.72	1.17	1.04
960.00	8.08	0.07	44.82	31.67	1.16	1.03

ZC6PD-960W

700 to 1000 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-4	VSWR S	VSWR 1
700.00	8.14	0.34	19.90	24.61	1.17	1.11
738.25	8.14	0.28	22.31	25.11	1.21	1.11
777.25	8.17	0.25	24.93	25.88	1.30	1.11
815.50	8.15	0.21	27.42	27.02	1.37	1.10
853.75	8.21	0.15	29.67	28.45	1.39	1.08
889.75	8.21	0.10	32.09	30.06	1.35	1.07
901.00	8.19	0.09	33.03	30.54	1.33	1.06
912.25	8.17	0.10	34.30	30.92	1.30	1.06
922.75	8.15	0.07	35.60	31.26	1.27	1.05
931.00	8.11	0.09	37.01	31.52	1.25	1.05
946.00	8.11	0.05	40.35	31.67	1.20	1.04
953.50	8.08	0.06	42.52	31.72	1.18	1.04
969.25	8.08	0.09	44.62	31.48	1.15	1.03
992.50	8.12	0.12	36.53	30.72	1.15	1.03
1000.00	8.10	0.14	34.64	30.33	1.17	1.03

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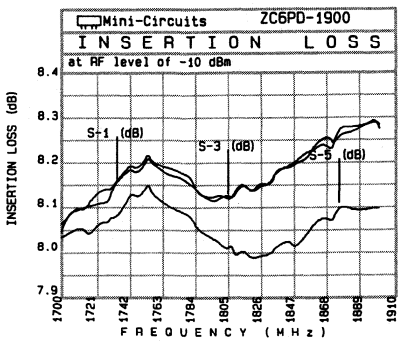
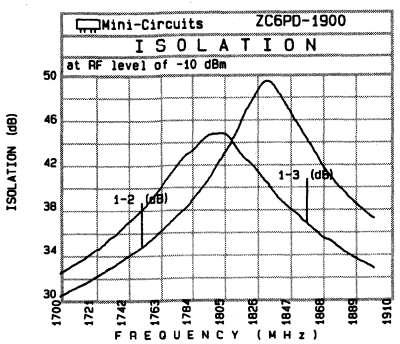
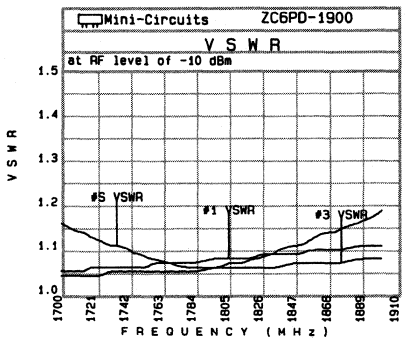
Mini-Circuits

ZC6PD-1900

1700 to 1900 MHz



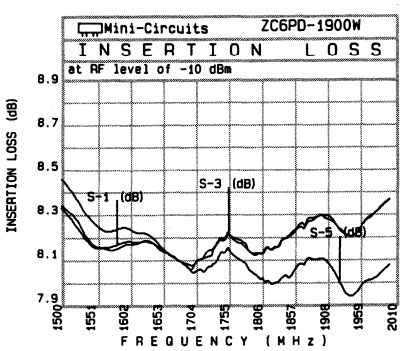


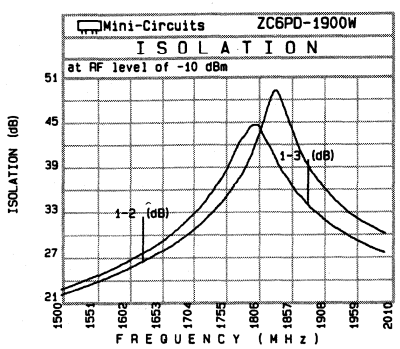


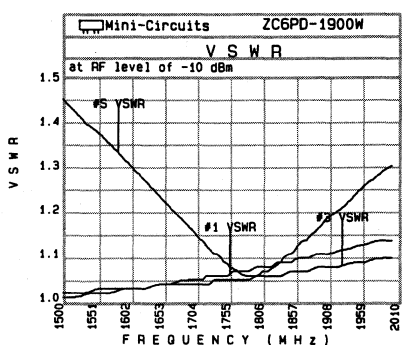
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
1700.00	8.06	0.09	30.11	34.33	1.16	1.05
1715.00	8.09	0.08	31.20	34.89	1.14	1.05
1730.00	8.14	0.11	32.44	35.60	1.11	1.06
1743.75	8.20	0.10	33.74	36.24	1.10	1.06
1755.00	8.23	0.11	34.80	36.89	1.08	1.06
1775.00	8.18	0.10	37.43	38.08	1.06	1.07
1795.00	8.12	0.10	40.51	39.64	1.06	1.08
1807.50	8.12	0.13	43.58	40.43	1.07	1.08
1820.00	8.13	0.18	47.36	41.31	1.08	1.08
1833.75	8.16	0.19	49.71	42.74	1.09	1.09
1855.00	8.21	0.21	45.06	44.76	1.12	1.10
1870.00	8.26	0.19	41.39	46.72	1.14	1.10
1885.00	8.27	0.20	39.06	48.61	1.16	1.11
1897.50	8.31	0.21	37.34	49.94	1.18	1.11
1900.00	8.28	0.22	37.20	50.18	1.19	1.11

ZC6PD-1900W

1500 to 2000 MHz







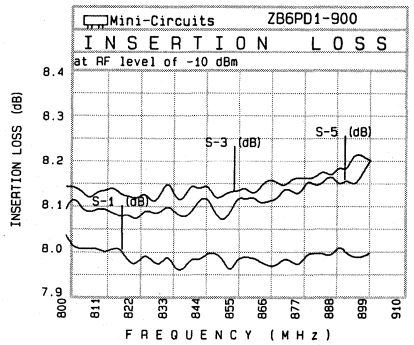
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
1500.00	8.33	0.13	21.76	28.98	1.46	1.01
1563.75	8.15	0.10	23.80	30.46	1.37	1.02
1628.75	8.18	0.08	26.36	31.93	1.27	1.03
1692.50	8.08	0.09	29.66	33.96	1.17	1.05
1717.50	8.11	0.12	31.32	35.14	1.13	1.06
1743.75	8.20	0.10	33.74	36.24	1.10	1.06
1768.75	8.19	0.10	36.47	37.82	1.07	1.07
1800.00	8.13	0.13	41.82	39.76	1.06	1.08
1820.00	8.13	0.18	47.36	41.31	1.08	1.08
1845.00	8.19	0.17	47.51	43.75	1.11	1.09
1871.25	8.24	0.17	41.31	46.86	1.14	1.10
1910.00	8.28	0.23	36.09	50.09	1.20	1.11
1973.75	8.30	0.30	31.43	45.35	1.28	1.14
1987.50	8.33	0.31	30.78	44.26	1.30	1.14
2000.00	8.37	0.30	30.19	43.33	1.31	1.14

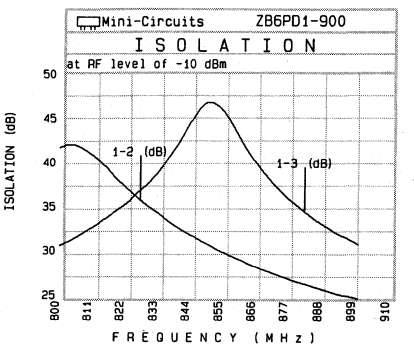
Power Splitter/Combiners

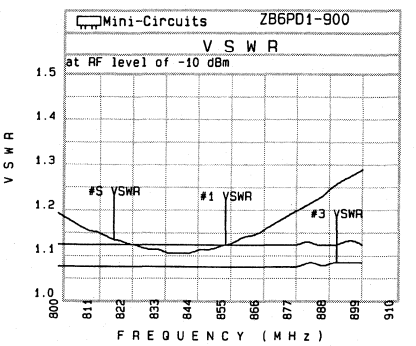
ZB6PD1-900

6 way - 0°

800 to 900 MHz





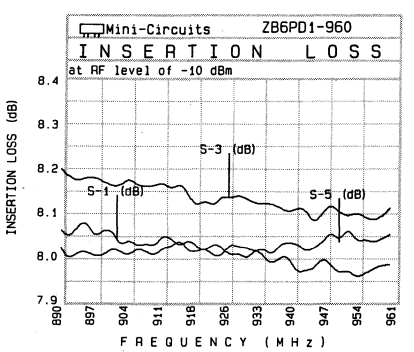


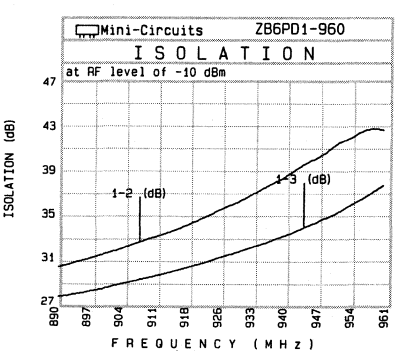
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
800.00	8.04	0.12	42.10	49.24	1.19	1.12
807.75	8.01	0.12	42.14	45.32	1.16	1.12
815.50	8.01	0.14	40.16	42.91	1.14	1.12
823.00	7.97	0.15	37.60	41.02	1.12	1.12
830.75	7.97	0.16	35.28	39.30	1.11	1.12
838.50	7.96	0.16	33.43	37.90	1.10	1.12
846.25	8.00	0.15	31.90	36.84	1.11	1.12
853.75	7.95	0.19	30.50	35.69	1.12	1.12
861.50	7.99	0.15	29.38	34.84	1.14	1.12
869.25	7.97	0.19	28.28	34.07	1.16	1.12
877.00	7.97	0.20	27.37	33.23	1.19	1.12
884.50	8.00	0.19	26.54	32.57	1.22	1.12
892.25	8.00	0.18	25.73	31.95	1.26	1.12
897.50	7.99	0.23	25.32	31.50	1.28	1.13
900.00	8.00	0.21	25.07	31.28	1.29	1.12

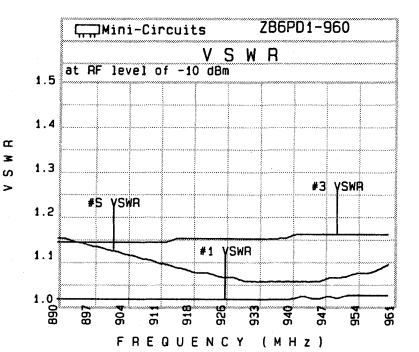
ZB6PD1-960

6 way - 0°

890 to 960 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
890.00	8.07	0.24	30.53	46.44	1.15	1.01
895.43	8.09	0.20	31.16	44.51	1.14	1.01
900.85	8.07	0.20	31.83	43.25	1.12	1.01
906.10	8.03	0.19	32.60	42.02	1.11	1.01
911.53	8.06	0.20	33.34	40.77	1.09	1.01
916.95	8.05	0.16	34.20	39.88	1.08	1.01
922.38	8.04	0.13	35.20	39.01	1.07	1.01
927.63	8.02	0.17	36.23	38.14	1.06	1.01
933.05	8.01	0.14	37.42	37.51	1.05	1.01
938.48	8.01	0.11	38.58	36.70	1.05	1.01
943.90	7.98	0.10	40.13	36.12	1.05	1.01
949.15	7.97	0.14	41.47	35.60	1.06	1.01
954.58	7.97	0.13	42.72	34.97	1.07	1.02
958.25	7.99	0.10	43.21	34.68	1.08	1.02
960.00	7.99	0.13	43.06	34.50	1.09	1.02

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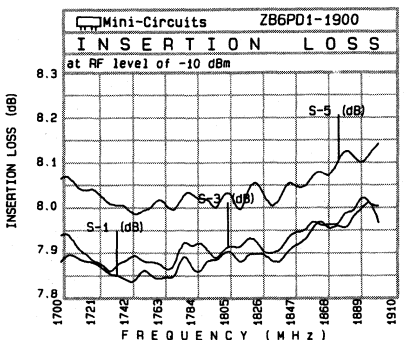
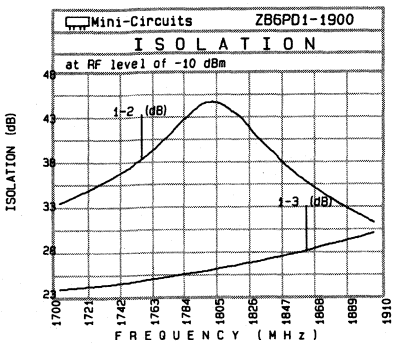
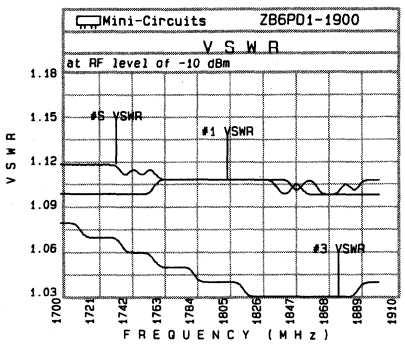
Mini-Circuits

ZB6PD1-1900 — 6 way - 0° — 1700 to 1900 MHz

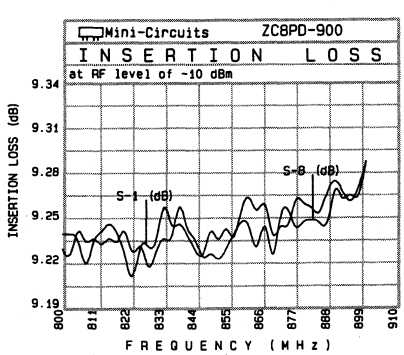


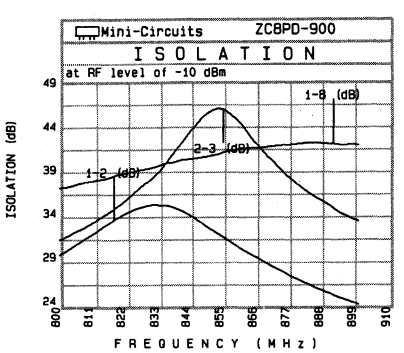


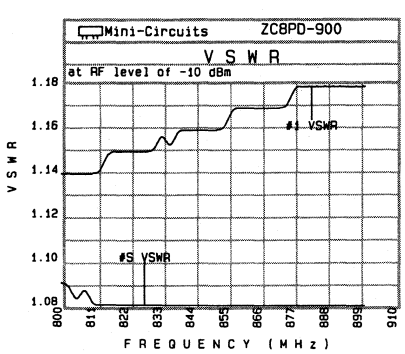


FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
1700.00	7.88	0.21	33.71	33.10	1.12	1.10
1715.50	7.88	0.20	34.95	33.70	1.12	1.10
1731.00	7.85	0.20	36.27	34.13	1.12	1.10
1746.00	7.83	0.17	37.81	34.76	1.12	1.10
1761.50	7.84	0.20	40.02	35.34	1.11	1.11
1777.00	7.91	0.17	42.84	36.27	1.11	1.11
1792.50	7.89	0.13	45.17	36.97	1.11	1.11
1807.50	7.91	0.13	44.54	37.90	1.11	1.11
1823.00	7.90	0.17	41.92	38.94	1.11	1.11
1838.50	7.88	0.15	39.17	39.91	1.11	1.10
1854.00	7.93	0.13	36.55	41.27	1.11	1.10
1869.00	7.95	0.12	34.68	43.01	1.10	1.10
1884.50	7.99	0.13	33.06	44.69	1.10	1.10
1895.00	8.03	0.12	32.02	46.45	1.11	1.10
1900.00	7.97	0.18	31.53	47.29	1.11	1.10

ZC8PD-900 — 8 way - 0° — 800 to 900 MHz







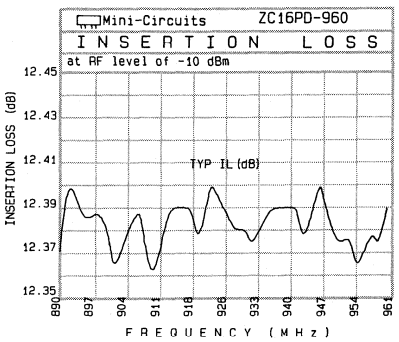
FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-6	(dB) S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-8	(dB) 3-4	(dB) 6-7	FREQ. (MHz)	VSWR S	VSWR 7	VSWR 8
800.00	9.24	9.26	9.22	9.24	9.20	9.23	0.07	29.65	37.33	28.76	30.42	800.00	1.09	1.14	1.16
807.75	9.21	9.25	9.19	9.24	9.23	9.23	0.10	31.28	37.95	30.26	31.63	807.75	1.09	1.15	1.17
815.50	9.25	9.27	9.23	9.24	9.24	9.24	0.07	33.05	38.37	31.79	33.09	815.50	1.08	1.15	1.17
823.00	9.20	9.24	9.18	9.21	9.21	9.22	0.07	34.54	39.04	33.30	34.45	823.00	1.08	1.15	1.18
830.75	9.23	9.27	9.19	9.21	9.24	9.23	0.09	35.46	39.66	34.49	36.49	830.75	1.08	1.16	1.18
838.50	9.25	9.27	9.20	9.22	9.23	9.27	0.08	35.09	40.23	35.02	38.80	838.50	1.08	1.16	1.19
846.25	9.22	9.27	9.20	9.23	9.23	9.22	0.07	33.80	40.80	34.13	41.46	846.25	1.08	1.17	1.19
853.75	9.25	9.28	9.19	9.22	9.23	9.23	0.09	32.04	41.24	32.83	44.17	853.75	1.08	1.17	1.19
861.50	9.27	9.29	9.21	9.22	9.22	9.25	0.08	30.33	41.95	31.18	45.14	861.50	1.08	1.17	1.20
869.25	9.23	9.27	9.20	9.23	9.23	9.21	0.07	28.80	42.10	29.64	42.88	869.25	1.08	1.18	1.20
877.00	9.27	9.27	9.20	9.21	9.24	9.24	0.07	27.43	42.35	28.27	40.21	877.00	1.08	1.18	1.21
884.50	9.25	9.28	9.22	9.27	9.26	9.25	0.07	26.24	42.53	27.01	38.03	884.50	1.08	1.19	1.21
892.25	9.27	9.31	9.22	9.24	9.27	9.26	0.09	25.11	42.51	25.89	36.07	892.25	1.08	1.19	1.22
897.50	9.27	9.32	9.25	9.25	9.28	9.26	0.08	24.47	42.48	25.11	35.08	897.50	1.08	1.19	1.22
900.00	9.29	9.30	9.22	9.25	9.30	9.29	0.09	24.12	42.28	24.85	34.50	900.00	1.08	1.19	1.22

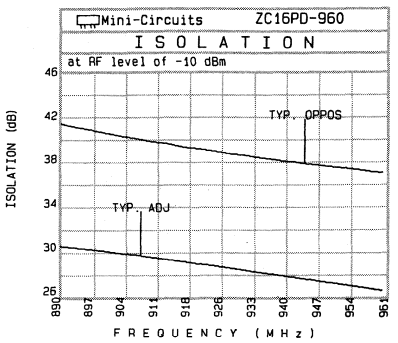
16 way - 0°

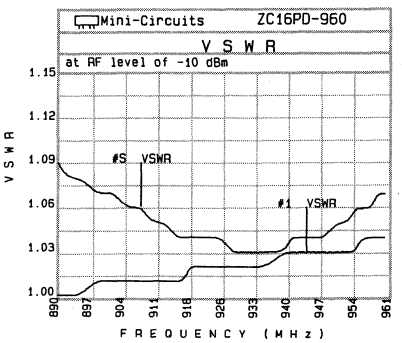
Power Splitter/Combiners

ZC16PD-960

890 to 960 MHz



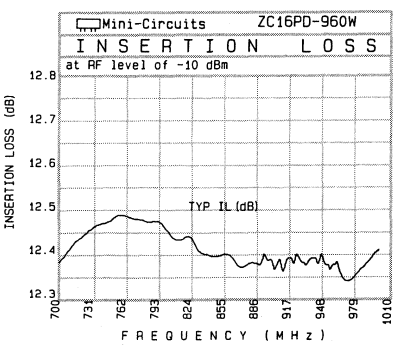


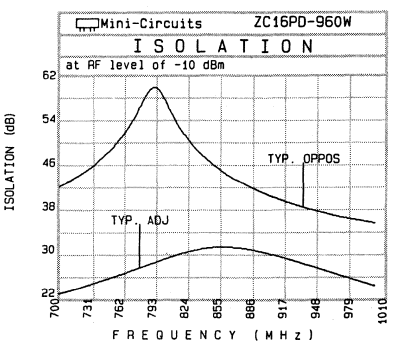


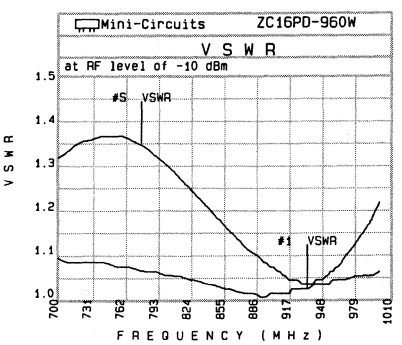
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-9	FREQUENCY (MHz)	VSWR S	VSWR 1
890.00	12.37	0.24	30.43	41.59	890.00	1.09	1.00
898.00	12.39	0.24	30.07	40.94	898.00	1.07	1.01
901.75	12.36	0.22	29.88	40.62	901.75	1.07	1.01
907.75	12.38	0.25	29.58	40.17	907.75	1.06	1.01
915.25	12.39	0.23	29.16	39.64	915.25	1.04	1.01
919.75	12.37	0.25	28.89	39.39	919.75	1.04	1.02
925.00	12.39	0.24	28.61	39.06	925.00	1.04	1.02
930.25	12.38	0.25	28.30	38.77	930.25	1.03	1.02
938.50	12.39	0.26	27.83	38.25	938.50	1.03	1.03
942.25	12.37	0.24	27.60	38.08	942.25	1.04	1.03
946.75	12.39	0.25	27.29	37.83	946.75	1.04	1.03
953.50	12.36	0.26	26.89	37.51	953.50	1.06	1.03
957.25	12.38	0.24	26.68	37.30	957.25	1.06	1.04
958.00	12.37	0.26	26.63	37.28	958.00	1.07	1.04
960.00	12.39	0.25	26.51	37.19	960.00	1.07	1.04

ZC16PD-960W

700 to 1000 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-9	FREQUENCY (MHz)	VSWR S	VSWR 1
700.00	12.38	0.24	22.43	42.27	700.00	1.32	1.09
746.50	12.47	0.26	25.21	48.38	746.50	1.37	1.08
792.25	12.48	0.24	28.34	60.92	792.25	1.32	1.06
838.75	12.40	0.24	30.89	47.70	838.75	1.21	1.03
884.50	12.38	0.23	30.67	42.07	884.50	1.10	1.01
901.00	12.37	0.25	29.93	40.69	901.00	1.07	1.01
907.75	12.38	0.25	29.58	40.17	907.75	1.06	1.01
913.00	12.39	0.25	29.29	39.85	913.00	1.05	1.01
922.75	12.40	0.23	28.75	39.19	922.75	1.04	1.02
934.75	12.39	0.25	28.03	38.49	934.75	1.03	1.02
946.00	12.40	0.23	27.37	37.88	946.00	1.04	1.03
957.25	12.38	0.24	26.68	37.30	957.25	1.06	1.04
984.25	12.37	0.26	25.01	36.25	984.25	1.15	1.05
994.00	12.40	0.30	24.41	35.89	994.00	1.19	1.05
1000.00	12.41	0.30	24.04	35.71	1000.00	1.22	1.06

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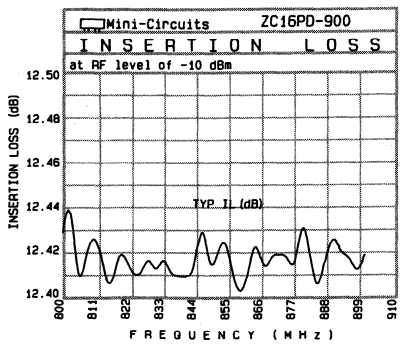
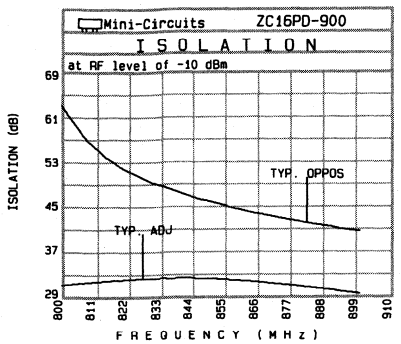
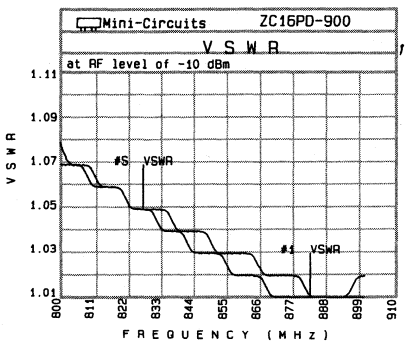
Mini-Circuits

ZC16PD-900

800 to 900 MHz



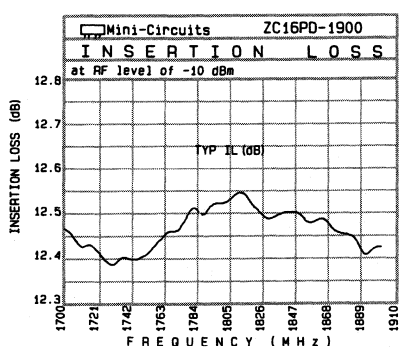


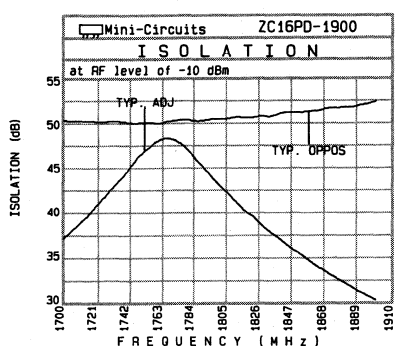


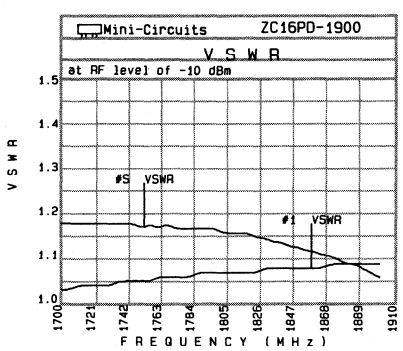
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-9	FREQUENCY (MHz)	VSWR S	VSWR 1
800.00	12.43	0.20	31.27	64.26	800.00	1.08	1.07
807.75	12.42	0.20	31.75	58.34	807.75	1.07	1.07
815.50	12.40	0.21	32.12	54.41	815.50	1.06	1.06
823.00	12.41	0.21	32.38	52.04	823.00	1.05	1.05
830.75	12.41	0.19	32.54	49.87	830.75	1.05	1.05
838.50	12.41	0.19	32.58	48.45	838.50	1.04	1.04
846.25	12.44	0.21	32.57	46.96	846.25	1.03	1.04
853.75	12.43	0.20	32.41	46.07	853.75	1.03	1.03
861.50	12.41	0.21	32.14	44.92	861.50	1.02	1.03
869.25	12.42	0.21	31.78	44.07	869.25	1.01	1.02
877.00	12.41	0.20	31.33	43.18	877.00	1.01	1.02
884.50	12.40	0.21	30.88	42.47	884.50	1.01	1.01
892.25	12.42	0.21	30.37	41.75	892.25	1.01	1.01
897.50	12.41	0.25	29.98	41.34	897.50	1.02	1.01
900.00	12.42	0.24	29.77	41.20	900.00	1.02	1.01

ZC16PD-1900

1700 to 1900 MHz



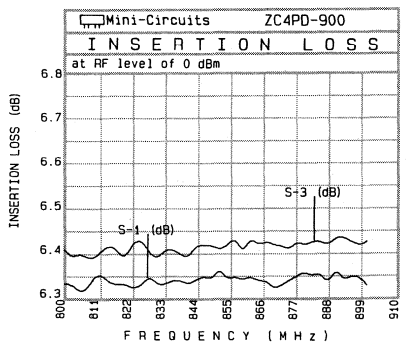


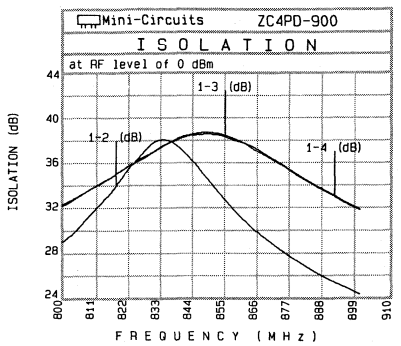


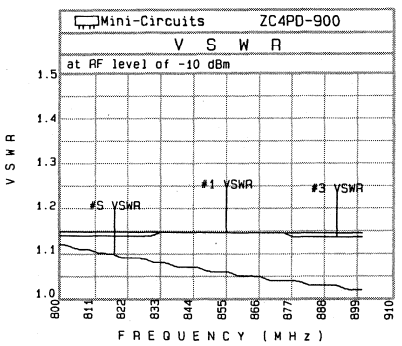
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-9	FREQUENCY (MHz)	VSWR S	VSWR 1
1700.00	12.47	0.34	37.37	50.92	1700.00	1.18	1.03
1715.50	12.44	0.36	39.87	50.79	1715.50	1.18	1.04
1731.00	12.38	0.37	43.00	50.90	1731.00	1.18	1.04
1746.00	12.40	0.37	46.25	50.55	1746.00	1.18	1.05
1761.50	12.45	0.38	48.81	50.47	1761.50	1.17	1.06
1777.00	12.50	0.37	48.09	51.06	1777.00	1.17	1.06
1792.50	12.53	0.37	45.23	50.96	1792.50	1.17	1.07
1807.50	12.55	0.35	42.40	51.21	1807.50	1.16	1.07
1823.00	12.51	0.36	39.90	51.28	1823.00	1.15	1.07
1838.50	12.51	0.40	37.48	51.74	1838.50	1.14	1.08
1854.00	12.48	0.39	35.52	51.89	1854.00	1.12	1.08
1869.00	12.47	0.36	33.64	52.39	1869.00	1.11	1.09
1884.50	12.45	0.38	31.94	52.35	1884.50	1.09	1.09
1895.00	12.43	0.38	30.91	52.78	1895.00	1.07	1.09
1900.00	12.43	0.37	30.48	53.15	1900.00	1.06	1.09

Power Splitter/Combiners 50 ohms

ZC4PD-900 — 4 way - 0° — 800 to 900 MHz

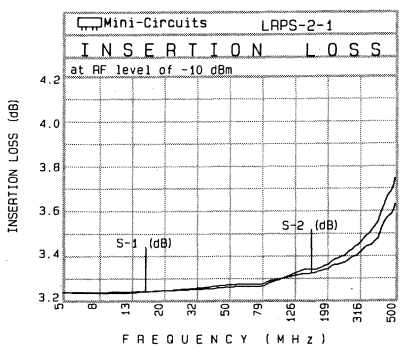


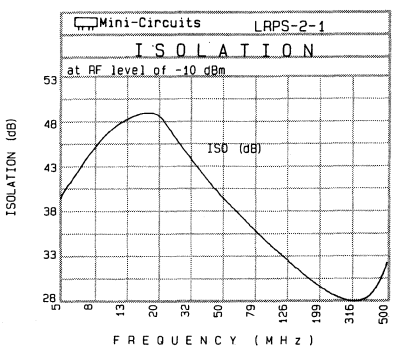


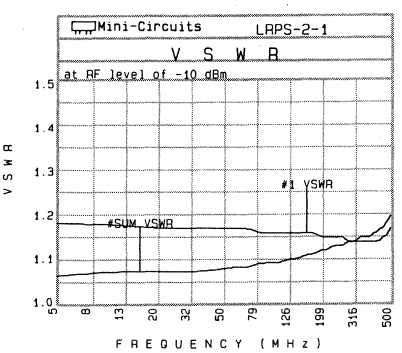


FREQ. (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
800.00	6.33	6.33	6.41	6.35	0.08	29.04	32.46	23.52	800.00	1.12	1.14	1.16	1.15	1.16
807.75	6.32	6.31	6.39	6.35	0.08	31.00	33.62	24.53	807.75	1.11	1.14	1.16	1.15	1.16
815.50	6.33	6.32	6.42	6.35	0.10	33.18	34.82	25.58	815.50	1.10	1.14	1.16	1.15	1.16
823.00	6.32	6.32	6.43	6.36	0.12	35.88	36.07	26.79	823.00	1.09	1.14	1.16	1.15	1.16
830.75	6.33	6.31	6.39	6.33	0.08	38.20	37.33	28.14	830.75	1.08	1.14	1.16	1.15	1.16
838.50	6.34	6.33	6.40	6.37	0.08	38.06	38.59	29.81	838.50	1.07	1.15	1.16	1.15	1.16
846.25	6.35	6.34	6.42	6.36	0.08	35.88	39.20	31.54	846.25	1.07	1.15	1.16	1.15	1.16
853.75	6.34	6.31	6.42	6.35	0.10	33.38	39.14	33.64	853.75	1.06	1.15	1.17	1.15	1.16
861.50	6.35	6.33	6.44	6.38	0.11	31.18	38.36	35.93	861.50	1.05	1.15	1.17	1.15	1.16
869.25	6.32	6.32	6.42	6.36	0.10	29.37	37.20	37.83	869.25	1.04	1.15	1.17	1.15	1.16
877.00	6.35	6.33	6.43	6.37	0.10	27.89	35.90	37.64	877.00	1.04	1.15	1.17	1.14	1.16
884.50	6.36	6.32	6.43	6.37	0.11	26.60	34.58	36.01	884.50	1.03	1.15	1.17	1.14	1.15
892.25	6.34	6.35	6.44	6.40	0.10	25.47	33.40	33.87	892.25	1.03	1.15	1.17	1.14	1.15
897.50	6.35	6.33	6.42	6.39	0.08	24.79	32.58	32.59	897.50	1.02	1.15	1.17	1.14	1.15
900.00	6.33	6.32	6.43	6.38	0.12	24.48	32.25	31.86	900.00	1.02	1.15	1.17	1.14	1.15

LRPS-2-1 — 2 way - 0° — 5 to 500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.000	3.24	3.24	0.00	39.91	5.000	1.07	1.19	1.19
9.950	3.24	3.23	0.01	48.64	9.950	1.08	1.19	1.18
55.738	3.28	3.27	0.01	39.25	55.738	1.09	1.18	1.17
59.450	3.28	3.27	0.01	38.76	59.450	1.09	1.18	1.17
100.288	3.30	3.30	0.00	34.57	100.288	1.10	1.17	1.17
158.450	3.35	3.33	0.02	31.32	158.450	1.12	1.17	1.17
210.425	3.39	3.37	0.02	29.61	210.425	1.13	1.16	1.16
226.513	3.40	3.37	0.02	29.20	226.513	1.14	1.16	1.16
250.025	3.41	3.38	0.03	28.76	250.025	1.14	1.16	1.16
278.488	3.44	3.41	0.03	28.42	278.488	1.15	1.15	1.16
329.225	3.50	3.45	0.05	28.21	329.225	1.16	1.15	1.16
397.288	3.57	3.49	0.08	28.88	397.288	1.17	1.15	1.16
449.263	3.69	3.59	0.09	30.36	449.263	1.18	1.16	1.16
482.675	3.72	3.61	0.11	31.81	482.675	1.20	1.17	1.17
500.000	3.77	3.65	0.12	32.62	500.000	1.21	1.18	1.18

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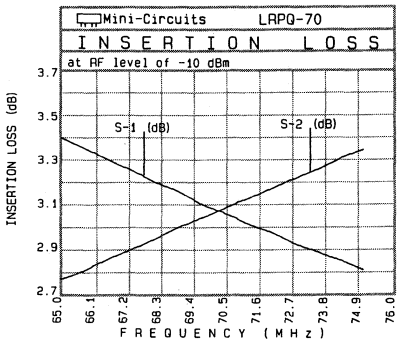
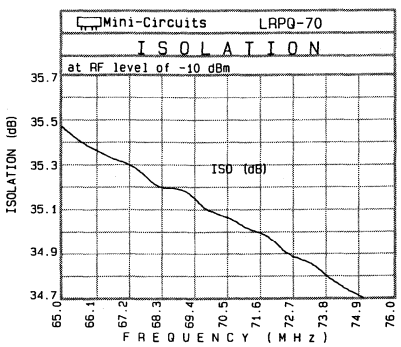
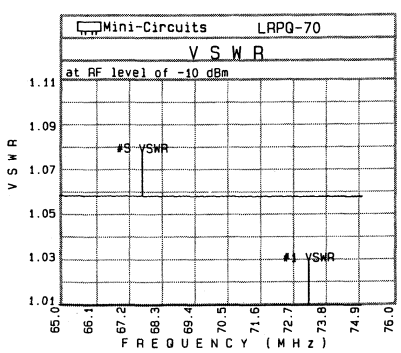
2 way - 90°

SYPQ-70
LRPQ-70 65 to 75 MHz

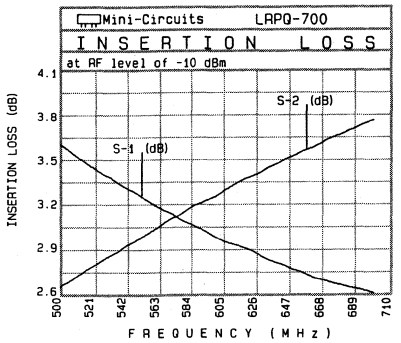


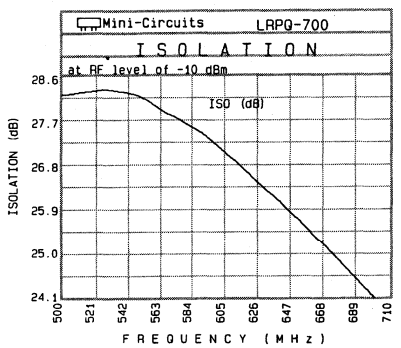


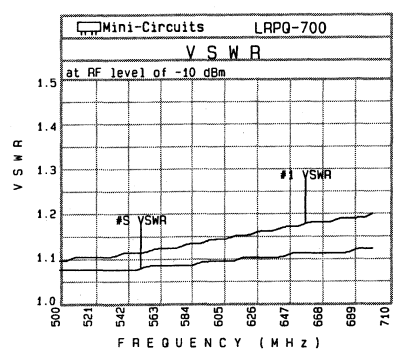


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
65.00	3.42	2.77	0.65	90.54	35.50
66.15	3.35	2.84	0.51	90.54	35.39
67.20	3.28	2.90	0.38	90.57	35.33
67.70	3.25	2.93	0.32	90.55	35.29
68.20	3.21	2.96	0.25	90.54	35.21
69.25	3.15	3.03	0.12	90.58	35.20
70.00	3.10	3.07	0.03	90.62	35.11
70.75	3.06	3.12	0.06	90.63	35.07
71.30	3.02	3.15	0.13	90.59	35.02
72.30	2.97	3.21	0.24	90.58	34.93
72.80	2.93	3.24	0.31	90.66	34.89
73.35	2.91	3.27	0.36	90.59	34.87
73.85	2.88	3.30	0.42	90.63	34.80
74.35	2.86	3.34	0.48	90.63	34.76
75.00	2.82	3.37	0.55	90.62	34.71

LRPQ-700 500 to 700 MHz

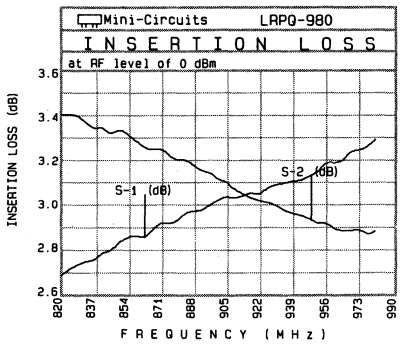


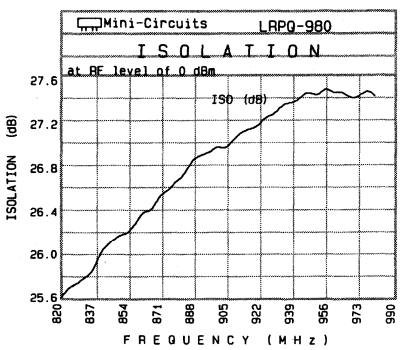


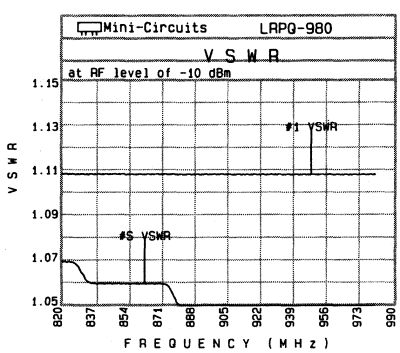


FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
500.00	3.64	2.66	0.98	88.52	28.37
515.00	3.52	2.76	0.76	88.49	28.43
531.00	3.42	2.87	0.55	88.60	28.48
546.00	3.32	2.96	0.36	88.59	28.39
562.00	3.21	3.06	0.15	88.64	28.10
577.00	3.12	3.15	0.03	88.54	27.85
592.00	3.05	3.24	0.19	88.55	27.56
608.00	2.96	3.34	0.38	88.56	27.12
623.00	2.91	3.42	0.51	88.58	26.67
638.00	2.83	3.50	0.67	88.54	26.25
654.00	2.77	3.59	0.82	88.58	25.73
669.00	2.71	3.67	0.96	88.55	25.24
685.00	2.66	3.74	1.08	88.54	24.69
695.00	2.64	3.79	1.15	88.60	24.35
700.00	2.62	3.81	1.19	88.60	24.18

LRPQ-980 820 to 980 MHz





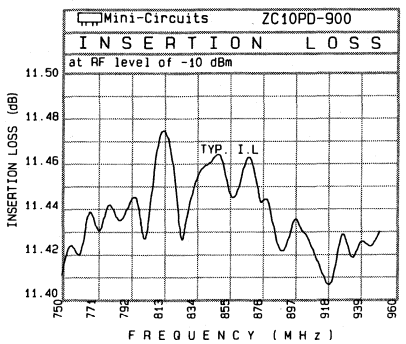


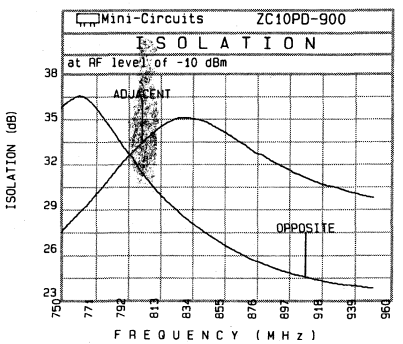
FREQ. (MHz)	INSERT. LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
820.000	2.69	3.43	0.74	89.05	25.63
833.000	2.76	3.39	0.63	88.93	25.83
845.000	2.80	3.33	0.53	89.09	26.13
858.000	2.88	3.31	0.43	89.16	26.32
871.000	2.94	3.28	0.34	89.24	26.62
883.000	2.98	3.23	0.25	89.12	26.77
896.000	3.02	3.17	0.15	88.97	26.98
908.000	3.05	3.09	0.04	89.18	27.10
921.000	3.06	3.04	0.02	89.17	27.22
934.000	3.12	2.99	0.13	89.26	27.44
946.000	3.15	2.96	0.19	89.25	27.55
959.000	3.21	2.91	0.30	89.36	27.52
972.000	3.27	2.91	0.36	89.35	27.49
976.000	3.29	2.88	0.41	89.45	27.57
980.000	3.32	2.90	0.42	89.36	27.50

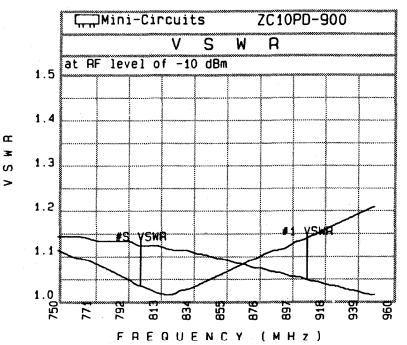
In Stock...Immediate Delivery

Power Splitter/Combiners 50 ohms

ZC10PD-900 — 10 way - 0° — 750 to 950 MHz

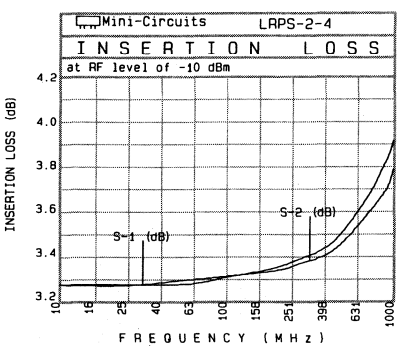


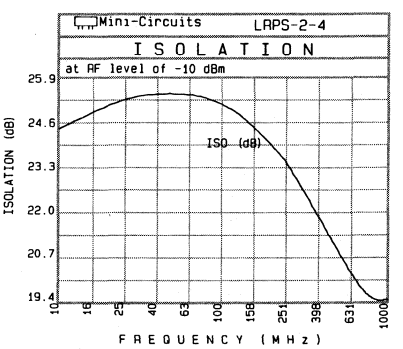


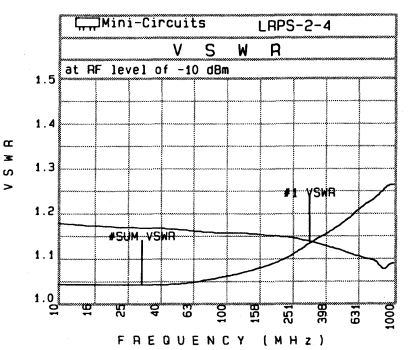


FREQ. (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION ADJACENT	ISOLATION OPPOSITE	FREQ. (MHz)	VSWR S	VSWR OUTPUT
750.000	11.41	0.37	27.37	35.92	750.000	1.11	1.17
767.500	11.45	0.31	29.27	36.54	767.500	1.09	1.17
785.500	11.43	0.29	31.56	34.08	785.500	1.06	1.16
800.000	11.43	0.27	33.26	31.85	800.000	1.03	1.15
814.500	11.48	0.28	34.67	29.97	814.500	1.01	1.15
826.500	11.43	0.30	35.21	28.75	826.500	1.02	1.14
844.000	11.46	0.25	34.99	27.33	844.000	1.04	1.13
862.000	11.45	0.25	33.76	26.17	862.000	1.07	1.12
875.000	11.44	0.27	32.81	25.49	875.000	1.09	1.11
891.000	11.42	0.32	32.01	24.85	891.000	1.11	1.10
903.000	11.43	0.33	31.41	24.52	903.000	1.13	1.09
920.500	11.40	0.41	30.62	24.07	920.500	1.16	1.08
938.000	11.43	0.40	30.15	23.81	938.000	1.19	1.06
944.000	11.42	0.40	29.95	23.70	944.000	1.20	1.06
950.000	11.43	0.39	29.85	23.63	950.000	1.21	1.06

LRPS-2-4 — 2 way - 0° — 10 to 1000 MHz







FREQ. (MHz)	INSERTION LOSS (dB) S-1	INSERTION UNBALANCE S-2	AMPLITUDE LOSS (dB) (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.000	3.27	3.27	0.00	24.54	10.000	1.04	1.18	1.18
25.313	3.26	3.27	0.01	25.52	25.313	1.04	1.17	1.17
49.758	3.29	3.27	0.02	25.62	49.758	1.04	1.17	1.17
75.913	3.30	3.28	0.02	25.52	75.913	1.05	1.16	1.17
99.899	3.31	3.31	0.00	25.29	99.899	1.06	1.16	1.16
134.269	3.32	3.32	0.00	24.96	134.269	1.07	1.16	1.16
232.522	3.36	3.34	0.02	23.74	232.522	1.10	1.15	1.16
247.731	3.38	3.36	0.02	23.57	247.731	1.11	1.15	1.15
402.670	3.43	3.40	0.03	21.85	402.670	1.16	1.13	1.15
497.364	3.51	3.46	0.05	20.96	497.364	1.18	1.12	1.14
697.324	3.66	3.59	0.07	19.78	697.324	1.23	1.10	1.12
791.534	3.74	3.64	0.10	19.53	791.534	1.24	1.10	1.11
879.696	3.82	3.69	0.13	19.43	879.696	1.26	1.07	1.10
937.238	3.86	3.72	0.14	19.44	937.238	1.27	1.09	1.10
1000.000	3.93	3.80	0.13	19.46	1000.000	1.27	1.09	1.10

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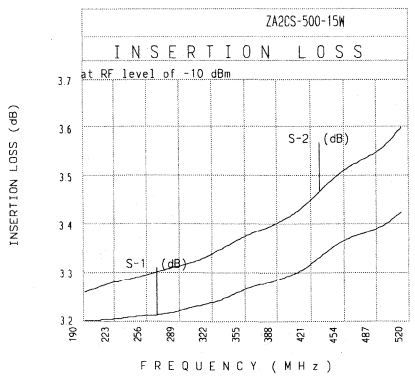
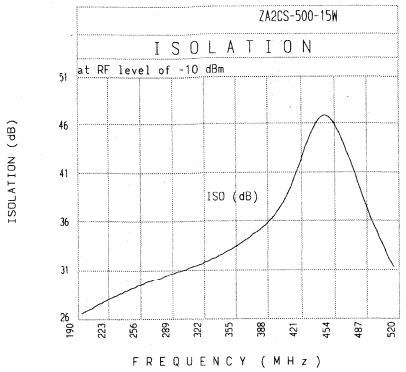
2 WAY-0°

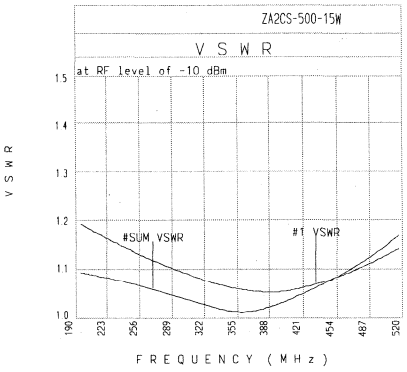
High Power Combiners

ZA2CS-500-15W

200 to 500 MHz



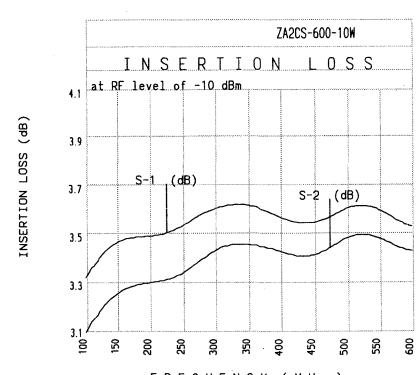


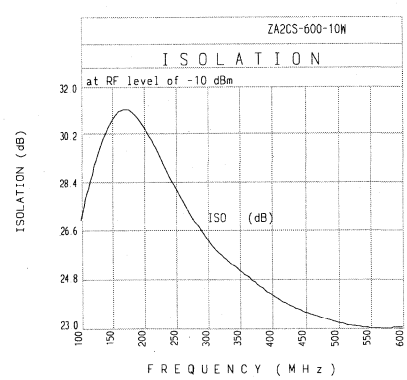


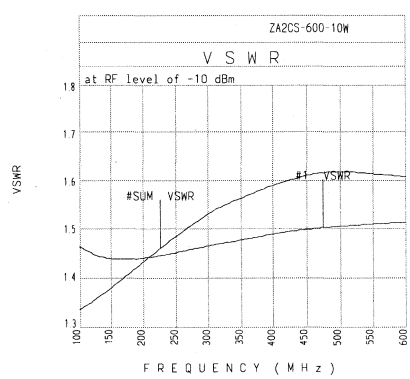
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
199.60	3.21	3.27	0.06	26.76	199.60	1.10	1.20	1.19
201.57	3.21	3.27	0.06	26.87	201.57	1.10	1.20	1.19
227.25	3.21	3.29	0.70	28.29	227.25	1.09	1.17	1.16
254.90	3.22	3.30	0.08	29.58	254.90	1.07	1.14	1.13
282.55	3.22	3.32	0.09	30.58	282.55	1.06	1.12	1.10
310.20	3.24	3.33	0.10	31.50	310.20	1.04	1.09	1.08
337.85	3.25	3.36	0.10	32.54	337.85	1.02	1.07	1.06
363.52	3.28	3.39	0.11	33.91	363.52	1.01	1.06	1.04
391.17	3.29	3.41	0.12	36.07	391.17	1.02	1.06	1.03
399.07	3.30	3.42	0.13	36.93	399.07	1.03	1.06	1.02
418.82	3.31	3.44	0.13	39.98	418.82	1.05	1.06	1.03
446.47	3.36	3.50	0.14	49.77	446.47	1.07	1.08	1.04
472.15	3.39	3.54	0.16	44.04	472.15	1.10	1.10	1.06
499.80	3.40	3.56	0.17	35.30	499.80	1.14	1.13	1.08
527.45	3.45	3.63	0.18	30.34	527.45	1.19	1.16	1.11

ZA2CS-600-10W

100 to 600 MHz







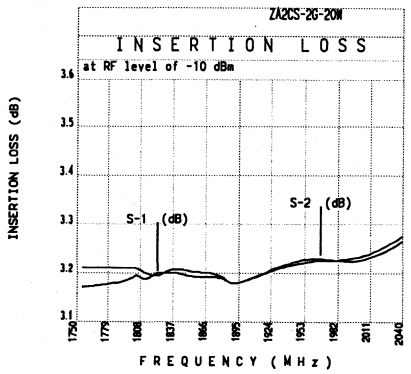
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
100.00	3.35	3.12	0.23	27.13	100.00	1.34	1.47	1.47
135.71	3.49	3.27	0.22	30.61	135.71	1.37	1.45	1.45
171.42	3.52	3.32	0.19	31.76	171.42	1.41	1.44	1.44
207.14	3.52	3.33	0.19	30.42	207.14	1.45	1.45	1.45
242.85	3.55	3.35	0.20	28.58	242.85	1.49	1.46	1.46
278.57	3.62	3.43	0.19	27.02	278.57	1.52	1.47	1.47
314.28	3.65	3.49	0.16	25.89	314.28	1.56	1.48	1.48
350.00	3.66	3.49	0.17	25.24	350.00	1.57	1.49	1.49
388.46	3.61	3.47	0.14	24.46	388.46	1.60	1.49	1.49
426.92	3.57	3.43	0.14	23.85	426.92	1.61	1.50	1.50
465.38	3.58	3.45	0.13	23.49	465.38	1.63	1.51	1.51
503.84	3.65	3.53	0.13	23.20	503.84	1.63	1.51	1.51
542.30	3.65	3.53	0.12	23.01	542.30	1.63	1.52	1.52
580.76	3.58	3.47	0.12	23.02	580.76	1.62	1.52	1.52
600.00	3.56	3.46	0.10	23.06	600.00	1.62	1.52	1.52

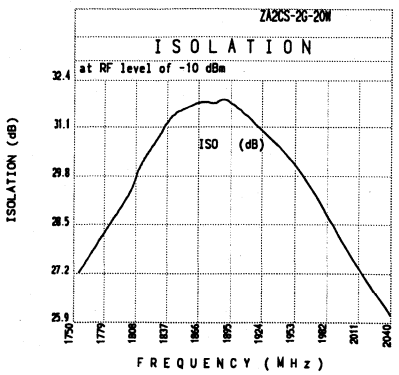
2 WAY-0°

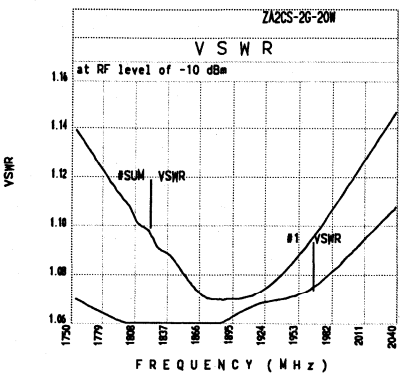
High Power Combiners

ZA2CS-2G-20W

1800 to 2000 MHz



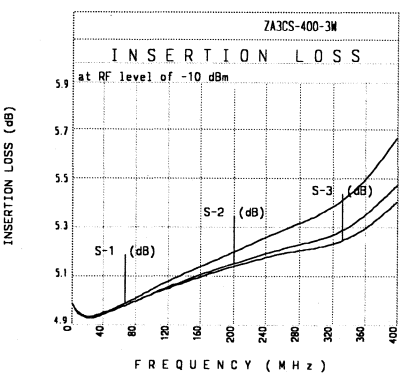


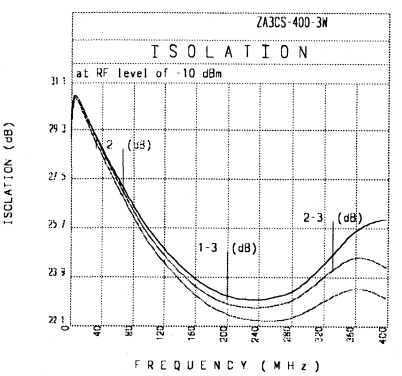


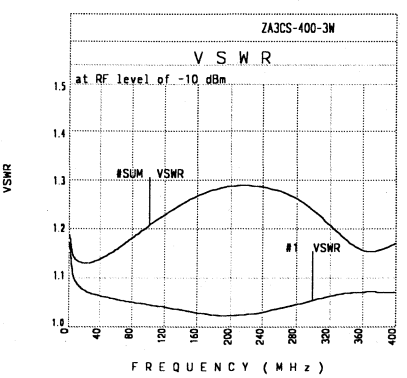
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1756.00	3.17	3.21	0.04	27.23	1756.00	1.14	1.07	1.11
1798.00	3.18	3.21	0.02	29.22	1798.00	1.11	1.06	1.10
1804.00	3.20	3.21	0.01	29.42	1804.00	1.11	1.06	1.10
1810.00	3.18	3.20	0.01	30.03	1810.00	1.10	1.06	1.10
1822.00	3.20	3.19	0.01	30.58	1822.00	1.10	1.06	1.10
1828.00	3.20	3.20	0.00	30.82	1828.00	1.09	1.06	1.10
1840.00	3.20	3.21	0.01	31.46	1840.00	1.09	1.06	1.09
1852.00	3.19	3.20	0.01	31.61	1852.00	1.08	1.06	1.09
1870.00	3.19	3.20	0.01	31.88	1870.00	1.07	1.06	1.09
1882.00	3.19	3.19	0.00	31.70	1882.00	1.07	1.06	1.09
1888.00	3.17	3.17	0.01	32.05	1888.00	1.07	1.06	1.09
1918.00	3.20	3.20	0.01	31.17	1918.00	1.07	1.07	1.09
1960.00	3.23	3.24	0.01	30.07	1960.00	1.09	1.07	1.09
2002.00	3.22	3.21	0.02	27.73	2002.00	1.12	1.09	1.10
2044.00	3.28	3.27	0.01	25.94	2044.00	1.15	1.11	1.11

ZA3CS-400-3W

2 to 400 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	INSERTION LOSS (dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-3	ISOLATION (dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
2.06	4.99	4.99	4.99	0.00	29.39	29.74	29.04	2.06	1.19	1.18	1.19	1.18
5.31	4.97	4.97	4.97	0.00	30.71	30.82	30.70	5.31	1.15	1.11	1.12	1.11
9.98	4.95	4.94	4.95	0.00	30.58	30.67	30.70	9.98	1.14	1.09	1.09	1.09
22.58	4.92	4.93	4.93	0.00	29.65	29.81	29.84	22.58	1.13	1.07	1.07	1.07
36.58	4.94	4.95	4.94	0.01	28.70	28.96	28.90	36.58	1.14	1.07	1.07	1.07
59.25	4.98	4.97	4.97	0.01	27.28	27.64	27.50	59.25	1.16	1.06	1.06	1.06
79.71	5.01	5.00	5.00	0.01	26.15	26.57	26.38	79.71	1.19	1.05	1.05	1.05
99.59	5.05	5.03	5.03	0.01	25.17	25.65	25.43	99.59	1.21	1.05	1.05	1.05
149.76	5.13	5.10	5.09	0.03	23.35	23.94	23.66	149.76	1.27	1.03	1.03	1.04
201.50	5.21	5.16	5.15	0.06	22.33	23.00	22.70	201.50	1.31	1.02	1.01	1.02
266.14	5.31	5.23	5.21	0.10	22.16	23.04	22.74	266.14	1.29	1.04	1.04	1.03
297.46	5.35	5.25	5.22	0.13	22.54	23.59	23.25	297.46	1.25	1.06	1.06	1.05
332.48	5.42	5.29	5.25	0.18	23.17	24.66	24.14	332.48	1.20	1.07	1.08	1.07
364.78	5.52	5.37	5.31	0.21	23.62	25.84	24.84	364.78	1.15	1.08	1.09	1.07
400.23	5.69	5.49	5.42	0.27	23.10	26.07	24.25	400.23	1.18	1.07	1.09	1.08

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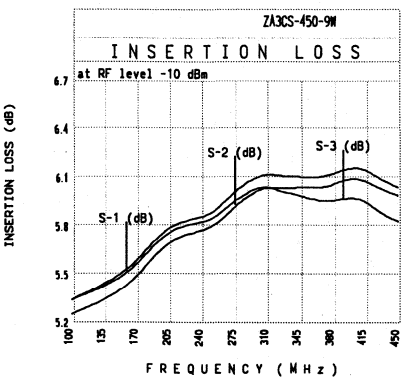
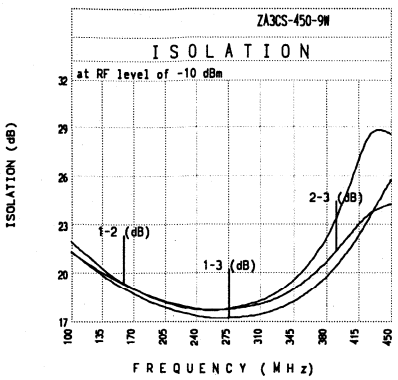
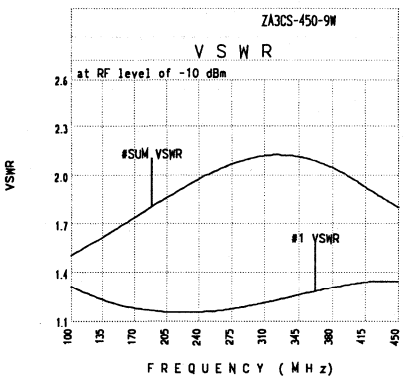
ZA3CS-450-9W

50 ohms

100 to 450 MHz



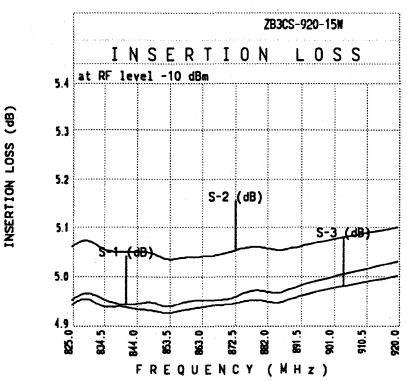


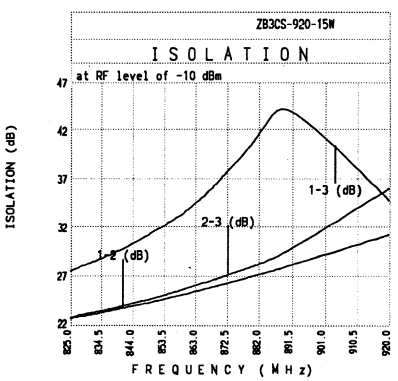


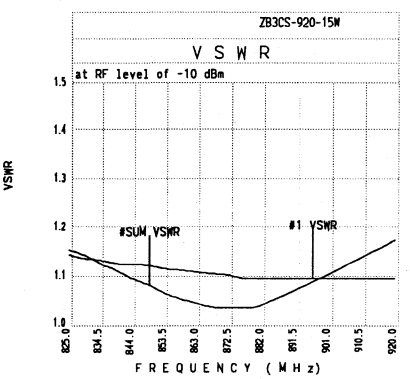
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-3	2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
100.04	5.37	5.28	5.37	0.09	22.31	21.68	21.64	100.04	1.54	1.35	1.32	1.31
136.01	5.47	5.37	5.45	0.10	20.54	20.17	20.33	136.01	1.66	1.26	1.22	1.22
166.90	5.58	5.48	5.56	0.09	19.35	19.04	19.35	166.90	1.77	1.21	1.17	1.18
204.82	5.87	5.78	5.84	0.09	18.40	18.11	18.48	204.82	1.91	1.19	1.17	1.19
248.79	5.87	5.79	5.84	0.08	17.93	17.52	17.99	248.79	2.05	1.19	1.21	1.24
275.61	6.06	5.96	6.00	0.10	18.09	17.55	18.07	275.61	2.11	1.21	1.26	1.29
305.32	6.16	6.08	6.09	0.07	18.49	17.70	18.33	305.32	2.16	1.24	1.33	1.35
321.35	6.14	6.06	6.05	0.09	18.90	17.96	18.61	321.35	2.17	1.26	1.37	1.38
338.22	6.14	6.07	6.03	0.11	19.52	18.33	19.06	338.22	2.16	1.29	1.41	1.41
355.98	6.13	6.07	6.00	0.14	20.47	18.91	19.75	355.98	2.14	1.31	1.45	1.44
374.68	6.14	6.07	5.98	0.16	21.88	19.76	20.68	374.68	2.10	1.34	1.49	1.47
390.34	6.18	6.12	6.00	0.18	23.48	20.68	21.64	390.34	2.06	1.35	1.52	1.49
410.83	6.20	6.13	6.01	0.19	26.46	22.19	23.06	410.83	1.98	1.38	1.55	1.51
428.00	6.13	6.07	5.92	0.21	29.60	23.86	24.22	428.00	1.92	1.38	1.57	1.51
450.48	6.07	6.02	5.86	0.21	28.39	26.14	24.61	450.48	1.84	1.38	1.57	1.49

ZB3CS-920-15W

825 to 920 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-3	2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
825.00	4.96	5.07	4.95	0.11	22.96	23.13	27.93	825.00	1.16	1.15	1.12	1.18
829.64	4.98	5.09	4.97	0.12	23.32	23.56	28.63	829.64	1.15	1.14	1.12	1.18
834.29	4.96	5.06	4.94	0.12	23.64	23.80	29.21	834.29	1.13	1.14	1.12	1.17
838.93	4.95	5.06	4.95	0.11	23.97	24.18	29.93	838.93	1.12	1.13	1.12	1.17
843.57	4.95	5.06	4.94	0.12	24.31	24.60	30.75	843.57	1.10	1.13	1.12	1.17
848.21	4.96	5.06	4.94	0.12	24.66	25.01	31.65	848.21	1.09	1.13	1.13	1.17
852.86	4.94	5.04	4.93	0.11	25.05	25.42	32.55	852.86	1.07	1.12	1.13	1.17
857.50	4.96	5.05	4.94	0.11	25.40	25.93	33.55	857.50	1.06	1.12	1.13	1.17
866.79	4.96	5.05	4.95	0.10	26.23	26.89	36.02	866.79	1.04	1.11	1.13	1.16
871.43	4.96	5.06	4.95	0.11	26.62	27.44	37.91	871.43	1.04	1.11	1.13	1.16
876.07	4.98	5.07	4.96	0.11	27.04	28.01	39.56	876.07	1.04	1.10	1.14	1.16
880.71	4.98	5.07	4.96	0.11	27.57	28.55	41.59	880.71	1.04	1.10	1.14	1.16
885.36	4.97	5.06	4.95	0.11	27.94	29.23	44.16	885.36	1.06	1.10	1.14	1.16
890.00	4.99	5.07	4.97	0.10	28.50	29.94	45.83	890.00	1.07	1.10	1.15	1.16
920.00	5.04	5.11	5.01	0.10	31.69	36.49	35.21	920.00	1.18	1.10	1.17	1.16

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4 WAY-0°
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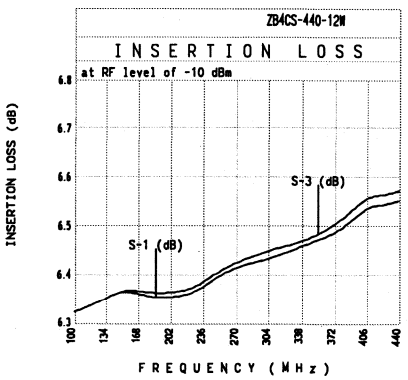
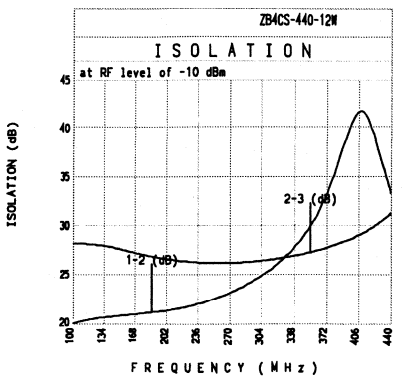
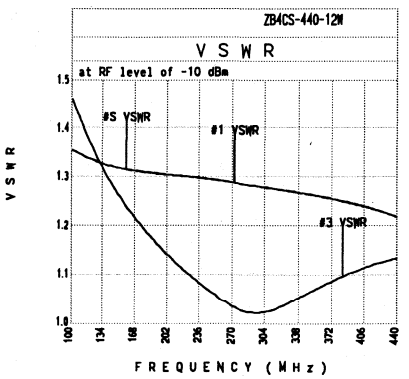
50 ohms

ZB4CS-440-12W

100 to 440 MHz



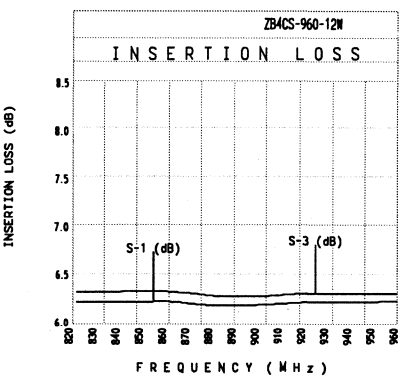


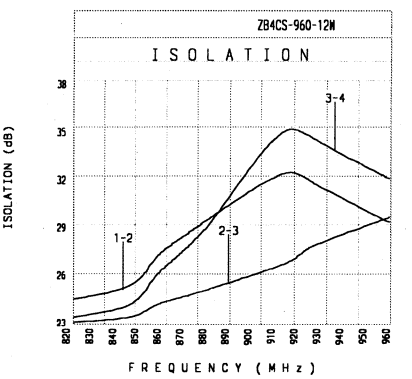


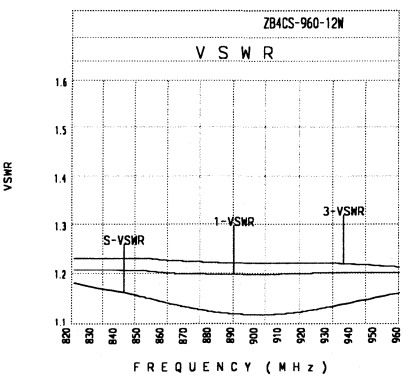
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
100.00	6.33	6.37	6.33	6.38	0.05	20.32	28.61	20.08	100.00	1.36	1.36	1.46	1.47	1.46
125.50	6.35	6.39	6.35	6.40	0.06	20.88	28.51	20.46	125.50	1.34	1.34	1.34	1.35	1.34
151.00	6.38	6.42	6.38	6.45	0.07	21.14	27.99	20.83	151.00	1.32	1.32	1.26	1.26	1.26
176.50	6.36	6.41	6.37	6.42	0.06	21.34	27.40	21.15	176.50	1.32	1.32	1.19	1.20	1.19
202.00	6.36	6.42	6.37	6.42	0.06	21.65	26.95	21.10	202.00	1.31	1.31	1.14	1.14	1.14
227.50	6.37	6.42	6.38	6.43	0.06	22.09	26.65	21.47	227.50	1.31	1.31	1.10	1.10	1.09
253.00	6.41	6.48	6.42	6.48	0.08	22.84	26.55	22.03	253.00	1.30	1.30	1.06	1.06	1.06
278.50	6.43	6.50	6.44	6.50	0.07	23.82	26.59	22.81	278.50	1.29	1.29	1.03	1.03	1.03
304.00	6.44	6.52	6.46	6.53	0.09	25.21	26.79	24.00	304.00	1.29	1.28	1.02	1.03	1.03
329.50	6.46	6.55	6.47	6.55	0.10	27.19	27.13	25.54	329.50	1.28	1.28	1.04	1.05	1.06
355.00	6.48	6.57	6.49	6.56	0.09	30.01	27.63	27.59	355.00	1.27	1.27	1.07	1.08	1.08
380.50	6.50	6.61	6.52	6.60	0.11	34.90	28.33	30.77	380.50	1.26	1.26	1.09	1.10	1.10
406.00	6.55	6.66	6.57	6.66	0.11	44.36	29.34	36.66	406.00	1.25	1.25	1.11	1.12	1.12
423.00	6.55	6.67	6.57	6.67	0.12	39.52	30.29	46.56	423.00	1.24	1.24	1.11	1.13	1.13
440.00	6.56	6.70	6.58	6.67	0.14	33.68	31.64	43.79	440.00	1.22	1.22	1.12	1.14	1.14

ZB4CS-960-12W

820 to 960 MHz





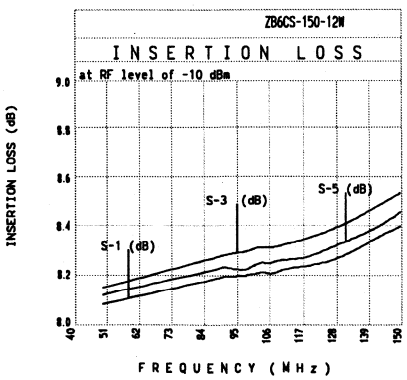


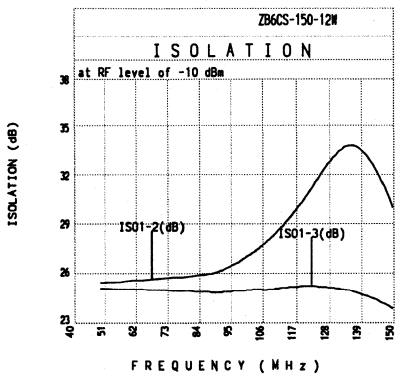
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.00	6.32	6.32	6.32	6.32	0.0	35.80	37.24	35.02	10.00	1.06	1.12	1.12	1.13	1.13
30.00	6.35	6.35	6.35	6.35	0.0	34.61	38.27	33.70	30.00	1.05	1.10	1.11	1.12	1.12
45.00	6.36	6.36	6.36	6.36	0.0	34.08	37.79	33.15	45.00	1.05	1.10	1.11	1.12	1.12
55.00	6.38	6.38	6.38	6.38	0.0	33.74	37.41	32.85	55.00	1.05	1.10	1.11	1.11	1.12
65.00	6.39	6.39	6.39	6.38	0.0	33.38	37.03	32.53	65.00	1.05	1.10	1.11	1.11	1.12
75.00	6.38	6.38	6.39	6.38	0.0	32.97	36.64	32.18	75.00	1.05	1.10	1.10	1.11	1.11
85.00	6.38	6.39	6.38	6.38	0.0	32.53	36.28	31.80	85.00	1.05	1.10	1.10	1.11	1.11
95.00	6.39	6.39	6.40	6.39	0.0	32.09	35.92	31.41	95.00	1.05	1.10	1.10	1.11	1.11
105.00	6.41	6.41	6.41	6.40	0.0	31.65	35.60	31.03	105.00	1.05	1.09	1.10	1.11	1.11
170.00	6.42	6.43	6.44	6.42	0.0	28.97	33.79	28.63	170.00	1.07	1.08	1.09	1.10	1.10
290.00	6.50	6.54	6.55	6.51	0.1	25.47	31.20	25.28	290.00	1.11	1.05	1.05	1.06	1.06
410.00	6.53	6.59	6.64	6.57	0.1	23.42	29.29	23.36	410.00	1.13	1.02	1.02	1.03	1.03
530.00	6.58	6.68	6.76	6.65	0.2	22.53	27.99	22.69	530.00	1.17	1.04	1.03	1.02	1.02
590.00	6.58	6.70	6.81	6.67	0.2	22.56	27.64	22.93	590.00	1.15	1.04	1.03	1.03	1.03
650.00	6.57	6.72	6.83	6.68	0.3	22.95	27.51	23.64	650.00	1.13	1.06	1.05	1.06	1.06

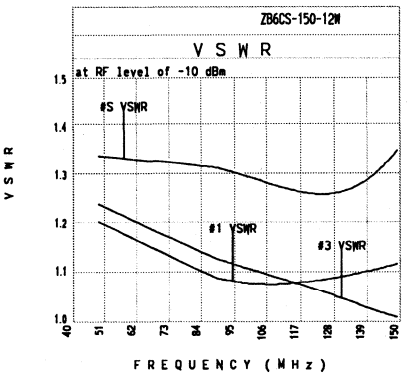
ZB6CS-150-12W

6 way - 0°

50 to 150 MHz





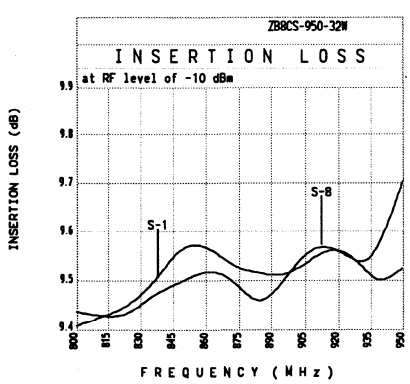


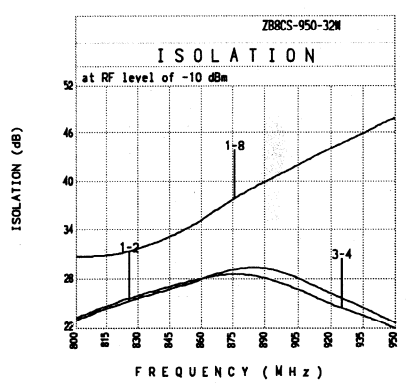
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-3	VSWR S	VSWR 1
49.87	8.09	0.07	25.54	25.20	1.35	1.21
88.81	8.20	0.09	26.08	24.98	1.33	1.09
90.57	8.21	0.09	26.25	24.92	1.32	1.09
97.94	8.21	0.10	26.83	25.07	1.31	1.08
99.87	8.22	0.10	27.13	25.05	1.30	1.08
101.84	8.22	0.10	27.36	25.11	1.30	1.08
103.86	8.23	0.10	27.59	25.16	1.30	1.08
104.88	8.22	0.11	27.76	25.12	1.30	1.08
108.00	8.22	0.11	28.25	25.11	1.29	1.08
110.13	8.24	0.11	28.60	25.18	1.29	1.08
117.94	8.25	0.11	30.18	25.36	1.27	1.08
126.29	8.27	0.13	32.59	25.33	1.27	1.09
135.24	8.32	0.13	34.78	25.13	1.28	1.10
143.42	8.38	0.13	33.21	24.61	1.31	1.11
150.61	8.42	0.14	30.11	23.90	1.36	1.12

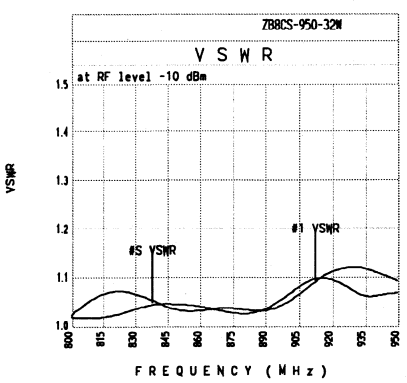
ZB8CS-950-32W

8 way - 0°

800 to 950 MHz







FREQ. (MHz)	INSERTION LOSS (dB) S-2	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-6	(dB) S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-8	(dB) 3-4	(dB) 6-7	FREQ. (MHz)	VSWR S	VSWR 1	VSWR 8
800.00	9.41	9.44	9.43	9.45	9.54	9.44	0.22	23.28	31.15	23.59	29.69	800.00	1.03	1.03	1.07
812.00	9.43	9.42	9.44	9.48	9.52	9.43	0.22	24.55	31.21	24.86	30.02	812.00	1.02	1.07	1.03
824.00	9.45	9.43	9.46	9.50	9.58	9.43	0.18	25.61	31.65	25.97	30.79	824.00	1.03	1.08	1.02
836.00	9.50	9.53	9.57	9.59	9.66	9.48	0.21	26.53	32.64	26.86	32.75	836.00	1.05	1.06	1.05
848.00	9.58	9.58	9.65	9.64	9.66	9.50	0.20	27.35	33.96	27.73	35.67	848.00	1.05	1.04	1.04
860.00	9.58	9.60	9.66	9.68	9.54	9.53	0.20	28.42	35.76	28.51	40.18	860.00	1.05	1.04	1.02
872.00	9.53	9.55	9.65	9.63	9.52	9.51	0.18	29.49	37.83	29.05	49.51	872.00	1.04	1.05	1.03
884.00	9.52	9.53	9.59	9.60	9.59	9.44	0.16	29.93	39.74	28.93	54.29	884.00	1.03	1.04	1.02
896.00	9.51	9.52	9.57	9.58	9.60	9.51	0.11	29.48	41.28	28.00	44.00	896.00	1.05	1.04	1.03
908.00	9.55	9.54	9.62	9.64	9.61	9.58	0.10	28.10	42.98	26.78	40.35	908.00	1.10	1.08	1.07
920.00	9.58	9.57	9.65	9.65	9.58	9.57	0.13	26.57	44.60	25.27	37.70	920.00	1.11	1.13	1.10
932.00	9.53	9.52	9.62	9.59	9.54	9.53	0.13	25.26	46.04	24.13	35.51	932.00	1.07	1.13	1.10
938.00	9.50	9.51	9.59	9.59	9.55	9.57	0.09	24.47	46.83	23.58	34.75	938.00	1.07	1.12	1.10
944.00	9.51	9.53	9.59	9.60	9.58	9.63	0.14	23.67	47.75	22.92	34.18	944.00	1.07	1.11	1.09
950.00	9.53	9.60	9.62	9.65	9.56	9.71	0.21	22.92	48.37	22.17	33.85	950.00	1.08	1.10	1.09

In Stock... Immediate Delivery

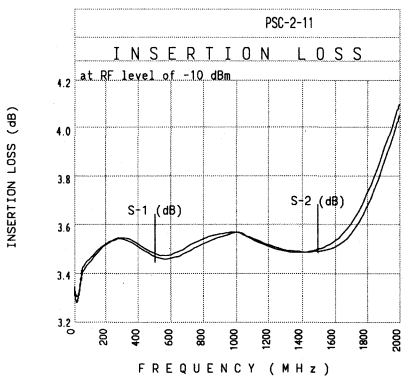
For Custom Versions Of Standard Models Consult Our Applications Dept.

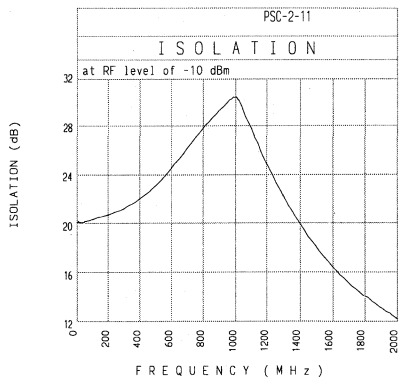
2 WAY-0°

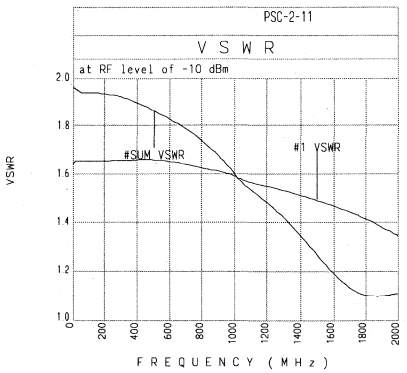
Power Splitter/Combiners 50 ohms

PSC-2-11

5 to 2000 MHz



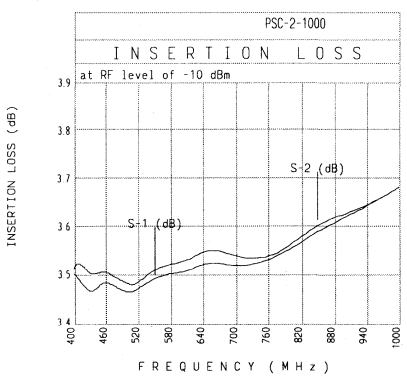


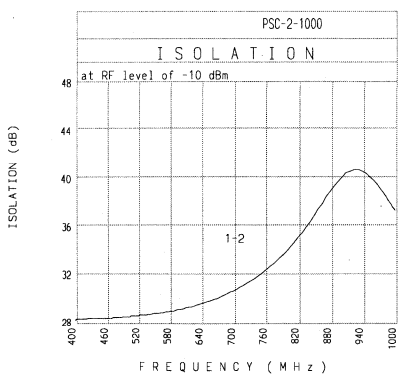


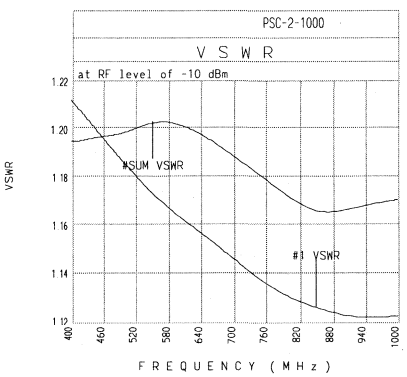
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.00	3.35	3.37	0.02	20.64	5.00	1.97	1.65	1.65
16.25	3.29	3.32	0.02	20.72	16.25	1.97	1.67	1.66
27.50	3.31	3.33	0.02	20.63	27.50	1.96	1.67	1.66
38.75	3.36	3.36	0.00	20.62	38.75	1.96	1.67	1.66
50.00	3.42	3.44	0.02	20.68	50.00	1.95	1.67	1.66
55.00	3.44	3.46	0.03	20.72	55.00	1.95	1.67	1.66
291.25	3.64	3.63	0.01	21.61	291.25	1.95	1.67	1.66
527.50	3.45	3.44	0.01	23.58	527.50	1.87	1.68	1.67
763.75	3.58	3.55	0.03	27.96	763.75	1.78	1.64	1.63
1000.00	3.60	3.60	0.01	31.13	1000.00	1.62	1.61	1.60
1010.00	3.60	3.60	0.01	30.84	1010.00	1.58	1.59	1.57
1257.50	3.52	3.51	0.01	23.43	1257.50	1.47	1.55	1.54
1505.00	3.51	3.51	0.00	18.34	1505.00	1.27	1.50	1.49
1752.50	3.56	3.62	0.06	15.03	1752.50	1.08	1.45	1.43
2000.00	4.08	4.13	0.04	12.81	2000.00	1.12	1.36	1.35

PSC-2-1000

400 to 1000 MHz



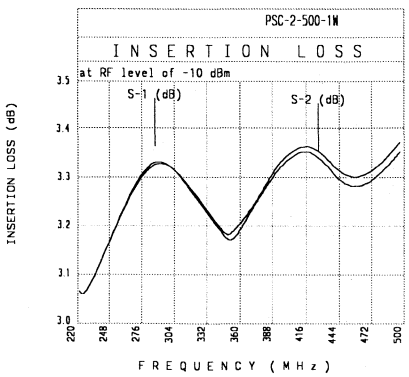


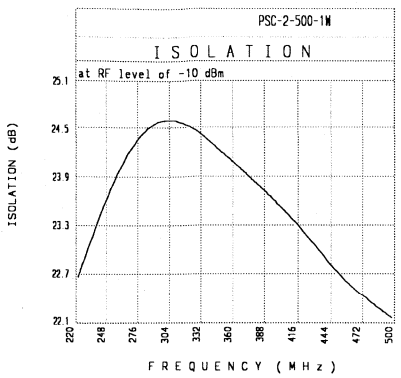


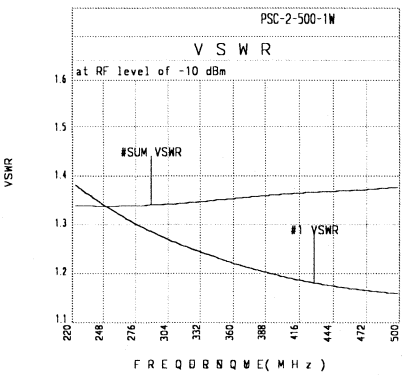
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
400.00	3.51	3.52	0.02	28.61	400.00	1.20	1.21	1.22
410.00	3.50	3.54	0.04	28.64	410.00	1.20	1.21	1.22
432.50	3.46	3.50	0.04	28.73	432.50	1.20	1.21	1.21
455.00	3.50	3.52	0.03	28.71	455.00	1.20	1.20	1.20
477.50	3.48	3.50	0.02	28.78	477.50	1.20	1.19	1.20
500.00	3.47	3.49	0.02	28.89	500.00	1.20	1.19	1.19
510.00	3.47	3.48	0.02	28.92	510.00	1.20	1.18	1.19
557.50	3.51	3.53	0.02	29.13	557.50	1.21	1.17	1.18
605.00	3.51	3.53	0.01	29.52	605.00	1.20	1.16	1.17
652.50	3.54	3.57	0.02	30.11	652.50	1.20	1.16	1.16
700.00	3.52	3.54	0.02	30.97	700.00	1.19	1.15	1.16
775.00	3.54	3.54	0.00	33.01	775.00	1.18	1.13	1.14
850.00	3.60	3.62	0.02	36.94	850.00	1.17	1.13	1.14
925.00	3.64	3.64	0.00	43.01	925.00	1.17	1.12	1.13
1000.00	3.69	3.69	0.00	37.74	1000.00	1.17	1.12	1.13

PSC-2-500-1W

225 to 500 MHz



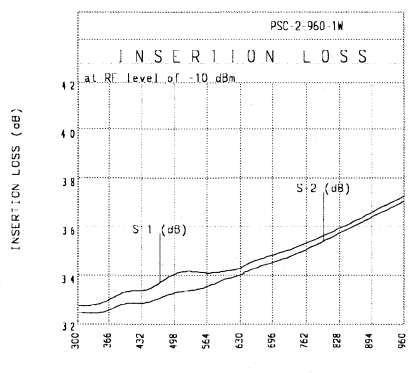


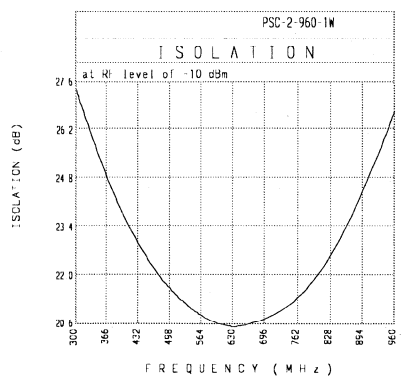


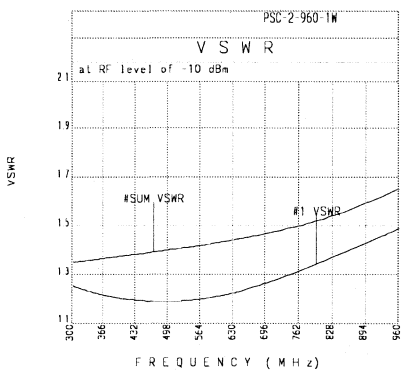
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
225.00	3.07	3.07	0.00	22.71	225.00	1.34	1.39	1.40
230.00	3.05	3.05	0.00	22.91	230.00	1.34	1.38	1.39
260.00	3.23	3.23	0.00	24.08	260.00	1.34	1.33	1.34
290.00	3.37	3.38	0.00	24.70	290.00	1.34	1.29	1.30
320.00	3.29	3.28	0.01	24.67	320.00	1.35	1.26	1.27
350.00	3.18	3.18	0.00	24.28	350.00	1.36	1.23	1.25
355.00	3.19	3.17	0.02	24.23	355.00	1.36	1.23	1.24
366.25	3.22	3.21	0.01	24.09	366.25	1.36	1.22	1.24
377.50	3.26	3.26	0.01	23.93	377.50	1.36	1.21	1.23
388.75	3.31	3.30	0.01	23.79	388.75	1.37	1.21	1.23
400.00	3.35	3.34	0.01	23.63	400.00	1.37	1.20	1.22
425.00	3.39	3.38	0.02	23.25	425.00	1.37	1.19	1.21
450.00	3.30	3.28	0.01	22.78	450.00	1.37	1.18	1.20
475.00	3.31	3.29	0.02	22.45	475.00	1.38	1.17	1.18
500.00	3.38	3.36	0.02	22.19	500.00	1.38	1.16	1.17

PSC-2-960-1W

300 to 960 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
300.00	3.31	3.28	0.03	27.50	300.00	1.35	1.26	1.27
310.00	3.31	3.28	0.03	27.06	310.00	1.35	1.25	1.26
352.50	3.31	3.27	0.04	25.34	352.50	1.36	1.22	1.23
395.00	3.38	3.33	0.05	23.90	395.00	1.38	1.20	1.21
437.50	3.36	3.31	0.05	22.81	437.50	1.39	1.19	1.20
480.00	3.43	3.36	0.07	21.94	480.00	1.40	1.19	1.19
517.50	3.46	3.37	0.09	21.40	517.50	1.41	1.19	1.19
555.00	3.44	3.38	0.06	20.98	555.00	1.42	1.20	1.20
592.50	3.45	3.42	0.03	20.71	592.50	1.43	1.21	1.20
630.00	3.46	3.43	0.03	20.60	630.00	1.44	1.23	1.22
640.00	3.49	3.46	0.03	20.63	640.00	1.45	1.23	1.22
720.00	3.53	3.50	0.03	20.91	720.00	1.48	1.28	1.27
800.00	3.60	3.58	0.02	21.96	800.00	1.52	1.35	1.32
880.00	3.68	3.66	0.02	23.95	880.00	1.58	1.42	1.39
960.00	3.76	3.74	0.02	26.87	960.00	1.65	1.49	1.45

In Stock... Immediate Delivery

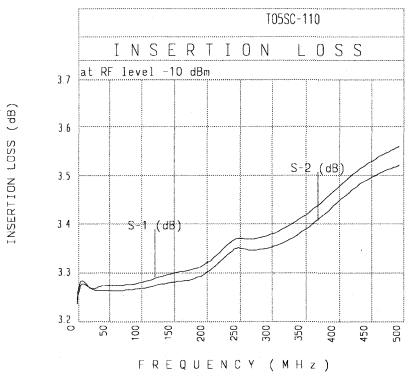
For Custom Versions Of Standard Models Consult Our Applications Dept.

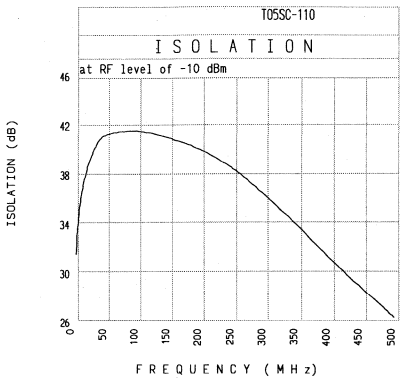
2 WAY-0°

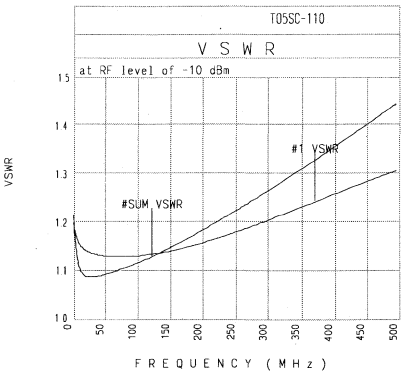
Power Splitter/Combiners 50 ohms

TO5SC-110

5 to 500 MHz



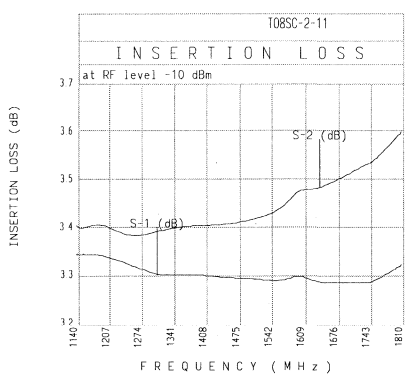


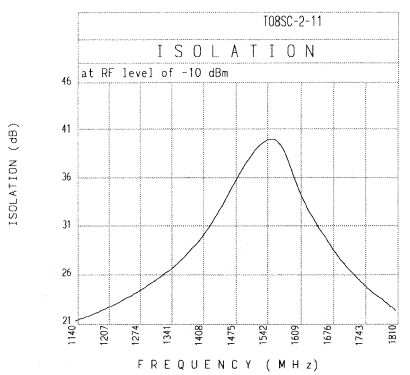


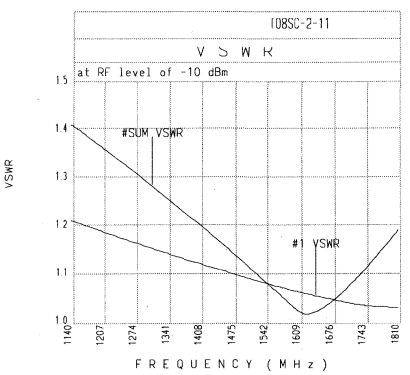
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.00	3.25	3.24	0.01	31.94	5.00	1.22	1.21	1.21
10.00	3.30	3.29	0.01	36.22	10.00	1.12	1.17	1.17
20.00	3.28	3.28	0.01	38.57	20.00	1.10	1.15	1.15
30.00	3.27	3.27	0.00	40.19	30.00	1.09	1.15	1.15
40.00	3.28	3.27	0.00	41.21	40.00	1.10	1.14	1.14
50.00	3.28	3.27	0.01	41.75	50.00	1.10	1.14	1.14
100.00	3.28	3.27	0.01	42.10	100.00	1.12	1.14	1.14
150.00	3.31	3.29	0.02	41.45	150.00	1.15	1.15	1.16
200.00	3.31	3.29	0.02	40.52	200.00	1.19	1.16	1.18
250.00	3.39	3.37	0.02	38.96	250.00	1.23	1.19	1.21
260.00	3.37	3.35	0.02	38.55	260.00	1.24	1.19	1.21
320.00	3.39	3.36	0.03	35.91	320.00	1.29	1.22	1.25
380.00	3.45	3.42	0.03	32.68	380.00	1.34	1.25	1.29
440.00	3.53	3.50	0.03	29.65	440.00	1.40	1.29	1.32
500.00	3.57	3.53	0.03	26.79	500.00	1.46	1.32	1.36

TO8SC-2-11

1150 to 1750 MHz



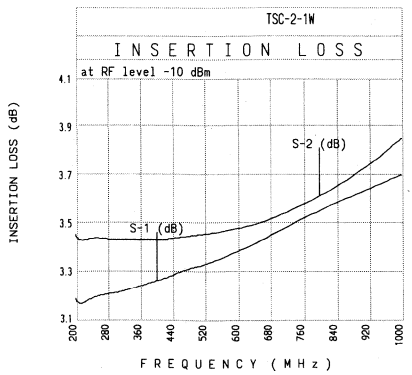


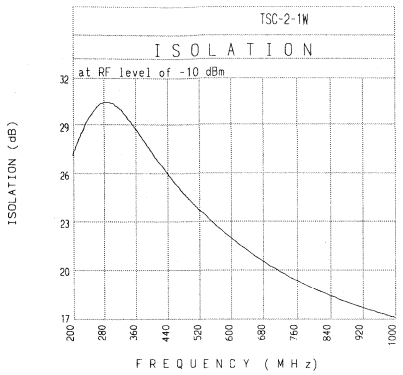


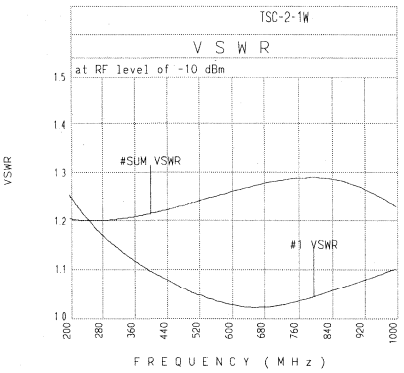
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1140.00	3.35	3.41	0.06	21.37	1140.00	1.42	1.22	1.35
1150.00	3.35	3.40	0.05	21.50	1150.00	1.41	1.21	1.34
1190.00	3.35	3.42	0.07	22.30	1190.00	1.38	1.20	1.33
1250.00	3.33	3.38	0.06	23.66	1250.00	1.33	1.18	1.31
1315.00	3.30	3.40	0.10	25.62	1315.00	1.28	1.15	1.29
1375.00	3.31	3.41	0.10	27.99	1375.00	1.23	1.13	1.27
1440.00	3.30	3.41	0.11	32.00	1440.00	1.18	1.11	1.25
1500.00	3.30	3.42	0.13	38.33	1500.00	1.12	1.10	1.23
1565.00	3.29	3.44	0.15	41.72	1565.00	1.06	1.08	1.21
1600.00	3.31	3.49	0.18	36.18	1600.00	1.03	1.07	1.21
1625.00	3.29	3.48	0.19	33.15	1625.00	1.01	1.06	1.20
1690.00	3.29	3.51	0.22	28.03	1690.00	1.05	1.05	1.20
1740.00	3.29	3.54	0.25	25.39	1740.00	1.11	1.04	1.20
1750.00	3.29	3.54	0.25	24.85	1750.00	1.12	1.04	1.20
1815.00	3.33	3.61	0.28	22.32	1815.00	1.20	1.03	1.22

TSC-2-1W

200 to 1000 MHz



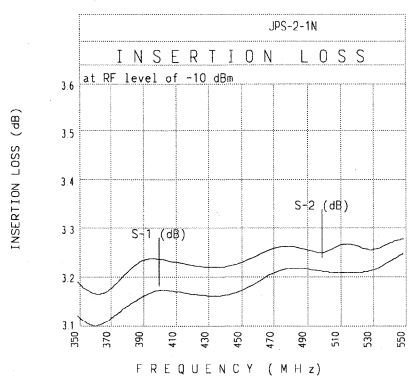


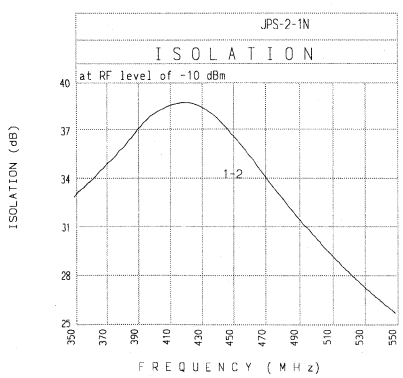


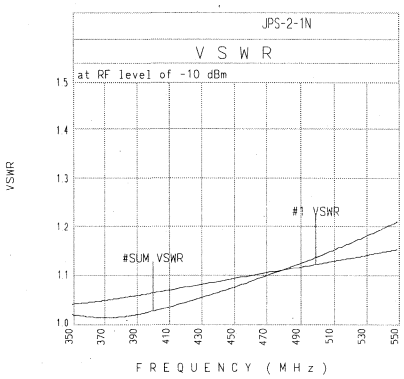
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
200.00	3.20	3.47	0.27	27.54	200.00	1.21	1.26	1.36
210.00	3.17	3.44	0.27	28.18	210.00	1.21	1.25	1.34
245.00	3.21	3.46	0.25	30.19	245.00	1.21	1.21	1.29
280.00	3.22	3.45	0.23	31.04	280.00	1.21	1.18	1.25
315.00	3.23	3.45	0.21	30.64	315.00	1.21	1.15	1.22
350.00	3.25	3.45	0.20	29.49	350.00	1.22	1.13	1.19
387.50	3.27	3.45	0.18	28.10	387.50	1.22	1.11	1.17
425.00	3.29	3.45	0.16	26.78	425.00	1.23	1.09	1.15
462.50	3.32	3.46	0.14	25.58	462.50	1.24	1.07	1.13
500.00	3.34	3.47	0.13	24.50	500.00	1.24	1.06	1.11
510.00	3.34	3.47	0.13	24.24	510.00	1.25	1.06	1.11
632.50	3.42	3.50	0.08	21.54	632.50	1.28	1.02	1.09
755.00	3.54	3.59	0.05	19.63	755.00	1.30	1.04	1.11
877.50	3.63	3.70	0.06	18.25	877.50	1.30	1.07	1.16
1000.00	3.72	3.87	0.16	17.33	1000.00	1.24	1.11	1.21

JPS-2-1N

350 to 550 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
350.00	3.13	3.20	0.07	33.17	350.00	1.03	1.05	1.06
360.00	3.10	3.17	0.07	34.09	360.00	1.02	1.05	1.06
370.00	3.12	3.18	0.06	35.09	370.00	1.02	1.06	1.06
380.00	3.15	3.22	0.07	36.10	380.00	1.02	1.06	1.06
390.00	3.17	3.25	0.07	37.32	390.00	1.03	1.07	1.07
400.00	3.19	3.25	0.06	38.52	400.00	1.03	1.07	1.07
425.00	3.17	3.23	0.06	39.51	425.00	1.06	1.09	1.08
450.00	3.17	3.23	0.06	37.28	450.00	1.08	1.10	1.09
475.00	3.24	3.29	0.06	33.68	475.00	1.11	1.12	1.10
500.00	3.22	3.25	0.03	30.70	500.00	1.14	1.13	1.12
510.00	3.22	3.28	0.06	29.60	510.00	1.16	1.14	1.12
520.00	3.22	3.28	0.06	28.58	520.00	1.17	1.14	1.13
530.00	3.22	3.26	0.04	27.63	530.00	1.19	1.15	1.13
540.00	3.24	3.28	0.04	26.77	540.00	1.20	1.15	1.14
550.00	3.26	3.29	0.04	25.93	550.00	1.22	1.16	1.15

In Stock... Immediate Delivery

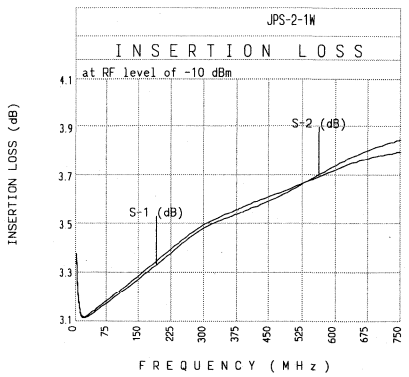
For Custom Versions Of Standard Models Consult Our Applications Dept.

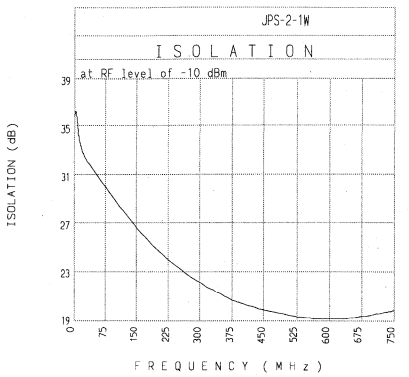
2 WAY-0°

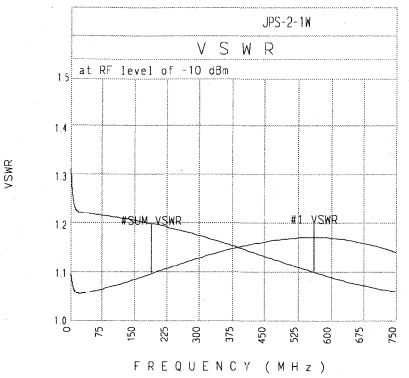
Power Splitter/Combiners 50 ohms

JPS-2-1W

3 to 750 MHz



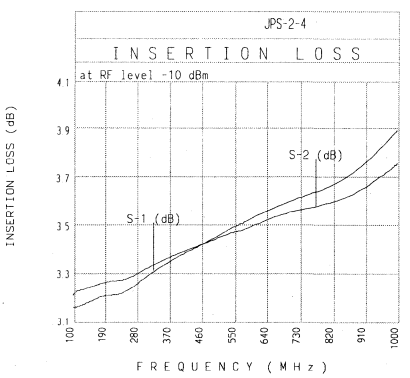


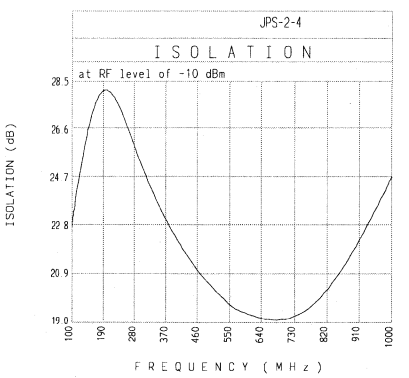


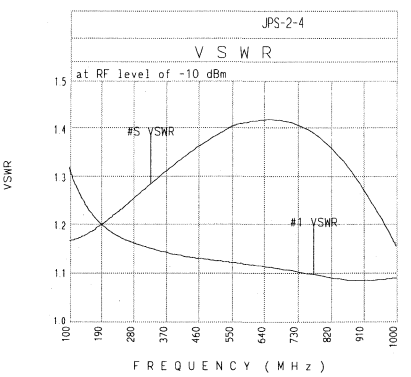
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
3.00	3.39	3.40	0.01	36.38	3.00	1.11	1.33	1.32
5.00	3.24	3.25	0.01	37.24	5.00	1.09	1.28	1.28
11.25	3.14	3.14	0.01	34.84	11.25	1.07	1.24	1.24
17.50	3.12	3.13	0.01	33.82	17.50	1.07	1.24	1.24
23.75	3.13	3.13	0.01	33.17	23.75	1.07	1.24	1.23
30.00	3.13	3.14	0.01	32.75	30.00	1.07	1.23	1.23
116.25	3.25	3.26	0.01	28.37	116.25	1.08	1.22	1.23
202.50	3.37	3.39	0.02	24.99	202.50	1.11	1.21	1.22
288.75	3.51	3.52	0.01	22.66	288.75	1.14	1.19	1.21
375.00	3.56	3.58	0.02	21.05	375.00	1.16	1.17	1.20
380.00	3.57	3.59	0.02	20.98	380.00	1.16	1.16	1.20
472.50	3.63	3.65	0.02	19.96	472.50	1.18	1.14	1.18
565.00	3.73	3.72	0.01	19.45	565.00	1.19	1.11	1.16
657.50	3.82	3.79	0.03	19.49	657.50	1.18	1.08	1.14
750.00	3.87	3.82	0.05	20.21	750.00	1.15	1.07	1.12

JPS-2-4

400 to 1000 MHz



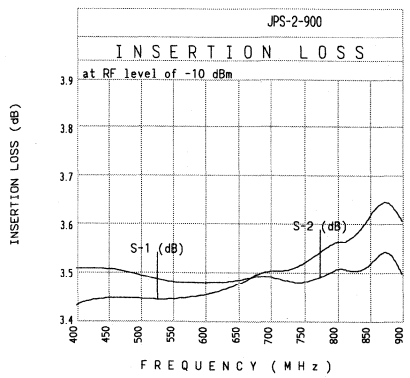


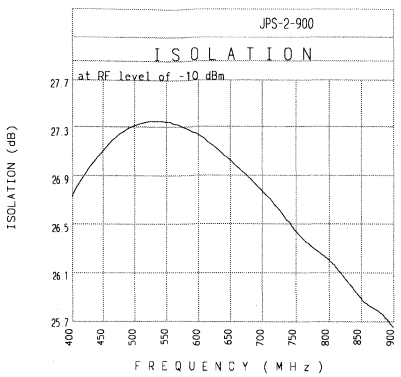


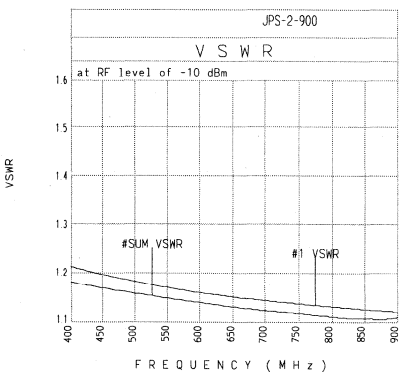
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
100.00	3.18	3.23	0.05	22.90	100.00	1.18	1.33	1.35
110.00	3.18	3.25	0.07	23.95	110.00	1.18	1.31	1.33
145.00	3.20	3.26	0.06	27.00	145.00	1.19	1.25	1.27
180.00	3.23	3.28	0.06	28.48	180.00	1.20	1.22	1.24
215.00	3.23	3.29	0.05	28.24	215.00	1.22	1.19	1.22
250.00	3.24	3.29	0.04	27.14	250.00	1.25	1.18	1.21
325.00	3.33	3.36	0.03	24.31	325.00	1.30	1.16	1.19
400.00	3.40	3.41	0.01	22.28	400.00	1.34	1.15	1.19
475.00	3.45	3.45	0.00	20.79	475.00	1.38	1.14	1.18
550.00	3.52	3.50	0.02	19.77	550.00	1.42	1.13	1.18
560.00	3.52	3.49	0.02	19.67	560.00	1.42	1.13	1.18
670.00	3.61	3.57	0.04	19.03	670.00	1.44	1.12	1.17
780.00	3.66	3.60	0.06	19.53	780.00	1.41	1.11	1.15
890.00	3.74	3.65	0.09	21.70	890.00	1.32	1.09	1.13
1000.00	3.92	3.78	0.14	24.89	1000.00	1.17	1.10	1.13

JPS-2-900

400 to 900 MHz







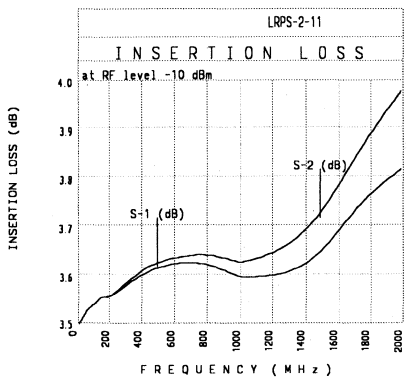
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
400.00	3.44	3.52	0.07	26.79	400.00	1.19	1.22	1.26
410.00	3.45	3.52	0.07	26.91	410.00	1.18	1.22	1.25
470.00	3.46	3.52	0.06	27.34	470.00	1.17	1.20	1.23
530.00	3.45	3.49	0.04	27.46	530.00	1.16	1.18	1.22
590.00	3.46	3.49	0.03	27.36	590.00	1.15	1.17	1.21
650.00	3.48	3.49	0.01	27.10	650.00	1.14	1.16	1.20
687.50	3.52	3.51	0.01	26.90	687.50	1.13	1.15	1.19
725.00	3.51	3.49	0.02	26.69	725.00	1.12	1.15	1.19
762.50	3.54	3.49	0.05	26.41	762.50	1.12	1.14	1.19
800.00	3.58	3.52	0.05	26.28	800.00	1.11	1.14	1.18
810.00	3.57	3.52	0.06	26.22	810.00	1.11	1.13	1.18
832.50	3.59	3.51	0.08	26.07	832.50	1.11	1.13	1.18
855.00	3.64	3.53	0.11	25.89	855.00	1.11	1.13	1.18
877.50	3.67	3.57	0.10	25.85	877.50	1.11	1.13	1.18
900.00	3.62	3.51	0.11	25.70	900.00	1.11	1.13	1.18

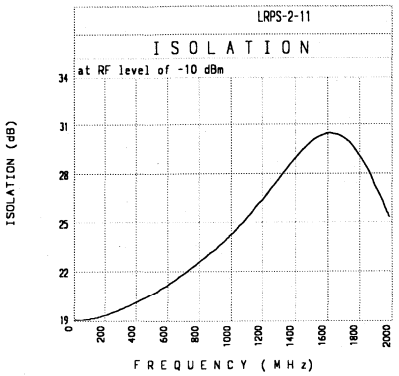
2 WAY-0°

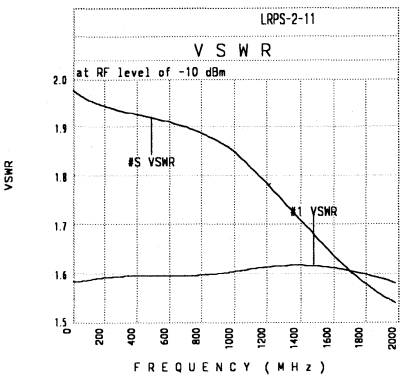
Power Splitter/Combiners 50 ohms

LRPS-2-11

20 to 2000 MHz



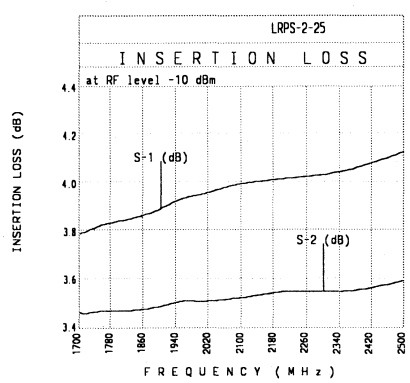


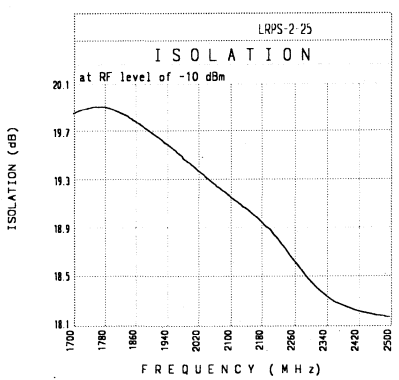


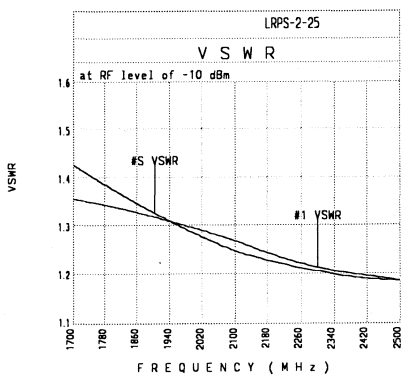
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
20.00	3.51	3.51	0.00	19.28	20.00	1.99	1.60	1.59
25.00	3.51	3.51	0.00	19.25	25.00	1.99	1.59	1.59
68.75	3.54	3.54	0.00	19.23	68.75	1.97	1.59	1.59
112.50	3.55	3.55	0.00	19.31	112.50	1.97	1.60	1.60
156.25	3.57	3.57	0.00	19.39	156.25	1.96	1.60	1.60
200.00	3.56	3.56	0.00	19.49	200.00	1.96	1.60	1.60
400.00	3.62	3.63	0.01	20.26	400.00	1.94	1.61	1.61
600.00	3.64	3.65	0.01	21.38	600.00	1.92	1.61	1.60
800.00	3.64	3.66	0.02	22.78	800.00	1.90	1.61	1.61
1000.00	3.61	3.64	0.03	24.48	1000.00	1.87	1.61	1.63
1010.00	3.61	3.64	0.03	24.57	1010.00	1.86	1.62	1.63
1257.50	3.61	3.66	0.05	27.17	1257.50	1.78	1.63	1.67
1505.00	3.65	3.73	0.08	30.72	1505.00	1.69	1.63	1.71
1752.50	3.77	3.88	0.11	31.25	1752.50	1.60	1.62	1.77
2000.00	3.83	3.99	0.16	25.63	2000.00	1.55	1.59	1.85

LRPS-2-25

1700 to 2500 MHz



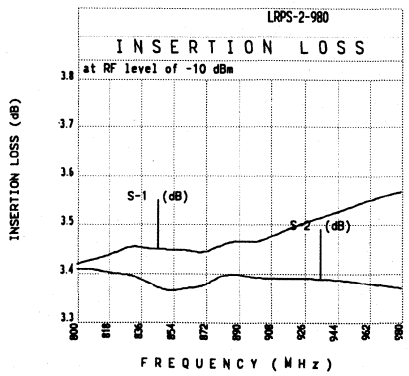


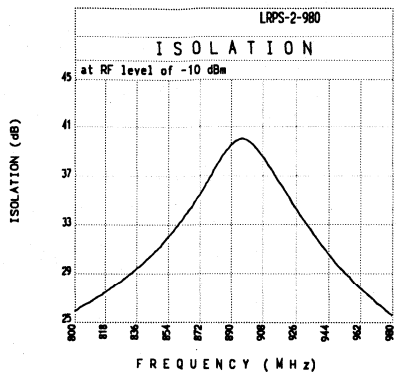


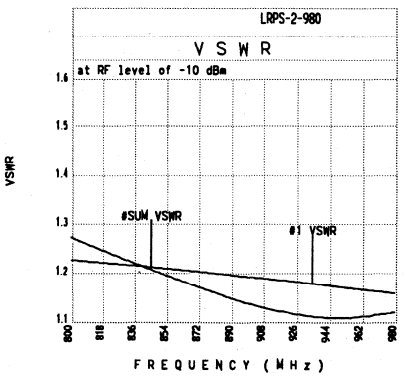
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1700.00	3.81	3.48	0.33	19.89	1700.00	1.44	1.37	1.37
1710.00	3.81	3.47	0.34	19.91	1710.00	1.43	1.37	1.37
1757.50	3.85	3.49	0.36	19.96	1757.50	1.41	1.36	1.37
1805.00	3.86	3.48	0.37	19.93	1805.00	1.38	1.35	1.37
1852.50	3.88	3.49	0.39	19.84	1852.50	1.36	1.34	1.37
1900.00	3.91	3.50	0.41	19.73	1900.00	1.34	1.33	1.37
1950.00	3.96	3.53	0.43	19.61	1950.00	1.31	1.32	1.36
2000.00	3.97	3.52	0.44	19.46	2000.00	1.29	1.30	1.36
2050.00	4.00	3.53	0.47	19.32	2050.00	1.27	1.29	1.35
2100.00	4.02	3.54	0.47	19.20	2100.00	1.26	1.28	1.35
2110.00	4.02	3.54	0.48	19.17	2110.00	1.25	1.28	1.34
2207.50	4.04	3.57	0.47	18.93	2207.50	1.23	1.24	1.33
2305.00	4.05	3.56	0.49	18.42	2305.00	1.21	1.22	1.33
2402.50	4.09	3.57	0.52	18.24	2402.50	1.20	1.21	1.34
2500.00	4.15	3.61	0.54	18.19	2500.00	1.19	1.19	1.35

LRPS-2-980

800 to 980 MHz



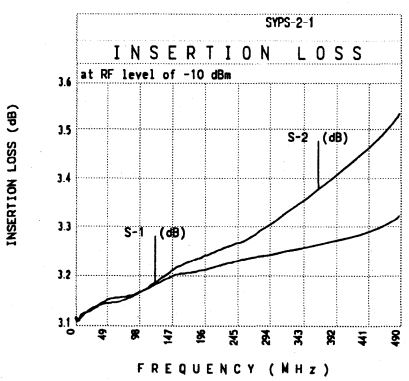


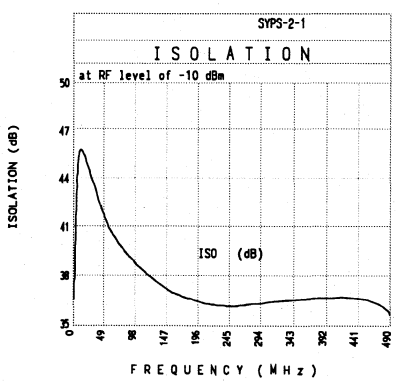


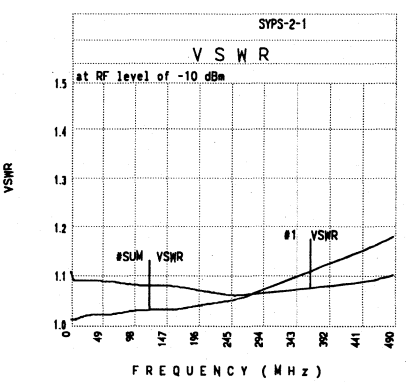
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
800.00	3.42	3.41	0.28	25.94	800.00	1.28	1.23	1.22
810.00	3.43	3.41	0.29	26.80	810.00	1.26	1.23	1.22
820.00	3.44	3.40	0.35	27.69	820.00	1.25	1.22	1.22
830.00	3.46	3.40	0.34	28.83	830.00	1.23	1.22	1.22
840.00	3.45	3.38	0.32	30.03	840.00	1.22	1.22	1.22
850.00	3.45	3.36	0.33	31.43	850.00	1.20	1.21	1.21
860.00	3.45	3.37	0.34	33.27	860.00	1.19	1.21	1.21
870.00	3.44	3.37	0.33	35.20	870.00	1.18	1.21	1.21
880.00	3.46	3.40	0.35	37.71	880.00	1.16	1.20	1.21
890.00	3.47	3.40	0.37	39.99	890.00	1.15	1.20	1.21
900.00	3.46	3.39	0.42	40.71	900.00	1.14	1.20	1.21
920.00	3.50	3.39	0.38	35.66	920.00	1.12	1.19	1.20
940.00	3.52	3.39	0.36	31.28	940.00	1.11	1.18	1.20
960.00	3.55	3.38	0.34	28.01	960.00	1.11	1.17	1.19
980.00	3.57	3.37	0.30	25.58	980.00	1.12	1.16	1.19

SYPS-2-1

2 to 500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
2.84	3.12	3.12	0.00	36.81	2.84	1.02	1.12	1.06
4.47	3.11	3.12	0.00	40.46	4.47	1.02	1.11	1.05
7.03	3.11	3.11	0.00	44.30	7.03	1.02	1.10	1.04
10.86	3.13	3.12	0.01	46.85	10.86	1.02	1.10	1.04
26.91	3.13	3.14	0.00	44.74	26.91	1.03	1.10	1.04
49.59	3.16	3.15	0.00	41.78	49.59	1.03	1.10	1.04
66.66	3.16	3.15	0.00	40.46	66.66	1.03	1.10	1.04
100.87	3.17	3.17	0.00	38.79	100.87	1.04	1.09	1.04
149.64	3.21	3.22	0.01	37.29	149.64	1.04	1.09	1.04
161.93	3.21	3.23	0.01	37.11	161.93	1.04	1.09	1.04
201.16	3.22	3.25	0.03	36.51	201.16	1.05	1.08	1.03
249.89	3.24	3.28	0.04	36.36	249.89	1.06	1.07	1.03
254.97	3.24	3.27	0.03	36.38	254.97	1.06	1.07	1.03
479.07	3.30	3.50	0.20	37.41	479.07	1.18	1.10	1.10
498.34	3.35	3.57	0.22	35.04	498.34	1.20	1.12	1.12

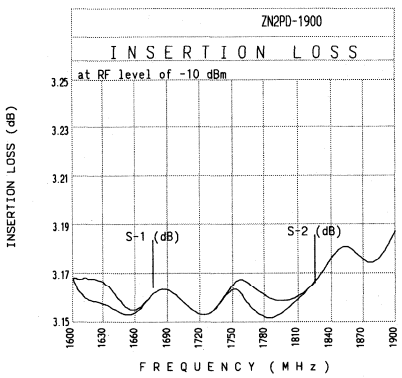
In Stock... Immediate Delivery

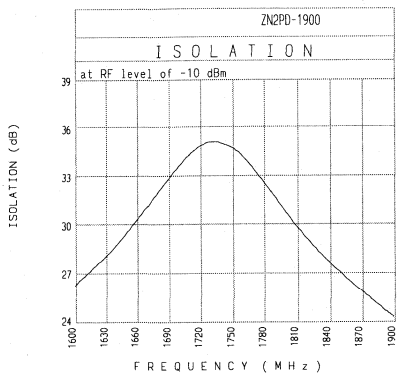
For Custom Versions Of Standard Models Consult Our Applications Dept.

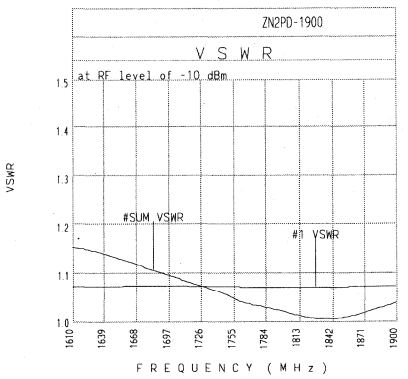
2 WAY-0°
Power Splitter/Combiners 50 ohms

ZN2PD-1900

1600 to 1900 MHz



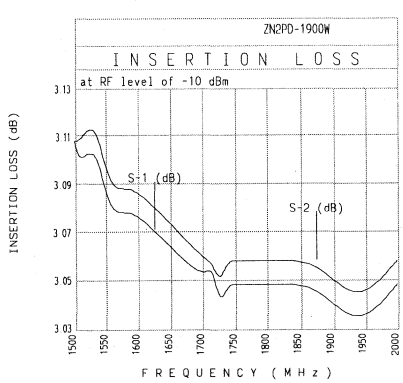


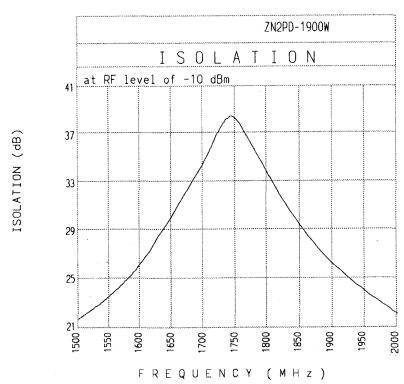


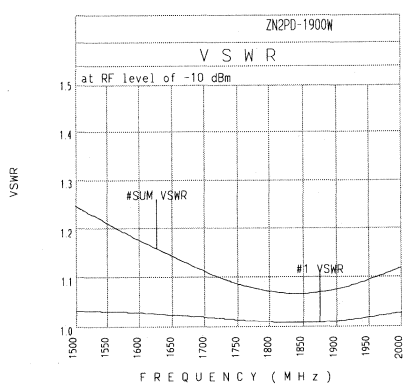
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1600.00	3.17	3.17	0.00	26.50	1600.00	1.17	1.09	1.07
1610.00	3.16	3.17	0.01	27.17	1610.00	1.16	1.09	1.07
1633.33	3.16	3.17	0.00	28.56	1633.33	1.14	1.09	1.07
1656.66	3.15	3.15	0.00	30.38	1656.66	1.12	1.09	1.07
1680.00	3.17	3.17	0.00	32.40	1680.00	1.10	1.09	1.07
1703.33	3.16	3.16	0.01	34.40	1703.33	1.09	1.09	1.07
1726.66	3.15	3.15	0.00	35.76	1726.66	1.07	1.09	1.07
1750.00	3.17	3.17	0.00	35.15	1750.00	1.05	1.08	1.07
1760.00	3.16	3.17	0.01	34.54	1760.00	1.04	1.08	1.07
1783.33	3.15	3.16	0.00	32.60	1783.33	1.03	1.08	1.07
1806.66	3.16	3.16	0.00	30.37	1806.66	1.01	1.08	1.07
1830.00	3.17	3.17	0.00	28.61	1830.00	1.02	1.08	1.07
1853.33	3.19	3.19	0.00	27.10	1853.33	1.03	1.09	1.07
1876.66	3.17	3.17	0.00	25.75	1876.66	1.05	1.09	1.07
1900.00	3.19	3.19	0.00	24.47	1900.00	1.07	1.09	1.07

ZN2PD-1900W

1500 to 2000 MHz



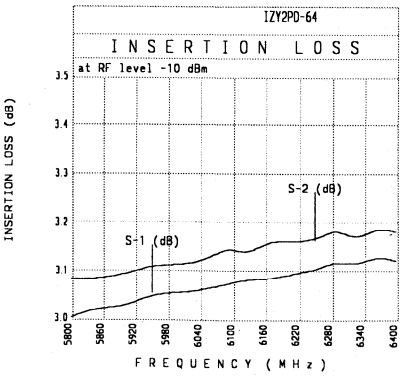


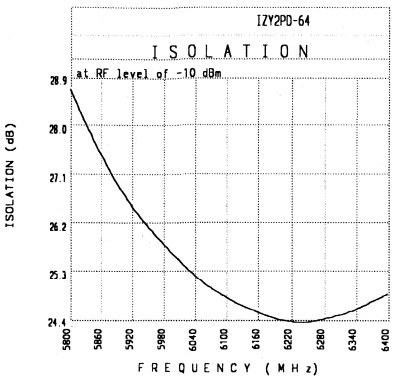


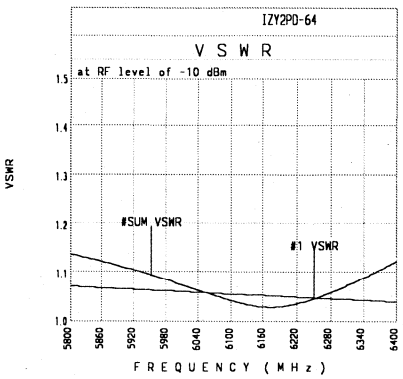
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1500.00	3.11	3.11	0.00	21.92	1500.00	1.26	1.05	1.04
1510.00	3.10	3.11	0.01	22.33	1510.00	1.26	1.05	1.04
1532.50	3.11	3.12	0.01	23.19	1532.50	1.24	1.05	1.04
1555.00	3.08	3.09	0.01	24.15	1555.00	1.22	1.05	1.04
1577.50	3.08	3.09	0.01	25.30	1577.50	1.21	1.05	1.04
1600.00	3.08	3.09	0.01	26.44	1600.00	1.19	1.05	1.04
1700.00	3.05	3.06	0.01	35.07	1700.00	1.13	1.04	1.03
1712.50	3.06	3.06	0.01	36.64	1712.50	1.12	1.03	1.03
1725.00	3.04	3.05	0.01	38.04	1725.00	1.11	1.03	1.03
1737.50	3.05	3.06	0.01	38.88	1737.50	1.11	1.03	1.03
1750.00	3.05	3.06	0.01	39.11	1750.00	1.10	1.03	1.03
1812.50	3.05	3.06	0.01	32.45	1812.50	1.08	1.02	1.02
1875.00	3.05	3.06	0.01	27.76	1875.00	1.08	1.02	1.03
1937.50	3.03	3.04	0.01	24.65	1937.50	1.10	1.03	1.04
2000.00	3.05	3.06	0.01	22.37	2000.00	1.14	1.04	1.05

IZY2PD-64

5800 to 6400 MHz



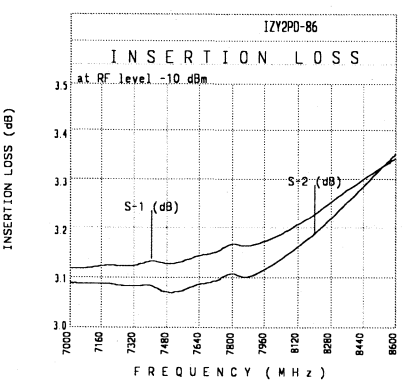


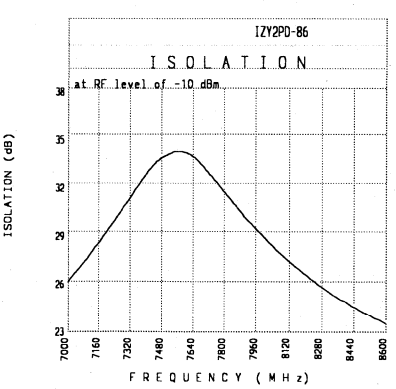


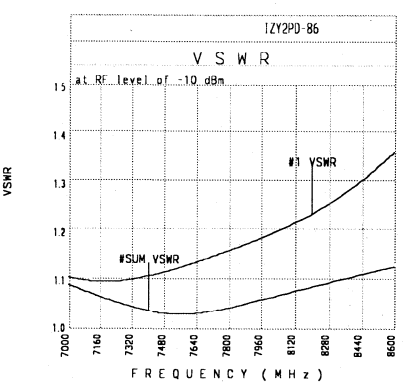
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5800.00	3.01	3.09	0.08	28.82	5800.00	1.15	1.08	1.27
5850.10	3.03	3.09	0.06	27.76	5850.10	1.14	1.08	1.28
5900.20	3.03	3.10	0.07	26.88	5900.20	1.12	1.08	1.28
5950.30	3.06	3.12	0.06	26.24	5950.30	1.11	1.07	1.29
6000.40	3.06	3.12	0.07	25.72	6000.40	1.09	1.07	1.29
6050.00	3.07	3.13	0.06	25.23	6050.00	1.07	1.07	1.30
6087.50	3.08	3.16	0.08	25.03	6087.50	1.06	1.07	1.30
6125.00	3.09	3.14	0.05	24.79	6125.00	1.04	1.07	1.30
6162.50	3.09	3.17	0.08	24.66	6162.50	1.04	1.06	1.31
6200.00	3.10	3.17	0.07	24.51	6200.00	1.04	1.06	1.31
6250.00	3.11	3.17	0.06	24.46	6250.00	1.06	1.06	1.32
6287.50	3.13	3.20	0.07	24.57	6287.50	1.07	1.06	1.32
6325.00	3.12	3.17	0.05	24.65	6325.00	1.09	1.05	1.32
6362.50	3.14	3.20	0.06	24.83	6362.50	1.11	1.05	1.33
6400.00	3.13	3.19	0.06	25.02	6400.00	1.14	1.05	1.33

IZY2PD-86

7000 to 8600 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
7000.00	3.13	3.10	0.03	26.38	7000.00	1.12	1.05	1.05
7099.90	3.13	3.10	0.03	27.86	7099.90	1.11	1.06	1.06
7199.80	3.14	3.10	0.04	29.56	7199.80	1.11	1.08	1.07
7299.70	3.13	3.09	0.04	31.35	7299.70	1.11	1.09	1.08
7399.60	3.15	3.10	0.05	33.23	7399.60	1.12	1.11	1.10
7450.00	3.14	3.08	0.06	33.95	7450.00	1.12	1.11	1.10
7537.60	3.14	3.08	0.06	34.63	7537.60	1.13	1.13	1.12
7625.20	3.16	3.10	0.06	34.44	7625.20	1.15	1.14	1.14
7712.80	3.16	3.10	0.06	33.29	7712.80	1.16	1.16	1.15
7800.40	3.19	3.13	0.06	31.96	7800.40	1.17	1.18	1.18
7850.00	3.17	3.10	0.06	31.18	7850.00	1.18	1.19	1.22
8037.50	3.20	3.15	0.05	28.55	8037.50	1.21	1.23	1.26
8225.00	3.25	3.21	0.04	26.52	8225.00	1.25	1.27	1.30
8412.50	3.31	3.29	0.02	24.99	8412.50	1.30	1.32	1.30
8600.00	3.36	3.37	0.01	23.79	8600.00	1.38	1.37	1.35

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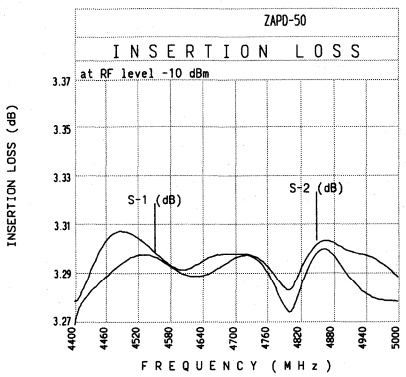
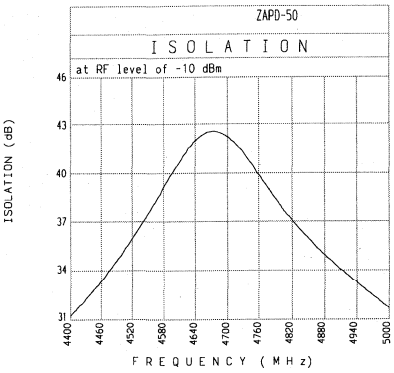
2 WAY-0°

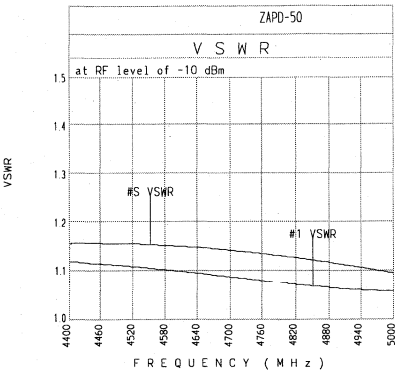
Power Splitter/Combiners 50 ohms

ZAPD-50

4400 to 5000 MHz



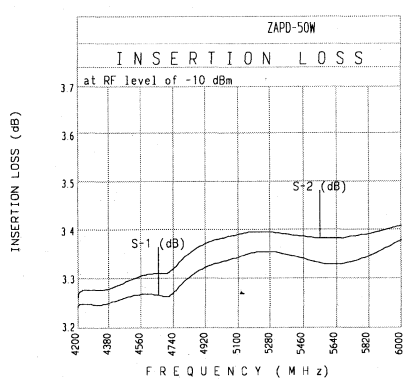


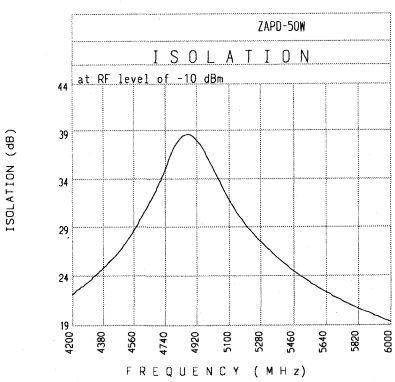


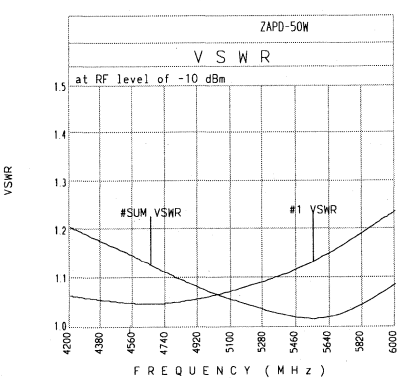
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
4400.00	3.28	3.27	0.01	31.27	4400.00	1.17	1.13	1.10
4410.00	3.28	3.28	0.00	31.59	4410.00	1.17	1.13	1.10
4457.50	3.31	3.29	0.01	33.42	4457.50	1.17	1.12	1.10
4505.00	3.31	3.30	0.01	35.55	4505.00	1.16	1.12	1.09
4552.50	3.30	3.30	0.00	37.82	4552.50	1.16	1.11	1.09
4600.00	3.29	3.29	0.00	40.63	4600.00	1.16	1.11	1.08
4650.00	3.30	3.29	0.00	43.02	4650.00	1.16	1.10	1.08
4700.00	3.30	3.30	0.00	42.77	4700.00	1.15	1.09	1.07
4750.00	3.30	3.30	0.00	40.53	4750.00	1.15	1.09	1.07
4800.00	3.28	3.27	0.01	38.07	4800.00	1.14	1.08	1.06
4810.00	3.29	3.28	0.01	37.64	4810.00	1.14	1.08	1.06
4857.50	3.31	3.31	0.01	35.87	4857.50	1.13	1.07	1.06
4905.00	3.30	3.29	0.01	34.37	4905.00	1.12	1.07	1.05
4952.50	3.30	3.28	0.02	33.03	4952.50	1.11	1.07	1.05
5000.00	3.29	3.28	0.01	31.75	5000.00	1.10	1.06	1.05

ZAPD-50W

4200 to 6000 MHz



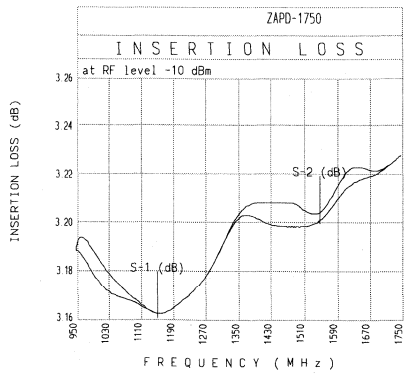


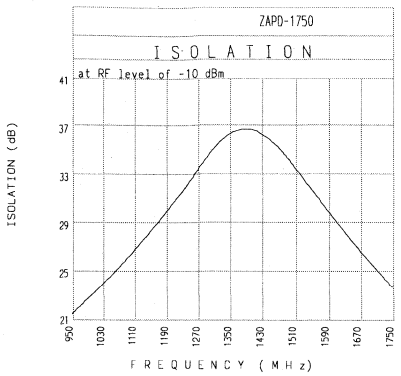


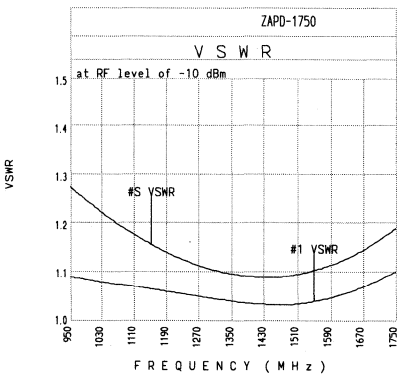
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
4200.00	3.25	3.27	0.02	22.67	4200.00	1.22	1.07	1.12
4210.00	3.26	3.29	0.03	22.77	4210.00	1.21	1.07	1.12
4332.50	3.25	3.28	0.03	24.57	4332.50	1.19	1.06	1.11
4455.00	3.27	3.30	0.04	26.77	4455.00	1.17	1.06	1.11
4577.50	3.28	3.32	0.04	29.78	4577.50	1.15	1.05	1.11
4700.00	3.27	3.32	0.05	34.24	4700.00	1.13	1.05	1.11
4710.00	3.27	3.32	0.06	34.56	4710.00	1.12	1.05	1.11
4832.50	3.32	3.37	0.05	40.68	4832.50	1.10	1.06	1.11
4955.00	3.34	3.39	0.05	37.99	4955.00	1.08	1.07	1.12
5077.50	3.35	3.40	0.05	32.96	5077.50	1.06	1.08	1.12
5200.00	3.37	3.41	0.04	29.43	5200.00	1.05	1.09	1.13
5400.00	3.36	3.40	0.04	25.79	5400.00	1.03	1.12	1.14
5600.00	3.33	3.39	0.06	23.24	5600.00	1.02	1.15	1.16
5800.00	3.35	3.40	0.06	21.34	5800.00	1.05	1.20	1.18
6000.00	3.39	3.42	0.04	19.75	6000.00	1.09	1.25	1.21

ZAPD-1750

950 to 1750 MHz



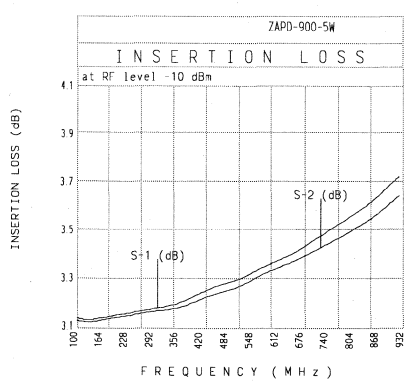


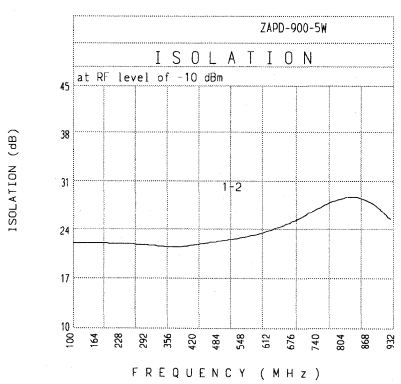


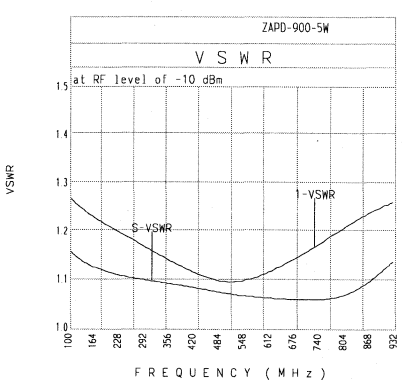
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
950.00	3.19	3.19	0.00	21.88	950.00	1.29	1.10	1.09
960.00	3.19	3.20	0.01	22.24	960.00	1.28	1.10	1.09
1025.00	3.17	3.18	0.00	24.25	1025.00	1.24	1.09	1.08
1090.00	3.17	3.17	0.01	26.57	1090.00	1.20	1.08	1.08
1155.00	3.16	3.16	0.00	29.13	1155.00	1.17	1.07	1.08
1220.00	3.17	3.17	0.00	31.78	1220.00	1.14	1.07	1.08
1285.00	3.18	3.18	0.00	34.90	1285.00	1.12	1.06	1.08
1350.00	3.21	3.21	0.00	37.32	1350.00	1.11	1.05	1.07
1415.00	3.20	3.21	0.01	37.52	1415.00	1.10	1.04	1.07
1480.00	3.20	3.21	0.01	35.45	1480.00	1.10	1.04	1.07
1490.00	3.20	3.21	0.01	34.93	1490.00	1.10	1.04	1.07
1555.00	3.20	3.20	0.01	32.07	1555.00	1.11	1.05	1.07
1620.00	3.22	3.23	0.01	29.18	1620.00	1.13	1.06	1.08
1685.00	3.22	3.22	0.01	26.58	1685.00	1.16	1.08	1.09
1750.00	3.23	3.23	0.00	24.15	1750.00	1.20	1.11	1.11

ZAPD-900-5W

100 to 900 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
100.00	3.15	3.14	0.01	22.80	100.00	1.16	1.27	1.27
130.00	3.14	3.13	0.01	22.85	130.00	1.14	1.25	1.25
160.00	3.15	3.14	0.00	22.87	160.00	1.13	1.24	1.24
230.00	3.17	3.16	0.01	22.70	230.00	1.11	1.20	1.20
300.00	3.19	3.18	0.01	22.65	300.00	1.11	1.17	1.17
370.00	3.21	3.19	0.02	22.56	370.00	1.10	1.14	1.14
440.00	3.28	3.25	0.03	22.84	440.00	1.09	1.11	1.11
510.00	3.30	3.27	0.03	23.22	510.00	1.08	1.10	1.10
580.00	3.37	3.34	0.03	24.02	580.00	1.07	1.11	1.11
650.00	3.41	3.38	0.04	25.31	650.00	1.07	1.14	1.14
720.00	3.49	3.44	0.05	27.32	720.00	1.07	1.17	1.17
790.00	3.56	3.50	0.05	29.51	790.00	1.07	1.21	1.21
860.00	3.64	3.57	0.07	29.70	860.00	1.10	1.25	1.25
924.00	3.74	3.66	0.09	26.35	924.00	1.15	1.27	1.27

In Stock... Immediate Delivery

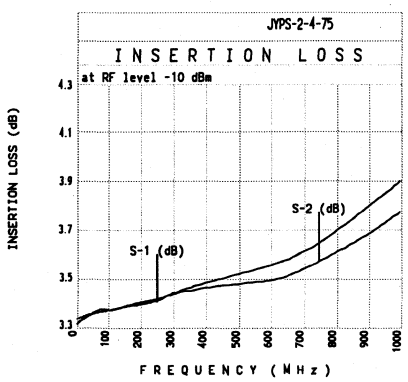
For Custom Versions Of Standard Models Consult Our Applications Dept.

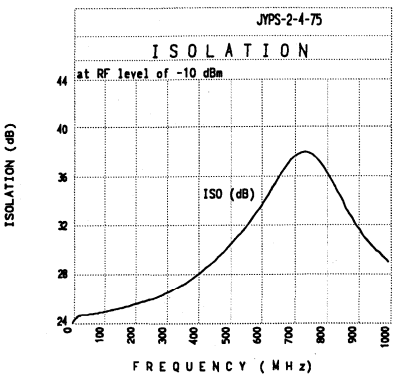
2 WAY-0°

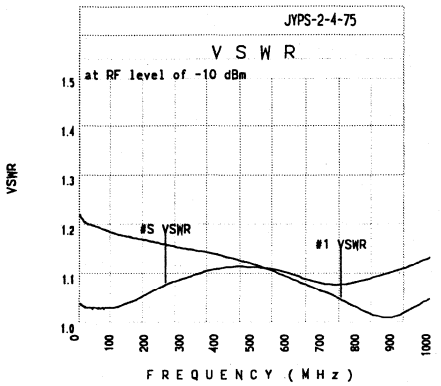
Power Splitter/Combiners 75 ohms

JYPS-2-4-75

5 to 1000 MHz



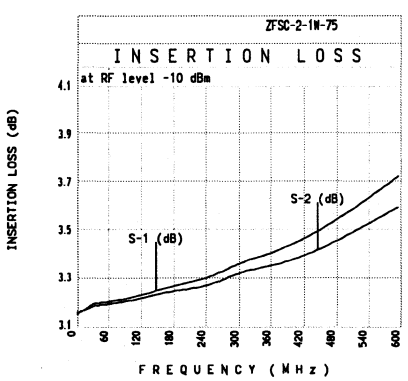


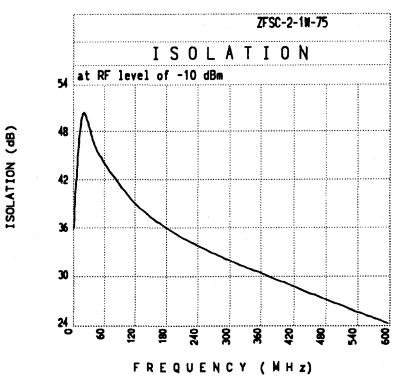


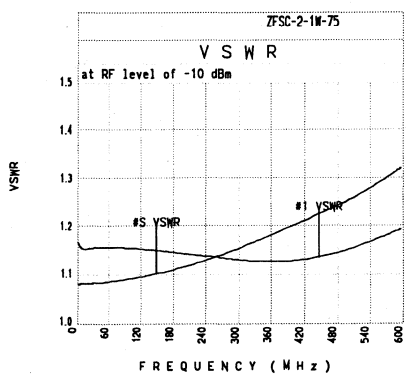
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.00	3.34	3.32	0.02	24.15	5.00	1.06	1.24	1.24
22.50	3.35	3.34	0.01	24.84	22.50	1.05	1.22	1.22
40.00	3.36	3.35	0.01	24.83	40.00	1.05	1.22	1.22
75.00	3.37	3.39	0.02	24.98	75.00	1.05	1.21	1.21
110.00	3.38	3.37	0.01	25.13	110.00	1.05	1.20	1.20
180.00	3.40	3.41	0.01	25.57	180.00	1.07	1.19	1.19
250.00	3.41	3.42	0.01	26.09	250.00	1.10	1.18	1.18
305.56	3.46	3.45	0.01	26.65	305.56	1.11	1.17	1.16
416.67	3.50	3.48	0.02	28.18	416.67	1.14	1.16	1.15
583.33	3.56	3.50	0.06	32.81	583.33	1.13	1.12	1.11
638.89	3.58	3.51	0.07	35.51	638.89	1.11	1.10	1.09
750.00	3.65	3.58	0.07	40.24	750.00	1.09	1.07	1.06
872.22	3.78	3.67	0.11	33.44	872.22	1.12	1.02	1.01
933.33	3.84	3.72	0.12	30.89	933.33	1.13	1.04	1.01
1055.55	3.97	3.84	0.13	27.96	1055.55	1.17	1.09	1.07

ZFSC-2-1W-75

5 to 600 MHz



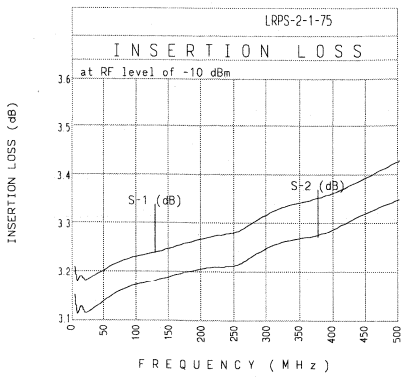


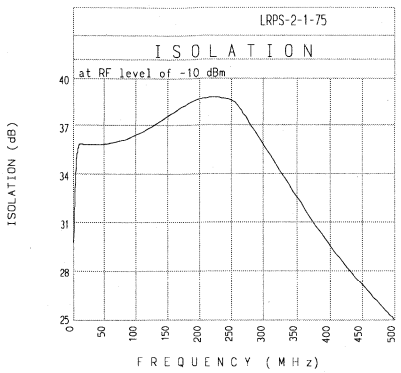


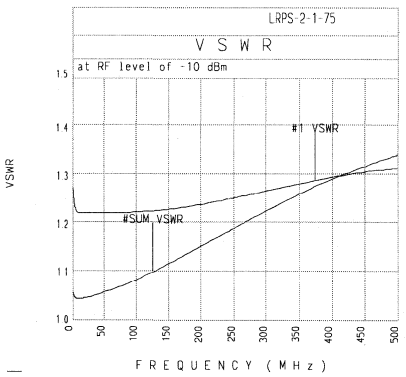
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.00	3.17	3.16	0.01	36.37	5.00	1.09	1.18	1.18
10.00	3.17	3.17	0.01	43.47	10.00	1.09	1.16	1.16
20.00	3.18	3.18	0.01	51.91	20.00	1.09	1.16	1.16
30.00	3.20	3.19	0.01	50.08	30.00	1.09	1.16	1.16
40.00	3.21	3.20	0.01	47.38	40.00	1.09	1.16	1.16
50.00	3.21	3.20	0.01	45.51	50.00	1.09	1.16	1.16
112.50	3.23	3.22	0.01	39.69	112.50	1.10	1.16	1.16
175.00	3.28	3.26	0.02	36.52	175.00	1.11	1.15	1.15
237.50	3.30	3.27	0.03	34.18	237.50	1.13	1.14	1.13
300.00	3.37	3.33	0.04	32.31	300.00	1.16	1.14	1.12
310.00	3.38	3.34	0.04	32.03	310.00	1.16	1.13	1.12
382.50	3.43	3.37	0.06	30.06	382.50	1.20	1.13	1.11
455.00	3.51	3.43	0.08	28.13	455.00	1.23	1.14	1.11
527.50	3.62	3.52	0.10	26.22	527.50	1.27	1.17	1.12
600.00	3.74	3.61	0.13	24.32	600.00	1.33	1.20	1.15

LRPS-2-1-75

2 to 500 MHz



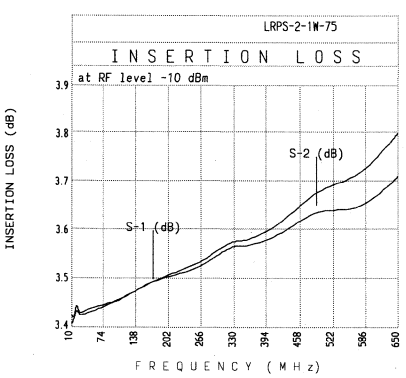


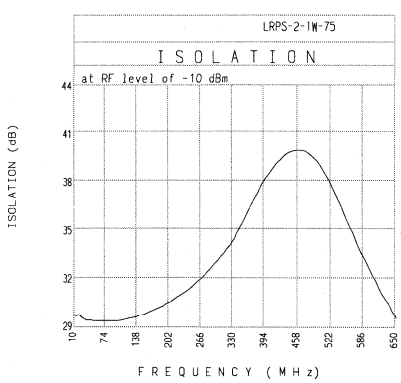


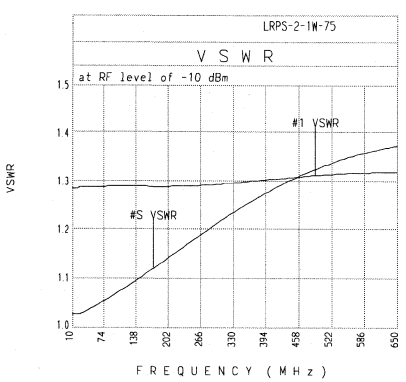
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
2.00	3.22	3.16	0.06	30.17	2.00	1.06	1.28	1.29
5.00	3.18	3.11	0.07	34.70	5.00	1.05	1.24	1.25
8.75	3.20	3.13	0.06	36.07	8.75	1.05	1.23	1.24
12.50	3.20	3.14	0.06	36.38	12.50	1.05	1.23	1.24
16.25	3.19	3.12	0.07	36.27	16.25	1.05	1.23	1.24
20.00	3.19	3.12	0.07	36.21	20.00	1.05	1.23	1.24
77.50	3.24	3.18	0.06	36.30	77.50	1.08	1.23	1.24
135.00	3.25	3.19	0.06	37.57	135.00	1.12	1.24	1.24
192.50	3.28	3.22	0.06	39.35	192.50	1.16	1.25	1.24
250.00	3.29	3.22	0.06	39.14	250.00	1.20	1.26	1.26
260.00	3.30	3.23	0.06	38.74	260.00	1.21	1.27	1.26
320.00	3.35	3.28	0.07	34.94	320.00	1.25	1.28	1.27
380.00	3.36	3.28	0.08	31.02	380.00	1.29	1.30	1.28
440.00	3.40	3.33	0.08	27.88	440.00	1.32	1.32	1.29
500.00	3.44	3.36	0.08	25.29	500.00	1.35	1.33	1.30

LRPS-2-1W-75

10 to 650 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.00	3.41	3.43	0.01	29.84	10.00	1.03	1.29	1.30
15.00	3.42	3.42	0.00	30.00	15.00	1.03	1.29	1.30
18.75	3.44	3.45	0.00	29.98	18.75	1.03	1.29	1.30
22.50	3.44	3.45	0.01	29.82	22.50	1.03	1.29	1.30
26.25	3.43	3.43	0.00	29.74	26.25	1.03	1.30	1.30
30.00	3.43	3.44	0.01	29.63	30.00	1.04	1.30	1.30
103.75	3.46	3.46	0.00	29.48	103.75	1.08	1.30	1.30
177.50	3.51	3.51	0.00	30.32	177.50	1.13	1.30	1.30
251.25	3.53	3.52	0.00	31.77	251.25	1.19	1.30	1.31
325.00	3.59	3.58	0.01	34.41	325.00	1.24	1.30	1.30
335.00	3.58	3.57	0.01	35.05	335.00	1.25	1.31	1.31
413.75	3.61	3.59	0.03	40.20	413.75	1.30	1.31	1.32
492.50	3.70	3.66	0.05	40.80	492.50	1.34	1.32	1.32
571.25	3.71	3.64	0.08	34.12	571.25	1.37	1.33	1.32
650.00	3.81	3.72	0.09	29.75	650.00	1.38	1.33	1.32

In Stock... Immediate Delivery

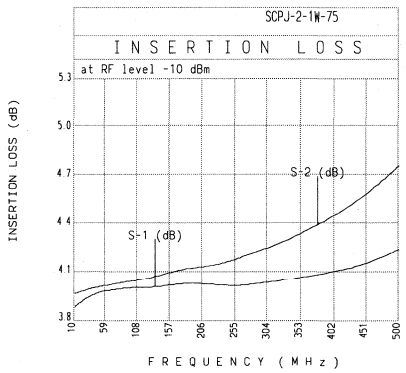
For Custom Versions Of Standard Models Consult Our Applications Dept.

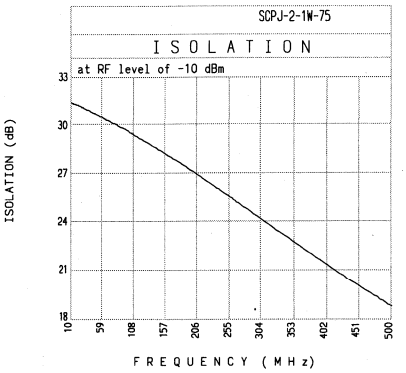
2 WAY-180°

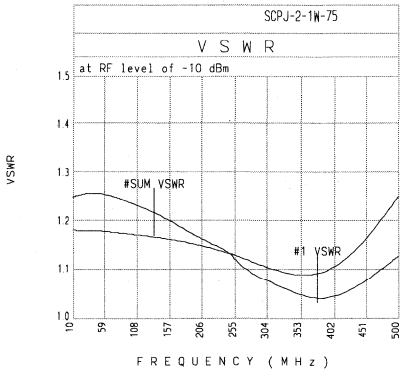
Power Splitter/Combiners 75 ohms

SCPJ-2-1W-75

10 to 500 MHz



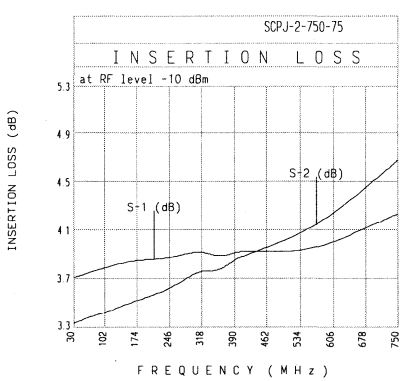


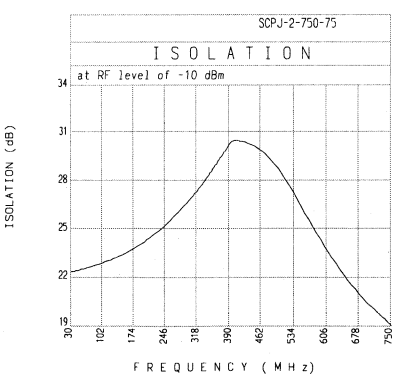


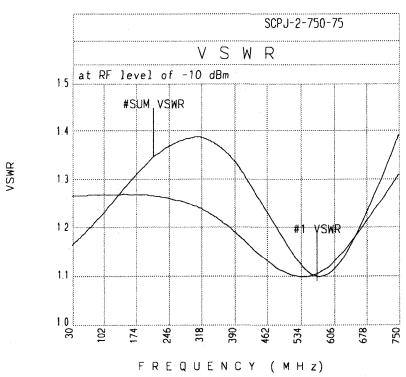
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.00	3.88	3.97	0.09	31.61	10.00	1.19	1.26	1.32
20.00	3.92	3.98	0.06	31.48	20.00	1.19	1.26	1.32
40.00	3.97	4.01	0.04	31.05	40.00	1.19	1.27	1.31
60.00	3.99	4.02	0.03	30.65	60.00	1.19	1.26	1.31
80.00	4.00	4.04	0.03	30.23	80.00	1.18	1.25	1.30
100.00	4.01	4.05	0.04	29.80	100.00	1.18	1.24	1.29
137.50	4.01	4.08	0.06	28.89	137.50	1.17	1.22	1.26
175.00	4.04	4.13	0.09	27.96	175.00	1.17	1.19	1.24
212.50	4.03	4.14	0.12	26.92	212.50	1.15	1.16	1.21
250.00	4.02	4.18	0.16	25.87	250.00	1.14	1.14	1.17
260.00	4.02	4.20	0.17	25.59	260.00	1.13	1.11	1.16
320.00	4.05	4.28	0.23	23.86	320.00	1.10	1.07	1.11
380.00	4.09	4.41	0.31	22.14	380.00	1.09	1.03	1.09
440.00	4.14	4.55	0.41	20.45	440.00	1.14	1.07	1.15
500.00	4.25	4.77	0.52	18.90	500.00	1.26	1.13	1.25

SCPJ-2-750-75

30 to 750 MHz





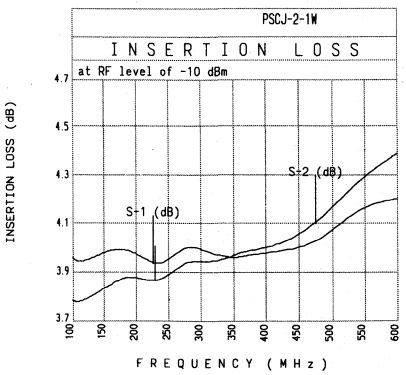


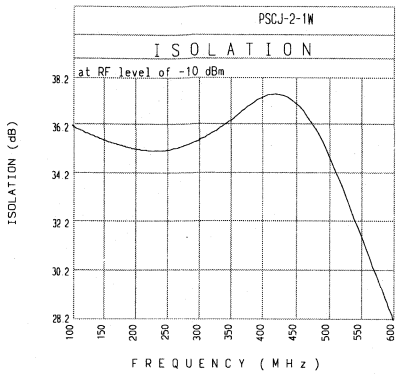
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
30.00	3.74	3.35	0.38	22.42	30.00	1.17	1.27	1.17
40.00	3.75	3.37	0.39	22.46	40.00	1.18	1.27	1.17
105.00	3.83	3.45	0.38	22.99	105.00	1.24	1.28	1.21
170.00	3.89	3.55	0.34	23.81	170.00	1.32	1.28	1.27
235.00	3.89	3.62	0.27	25.03	235.00	1.38	1.27	1.33
300.00	3.96	3.78	0.18	26.96	300.00	1.40	1.25	1.36
322.50	3.95	3.80	0.15	27.75	322.50	1.39	1.24	1.36
345.00	3.92	3.79	0.13	28.61	345.00	1.38	1.23	1.36
367.50	3.92	3.83	0.10	29.56	367.50	1.37	1.21	1.36
390.00	3.95	3.89	0.06	30.48	390.00	1.34	1.20	1.35
400.00	3.96	3.91	0.05	30.84	400.00	1.33	1.19	1.34
487.50	3.95	4.03	0.08	29.93	487.50	1.19	1.11	1.27
575.00	3.98	4.18	0.20	25.06	575.00	1.06	1.09	1.17
662.50	4.13	4.44	0.32	21.43	662.50	1.19	1.19	1.08
750.00	4.27	4.72	0.45	19.03	750.00	1.40	1.32	1.02

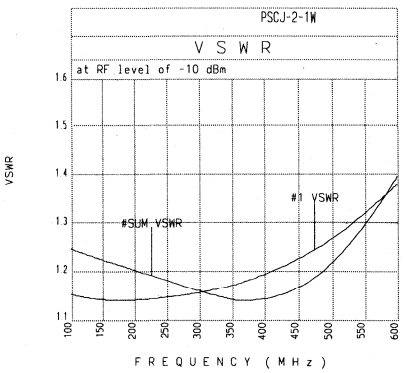
50 ohms

PSCJ-2-1W

100 to 600 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB)
100.00	3.97	3.79	0.21	36.45
110.00	3.95	3.78	0.20	36.30
132.50	3.97	3.81	0.18	36.03
155.00	4.00	3.85	0.17	35.80
177.50	4.01	3.89	0.15	35.61
200.00	3.99	3.89	0.12	35.45
237.50	3.92	3.86	0.08	35.33
275.00	4.04	3.97	0.08	35.56
312.50	3.99	3.95	0.06	35.96
350.00	3.97	3.98	0.01	36.62
360.00	3.98	4.00	0.00	36.85
420.00	4.00	4.02	0.00	38.18
480.00	4.03	4.12	0.07	36.79
540.00	4.19	4.30	0.10	32.52
600.00	4.22	4.41	0.16	28.29

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
100.00	1.25	1.15	1.03
110.00	1.25	1.15	1.03
132.50	1.23	1.15	1.03
155.00	1.22	1.14	1.03
177.50	1.22	1.14	1.03
200.00	1.21	1.14	1.03
237.50	1.19	1.15	1.04
275.00	1.17	1.15	1.04
312.50	1.16	1.16	1.04
350.00	1.14	1.17	1.05
360.00	1.14	1.18	1.05
420.00	1.15	1.21	1.07
480.00	1.19	1.25	1.11
540.00	1.28	1.31	1.15
600.00	1.40	1.39	1.20

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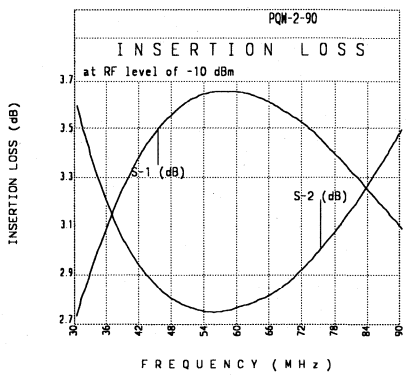
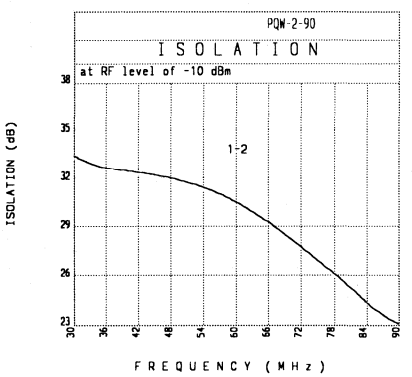
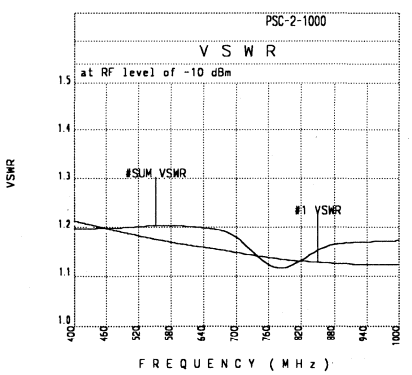
2 WAY-90°
Power Splitter/Combiners

50 ohms

PQW-2-90 — 30 to 90 MHz

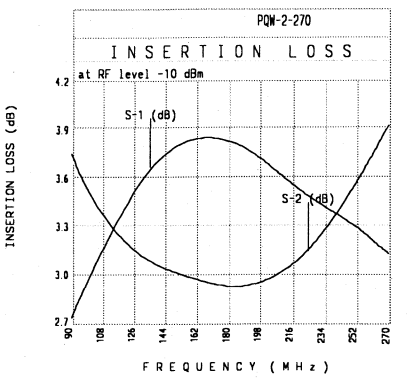


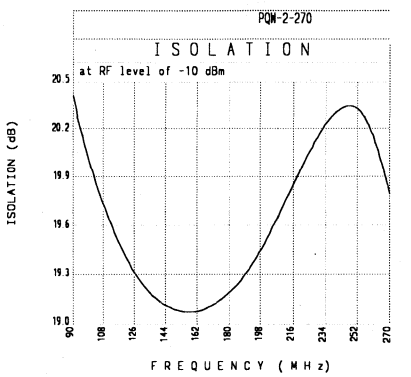


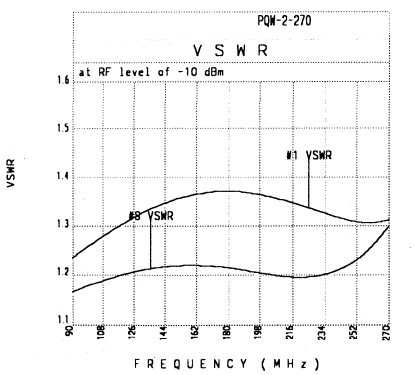


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
30.00	2.73	3.61	0.88	89.79	33.54
34.28	3.04	3.27	0.23	89.90	32.81
38.57	3.28	3.04	0.24	89.92	32.62
42.85	3.46	2.90	0.56	89.94	32.43
47.14	3.57	2.80	0.78	89.88	32.18
51.42	3.65	2.76	0.89	90.07	31.80
55.71	3.67	2.74	0.93	90.15	31.32
60.00	3.67	2.77	0.91	90.21	30.62
64.28	3.64	2.80	0.83	90.36	29.73
68.57	3.58	2.86	0.71	90.40	28.71
72.85	3.52	2.96	0.56	90.50	27.59
77.14	3.42	3.07	0.36	90.70	26.43
81.42	3.32	3.20	0.12	90.90	25.26
85.71	3.21	3.35	0.14	91.09	23.85
90.00	3.10	3.51	0.40	91.35	23.06

PQW-2-270 — 90 to 270 MHz

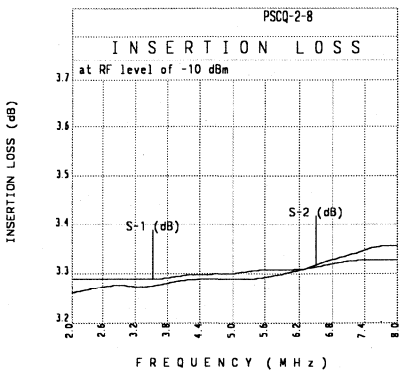


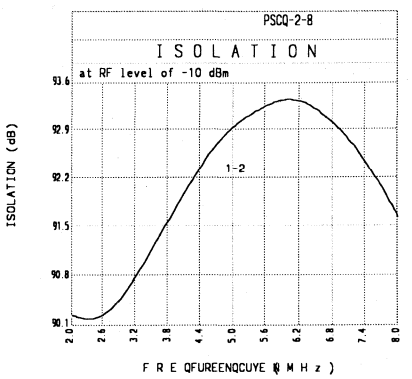


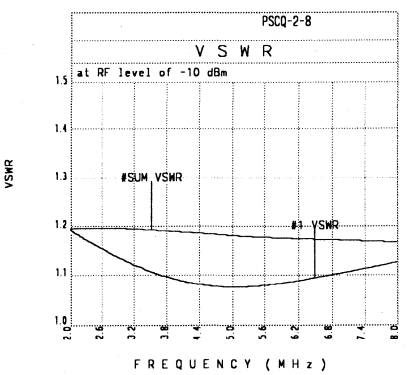


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
90.00	2.75	3.78	1.03	90.51	20.42
100.00	3.01	3.51	0.50	90.67	19.95
120.00	3.46	3.21	0.25	91.07	19.37
140.00	3.77	3.07	0.69	91.32	19.11
160.00	3.89	3.00	0.90	91.58	19.05
180.00	3.87	2.94	0.93	91.62	19.18
195.00	3.78	2.96	0.82	91.44	19.40
210.00	3.64	3.03	0.61	91.48	19.73
225.00	3.51	3.17	0.34	91.70	20.09
240.00	3.41	3.38	0.03	91.88	20.35
250.00	3.34	3.56	0.22	91.96	20.37
255.00	3.30	3.65	0.36	92.02	20.31
260.00	3.25	3.75	0.50	92.07	20.20
265.00	3.20	3.85	0.65	92.14	20.03
270.00	3.16	3.95	0.80	92.25	19.81

PSCQ-2-8 — 2 to 8 MHz







FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
2.00	3.29	3.26	0.03	90.26	34.06
2.43	3.29	3.27	0.02	90.17	33.54
2.86	3.29	3.28	0.01	90.42	32.81
3.29	3.29	3.27	0.01	90.96	32.62
3.71	3.29	3.28	0.01	91.56	32.43
4.14	3.30	3.29	0.02	92.12	32.18
4.57	3.30	3.29	0.01	92.68	31.80
5.00	3.30	3.29	0.01	93.03	31.32
5.43	3.31	3.29	0.01	93.24	30.62
5.86	3.31	3.30	0.01	93.41	29.73
6.29	3.31	3.31	0.00	93.37	28.71
6.71	3.32	3.33	0.01	93.12	27.59
7.14	3.33	3.34	0.01	92.79	26.43
7.57	3.33	3.36	0.02	92.29	25.26
8.00	3.33	3.36	0.03	91.68	23.85

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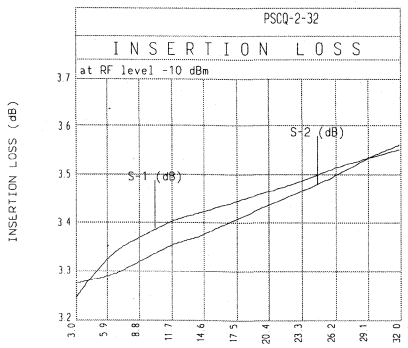
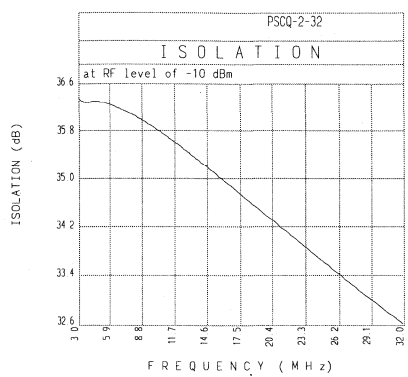
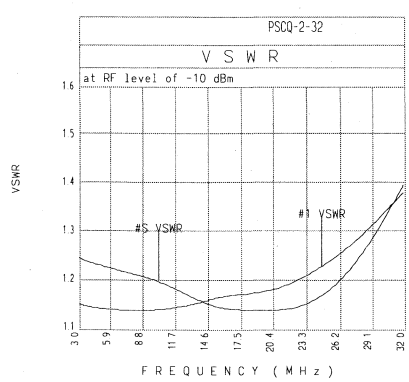
PSCQ-2-32 3.2 to 32 MHz

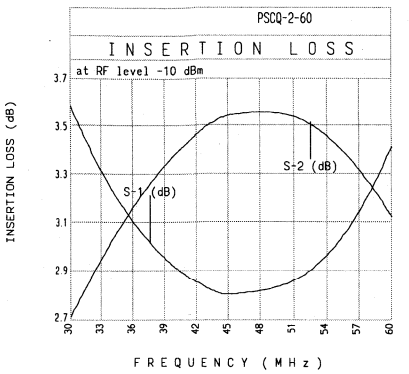


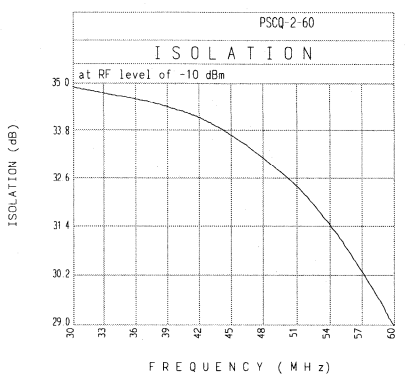


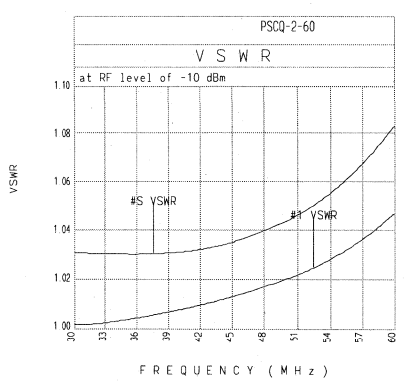


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
3.20	3.25	3.28	0.03	91.71	36.38
3.50	3.26	3.28	0.02	92.38	36.30
5.13	3.31	3.29	0.02	92.00	36.35
6.75	3.35	3.30	0.04	90.01	36.23
8.38	3.37	3.32	0.05	88.50	36.08
10.00	3.39	3.34	0.06	87.73	35.89
11.50	3.41	3.36	0.05	87.58	35.69
13.00	3.42	3.37	0.05	87.77	35.47
14.50	3.43	3.38	0.04	88.12	35.25
16.00	3.44	3.40	0.04	88.60	35.02
20.00	3.47	3.44	0.03	89.80	34.40
23.00	3.49	3.47	0.02	90.44	33.95
26.00	3.52	3.50	0.01	90.71	33.49
29.00	3.54	3.54	0.00	90.63	33.04
32.00	3.56	3.57	0.01	90.24	32.62

PSCQ-2-60 30 to 60 MHz

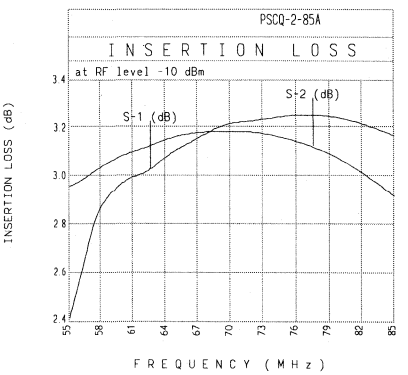


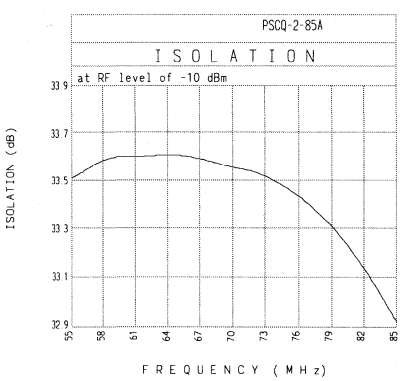


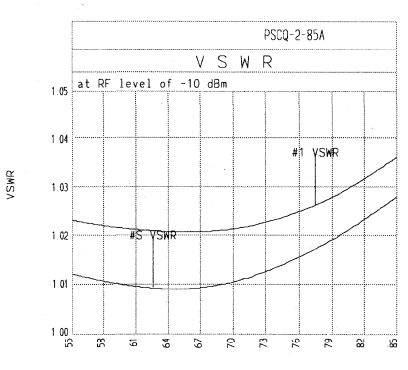


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
30.00	3.60	2.72	0.88	88.97	34.98
32.00	3.40	2.89	0.50	88.96	34.88
34.00	3.24	3.05	0.19	88.90	34.78
36.00	3.11	3.19	0.09	88.87	34.69
38.00	3.00	3.31	0.32	88.81	34.57
40.00	2.92	3.41	0.50	88.81	34.41
41.25	2.88	3.46	0.59	88.77	34.30
42.50	2.85	3.51	0.67	88.75	34.16
43.75	2.82	3.54	0.72	88.76	33.99
45.00	2.81	3.57	0.76	88.74	33.81
50.00	2.84	3.58	0.75	88.71	32.79
52.50	2.91	3.53	0.63	88.71	32.08
55.00	3.02	3.44	0.43	88.75	31.21
57.50	3.19	3.31	0.13	88.82	30.19
60.00	3.43	3.14	0.28	88.91	29.01

PSCQ-2-85A 55 to 85 MHz







FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
55.00	2.42	2.97	0.54	87.53	33.53
56.00	2.58	2.99	0.42	87.62	33.55
57.50	2.88	3.04	0.15	87.72	33.60
59.00	2.95	3.08	0.13	87.83	33.62
60.50	3.01	3.11	0.10	87.95	33.62
62.00	3.02	3.13	0.11	88.08	33.62
64.00	3.10	3.17	0.06	88.28	33.63
66.00	3.15	3.19	0.03	88.48	33.62
68.00	3.20	3.20	0.00	88.71	33.60
70.00	3.24	3.20	0.03	88.97	33.57
72.00	3.24	3.20	0.05	89.23	33.56
75.25	3.27	3.17	0.10	89.69	33.48
78.50	3.27	3.12	0.16	90.17	33.36
81.75	3.24	3.04	0.20	90.70	33.18
85.00	3.18	2.93	0.25	91.25	32.93

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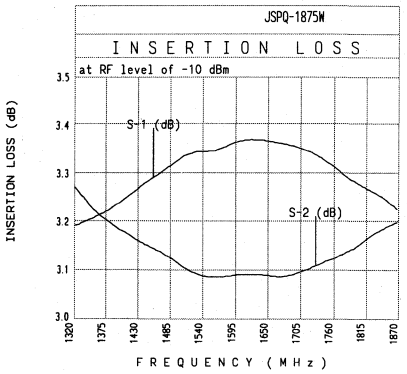
2 WAY-90°

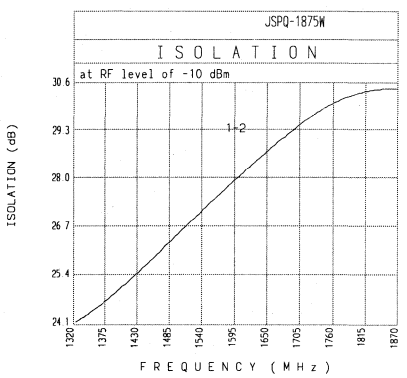
Power Splitter/Combiners

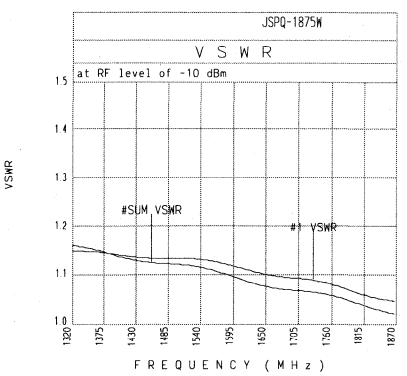
50 ohms

JSPQ-1875W

1325 to 1875 MHz



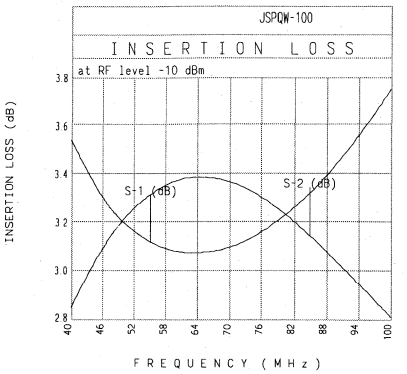


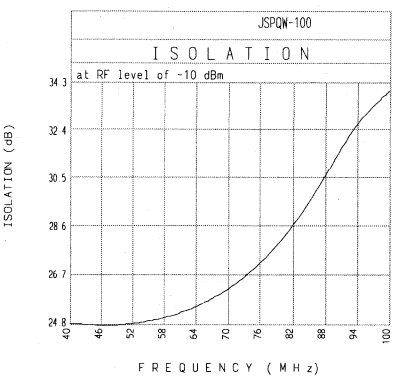


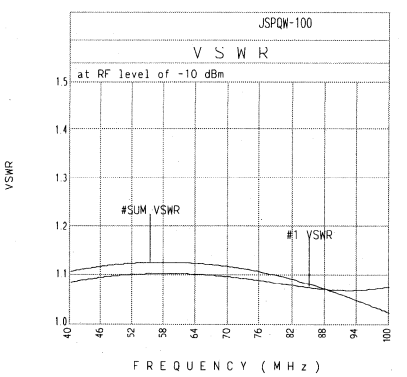
FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1325.00	3.20	3.28	0.07	91.43	24.19
1364.30	3.22	3.22	0.00	91.27	24.61
1403.60	3.25	3.19	0.06	91.51	25.16
1442.90	3.29	3.16	0.13	91.51	25.72
1482.20	3.32	3.14	0.18	91.69	26.34
1521.50	3.36	3.10	0.25	91.81	26.95
1560.80	3.35	3.09	0.26	91.88	27.54
1600.10	3.38	3.10	0.28	92.02	28.12
1639.40	3.38	3.10	0.27	91.90	28.72
1678.70	3.37	3.09	0.27	92.07	29.23
1718.00	3.36	3.11	0.25	92.10	29.73
1757.30	3.33	3.13	0.19	92.25	30.13
1796.60	3.29	3.15	0.14	92.28	30.38
1835.90	3.27	3.19	0.08	92.23	30.53
1875.20	3.23	3.21	0.02	92.45	30.51

JSPQW-100

40 to 100 MHz



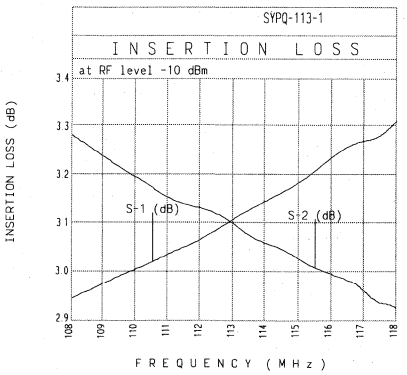


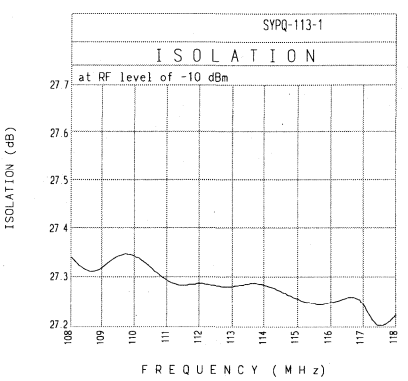


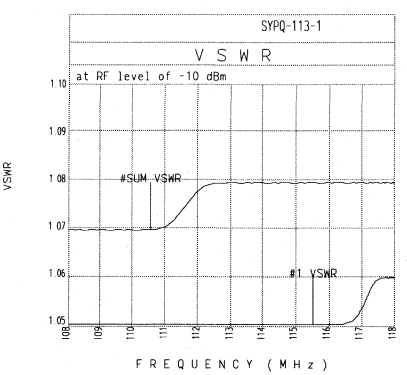
FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
40.00	3.56	2.86	0.70	89.72	24.93
45.00	3.35	3.08	0.27	89.68	24.86
46.25	3.31	3.12	0.18	89.70	24.85
47.50	3.27	3.17	0.11	89.70	24.86
48.75	3.24	3.20	0.04	89.70	24.86
50.00	3.21	3.24	0.03	89.70	24.88
55.00	3.13	3.34	0.21	89.67	25.01
60.00	3.09	3.40	0.30	89.62	25.26
65.00	3.09	3.41	0.32	89.56	25.68
70.00	3.11	3.39	0.27	89.48	26.27
75.00	3.16	3.34	0.17	89.40	27.08
81.25	3.26	3.24	0.02	89.28	28.49
87.50	3.39	3.11	0.28	89.18	30.48
93.75	3.56	2.97	0.59	89.12	32.93
100.00	3.77	2.82	0.95	89.11	34.15

SYPQ-113-1

108 to 118 MHz

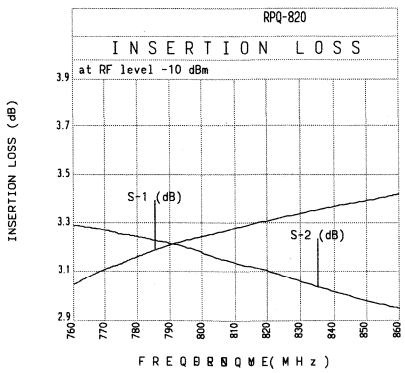


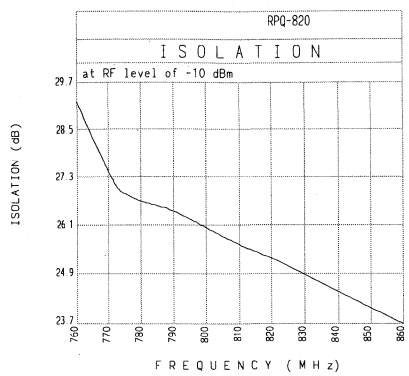


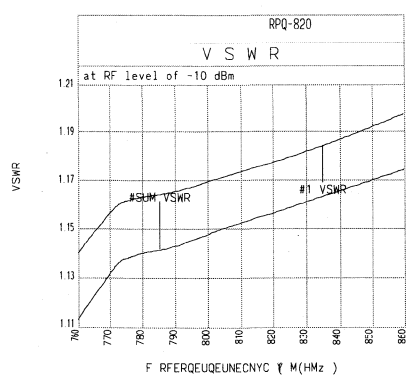


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
108.00	2.95	3.29	0.34	90.21	27.35
108.68	2.97	3.26	0.29	90.25	27.30
109.52	3.00	3.22	0.22	90.08	27.37
110.32	3.02	3.19	0.17	90.21	27.34
111.16	3.05	3.15	0.10	90.24	27.28
111.96	3.07	3.14	0.07	90.27	27.30
112.80	3.11	3.12	0.01	90.05	27.28
113.60	3.14	3.07	0.07	90.27	27.30
114.44	3.17	3.06	0.11	90.33	27.28
115.24	3.20	3.02	0.18	90.19	27.25
116.08	3.25	3.00	0.25	90.32	27.25
116.88	3.28	2.98	0.30	90.21	27.28
117.32	3.28	2.94	0.34	90.17	27.20
117.72	3.30	2.94	0.36	90.17	27.21
118.00	3.32	2.93	0.39	90.32	27.23

RPQ-820 760 to 860 MHz

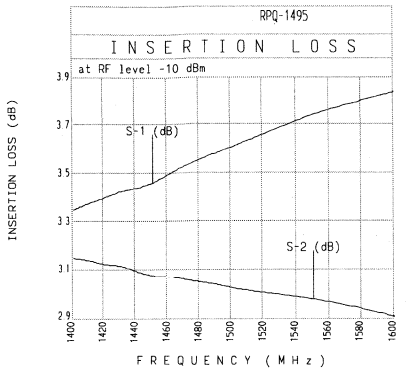


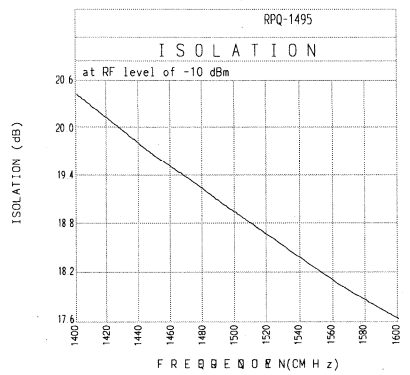


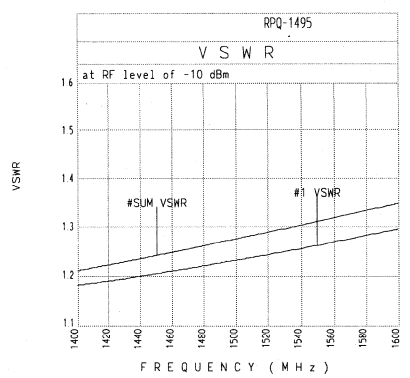


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
760.00	3.05	3.30	0.25	90.63	29.28
770.00	3.12	3.28	0.16	90.77	27.48
772.50	3.13	3.27	0.14	90.77	27.05
775.00	3.14	3.26	0.12	90.79	26.95
777.50	3.16	3.26	0.10	90.78	26.85
780.00	3.17	3.25	0.08	90.81	26.75
787.50	3.21	3.23	0.02	90.80	26.63
795.00	3.24	3.21	0.03	90.85	26.31
802.50	3.26	3.17	0.09	90.87	25.99
810.00	3.29	3.14	0.15	90.94	25.66
820.00	3.32	3.11	0.21	90.93	25.35
830.00	3.35	3.06	0.29	90.99	24.93
840.00	3.38	3.02	0.35	91.01	24.51
850.00	3.40	2.98	0.42	91.05	24.11
860.00	3.43	2.95	0.48	91.13	23.71

RPQ-1495 1400 to 1600 MHz

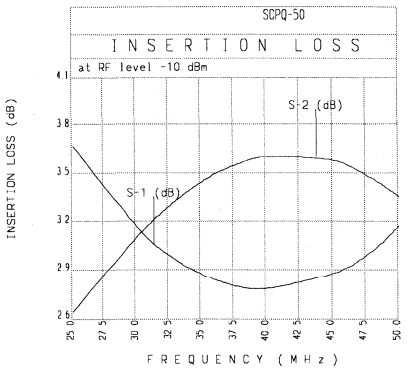


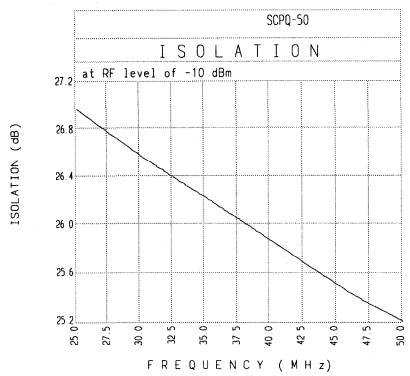


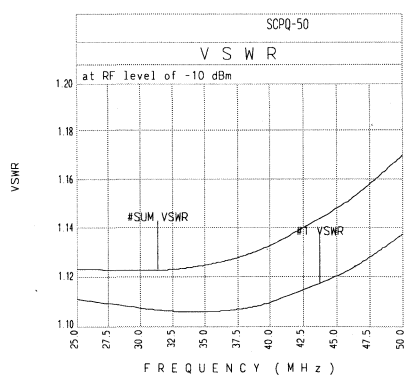


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1400.00	3.36	3.16	0.20	92.14	20.47
1410.00	3.39	3.15	0.24	92.19	20.31
1420.00	3.41	3.13	0.28	92.24	20.15
1430.00	3.44	3.13	0.32	92.30	20.00
1440.00	3.45	3.10	0.35	92.38	19.83
1450.00	3.47	3.08	0.39	92.44	19.68
1462.50	3.52	3.08	0.44	92.53	19.51
1475.00	3.56	3.06	0.49	92.61	19.33
1487.50	3.59	3.05	0.54	92.69	19.15
1500.00	3.62	3.03	0.59	92.80	18.97
1510.00	3.65	3.02	0.63	92.84	18.83
1532.50	3.71	3.00	0.71	92.99	18.51
1555.00	3.77	2.98	0.79	93.13	18.19
1577.50	3.81	2.95	0.87	93.29	17.90
1600.00	3.85	2.91	0.95	93.46	17.65

SCPQ-50 25 to 50 MHz







FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
25.00	3.68	2.64	1.04	89.84	27.00
30.00	3.16	3.12	0.03	89.97	26.60
31.25	3.06	3.22	0.16	90.02	26.51
32.50	2.99	3.31	0.33	90.05	26.42
33.75	2.92	3.39	0.47	90.09	26.33
35.00	2.87	3.46	0.59	90.12	26.25
36.25	2.83	3.52	0.69	90.17	26.16
37.50	2.80	3.56	0.76	90.21	26.07
38.75	2.78	3.60	0.82	90.27	25.98
40.00	2.78	3.62	0.85	90.31	25.89
45.00	2.87	3.60	0.73	90.58	25.53
46.25	2.92	3.56	0.64	90.66	25.44
47.50	2.99	3.50	0.51	90.76	25.36
48.75	3.07	3.44	0.36	90.85	25.29
50.00	3.18	3.36	0.18	90.96	25.22

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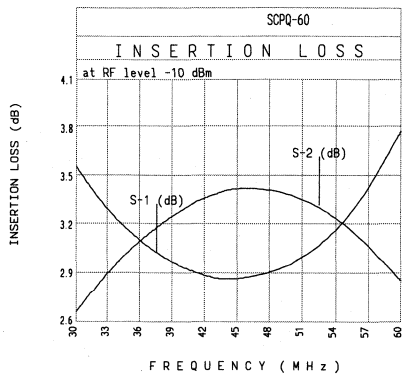
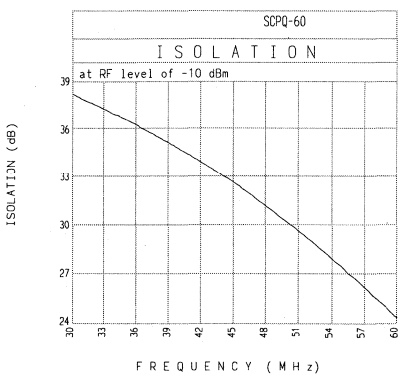
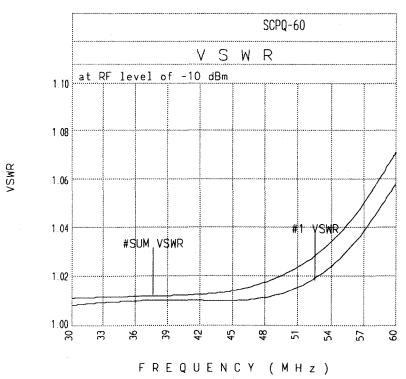
Power Splitter/Combiners

50 ohms

SCPQ-60 30 to 60 MHz

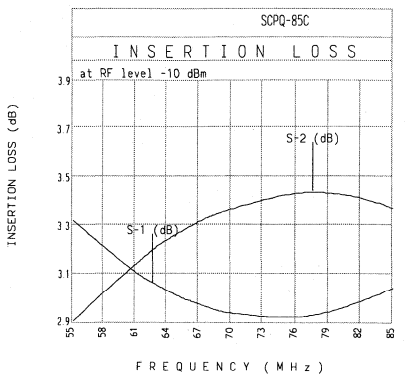


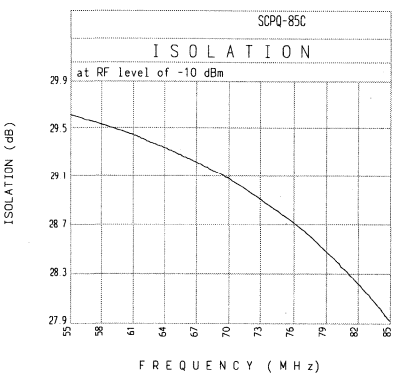


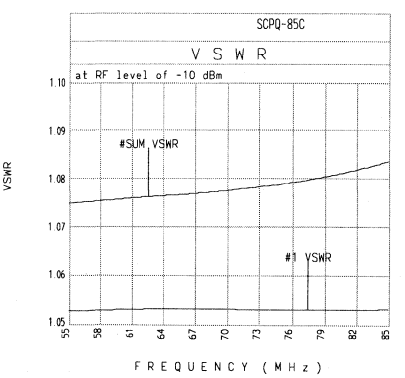


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
30.00	3.59	2.68	0.91	89.10	38.44
32.00	3.40	2.85	0.55	89.04	37.82
33.50	3.28	2.97	0.32	89.02	37.34
35.00	3.18	3.07	0.11	88.98	36.84
36.50	3.10	3.16	0.06	88.94	36.31
38.00	3.03	3.24	0.22	88.92	35.75
40.00	2.96	3.33	0.37	88.87	34.98
41.25	2.93	3.38	0.45	88.83	34.49
42.50	2.90	3.41	0.51	88.82	33.95
43.75	2.89	3.44	0.55	88.79	33.41
45.00	2.89	3.46	0.57	88.76	32.86
48.75	2.94	3.45	0.52	88.69	31.03
52.50	3.08	3.35	0.27	88.66	29.02
56.25	3.35	3.16	0.19	88.65	26.83
60.00	3.81	2.88	0.93	88.70	24.47

SCPQ-85C 55 to 85 MHz

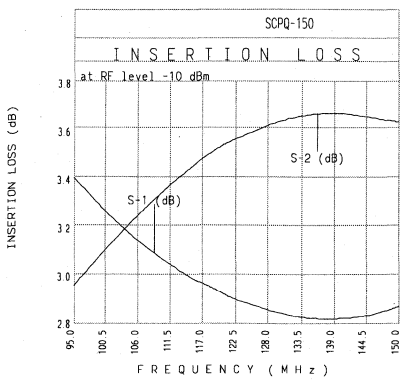


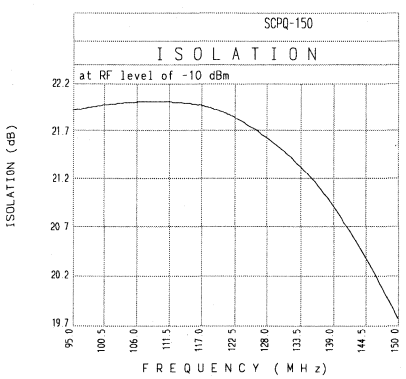


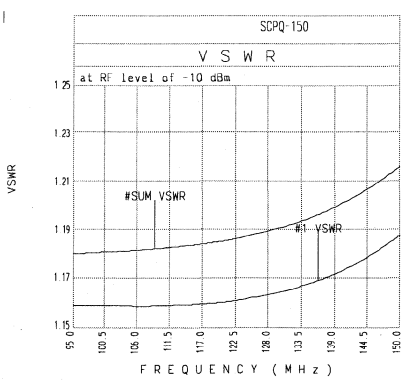


FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
55.00	3.34	2.92	0.42	89.31	29.65
60.00	3.15	3.13	0.03	89.32	29.51
61.25	3.11	3.17	0.06	89.32	29.47
62.50	3.08	3.22	0.14	89.35	29.42
63.75	3.05	3.26	0.21	89.33	29.38
65.00	3.02	3.29	0.27	89.35	29.33
66.25	3.00	3.32	0.32	89.36	29.28
67.50	2.98	3.35	0.37	89.37	29.23
68.75	2.96	3.37	0.41	89.38	29.17
70.00	2.95	3.39	0.45	89.38	29.11
75.00	2.93	3.45	0.52	89.44	28.82
77.50	2.94	3.46	0.52	89.46	28.64
80.00	2.97	3.45	0.48	89.51	28.43
82.50	3.01	3.43	0.42	89.54	28.20
85.00	3.06	3.39	0.32	89.62	27.93

SCPQ-150 95 to 150 MHz







FREQ. (MHz)	INSERT. LOSS. (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
95.00	3.43	2.98	0.46	90.09	21.96
100.00	3.30	3.12	0.18	90.18	22.01
103.75	3.21	3.22	0.01	90.27	22.04
107.50	3.14	3.31	0.17	90.34	22.05
111.25	3.07	3.40	0.32	90.45	22.05
115.00	3.01	3.47	0.46	90.54	22.03
116.88	2.99	3.51	0.52	90.58	22.01
118.75	2.97	3.54	0.57	90.64	21.98
120.63	2.94	3.57	0.62	90.70	21.94
122.50	2.92	3.59	0.67	90.76	21.89
130.00	2.86	3.67	0.80	90.98	21.59
135.00	2.84	3.69	0.85	91.22	21.29
140.00	2.84	3.70	0.86	91.44	20.89
145.00	2.85	3.68	0.83	91.74	20.39
150.00	2.89	3.66	0.77	92.14	19.79

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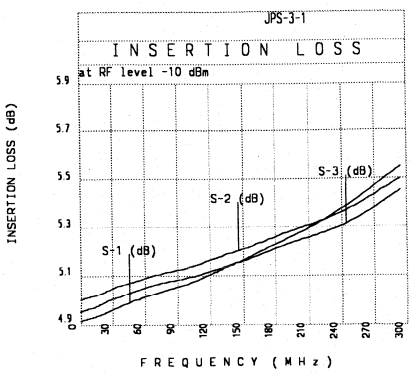
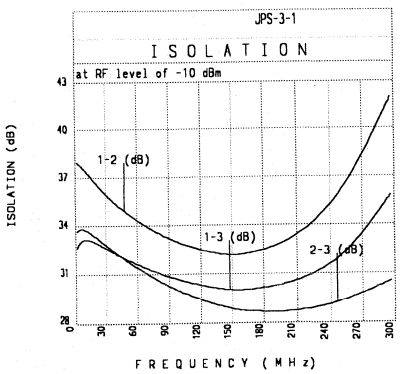
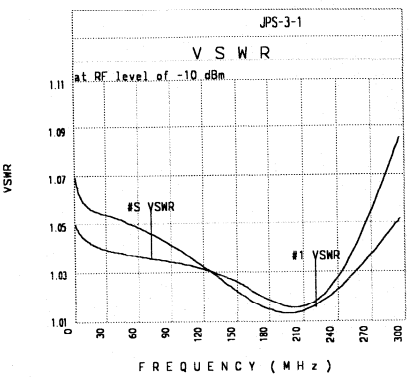
JPS-3-1

5 to 300 MHz



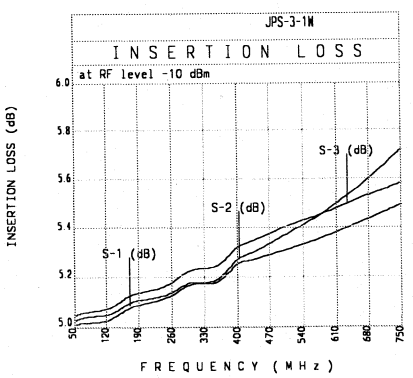


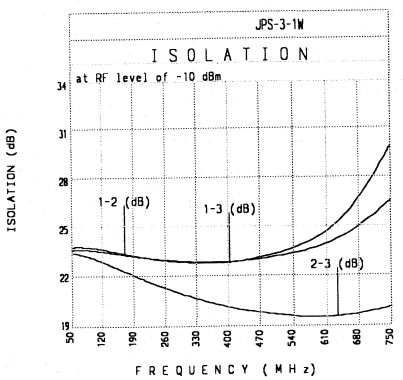


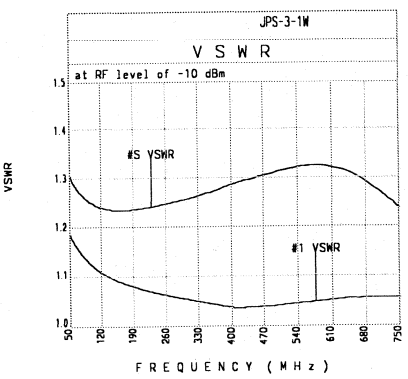
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
5.00	4.90	4.99	4.94	0.09	38.15	33.77	5.00	1.05	1.07	1.09	1.10
10.00	4.91	5.00	4.95	0.09	37.89	34.02	10.00	1.05	1.06	1.08	1.09
20.00	4.92	5.01	4.96	0.09	37.06	33.60	20.00	1.04	1.06	1.08	1.08
30.00	4.94	5.03	4.99	0.09	36.29	33.06	30.00	1.04	1.06	1.08	1.08
40.00	4.96	5.05	5.00	0.09	35.63	32.53	40.00	1.04	1.06	1.07	1.08
50.00	4.98	5.06	5.02	0.09	35.05	32.02	50.00	1.04	1.05	1.07	1.08
75.00	5.02	5.10	5.06	0.08	33.88	30.93	75.00	1.04	1.05	1.07	1.07
100.00	5.05	5.12	5.08	0.07	33.03	30.03	100.00	1.04	1.04	1.06	1.07
125.00	5.10	5.16	5.11	0.06	32.49	29.35	125.00	1.03	1.03	1.06	1.06
150.00	5.15	5.20	5.15	0.05	32.26	28.88	150.00	1.03	1.03	1.05	1.06
160.00	5.17	5.21	5.16	0.05	32.25	28.74	160.00	1.03	1.02	1.05	1.06
195.00	5.25	5.28	5.23	0.04	32.74	28.59	195.00	1.02	1.01	1.05	1.06
230.00	5.32	5.32	5.27	0.05	34.13	28.82	230.00	1.02	1.02	1.06	1.07
265.00	5.43	5.40	5.34	0.09	37.22	29.55	265.00	1.04	1.03	1.07	1.08
300.00	5.55	5.50	5.45	0.11	42.14	30.61	300.00	1.09	1.05	1.09	1.10

JPS-3-1W

50 to 750 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
50.00	5.00	5.02	5.04	0.04	24.09	23.73	50.00	1.31	1.19	1.18	1.19
60.00	5.01	5.03	5.05	0.04	24.15	23.73	60.00	1.29	1.17	1.16	1.17
95.00	5.01	5.04	5.06	0.04	24.09	23.46	95.00	1.25	1.12	1.11	1.12
130.00	5.02	5.04	5.07	0.05	23.90	23.05	130.00	1.24	1.10	1.09	1.09
165.00	5.08	5.10	5.13	0.05	23.69	22.61	165.00	1.24	1.09	1.07	1.08
200.00	5.09	5.11	5.14	0.05	23.50	22.18	200.00	1.24	1.08	1.06	1.06
250.00	5.11	5.12	5.16	0.05	23.27	21.60	250.00	1.25	1.06	1.05	1.04
300.00	5.19	5.20	5.25	0.06	23.14	21.11	300.00	1.26	1.06	1.03	1.03
350.00	5.16	5.15	5.22	0.06	23.07	20.68	350.00	1.28	1.05	1.02	1.02
400.00	5.29	5.27	5.34	0.07	23.13	20.33	400.00	1.29	1.04	1.02	1.04
410.00	5.28	5.26	5.33	0.08	23.15	20.27	410.00	1.30	1.04	1.02	1.04
495.00	5.37	5.31	5.41	0.09	23.56	19.86	495.00	1.32	1.04	1.04	1.07
580.00	5.46	5.36	5.46	0.10	24.36	19.63	580.00	1.34	1.05	1.06	1.11
665.00	5.58	5.43	5.53	0.15	26.13	19.77	665.00	1.31	1.06	1.08	1.15
750.00	5.73	5.50	5.59	0.23	30.42	20.33	750.00	1.24	1.06	1.09	1.18

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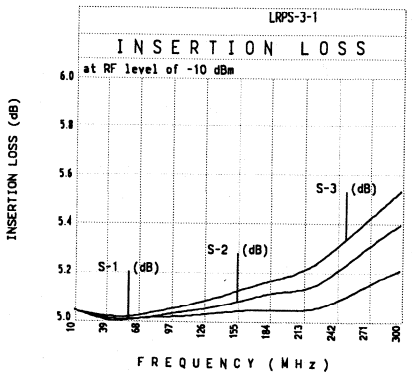
3 WAY-0°

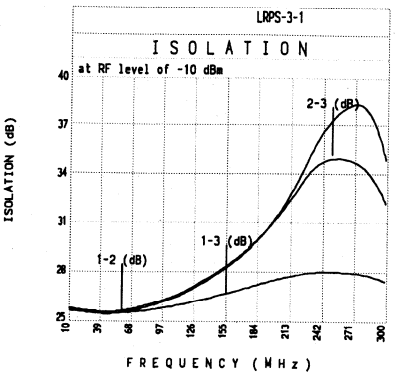
Power Splitter/Combiners

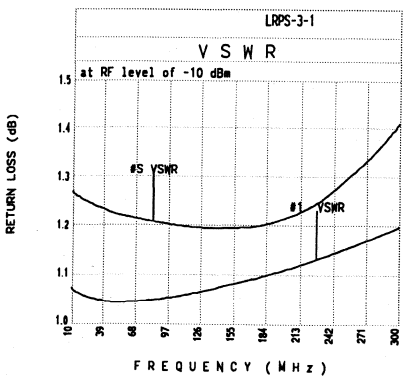
50 ohms

LRPS-3-1

10 to 300 MHz



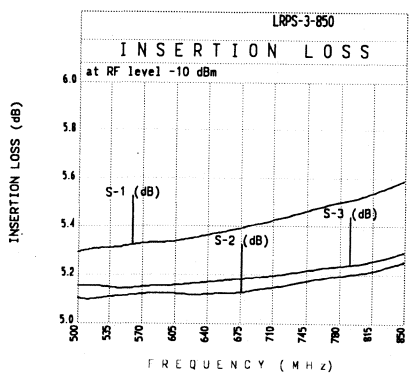


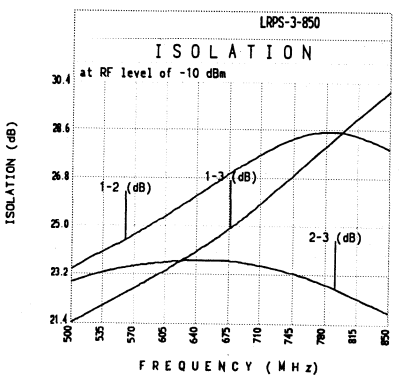


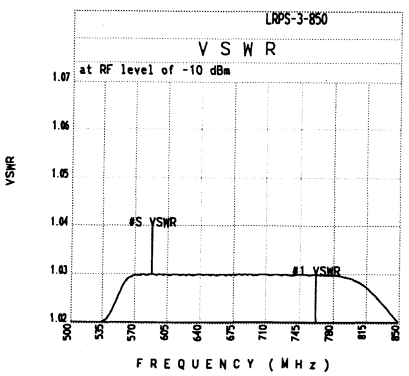
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
10.00	5.05	5.05	5.05	0.00	25.73	25.85	10.00	1.28	1.08	1.07	1.08
14.50	5.04	5.04	5.04	0.00	25.70	25.84	14.50	1.27	1.07	1.06	1.06
41.50	5.00	5.01	5.02	0.02	25.47	25.60	41.50	1.24	1.05	1.05	1.05
50.50	5.00	5.01	5.02	0.01	25.53	25.65	50.50	1.23	1.05	1.05	1.05
61.00	5.01	5.01	5.02	0.02	25.61	25.73	61.00	1.23	1.05	1.05	1.05
80.50	5.02	5.02	5.04	0.02	25.89	26.01	80.50	1.22	1.05	1.05	1.05
101.50	5.02	5.04	5.06	0.04	26.34	26.45	101.50	1.21	1.06	1.06	1.06
121.00	5.03	5.05	5.08	0.05	26.89	27.01	121.00	1.20	1.07	1.08	1.07
161.50	5.05	5.09	5.14	0.09	28.63	28.73	161.50	1.20	1.09	1.10	1.10
181.00	5.05	5.12	5.17	0.12	29.86	29.92	181.00	1.21	1.10	1.12	1.11
200.50	5.05	5.13	5.19	0.14	31.44	31.40	200.50	1.22	1.12	1.13	1.13
221.50	5.05	5.14	5.23	0.18	33.80	33.37	221.50	1.25	1.13	1.15	1.14
241.00	5.08	5.20	5.30	0.22	37.02	35.48	241.00	1.28	1.15	1.17	1.16
281.50	5.18	5.35	5.47	0.30	39.81	35.17	281.50	1.36	1.19	1.21	1.20
301.00	5.22	5.41	5.55	0.34	35.08	32.35	301.00	1.42	1.21	1.23	1.23

LRPS-3-850

500 to 850 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
500.00	5.30	5.11	5.16	0.20	23.50	23.00	500.00	1.02	1.02	1.01	1.01
510.00	5.31	5.10	5.16	0.21	23.68	23.12	510.00	1.02	1.02	1.01	1.01
526.25	5.32	5.11	5.16	0.21	24.02	23.31	526.25	1.02	1.02	1.01	1.01
542.50	5.32	5.12	5.15	0.21	24.29	23.46	542.50	1.02	1.02	1.01	1.01
558.75	5.33	5.12	5.15	0.21	24.59	23.57	558.75	1.03	1.02	1.01	1.01
575.00	5.34	5.13	5.16	0.21	24.91	23.67	575.00	1.03	1.02	1.01	1.01
600.00	5.34	5.13	5.16	0.22	25.42	23.76	600.00	1.03	1.02	1.01	1.01
625.00	5.36	5.12	5.17	0.23	25.97	23.83	625.00	1.03	1.02	1.01	1.01
650.00	5.38	5.13	5.18	0.25	26.53	23.85	650.00	1.03	1.02	1.01	1.01
675.00	5.40	5.13	5.19	0.26	27.12	23.83	675.00	1.03	1.02	1.01	1.01
685.00	5.41	5.14	5.19	0.27	27.34	23.79	685.00	1.03	1.02	1.01	1.01
726.25	5.45	5.16	5.21	0.29	28.19	23.55	726.25	1.03	1.02	1.01	1.01
767.50	5.50	5.20	5.24	0.30	28.74	23.13	767.50	1.03	1.02	1.01	1.01
808.75	5.53	5.21	5.25	0.32	28.69	22.55	808.75	1.03	1.02	1.01	1.01
850.00	5.60	5.26	5.30	0.34	28.03	21.90	850.00	1.02	1.02	1.01	1.01

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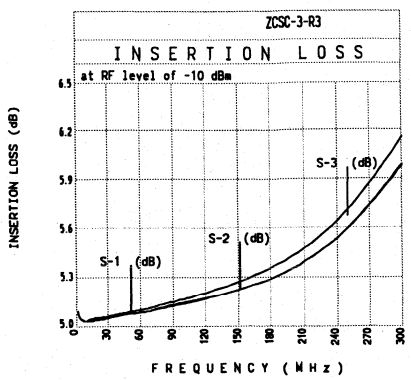
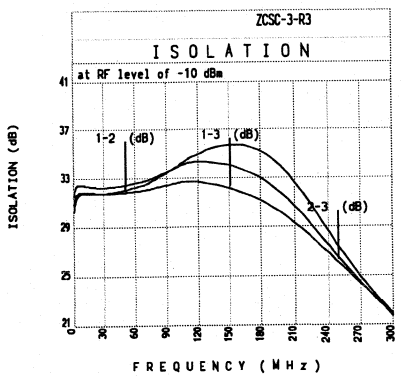
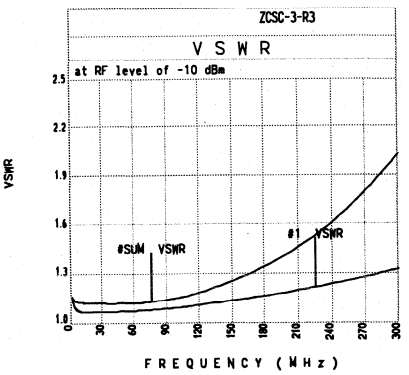
ZCSC-3-R3

2 to 300 MHz





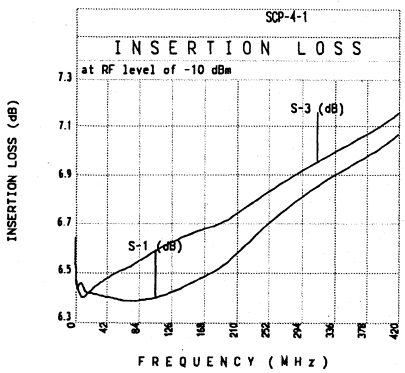


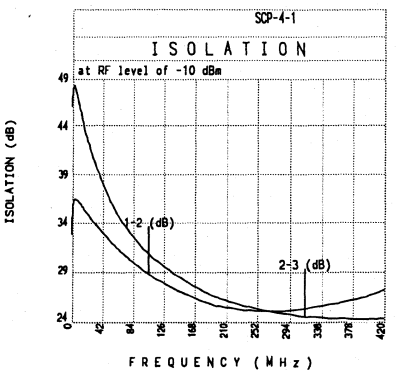
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3
1.32	5.10	5.10	5.10	0.00	30.45	31.77	1.32	1.16	1.15	1.15	1.14
2.16	5.07	5.07	5.07	0.00	31.27	32.46	2.16	1.15	1.11	1.11	1.10
4.99	5.04	5.04	5.04	0.01	31.90	32.76	4.99	1.13	1.08	1.07	1.07
9.52	5.04	5.04	5.04	0.01	32.02	32.70	9.52	1.13	1.07	1.06	1.06
10.08	5.04	5.04	5.04	0.01	32.02	32.67	10.08	1.12	1.07	1.06	1.06
15.61	5.05	5.04	5.06	0.01	31.99	32.59	15.61	1.12	1.06	1.06	1.06
25.11	5.05	5.05	5.06	0.01	31.98	32.47	25.11	1.12	1.06	1.06	1.06
41.95	5.08	5.08	5.09	0.01	32.09	32.54	41.95	1.12	1.07	1.06	1.06
68.76	5.10	5.10	5.12	0.02	32.73	33.05	68.76	1.12	1.07	1.07	1.08
70.08	5.11	5.11	5.13	0.02	32.76	33.08	70.08	1.13	1.07	1.07	1.08
100.55	5.15	5.16	5.18	0.03	34.29	34.20	100.55	1.15	1.09	1.09	1.10
112.70	5.17	5.17	5.20	0.03	35.22	34.83	112.70	1.17	1.10	1.10	1.11
184.71	5.29	5.29	5.36	0.07	37.29	34.14	184.71	1.34	1.17	1.16	1.18
250.34	5.58	5.58	5.69	0.11	27.01	26.39	250.34	1.65	1.25	1.25	1.27
302.73	6.03	6.04	6.21	0.18	21.56	21.44	302.73	2.07	1.34	1.33	1.36

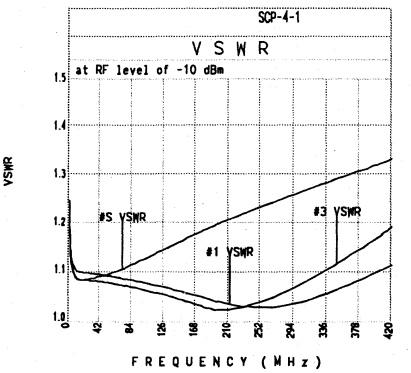
4 WAY-0°
Power Splitter/Combiners 50 ohms

SCP-4-1

1 to 400 MHz



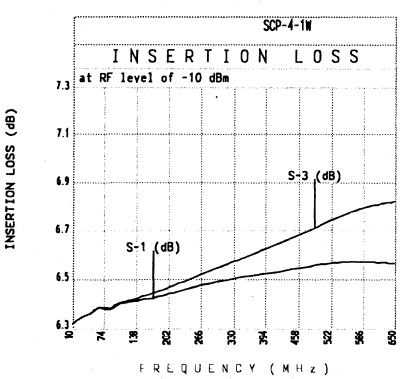


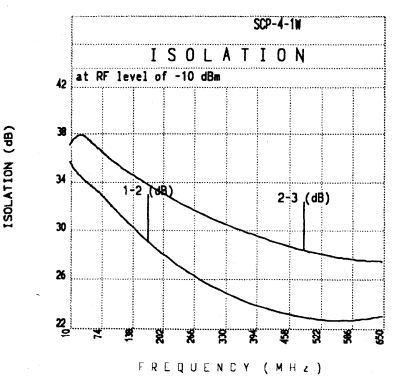


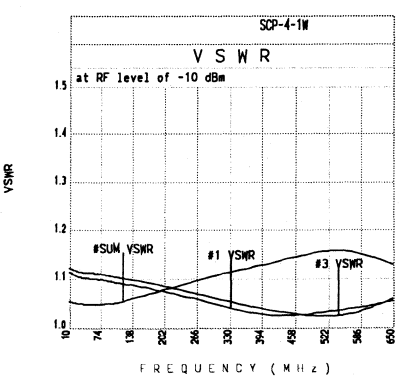
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
1.00	6.65	6.63	6.62	6.63	0.02	33.09	46.44	30.46	1.00	1.23	1.25	1.25	1.25	1.27
1.07	6.62	6.60	6.60	6.60	0.03	33.37	46.54	30.72	1.07	1.22	1.24	1.24	1.24	1.26
2.51	6.45	6.47	6.46	6.46	0.02	36.36	48.45	34.04	2.51	1.14	1.15	1.15	1.15	1.16
3.89	6.42	6.43	6.45	6.44	0.03	36.88	48.83	34.75	3.89	1.11	1.12	1.13	1.11	1.13
9.15	6.48	6.41	6.39	6.40	0.08	36.71	47.29	34.72	9.15	1.09	1.11	1.11	1.09	1.11
13.89	6.41	6.43	6.40	6.43	0.04	36.12	45.38	34.27	13.89	1.09	1.10	1.10	1.09	1.11
21.51	6.42	6.43	6.43	6.44	0.02	35.19	42.59	33.50	21.51	1.09	1.10	1.10	1.09	1.11
49.57	6.39	6.49	6.50	6.49	0.10	32.48	36.62	30.87	49.57	1.09	1.10	1.09	1.08	1.10
76.75	6.38	6.52	6.53	6.53	0.15	30.53	33.23	28.77	76.75	1.11	1.09	1.09	1.07	1.09
118.84	6.40	6.60	6.63	6.62	0.23	28.12	29.92	26.33	118.84	1.14	1.07	1.07	1.06	1.07
180.39	6.51	6.65	6.70	6.68	0.19	25.94	26.99	23.95	180.39	1.19	1.05	1.04	1.03	1.04
199.23	6.54	6.65	6.72	6.70	0.18	25.53	26.38	23.45	199.23	1.21	1.04	1.03	1.02	1.03
279.31	6.81	6.78	6.91	6.87	0.13	24.67	24.57	22.14	279.31	1.26	1.02	1.03	1.05	1.04
399.43	7.02	6.92	7.11	7.02	0.19	26.45	24.12	22.27	399.43	1.32	1.10	1.12	1.17	1.17
423.97	7.09	6.96	7.18	7.06	0.22	27.44	24.35	22.46	423.97	1.34	1.12	1.14	1.20	1.20

SCP-4-1W

10 to 650 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.00	6.32	6.32	6.32	6.32	0.0	35.80	37.24	35.02	10.00	1.06	1.12	1.12	1.13	1.13
30.00	6.35	6.35	6.35	6.35	0.0	34.61	38.27	33.70	30.00	1.05	1.10	1.11	1.12	1.12
45.00	6.36	6.36	6.36	6.36	0.0	34.08	37.79	33.15	45.00	1.05	1.10	1.11	1.12	1.12
55.00	6.38	6.38	6.38	6.38	0.0	33.74	37.41	32.85	55.00	1.05	1.10	1.11	1.11	1.12
65.00	6.39	6.39	6.39	6.38	0.0	33.38	37.03	32.53	65.00	1.05	1.10	1.11	1.11	1.12
75.00	6.38	6.38	6.39	6.38	0.0	32.97	36.64	32.18	75.00	1.05	1.10	1.10	1.11	1.11
85.00	6.38	6.39	6.38	6.38	0.0	32.53	36.28	31.80	85.00	1.05	1.10	1.10	1.11	1.11
95.00	6.39	6.39	6.40	6.39	0.0	32.09	35.92	31.41	95.00	1.05	1.10	1.10	1.11	1.11
105.00	6.41	6.41	6.41	6.40	0.0	31.65	35.60	31.03	105.00	1.05	1.09	1.10	1.11	1.11
170.00	6.42	6.43	6.44	6.42	0.0	28.97	33.79	28.63	170.00	1.07	1.08	1.09	1.10	1.10
290.00	6.50	6.54	6.55	6.51	0.1	25.47	31.20	25.28	290.00	1.11	1.05	1.05	1.06	1.06
410.00	6.53	6.59	6.64	6.57	0.1	23.42	29.29	23.36	410.00	1.13	1.02	1.02	1.03	1.03
530.00	6.58	6.68	6.76	6.65	0.2	22.53	27.99	22.69	530.00	1.17	1.04	1.03	1.02	1.02
590.00	6.58	6.70	6.81	6.67	0.2	22.56	27.64	22.93	590.00	1.15	1.04	1.03	1.03	1.03
650.00	6.57	6.72	6.83	6.68	0.3	22.95	27.51	23.64	650.00	1.13	1.06	1.05	1.06	1.06

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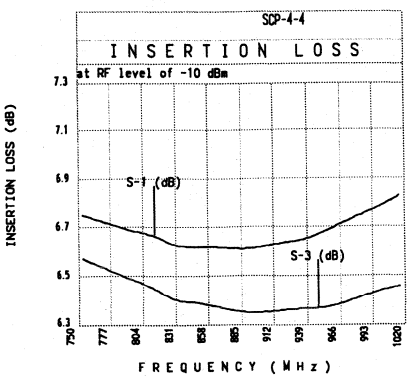
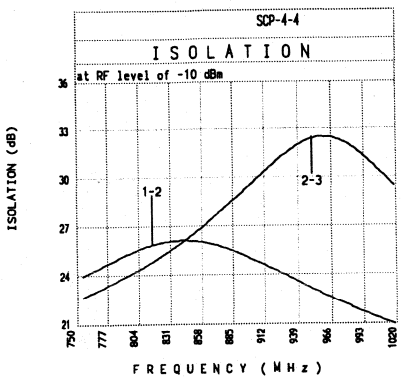
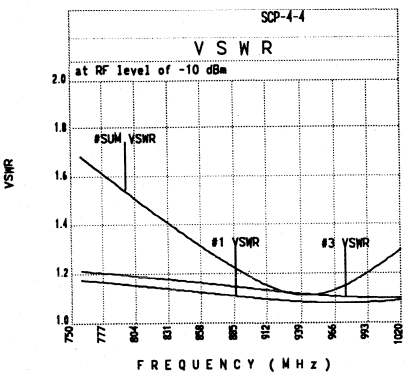
SCP-4-4

800 to 1000 MHz



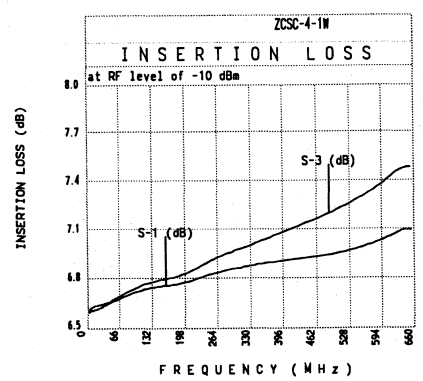


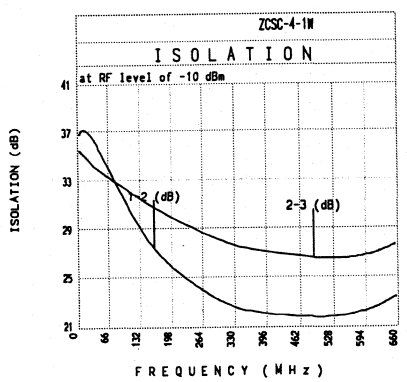


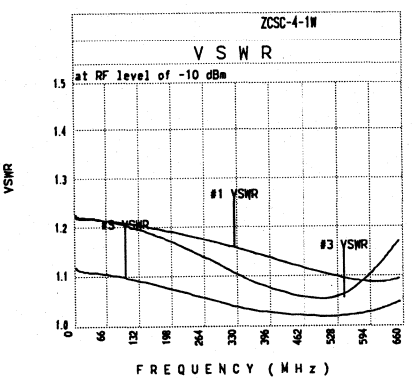
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
758.33	6.76	6.82	6.58	6.51	0.30	24.25	22.89	23.31	758.33	1.69	1.18	1.15	1.22	1.23
800.00	6.69	6.76	6.49	6.42	0.33	25.73	24.36	24.99	800.00	1.53	1.16	1.13	1.20	1.21
816.67	6.68	6.71	6.46	6.37	0.34	26.18	25.05	25.58	816.67	1.46	1.15	1.12	1.19	1.20
833.33	6.63	6.70	6.40	6.34	0.36	26.42	25.82	26.07	833.33	1.40	1.14	1.11	1.18	1.19
850.00	6.63	6.70	6.40	6.32	0.39	26.46	26.68	26.42	850.00	1.34	1.13	1.10	1.17	1.18
866.67	6.63	6.69	6.38	6.31	0.38	26.28	27.62	26.57	866.67	1.29	1.12	1.09	1.16	1.17
883.33	6.62	6.68	6.36	6.28	0.41	25.91	28.65	26.44	883.33	1.23	1.12	1.08	1.15	1.16
900.00	6.62	6.68	6.35	6.25	0.43	25.34	29.76	26.12	900.00	1.18	1.11	1.07	1.14	1.15
916.67	6.64	6.70	6.36	6.24	0.45	24.77	30.92	25.64	916.67	1.14	1.10	1.06	1.14	1.15
933.33	6.65	6.74	6.37	6.25	0.49	24.16	32.00	25.05	933.33	1.12	1.09	1.05	1.13	1.14
950.00	6.67	6.75	6.37	6.26	0.49	23.48	32.74	24.40	950.00	1.12	1.09	1.04	1.12	1.13
966.67	6.71	6.80	6.38	6.28	0.51	22.87	32.95	23.74	966.67	1.14	1.08	1.04	1.11	1.13
983.33	6.75	6.83	6.41	6.30	0.53	22.29	32.38	23.08	983.33	1.18	1.08	1.04	1.11	1.12
1000.00	6.78	6.88	6.44	6.32	0.56	21.75	31.34	22.50	1000.00	1.23	1.09	1.04	1.10	1.12
1025.00	6.85	6.94	6.47	6.36	0.58	21.02	29.39	21.63	1025.00	1.32	1.10	1.05	1.10	1.13

ZCSC-4-1W

10 to 650 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
9.94	6.60	6.60	6.61	6.61	0.01	37.20	35.88	36.34	9.94	1.13	1.23	1.23	1.23	1.23
13.80	6.61	6.61	6.62	6.61	0.01	37.44	35.74	36.34	13.80	1.12	1.23	1.23	1.23	1.23
18.83	6.61	6.61	6.64	6.63	0.03	37.68	35.51	36.32	18.83	1.12	1.23	1.22	1.23	1.23
36.30	6.63	6.63	6.65	6.63	0.02	37.13	34.74	35.47	36.30	1.11	1.22	1.22	1.23	1.23
50.40	6.66	6.65	6.66	6.66	0.01	36.03	34.20	34.31	50.40	1.12	1.22	1.22	1.23	1.23
134.89	6.77	6.79	6.81	6.79	0.03	29.16	31.89	27.58	134.89	1.10	1.21	1.21	1.21	1.22
187.28	6.76	6.78	6.80	6.79	0.04	26.58	30.55	25.01	187.28	1.08	1.20	1.19	1.19	1.20
260.01	6.85	6.88	6.94	6.90	0.08	24.31	29.10	22.79	260.01	1.06	1.18	1.17	1.15	1.18
325.46	6.88	6.91	7.00	6.94	0.12	22.95	28.06	21.49	325.46	1.05	1.17	1.14	1.12	1.15
360.99	6.91	6.94	7.05	6.99	0.14	22.43	27.59	21.03	360.99	1.04	1.16	1.13	1.10	1.14
527.83	6.96	7.04	7.25	7.13	0.29	21.79	26.67	20.92	527.83	1.02	1.10	1.06	1.04	1.05
606.03	7.05	7.15	7.40	7.23	0.35	22.59	27.14	22.67	606.03	1.03	1.09	1.05	1.11	1.08
627.33	7.08	7.19	7.47	7.29	0.39	22.95	27.40	23.55	627.33	1.04	1.09	1.05	1.14	1.11
649.38	7.12	7.22	7.50	7.31	0.38	23.44	27.78	24.63	649.38	1.05	1.10	1.06	1.16	1.14
660.69	7.11	7.22	7.50	7.30	0.39	23.70	27.99	25.32	660.69	1.05	1.10	1.07	1.18	1.15

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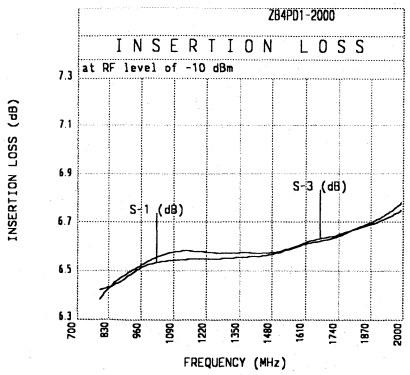
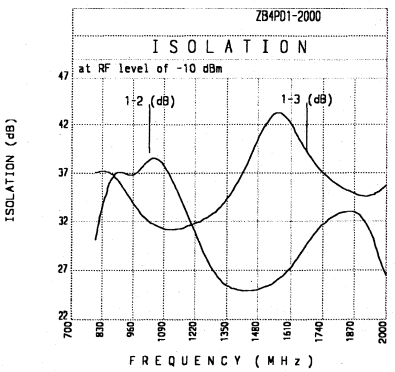
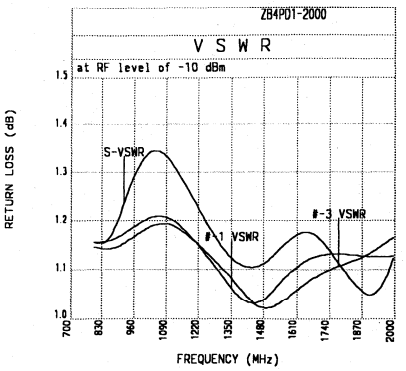
ZB4PD1-2000

800 to 2000 MHz



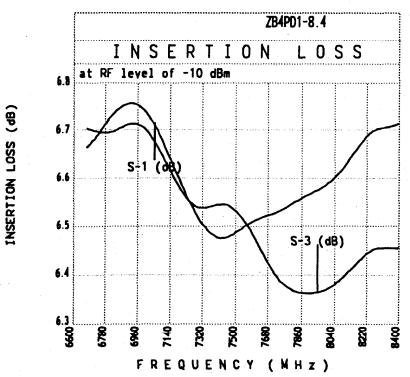


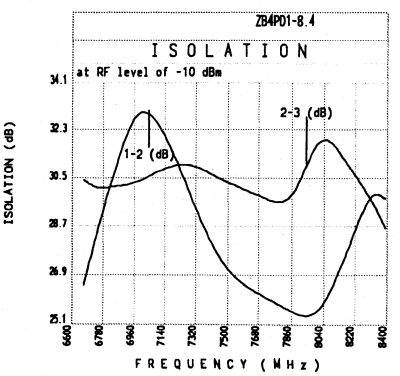


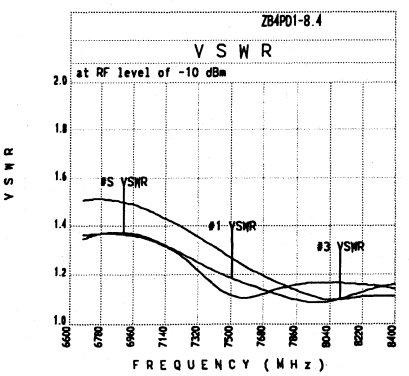
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
796.00	6.43	6.36	6.39	6.49	0.13	30.41	37.43	31.33	796.00	1.16	1.16	1.15	1.15	1.13
868.50	6.45	6.46	6.48	6.47	0.02	38.89	37.81	40.48	868.50	1.15	1.16	1.15	1.14	1.13
955.50	6.53	6.52	6.53	6.52	0.01	35.98	33.94	34.14	955.50	1.31	1.19	1.18	1.17	1.16
1042.50	6.55	6.56	6.58	6.59	0.04	40.22	31.76	36.51	1042.50	1.37	1.22	1.21	1.20	1.18
1129.50	6.56	6.57	6.60	6.57	0.03	36.52	31.12	46.39	1129.50	1.32	1.21	1.21	1.20	1.18
1289.00	6.56	6.57	6.58	6.57	0.02	26.36	32.78	29.03	1289.00	1.16	1.11	1.13	1.12	1.11
1376.00	6.57	6.58	6.59	6.60	0.03	25.09	35.33	27.07	1376.00	1.11	1.04	1.07	1.07	1.07
1463.00	6.57	6.58	6.58	6.60	0.03	24.97	40.07	26.60	1463.00	1.10	1.02	1.01	1.01	1.03
1550.00	6.60	6.59	6.60	6.61	0.01	25.83	45.06	27.21	1550.00	1.15	1.08	1.05	1.03	1.04
1637.00	6.63	6.64	6.64	6.65	0.02	28.22	41.29	29.53	1637.00	1.19	1.12	1.09	1.07	1.05
1724.00	6.64	6.66	6.65	6.68	0.03	32.04	37.29	32.99	1724.00	1.17	1.14	1.13	1.10	1.05
1898.00	6.72	6.74	6.71	6.75	0.04	34.64	34.51	38.14	1898.00	1.02	1.13	1.15	1.13	1.05
1970.50	6.76	6.77	6.74	6.76	0.03	28.56	35.21	31.50	1970.50	1.08	1.13	1.17	1.16	1.06
1999.50	6.73	6.78	6.75	6.77	0.05	26.39	36.03	28.54	1999.50	1.12	1.13	1.18	1.17	1.07
2057.50	6.85	6.85	6.80	6.84	0.05	22.86	37.33	24.27	2057.50	1.25	1.15	1.19	1.18	1.10

ZB4PD1-8.4

6700 to 8400 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
6675.00	6.67	6.52	6.71	6.68	0.19	26.52	30.49	27.41	6675.00	1.37	1.35	1.42	1.52	1.37
6750.00	6.70	6.55	6.70	6.67	0.15	28.49	30.14	29.46	6750.00	1.37	1.37	1.44	1.52	1.39
6825.00	6.75	6.58	6.70	6.67	0.17	30.31	30.23	31.52	6825.00	1.38	1.38	1.44	1.52	1.41
6975.00	6.78	6.65	6.74	6.67	0.13	33.63	30.34	34.43	6975.00	1.37	1.38	1.42	1.50	1.42
7125.00	6.66	6.59	6.63	6.52	0.13	32.58	30.92	32.21	7125.00	1.33	1.33	1.38	1.45	1.38
7275.00	6.52	6.50	6.52	6.35	0.17	30.18	31.21	30.37	7275.00	1.26	1.27	1.33	1.38	1.33
7425.00	6.46	6.58	6.57	6.31	0.27	27.72	30.64	29.07	7425.00	1.14	1.21	1.27	1.31	1.27
7575.00	6.52	6.54	6.51	6.36	0.18	26.56	30.19	26.94	7575.00	1.09	1.17	1.21	1.24	1.22
7725.00	6.53	6.45	6.38	6.38	0.15	26.08	29.79	26.01	7725.00	1.14	1.13	1.17	1.18	1.17
7875.00	6.57	6.43	6.36	6.40	0.21	25.49	29.40	24.82	7875.00	1.17	1.09	1.12	1.13	1.14
8025.00	6.59	6.46	6.37	6.44	0.22	25.20	32.73	24.91	8025.00	1.17	1.08	1.08	1.09	1.13
8175.00	6.67	6.50	6.43	6.49	0.24	27.63	31.20	26.73	8175.00	1.17	1.12	1.10	1.11	1.15
8250.00	6.71	6.52	6.46	6.52	0.25	28.99	30.46	28.38	8250.00	1.16	1.14	1.12	1.12	1.16
8325.00	6.71	6.51	6.46	6.52	0.25	30.14	29.71	29.49	8325.00	1.16	1.16	1.12	1.12	1.17
8400.00	6.72	6.52	6.46	6.53	0.26	29.80	28.69	29.54	8400.00	1.15	1.16	1.12	1.11	1.17

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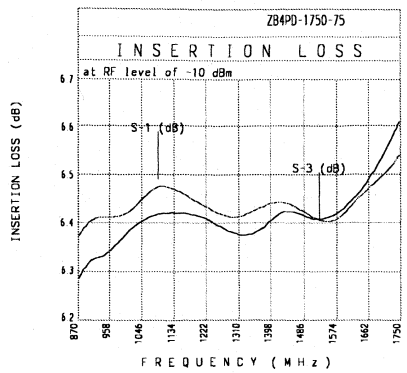
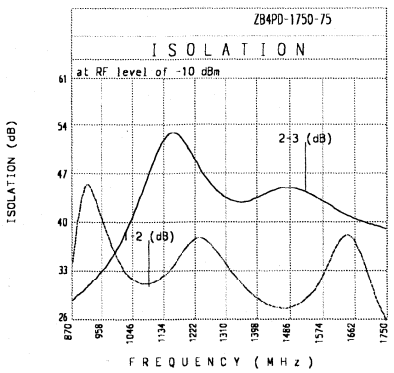
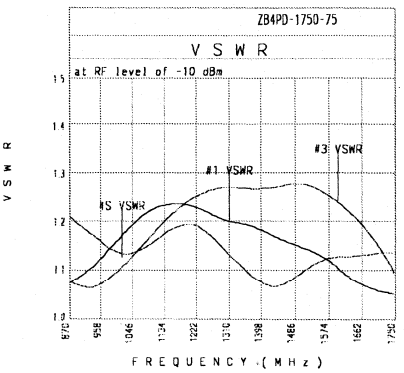
75 ohms

ZB4PD-1750-75

875 to 1750 MHz



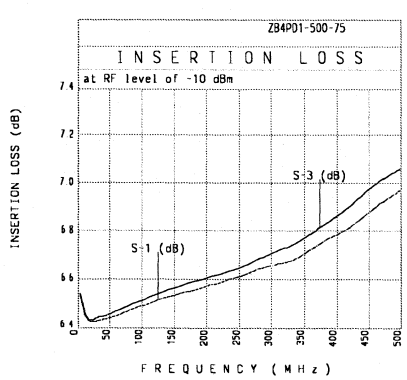


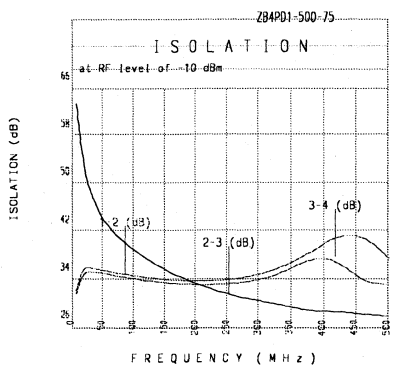


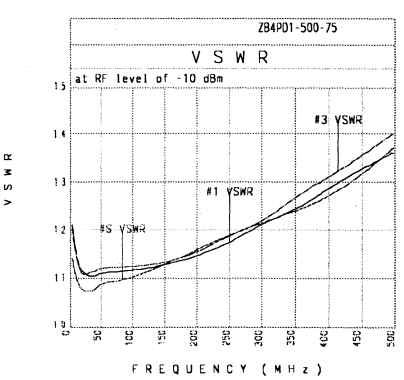
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
875.00	0.38	0.36	0.29	0.38	0.10	34.52	29.10	33.85	875.00	1.22	1.08	1.08	1.08	1.11
910.00	0.42	0.38	0.34	0.43	0.09	49.11	30.62	48.45	910.00	1.20	1.10	1.12	1.07	1.13
945.00	0.42	0.41	0.33	0.39	0.08	42.90	32.44	44.03	945.00	1.18	1.12	1.15	1.07	1.15
1015.00	0.42	0.45	0.40	0.46	0.06	32.58	37.19	32.80	1015.00	1.13	1.18	1.21	1.11	1.22
1085.00	0.50	0.49	0.43	0.50	0.07	30.77	46.77	30.79	1085.00	1.15	1.23	1.24	1.17	1.21
1155.00	0.47	0.50	0.43	0.49	0.07	33.13	56.75	32.86	1155.00	1.20	1.25	1.24	1.23	1.24
1225.00	0.44	0.49	0.42	0.45	0.07	40.13	48.63	39.41	1225.00	1.21	1.24	1.21	1.27	1.21
1295.00	0.41	0.46	0.38	0.45	0.08	35.53	44.23	35.16	1295.00	1.15	1.21	1.19	1.28	1.17
1365.00	0.44	0.47	0.38	0.44	0.09	30.39	42.86	30.09	1365.00	1.10	1.21	1.18	1.28	1.14
1435.00	0.46	0.49	0.45	0.43	0.06	27.78	45.51	27.52	1435.00	1.06	1.17	1.16	1.28	1.12
1505.00	0.42	0.47	0.41	0.48	0.07	27.79	45.90	27.37	1505.00	1.10	1.16	1.15	1.29	1.13
1575.00	0.40	0.49	0.42	0.44	0.09	31.02	43.80	30.13	1575.00	1.14	1.13	1.12	1.27	1.11
1645.00	0.47	0.54	0.47	0.46	0.08	42.87	41.29	41.50	1645.00	1.13	1.08	1.11	1.22	1.08
1715.00	0.51	0.62	0.56	0.54	0.12	29.74	40.15	30.82	1715.00	1.15	1.06	1.10	1.16	1.08
1750.00	0.55	0.67	0.62	0.54	0.13	26.07	39.59	26.98	1750.00	1.14	1.06	1.09	1.10	1.08

ZB4PD1-500-75

5 to 500 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
5.45	6.54	6.56	6.55	6.55	0.01	30.58	62.11	30.00	5.45	1.15	1.22	1.22	1.21	1.22
14.36	6.43	6.44	6.44	6.44	0.01	34.21	53.37	33.28	14.36	1.09	1.13	1.13	1.13	1.13
23.27	6.43	6.42	6.43	6.43	0.01	34.52	48.35	33.79	23.27	1.08	1.12	1.12	1.11	1.12
32.18	6.43	6.44	6.45	6.44	0.02	34.41	46.31	33.81	32.18	1.08	1.11	1.11	1.12	1.12
41.09	6.44	6.45	6.45	6.44	0.01	34.20	43.93	33.68	41.09	1.08	1.11	1.11	1.12	1.11
50.00	6.44	6.45	6.46	6.46	0.02	34.00	42.16	33.54	50.00	1.10	1.12	1.12	1.13	1.13
90.90	6.49	6.52	6.51	6.52	0.03	33.18	37.54	32.67	90.90	1.10	1.12	1.12	1.13	1.13
172.72	6.56	6.59	6.60	6.59	0.04	32.12	32.50	31.54	172.72	1.15	1.14	1.15	1.14	1.16
254.54	6.62	6.63	6.65	6.66	0.03	32.41	29.85	31.67	254.54	1.20	1.18	1.20	1.20	1.22
295.45	6.67	6.70	6.72	6.75	0.07	33.19	28.96	32.36	295.45	1.22	1.22	1.23	1.22	1.27
336.36	6.68	6.71	6.75	6.75	0.08	34.63	28.20	33.54	336.36	1.24	1.24	1.26	1.26	1.30
377.27	6.77	6.81	6.83	6.84	0.08	36.89	27.13	36.17	377.27	1.26	1.27	1.29	1.30	1.34
418.18	6.81	6.86	6.90	6.95	0.14	39.94	27.13	36.17	418.18	1.29	1.31	1.34	1.33	1.38
459.09	6.91	6.94	7.01	7.01	0.11	40.21	26.67	31.81	459.09	1.33	1.34	1.37	1.37	1.42
500.00	6.98	7.02	7.07	7.11	0.12	36.08	26.31	31.71	500.00	1.38	1.37	1.39	1.41	1.45

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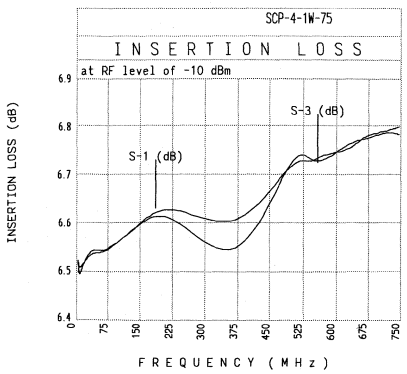
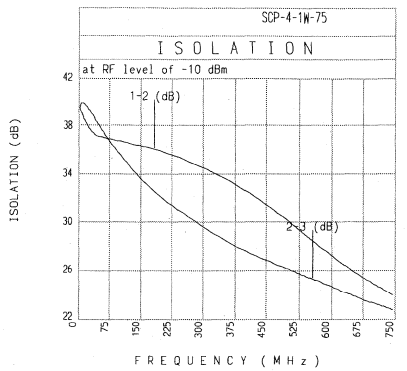
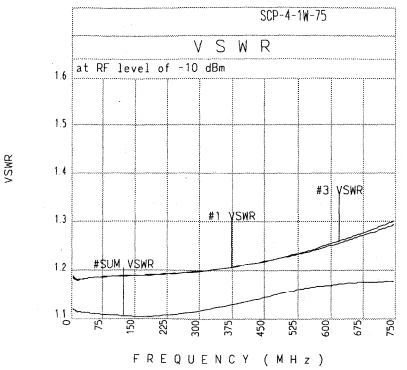
4 WAY-0°
Power Splitter/Combiners

SCP-4-1W-75

10 to 750 MHz



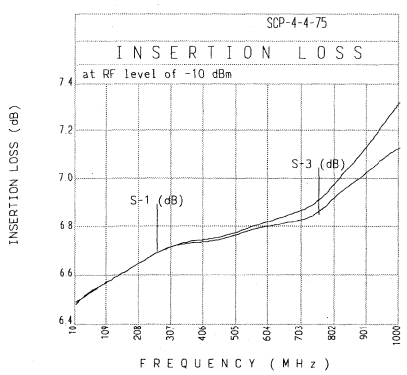


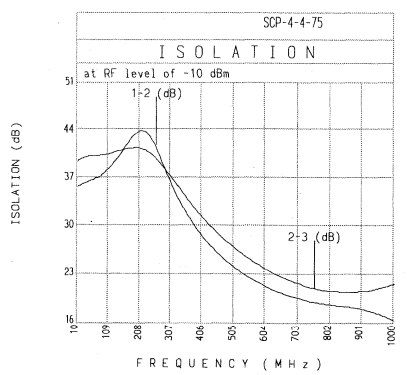


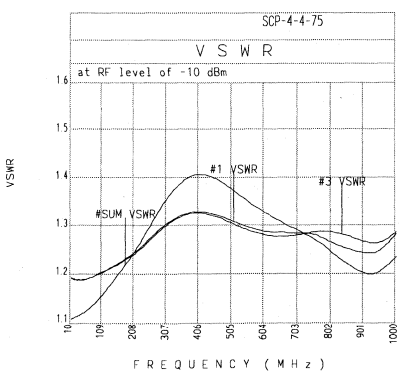
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
9.85	6.53	6.54	6.53	6.54	0.01	39.77	39.77	39.73	9.85	1.12	1.19	1.19	1.19	1.21
12.06	6.51	6.51	6.49	6.51	0.02	39.54	40.16	39.56	12.06	1.12	1.18	1.18	1.19	1.20
18.87	6.52	6.53	6.52	6.51	0.02	38.79	40.28	38.87	18.87	1.11	1.18	1.18	1.18	1.19
42.48	6.55	6.53	6.56	6.53	0.02	37.39	39.06	37.33	42.48	1.11	1.18	1.18	1.18	1.19
63.73	6.54	6.54	6.54	6.54	0.01	37.32	37.62	36.67	63.73	1.11	1.19	1.19	1.19	1.19
143.44	6.60	6.60	6.60	6.59	0.02	36.64	34.06	35.82	143.44	1.10	1.19	1.19	1.19	1.19
215.18	6.66	6.67	6.65	6.61	0.05	36.19	31.89	34.81	215.18	1.10	1.19	1.19	1.19	1.19
379.08	6.57	6.56	6.48	6.47	0.11	33.66	28.02	31.30	379.08	1.13	1.21	1.21	1.21	1.20
504.27	6.75	6.84	6.77	6.69	0.15	30.38	26.32	28.69	504.27	1.16	1.23	1.24	1.23	1.22
544.23	6.73	6.80	6.74	6.67	0.13	29.17	25.68	27.44	544.23	1.16	1.24	1.25	1.24	1.23
568.70	6.75	6.85	6.73	6.65	0.20	28.48	25.39	26.92	568.70	1.17	1.25	1.26	1.24	1.23
642.11	6.76	6.86	6.78	6.64	0.23	26.50	24.28	25.21	642.11	1.17	1.27	1.28	1.26	1.25
666.58	6.79	6.92	6.78	6.67	0.25	25.88	23.88	24.61	666.58	1.18	1.28	1.29	1.27	1.26
726.53	6.80	6.98	6.80	6.66	0.31	24.62	23.15	23.52	726.53	1.18	1.29	1.31	1.29	1.27
756.50	6.81	6.98	6.79	6.68	0.31	23.97	22.77	22.97	756.50	1.18	1.31	1.32	1.30	1.28

SCP-4-4-75

10 to 1000 MHz







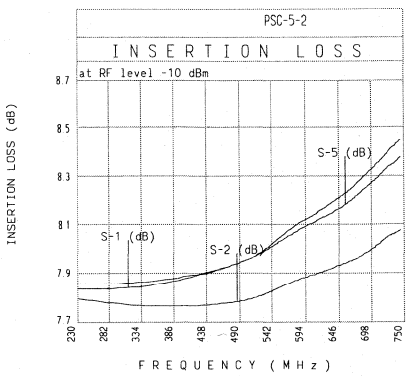
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 2-3	(dB) 3-4	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
10.00	6.48	6.49	6.49	6.49	0.01	36.05	39.87	35.28	10.00	1.11	1.19	1.19	1.19	1.19
46.00	6.53	6.52	6.52	6.52	0.01	36.97	40.84	37.01	46.00	1.12	1.19	1.19	1.19	1.19
82.00	6.56	6.56	6.56	6.56	0.01	37.50	40.60	37.72	82.00	1.14	1.20	1.20	1.20	1.20
140.00	6.60	6.60	6.60	6.61	0.01	40.28	41.40	40.82	140.00	1.19	1.22	1.21	1.21	1.22
220.00	6.67	6.67	6.67	6.68	0.01	47.12	42.47	46.77	220.00	1.26	1.25	1.25	1.25	1.25
300.00	6.73	6.75	6.73	6.73	0.02	36.35	37.94	36.06	300.00	1.36	1.31	1.31	1.31	1.31
380.00	6.75	6.77	6.74	6.73	0.04	29.84	32.65	29.69	380.00	1.42	1.34	1.33	1.34	1.34
460.00	6.76	6.80	6.75	6.73	0.07	25.68	28.67	25.59	460.00	1.40	1.33	1.32	1.32	1.33
550.00	6.81	6.88	6.80	6.76	0.12	22.57	25.34	22.46	550.00	1.35	1.30	1.28	1.29	1.30
650.00	6.85	6.93	6.82	6.75	0.18	20.31	22.69	20.19	650.00	1.31	1.29	1.28	1.28	1.29
750.00	6.90	7.00	6.85	6.77	0.24	19.10	21.11	18.95	750.00	1.28	1.29	1.28	1.29	1.29
800.00	6.99	7.10	6.94	6.85	0.28	18.81	20.71	18.67	800.00	1.25	1.27	1.28	1.29	1.29
900.00	7.14	7.25	7.03	6.89	0.36	18.18	20.62	18.28	900.00	1.20	1.24	1.25	1.27	1.27
950.00	7.24	7.36	7.10	6.98	0.38	17.55	21.08	17.96	950.00	1.20	1.24	1.25	1.26	1.27
1000.00	7.33	7.45	7.14	7.01	0.44	16.44	21.85	17.24	1000.00	1.24	1.29	1.30	1.29	1.30

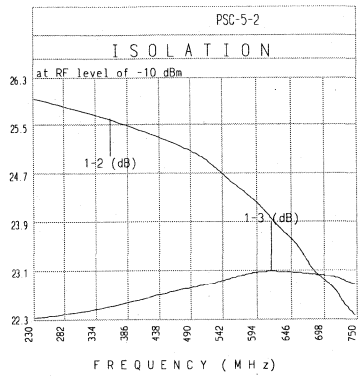
Mini-Circuits®

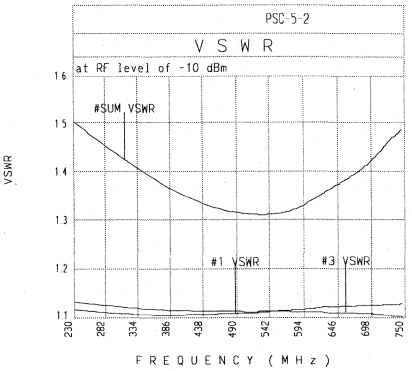
50 ohms

PSC-5-2

250 to 750 MHz



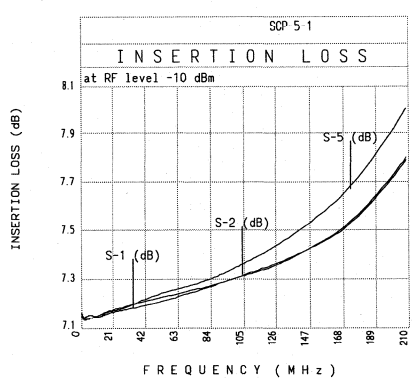


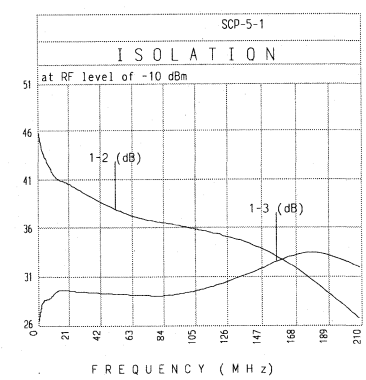


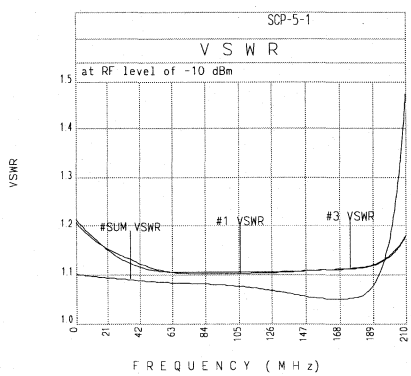
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-5	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-3	(dB) 2-3	(dB) 3-5	(dB) 4-5	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
236.00	7.85	7.81	7.84	7.86	7.87	0.06	26.06	22.40	26.52	22.08	24.71	236.00	1.51	1.14
344.00	7.85	7.77	7.82	7.84	7.87	0.10	25.78	22.53	26.64	22.07	24.11	334.00	1.40	1.12
452.00	7.92	7.78	7.84	7.85	7.92	0.14	25.37	22.82	26.69	22.14	23.45	452.00	1.33	1.12
506.00	7.97	7.80	7.87	7.87	7.97	0.18	25.14	22.93	26.61	22.21	23.20	506.00	1.32	1.12
530.30	8.00	7.82	7.90	7.90	8.00	0.18	24.93	22.98	26.50	22.20	22.98	530.30	1.32	1.12
560.00	8.07	7.86	7.95	7.94	8.05	0.21	24.65	23.08	26.31	22.24	22.70	560.00	1.32	1.12
589.70	8.13	7.89	7.98	7.96	8.10	0.24	24.42	23.16	26.12	22.19	22.42	589.70	1.33	1.12
614.00	8.16	7.91	8.01	8.00	8.13	0.25	24.13	23.19	25.87	22.11	22.18	614.00	1.35	1.11
635.60	8.20	7.93	8.02	8.01	8.16	0.27	23.87	23.18	25.63	22.07	21.95	635.60	1.37	1.11
665.30	8.25	7.96	8.06	8.04	8.20	0.30	23.58	23.16	25.31	22.00	21.66	665.30	1.39	1.11
684.20	8.30	7.98	8.09	8.05	8.25	0.33	23.16	23.13	24.92	21.86	21.34	684.20	1.41	1.11
713.90	8.37	8.03	8.15	8.11	8.31	0.34	22.97	23.11	24.73	21.78	21.21	713.90	1.44	1.11
730.10	8.42	8.07	8.19	8.14	8.36	0.35	22.68	23.05	24.41	21.69	20.96	730.10	1.47	1.11
740.90	8.45	8.08	8.20	8.15	8.37	0.37	22.54	22.99	24.24	21.61	20.84	740.90	1.48	1.11
759.80	8.49	8.11	8.23	8.18	8.43	0.37	22.34	22.94	24.06	21.54	20.69	759.80	1.51	1.10

SCP-5-1

2 to 200 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	(dB) S-2	(dB) S-3	(dB) S-4	(dB) S-5	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	(dB) 1-3	(dB) 2-3	(dB) 3-5	(dB) 4-5	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
2.01	7.15	7.15	7.16	7.16	7.17	0.02	46.32	26.77	43.25	26.10	45.27	2.01	1.10	1.22
3.37	7.14	7.14	7.14	7.14	7.15	-0.02	44.97	28.24	42.56	27.77	44.13	3.37	1.10	1.17
4.92	7.16	7.14	7.14	7.15	7.14	0.00	43.96	29.05	42.40	29.25	43.04	4.92	1.09	1.13
9.49	7.16	7.15	7.15	7.15	7.15	0.01	42.79	29.00	41.80	29.65	42.05	9.49	1.09	1.11
13.40	7.15	7.14	7.16	7.16	7.15	-0.01	41.40	30.04	41.25	29.85	41.04	13.40	1.08	1.11
18.93	7.17	7.17	7.18	7.17	7.18	0.00	41.40	30.04	40.66	29.85	41.10	18.93	1.08	1.11
26.74	7.18	7.18	7.19	7.20	7.18	0.00	40.53	29.84	39.65	29.72	40.62	26.74	1.08	1.11
49.79	7.21	7.25	7.23	7.23	7.25	-0.01	38.47	29.63	38.81	29.51	38.92	49.79	1.07	1.11
70.33	7.25	7.26	7.26	7.26	7.28	0.01	37.30	29.45	37.71	29.52	37.94	70.33	1.06	1.11
89.56	7.29	7.29	7.29	7.30	7.32	-0.01	36.90	29.39	36.59	29.65	37.89	89.56	1.05	1.11
106.44	7.33	7.32	7.33	7.33	7.38	-0.01	36.28	29.95	35.88	30.25	37.46	106.44	1.05	1.11
118.07	7.34	7.35	7.35	7.35	7.41	0.01	35.93	30.34	35.72	30.75	37.14	118.07	1.05	1.12
150.36	7.44	7.41	7.44	7.44	7.55	0.00	34.47	32.28	34.49	33.07	35.27	150.36	1.12	1.13
178.70	7.55	7.53	7.54	7.56	7.70	0.00	31.28	34.75	32.89	36.23	31.63	178.70	1.23	1.15
212.38	7.83	7.82	7.82	7.85	8.04	0.01	26.71	32.17	26.28	32.78	26.74	212.38	1.48	1.18

In Stock... Immediate Delivery

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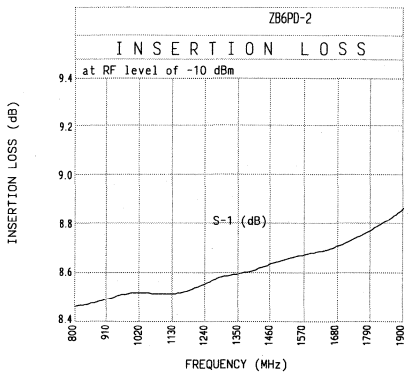
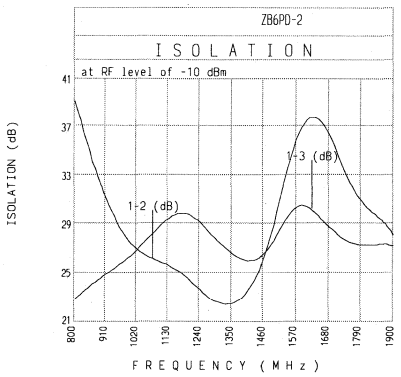
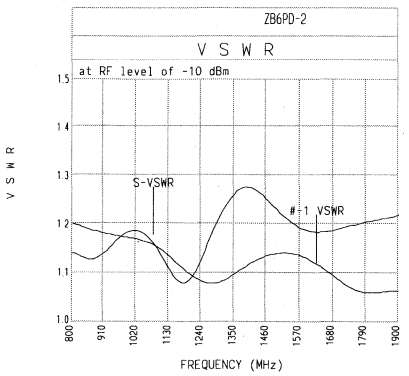
6 WAY-0°
Power Splitter/Combiners 50 ohms

ZB6PD-2

800 to 2000 MHz



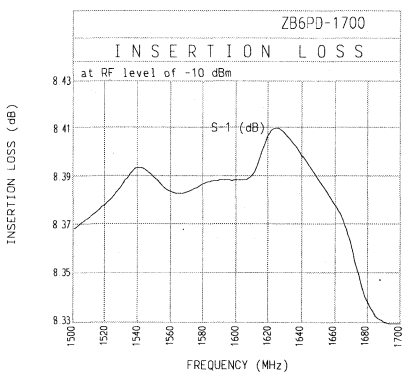


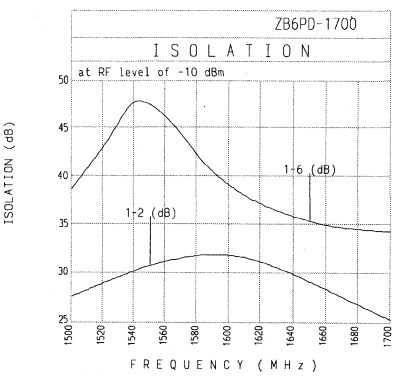


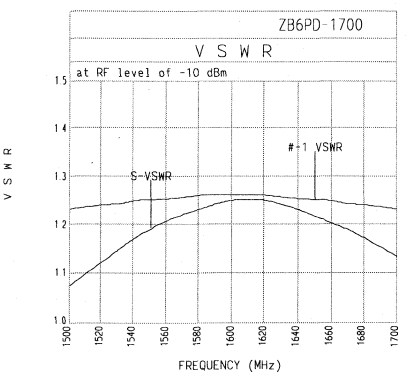
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
801.50	8.47	0.33	39.60	23.12	1.15	1.21
887.00	8.49	0.31	32.26	24.98	1.12	1.19
986.50	8.54	0.33	27.48	26.44	1.21	1.18
1085.00	8.52	0.31	26.40	28.83	1.18	1.17
1179.50	8.53	0.31	25.53	31.14	1.03	1.11
1278.50	8.60	0.31	22.70	28.45	1.21	1.07
1377.50	8.61	0.30	22.46	26.13	1.31	1.12
1472.00	8.66	0.30	26.27	26.38	1.25	1.15
1571.00	8.69	0.27	38.21	32.21	1.19	1.15
1665.00	8.71	0.26	38.95	29.48	1.19	1.11
1764.50	8.77	0.33	31.36	27.36	1.21	1.06
1863.50	8.84	0.30	29.93	27.81	1.22	1.07
1913.00	8.89	0.32	28.17	27.62	1.23	1.07
1958.00	8.97	0.34	24.73	25.52	1.24	1.07
1998.50	9.01	0.35	21.70	23.15	1.25	1.07

ZB6PD-1700

1500 to 1700 MHz







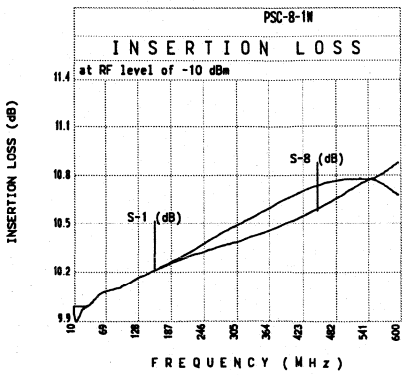
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	ISOLATION (dB) 1-4	VSWR S	VSWR 1
1500.00	8.37	0.24	27.78	39.07	1.08	1.24
1520.00	8.38	0.22	29.22	43.44	1.13	1.25
1532.00	8.39	0.22	30.03	46.82	1.16	1.25
1540.00	8.40	0.23	30.54	48.92	1.18	1.26
1560.00	8.38	0.22	31.54	46.94	1.22	1.26
1580.00	8.39	0.21	32.19	42.37	1.24	1.27
1588.00	8.39	0.20	32.25	40.99	1.25	1.27
1600.00	8.39	0.19	32.19	39.37	1.26	1.27
1612.00	8.39	0.19	31.83	38.09	1.26	1.27
1620.00	8.42	0.19	31.47	37.44	1.26	1.27
1640.00	8.40	0.17	30.17	36.11	1.24	1.26
1660.00	8.38	0.16	28.59	35.26	1.21	1.26
1668.00	8.37	0.15	27.96	35.03	1.20	1.25
1680.00	8.33	0.15	26.96	34.74	1.18	1.25
1700.00	8.33	0.14	25.42	34.59	1.14	1.24

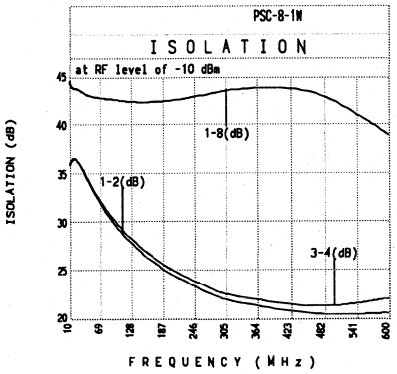
Mini-Circuits®

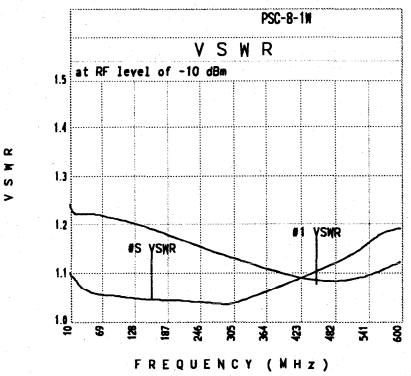
PSC-8-1W

50 ohms

10 to 600 MHz





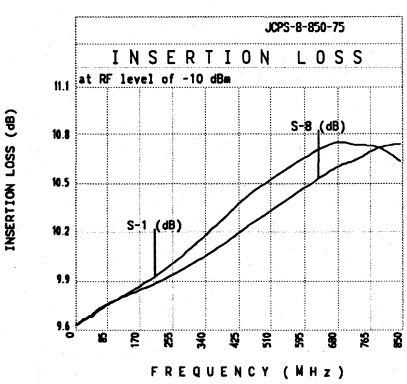


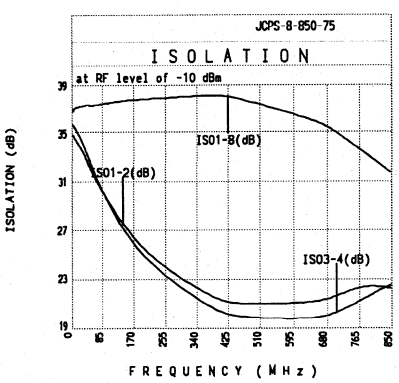
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
10.138	10.0	9.9	10.0	10.0	10.0	10.0	0.06	36.46	44.94	36.37	32.07	10.138	1.11	1.25	1.25
11.616	9.9	9.9	10.0	9.9	10.0	10.0	0.05	36.60	44.47	36.59	32.26	11.616	1.10	1.24	1.24
17.448	9.9	9.9	9.9	10.0	10.0	10.0	0.05	37.26	44.16	37.07	32.55	17.448	1.10	1.24	1.23
26.247	10.0	9.9	10.0	10.0	10.0	10.0	0.04	36.63	44.21	36.74	32.71	26.247	1.08	1.23	1.23
39.517	10.0	10.0	10.0	10.0	10.0	10.0	0.02	35.18	43.52	35.35	32.73	39.517	1.07	1.23	1.23
59.231	10.1	10.1	10.0	10.0	10.1	10.1	0.02	33.10	43.31	33.28	32.36	59.231	1.06	1.23	1.23
89.397	10.1	10.1	10.1	10.1	10.1	10.1	0.02	30.34	43.11	30.74	31.66	89.397	1.06	1.22	1.22
134.284	10.2	10.2	10.2	10.2	10.2	10.2	0.04	27.55	42.75	28.03	30.48	134.284	1.05	1.20	1.21
201.999	10.3	10.3	10.3	10.3	10.2	10.3	0.09	24.71	42.92	25.20	28.76	201.999	1.05	1.17	1.18
293.978	10.5	10.4	10.4	10.4	10.3	10.4	0.17	22.46	43.84	23.03	26.96	293.978	1.04	1.13	1.14
304.125	10.5	10.4	10.9	10.4	10.3	10.4	0.18	22.29	44.07	22.87	26.83	304.125	1.04	1.12	1.14
455.846	10.8	10.7	10.7	10.6	10.5	10.6	0.24	20.67	44.64	21.40	24.98	455.846	1.11	1.06	1.08
540.349	10.8	10.8	10.9	10.8	10.7	10.8	0.26	20.76	41.58	21.86	24.59	540.349	1.16	1.09	1.10
560.383	10.8	10.8	11.0	10.8	10.7	10.8	0.25	20.77	40.98	22.04	24.45	560.383	1.19	1.11	1.11
600.449	10.7	10.8	11.1	10.9	10.8	10.9	0.40	20.91	39.46	22.42	24.18	600.449	1.20	1.14	1.13

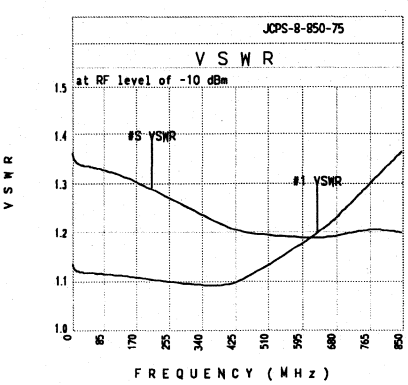
JCPS-8-850-75

75 ohms

10 to 850 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	S-2	S-3	S-4	S-6	S-8	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	1-8	3-4	5-7	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 8
6.51	9.64	9.65	9.65	9.65	9.64	9.64	0.01	35.25	37.15	36.09	36.31	6.51	1.37	1.14	1.19
10.76	9.63	9.64	9.65	9.64	9.63	9.63	0.02	35.05	37.50	35.94	36.20	10.76	1.36	1.13	1.18
30.01	9.67	9.66	9.67	9.68	9.66	9.68	0.02	34.07	37.58	34.88	35.91	30.01	1.35	1.13	1.17
49.61	9.69	9.70	9.70	9.70	9.71	9.70	0.02	32.79	37.77	33.27	35.11	49.61	1.34	1.12	1.17
50.66	9.70	9.72	9.71	9.70	9.69	9.71	0.02	32.66	37.63	33.21	34.96	50.66	1.35	1.13	1.17
83.73	9.76	9.78	9.76	9.77	9.76	9.77	0.02	30.66	37.77	30.72	32.73	83.73	1.34	1.12	1.16
141.31	9.84	9.82	9.83	9.82	9.81	9.83	0.03	27.71	38.12	27.27	29.61	141.31	1.33	1.12	1.15
233.55	9.96	9.94	9.93	9.90	9.91	9.91	0.06	24.47	38.25	23.80	26.17	233.55	1.29	1.11	1.12
386.01	10.29	10.23	10.17	10.14	10.10	10.13	0.20	21.66	38.59	20.71	22.71	386.01	1.23	1.10	1.09
446.93	10.45	10.36	10.28	10.26	10.22	10.25	0.24	21.10	38.35	20.02	21.74	446.93	1.20	1.11	1.09
651.48	10.76	10.66	10.51	10.55	10.51	10.57	0.27	21.31	36.46	19.89	19.90	651.48	1.19	1.21	1.19
693.71	10.79	10.70	10.54	10.60	10.56	10.64	0.26	21.71	35.75	20.30	19.77	693.71	1.20	1.25	1.22
738.68	10.75	10.71	10.53	10.63	10.59	10.66	0.22	22.27	34.72	20.90	19.66	738.68	1.21	1.28	1.25
786.56	10.77	10.75	10.56	10.68	10.68	10.75	0.22	22.78	33.58	21.79	19.75	786.56	1.22	1.32	1.29
855.26	10.65	10.71	10.50	10.70	10.70	10.77	0.36	22.52	32.02	22.87	19.96	855.26	1.21	1.38	1.34

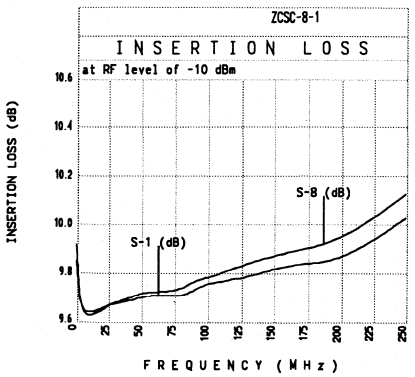
In Stock... Immediate Delivery

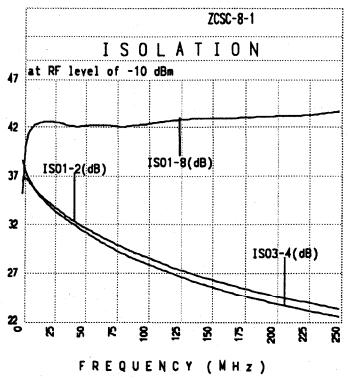
For Custom Versions Of Standard Models Consult Our Applications Dept.

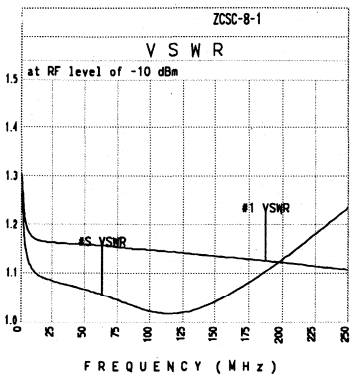
8 WAY-0°
Power Splitter/Combiners 50 ohms

ZCSC-8-1

2 to 250 MHz







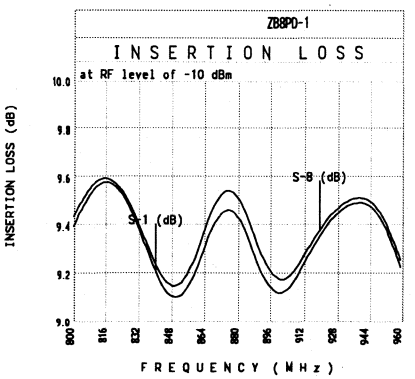
FREQUENCY	INSERTION LOSS (dB)					
(MHz)	S-1	S-2	S-3	S-4	S-6	S-8
1.00	9.86	9.86	9.87	9.87	9.93	9.93
2.99	9.67	9.66	9.66	9.66	9.67	9.67
9.97	9.63	9.61	9.62	9.61	9.60	9.61
24.94	9.68	9.67	9.68	9.67	9.68	9.68
39.90	9.69	9.69	9.70	9.70	9.71	9.70
49.87	9.71	9.71	9.71	9.72	9.71	9.73
64.84	9.72	9.73	9.72	9.74	9.73	9.73
79.80	9.71	9.72	9.73	9.75	9.72	9.74
89.77	9.74	9.75	9.76	9.78	9.74	9.78
99.75	9.77	9.76	9.79	9.80	9.76	9.79
128.68	9.79	9.78	9.80	9.84	9.81	9.85
160.60	9.85	9.84	9.88	9.92	9.85	9.90
192.52	9.85	9.83	9.88	9.95	9.87	9.93
224.44	9.94	9.91	9.98	10.07	9.97	10.03
250.37	10.04	10.01	10.09	10.19	10.05	10.14

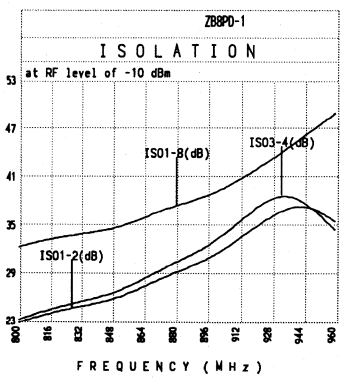
AMPLITUDE	ISOLATION (dB)			
UNBALANCE (dB)	1-2	1-8	3-4	5-7
0.08	39.00	38.56	36.88	30.29
0.01	37.89	41.52	37.47	33.75
0.02	35.82	42.89	35.92	35.59
0.01	34.27	43.12	33.78	35.59
0.03	32.81	42.44	32.50	35.32
0.02	32.12	42.54	31.68	34.93
0.02	31.03	42.79	30.46	34.19
0.04	30.04	42.38	29.42	33.50
0.04	29.48	42.69	28.81	32.93
0.04	28.99	42.73	28.33	32.39
0.07	27.46	43.40	26.79	30.91
0.08	26.34	43.23	25.48	29.54
0.11	25.14	43.58	24.39	28.33
0.15	24.32	43.56	23.45	27.14
0.18	23.58	44.08	22.82	26.19

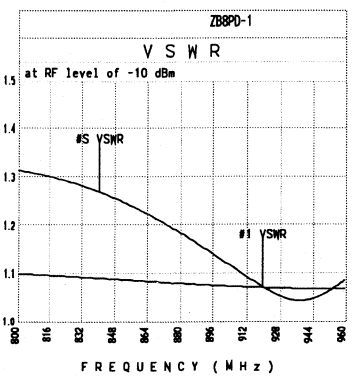
FREQUENCY	VSWR	VSWR	VSWR
(MHz)	S	1	8
1.00	1.27	1.31	1.32
2.99	1.15	1.20	1.20
9.97	1.10	1.17	1.17
24.94	1.09	1.17	1.17
39.90	1.08	1.17	1.17
49.87	1.07	1.17	1.17
64.84	1.06	1.16	1.17
79.80	1.05	1.16	1.16
89.77	1.04	1.16	1.16
99.75	1.03	1.16	1.16
128.68	1.02	1.15	1.16
160.60	1.06	1.14	1.15
192.52	1.12	1.13	1.15
224.44	1.19	1.12	1.14
250.37	1.24	1.12	1.14

ZB8PD-1

800 to 960 MHz







FREQUENCY	INSERTION LOSS (dB)					
(MHz)	S-1	S-2	S-3	S-4	S-6	S-8
800.00	9.42	9.45	9.42	9.45	9.49	9.46
811.42	9.62	9.65	9.65	9.65	9.67	9.64
822.85	9.60	9.63	9.64	9.63	9.64	9.61
834.28	9.36	9.38	9.41	9.39	9.40	9.38
845.71	9.09	9.09	9.13	9.11	9.13	9.13
857.14	9.14	9.12	9.15	9.16	9.19	9.20
868.57	9.48	9.45	9.47	9.49	9.54	9.56
880.00	9.52	9.50	9.49	9.53	9.59	9.60
891.42	9.19	9.20	9.17	9.21	9.27	9.27
902.85	9.10	9.12	9.08	9.12	9.17	9.15
914.28	9.30	9.34	9.32	9.33	9.37	9.33
925.71	9.46	9.50	9.49	9.50	9.52	9.48
937.14	9.53	9.57	9.58	9.57	9.58	9.55
948.57	9.51	9.52	9.55	9.54	9.55	9.53
960.00	9.25	9.24	9.27	9.27	9.29	9.28

AMPLITUDE	ISOLATION (dB)			
UNBALANCE (dB)	1-2	1-8	3-4	5-7
0.07	23.29	32.82	23.68	26.01
0.06	24.24	33.57	24.69	26.75
0.05	24.97	34.12	25.50	27.29
0.06	25.51	34.52	26.14	27.66
0.07	26.10	34.96	26.84	28.08
0.09	27.10	35.81	27.99	28.92
0.11	28.46	37.01	29.51	30.12
0.11	29.68	37.99	30.92	31.13
0.10	30.77	38.78	32.25	31.96
0.09	32.29	39.95	34.11	33.19
0.06	34.28	41.53	36.49	34.86
0.06	36.35	43.31	38.76	36.69
0.05	37.93	45.26	39.51	38.59
0.05	37.96	47.45	37.83	40.29
0.07	36.08	49.39	35.03	40.93

FREQUENCY	VSWR	VSWR	VSWR
(MHz)	S	1	8
800.00	1.32	1.11	1.08
811.42	1.31	1.11	1.08
822.85	1.30	1.10	1.08
834.28	1.29	1.10	1.07
845.71	1.27	1.10	1.07
857.14	1.25	1.09	1.07
868.57	1.22	1.09	1.07
880.00	1.19	1.09	1.06
891.42	1.16	1.09	1.06
902.85	1.13	1.08	1.06
914.28	1.10	1.08	1.06
925.71	1.07	1.08	1.06
937.14	1.05	1.08	1.06
948.57	1.06	1.08	1.05
960.00	1.09	1.08	1.06

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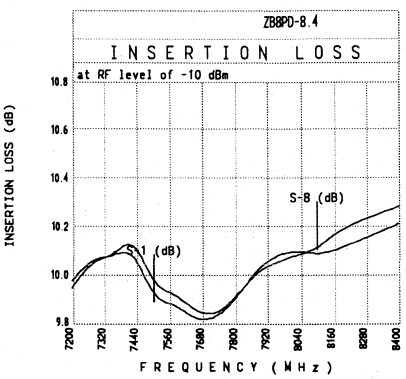
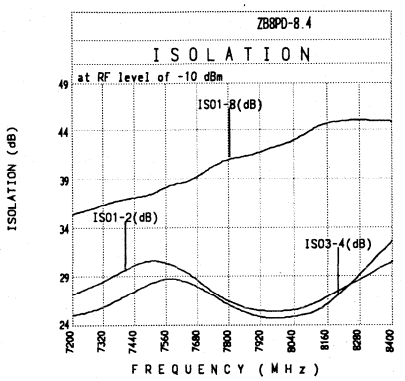
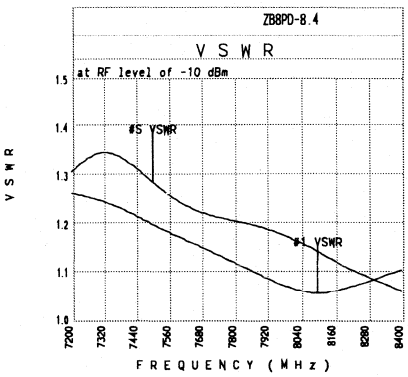
ZB8PD-8.4

7200 to 8400 MHz





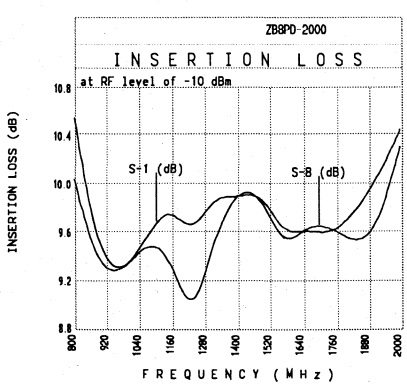


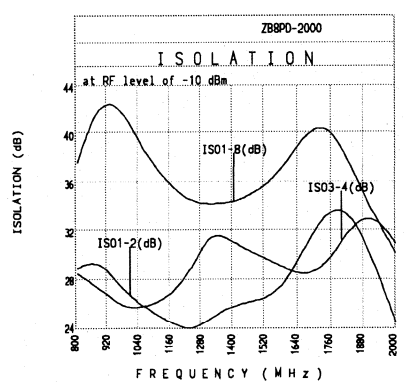
FREQUENCY	INSERTION LOSS (dB)					
(MHz)	S-1	S-2	S-3	S-4	S-6	S-8
7200.00	9.99	9.86	9.89	9.97	9.90	9.96
7275.00	10.09	9.98	10.01	10.05	10.01	10.08
7350.00	10.09	9.98	10.03	10.02	10.05	10.09
7425.00	10.14	10.04	10.09	10.09	10.14	10.19
7500.00	9.90	9.80	9.84	9.84	9.91	9.96
7575.00	9.90	9.80	9.82	9.82	9.88	9.94
7650.00	9.82	9.72	9.74	9.72	9.77	9.86
7725.00	9.83	9.73	9.74	9.75	9.74	9.84
7800.00	9.91	9.81	9.81	9.81	9.80	9.92
7875.00	10.04	9.92	9.91	9.92	9.90	10.03
7950.00	10.10	9.99	9.96	9.98	9.95	10.07
8025.00	10.12	10.02	9.96	10.00	9.98	10.10
8100.00	10.10	10.00	9.95	9.99	9.96	10.12
8175.00	10.12	10.01	9.98	10.01	9.96	10.21
8400.00	10.23	10.13	10.18	10.29	10.13	10.30

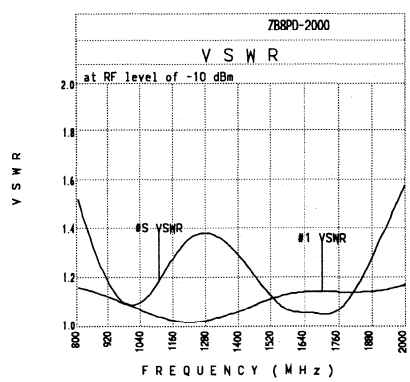
AMPLITUDE	ISOLATION (dB)				FREQUENCY	VSWR	VSWR	VSWR
UNBALANCE (dB)	1-2	1-8	3-4	5-7	(MHz)	S	1	8
0.13	27.56	35.97	25.40	36.63	7200.00	1.32	1.27	1.24
0.11	28.39	36.47	25.75	34.71	7275.00	1.36	1.26	1.23
0.12	29.42	37.25	26.64	32.95	7350.00	1.36	1.25	1.22
0.15	30.53	37.66	27.75	31.69	7425.00	1.33	1.23	1.20
0.15	31.30	37.87	28.82	30.49	7500.00	1.29	1.21	1.18
0.14	30.74	39.13	29.46	30.06	7575.00	1.26	1.19	1.15
0.14	29.68	39.20	28.73	29.43	7650.00	1.24	1.17	1.14
0.11	27.93	40.74	27.66	29.46	7725.00	1.22	1.15	1.10
0.14	26.71	41.79	26.33	29.64	7800.00	1.21	1.13	1.09
0.16	25.94	41.90	25.43	29.70	7875.00	1.21	1.11	1.08
0.17	25.75	42.81	24.95	30.40	7950.00	1.19	1.09	1.07
0.17	25.81	43.25	25.16	30.74	8025.00	1.17	1.07	1.05
0.16	26.29	44.56	25.49	30.63	8100.00	1.15	1.06	1.04
0.25	27.52	45.80	26.55	30.81	8175.00	1.12	1.07	1.03
0.18	30.99	45.55	33.14	29.92	8400.00	1.07	1.11	1.04

ZB8PD-2000

800 to 2000 MHz







FREQUENCY	INSERTION LOSS (dB)					
(MHz)	S-1	S-2	S-3	S-4	S-6	S-8
800.00	10.08	10.62	10.65	10.65	10.66	10.59
885.71	9.33	9.48	9.51	9.48	9.53	9.45
971.42	9.29	9.27	9.36	9.37	9.37	9.28
1057.14	9.56	9.60	9.66	9.63	9.66	9.56
1142.85	9.89	9.51	9.62	9.62	9.63	9.51
1228.57	9.60	8.86	8.99	8.98	8.99	8.84
1314.28	9.96	9.66	9.80	9.78	9.77	9.63
1400.00	9.92	10.00	10.17	10.17	10.15	10.00
1485.71	9.99	9.97	10.16	10.17	10.15	9.97
1571.42	9.60	9.50	9.75	9.73	9.73	9.48
1657.14	9.67	9.73	10.01	10.03	10.00	9.71
1742.85	9.61	9.73	10.01	9.99	10.03	9.69
1828.57	9.79	9.57	9.86	9.81	9.88	9.54
1914.28	10.07	9.69	9.90	9.84	9.92	9.63
2000.00	10.49	10.43	10.51	10.44	10.50	10.35

AMPLITUDE	ISOLATION (dB)				FREQUENCY	VSWR	VSWR	VSWR
UNBALANCE (dB)	1-2	1-8	3-4	5-7	(MHz)	S	1	8
0.59	29.37	38.09	28.93	29.10	800.00	1.54	1.17	1.18
0.20	30.16	43.58	27.72	31.66	885.71	1.24	1.15	1.16
0.14	27.57	42.76	26.04	31.52	971.42	1.08	1.11	1.12
0.10	26.07	38.81	26.09	30.65	1057.14	1.11	1.07	1.09
0.40	24.98	36.55	26.85	29.67	1142.85	1.29	1.04	1.06
0.76	24.03	34.79	28.90	28.32	1228.57	1.41	1.02	1.03
0.33	25.23	34.64	32.75	28.61	1314.28	1.40	1.05	1.03
0.25	26.34	34.77	31.43	29.66	1400.00	1.31	1.08	1.05
0.21	26.62	35.64	30.48	32.27	1485.71	1.17	1.12	1.09
0.27	27.34	37.18	29.58	35.61	1571.42	1.06	1.15	1.12
0.36	30.70	40.32	28.65	35.86	1657.14	1.08	1.16	1.13
0.42	34.23	41.64	29.45	33.36	1742.85	1.05	1.16	1.12
0.34	34.32	38.12	32.71	30.46	1828.57	1.16	1.15	1.13
0.44	30.22	33.96	34.05	27.10	1914.28	1.38	1.16	1.14
0.16	24.94	30.67	31.44	24.20	2000.00	1.60	1.18	1.18

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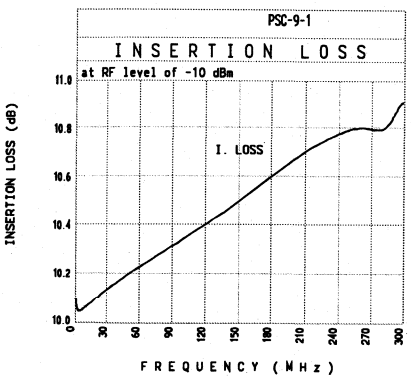
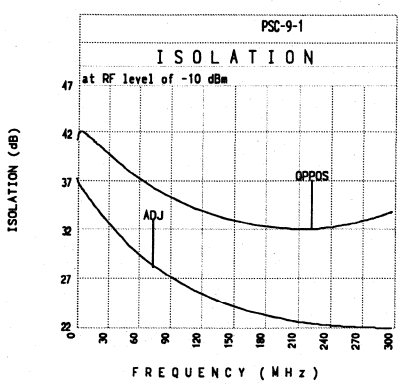
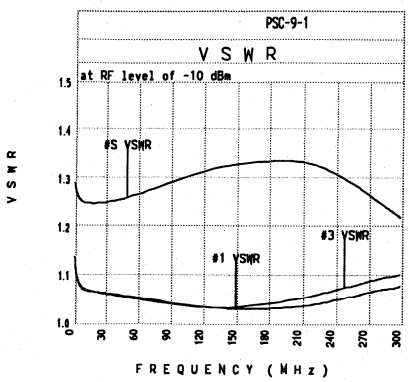
9 WAY-0°
Power Splitter/Combiners 50 ohms

PSC-9-1

2 to 300 MHz



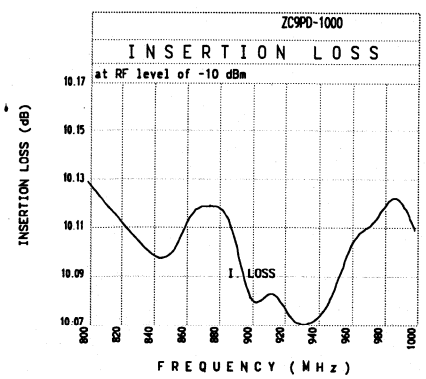


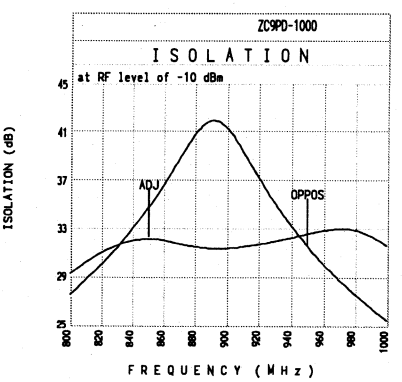


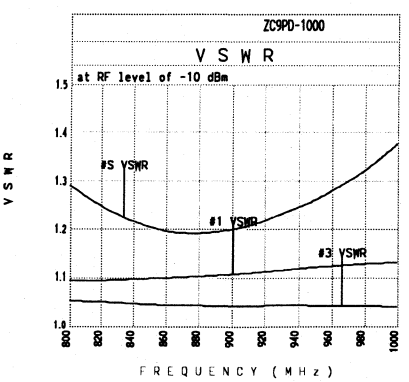
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.992	10.11	0.01	37.91	41.88	1.992	1.30	1.15
2.512	10.09	0.01	37.58	42.24	2.512	1.29	1.13
3.007	10.07	0.01	37.50	42.46	3.007	1.29	1.12
4.983	10.05	0.01	37.09	42.87	4.983	1.27	1.10
9.331	10.07	0.01	36.45	42.57	9.331	1.26	1.08
13.630	10.08	0.01	35.78	42.11	13.630	1.26	1.08
29.582	10.15	0.02	33.47	40.63	29.582	1.26	1.07
64.015	10.26	0.01	29.33	37.36	64.015	1.28	1.06
135.931	10.46	0.04	24.77	33.53	135.931	1.34	1.03
210.146	10.73	0.07	22.93	32.50	210.146	1.35	1.06
233.179	10.78	0.09	22.68	32.67	233.179	1.33	1.08
260.752	10.84	0.11	22.46	33.11	260.752	1.30	1.09
284.635	10.79	0.12	22.33	33.87	284.635	1.26	1.11
295.638	10.92	0.12	22.33	34.27	295.638	1.24	1.11
301.139	10.93	0.12	22.29	34.51	301.139	1.23	1.11

ZC9PD-1000

800 to 1000 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
800.00	10.13	0.21	29.59	27.84	800.00	1.30	1.06
825.00	10.11	0.14	32.05	31.00	825.00	1.24	1.06
850.00	10.09	0.13	32.62	35.01	850.00	1.21	1.05
862.50	10.12	0.09	32.32	37.56	862.50	1.20	1.05
875.00	10.12	0.12	31.93	40.49	875.00	1.20	1.05
887.50	10.12	0.11	31.72	42.79	887.50	1.20	1.05
900.00	10.07	0.14	31.72	42.06	900.00	1.21	1.05
912.50	10.09	0.12	31.91	39.18	912.50	1.22	1.05
925.00	10.07	0.15	32.19	36.34	925.00	1.23	1.05
937.50	10.07	0.23	32.50	34.00	937.50	1.25	1.05
950.00	10.08	0.19	32.96	31.86	950.00	1.27	1.05
962.50	10.11	0.21	33.29	30.06	962.50	1.29	1.05
975.00	10.11	0.24	33.49	28.51	975.00	1.32	1.05
987.50	10.13	0.23	33.00	27.04	987.50	1.35	1.05
1000.00	10.11	0.31	31.97	25.76	1000.00	1.39	1.05

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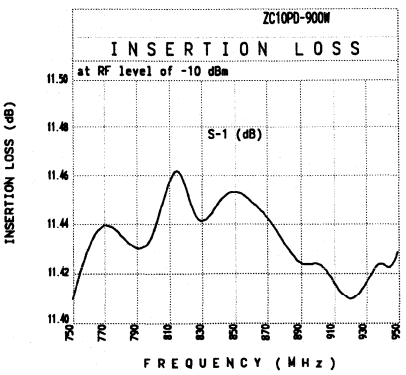
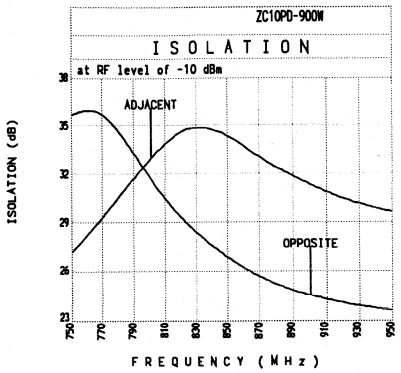
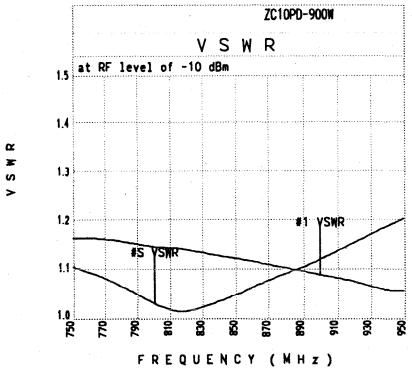
ZC10PD-900W

10 WAY - 0°

750 to 900 MHz







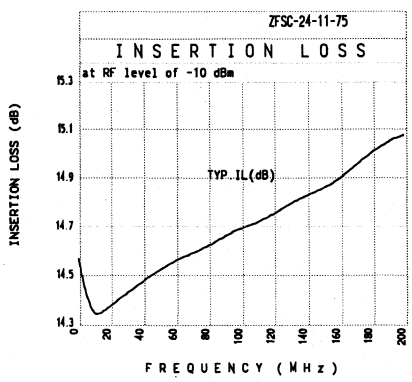
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE
750.00	11.41	0.37	27.37	35.92
767.50	11.45	0.31	29.27	36.54
785.50	11.43	0.29	31.56	34.08
800.00	11.43	0.27	33.26	31.85
814.50	11.48	0.28	34.67	29.97
826.50	11.43	0.30	35.21	28.75
844.00	11.46	0.25	34.99	27.33
862.00	11.45	0.25	33.76	26.17
875.00	11.44	0.27	32.81	25.49
891.00	11.42	0.32	32.01	24.85
903.00	11.43	0.33	31.41	24.52
920.50	11.40	0.41	30.62	24.07
938.00	11.43	0.40	30.15	23.81
944.00	11.42	0.40	29.95	23.70
950.00	11.43	0.39	29.85	23.63

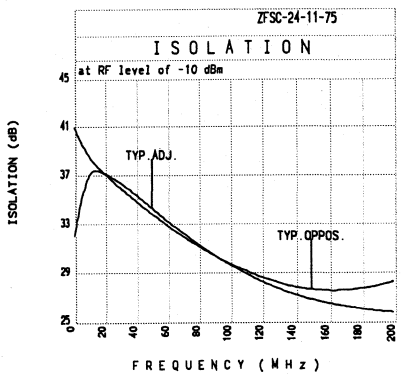
FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
750.00	1.11	1.17
767.50	1.09	1.17
785.50	1.06	1.16
800.00	1.03	1.15
814.50	1.01	1.15
826.50	1.02	1.14
844.00	1.04	1.13
862.00	1.07	1.12
875.00	1.09	1.11
891.00	1.11	1.10
903.00	1.13	1.09
920.50	1.16	1.08
938.00	1.19	1.06
944.00	1.20	1.06
950.00	1.21	1.06

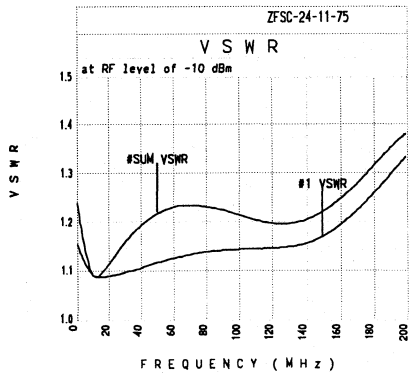
ZFSC-24-11-75

24 WAY - 0°

1 to 200 MHz







FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE
1.00	14.58	0.04	32.23	41.15
8.96	14.32	0.06	37.72	38.89
16.92	14.37	0.04	37.68	37.68
32.84	14.45	0.03	36.38	35.79
48.76	14.53	0.04	34.62	34.15
64.68	14.59	0.04	32.92	32.60
80.60	14.63	0.05	31.42	31.27
96.52	14.70	0.06	30.09	30.14
112.44	14.73	0.06	28.91	29.16
128.36	14.80	0.08	27.89	28.35
144.28	14.85	0.09	27.14	27.82
160.20	14.90	0.11	26.62	27.65
176.12	15.00	0.12	26.22	27.73
192.04	15.07	0.17	25.96	28.10
200.00	15.09	0.19	25.88	28.42

FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1.00	1.25	1.16
8.96	1.07	1.09
16.92	1.10	1.09
32.84	1.18	1.10
48.76	1.23	1.12
64.68	1.24	1.14
80.60	1.24	1.15
96.52	1.23	1.15
112.44	1.21	1.15
128.36	1.20	1.15
144.28	1.21	1.16
160.20	1.25	1.20
176.12	1.30	1.25
192.04	1.37	1.31
200.00	1.39	1.34

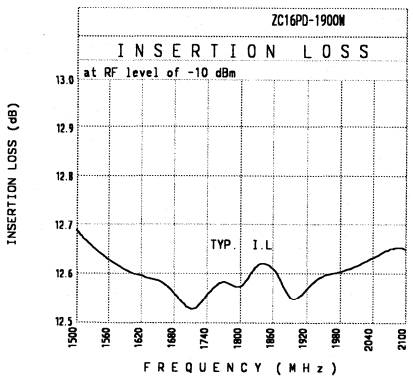
In Stock... Immediate Delivery

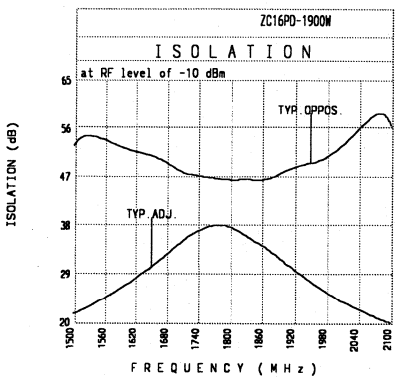
For Custom Versions Of Standard Models Consult Our Applications Dept.

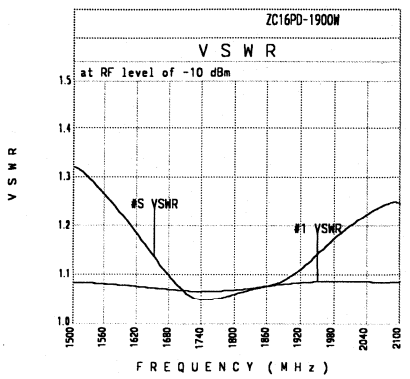
16 WAY-0°
Power Splitter/Combiners 50 ohms

ZC16PD-1900W

1500 to 2100 MHz



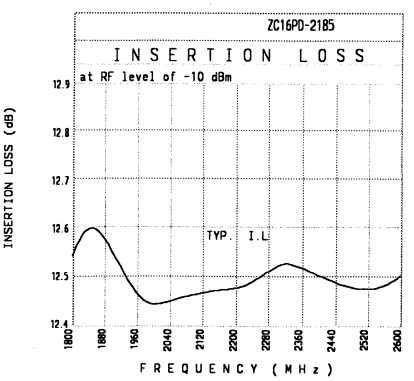


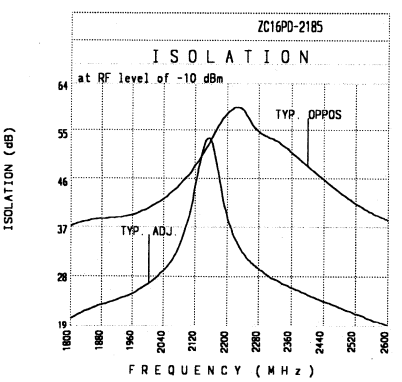


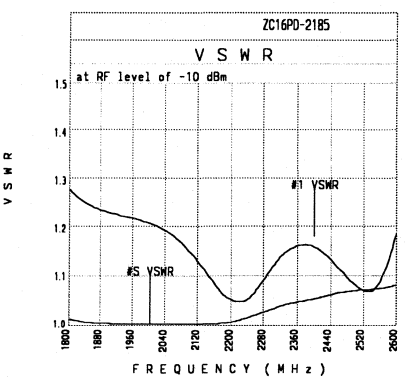
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1500.00	12.70	0.07	22.35	53.54	1500.00	1.33	1.09
1521.00	12.67	0.07	23.25	56.69	1521.00	1.32	1.09
1603.50	12.60	0.09	27.78	52.48	1603.50	1.21	1.08
1665.00	12.60	0.07	32.23	51.78	1665.00	1.12	1.08
1707.00	12.52	0.08	35.79	48.34	1707.00	1.07	1.07
1728.00	12.55	0.09	37.52	48.28	1728.00	1.05	1.07
1768.50	12.61	0.10	39.11	47.58	1768.50	1.06	1.07
1800.00	12.56	0.10	38.79	47.20	1800.00	1.07	1.07
1831.50	12.65	0.10	36.75	47.42	1831.50	1.08	1.08
1872.00	12.61	0.16	34.44	47.08	1872.00	1.09	1.08
1893.00	12.53	0.18	32.71	48.66	1893.00	1.10	1.09
1935.00	12.61	0.17	29.44	50.28	1935.00	1.13	1.09
1996.50	12.61	0.21	25.30	51.19	1996.50	1.20	1.09
2079.00	12.67	0.21	21.51	61.84	2079.00	1.26	1.09
2100.00	12.66	0.18	20.82	57.50	2100.00	1.25	1.09

ZC16PD-2185

1800 to 2600 MHz







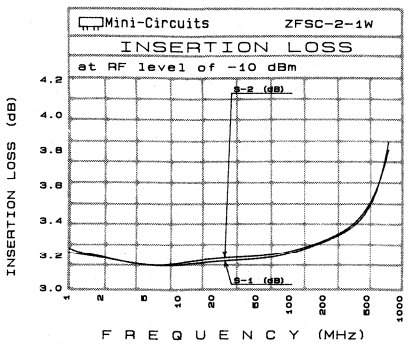
FREQUENCY (MHz)	INSERTION LOSS (dB)	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) ADJACENT	ISOLATION (dB) OPPOSITE	FREQUENCY (MHz)	VSWR S	VSWR OUTPUTS
1800	12.55	0.25	21.08	38.52	1880	1.02	1.29
1852	12.66	0.35	23.33	39.96	1880	1.01	1.25
1960	12.43	0.23	25.42	40.09	1960	1.01	1.23
2040	12.46	0.21	29.73	43.64	2040	1.01	1.21
2100	12.47	0.23	36.51	47.80	2100	1.01	1.16
2152	12.48	0.25	63.21	53.75	2152	1.01	1.10
2184	12.48	0.26	41.36	58.87	2184	1.01	1.06
2232	12.49	0.26	33.74	62.29	2232	1.02	1.05
2260	12.51	0.26	31.42	56.86	2260	1.03	1.08
2300	12.53	0.26	29.12	55.06	2300	1.04	1.13
2324	12.54	0.25	28.10	54.84	2324	1.05	1.16
2400	12.51	0.23	25.55	49.70	2400	1.06	1.19
2480	12.48	0.30	23.27	44.76	2480	1.08	1.10
2552	12.48	0.31	21.19	41.17	2552	1.08	1.05
2600	12.51	0.35	19.87	39.63	2600	1.09	1.20

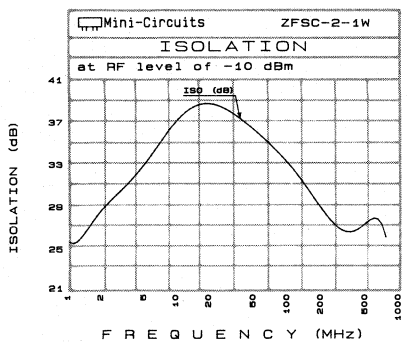
2WAY-0°

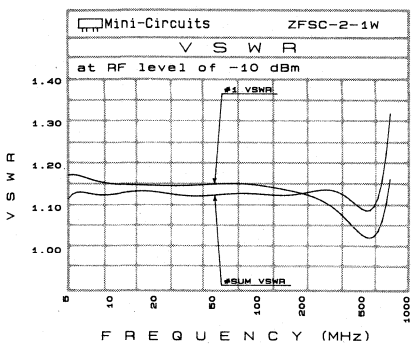
Power Splitter/Combiners 50 ohms

ZFSC-2-1W

1 to 750MHz



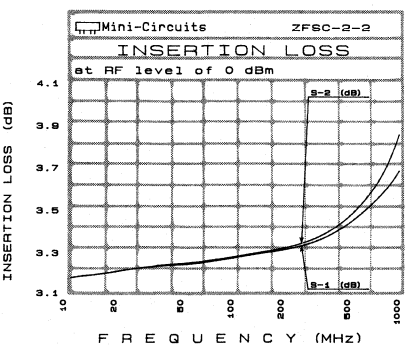


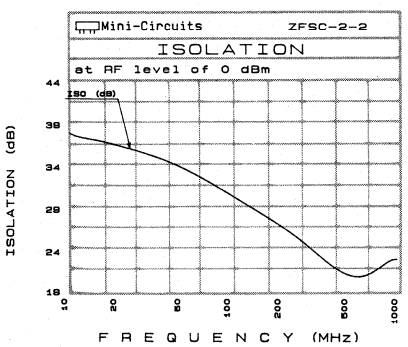


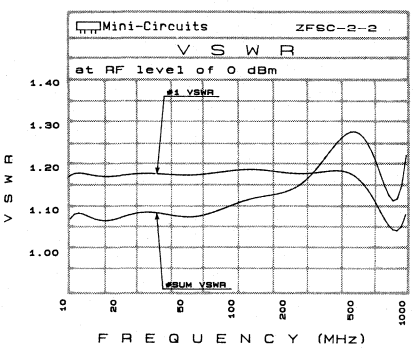
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
1.0	3.22	3.24	0.02	25.14	5.0	1.13	1.18	1.18
2.0	3.19	3.19	0.00	28.53	10.0	1.13	1.16	1.16
5.0	3.15	3.15	0.00	33.16	20.0	1.14	1.15	1.15
10.0	3.14	3.15	0.01	37.27	27.6	1.13	1.15	1.15
20.0	3.19	3.20	0.01	38.91	50.0	1.13	1.16	1.16
50.0	3.18	3.19	0.01	36.43	95.3	1.13	1.15	1.16
100.0	3.24	3.25	0.01	32.90	140.5	1.13	1.14	1.15
146.0	3.24	3.24	0.00	30.74	185.6	1.14	1.14	1.14
200.0	3.27	3.28	0.01	29.06	230.8	1.14	1.13	1.13
315.1	3.34	3.34	0.00	26.79	343.6	1.13	1.09	1.10
411.7	3.42	3.44	0.02	26.22	433.9	1.12	1.06	1.07
500.0	3.48	3.50	0.02	26.84	501.7	1.10	1.03	1.04
605.0	3.54	3.56	0.02	29.11	614.6	1.11	1.04	1.03
701.7	3.77	3.75	0.02	26.91	704.9	1.23	1.11	1.10
750.0	3.96	3.90	0.06	23.19	750.0	1.34	1.16	1.15

ZFSC-2-2

10 to 1000MHz





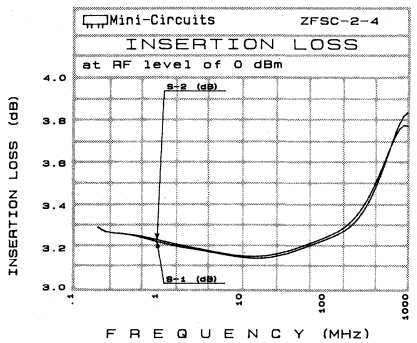


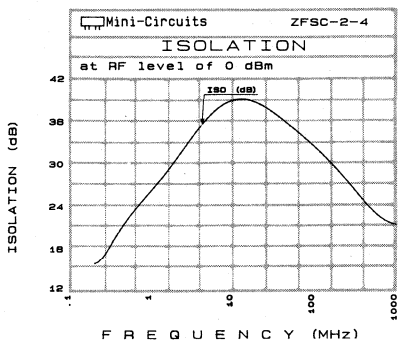
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)	FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	3.18	3.18	0.00	38.07	10.0	1.08	1.18	1.18
34.8	3.24	3.24	0.00	35.46	34.8	1.09	1.18	1.18
59.5	3.25	3.26	0.01	33.29	59.5	1.10	1.19	1.19
109.0	3.28	3.29	0.01	30.53	109.0	1.11	1.19	1.19
158.5	3.30	3.30	0.00	28.46	158.5	1.13	1.19	1.19
257.5	3.33	3.35	0.02	25.52	257.5	1.18	1.19	1.19
356.5	3.37	3.39	0.02	23.46	356.5	1.23	1.19	1.18
406.0	3.39	3.40	0.01	22.63	406.0	1.25	1.19	1.18
505.0	3.48	3.52	0.04	21.54	505.0	1.28	1.18	1.17
653.5	3.48	3.54	0.06	20.99	653.5	1.25	1.14	1.13
752.5	3.60	3.69	0.09	21.62	752.5	1.18	1.09	1.10
851.5	3.58	3.69	0.11	23.16	851.5	1.07	1.03	1.05
901.0	3.59	3.71	0.12	23.85	901.0	1.07	1.02	1.02
950.5	3.62	3.77	0.15	23.43	950.5	1.17	1.07	1.04
1000.0	3.79	3.98	0.19	21.38	1000.0	1.34	1.14	1.10

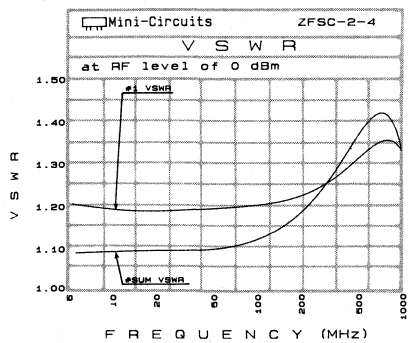
Mini-Circuits

ZFSC-2-4

0.2 to 1000MHz





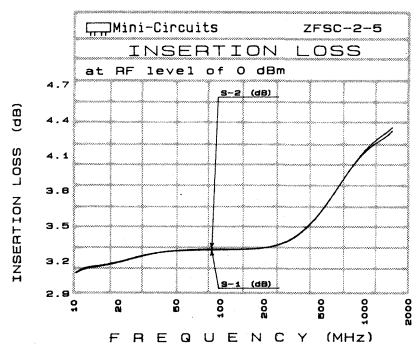


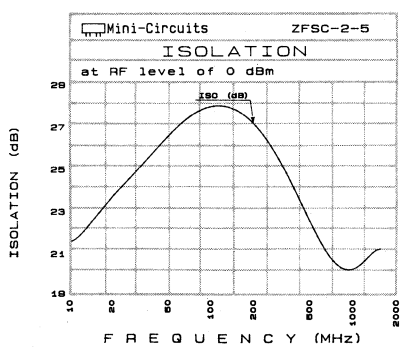
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.2	3.29	3.29	0.00	15.38
1.0	3.23	3.24	0.01	26.35
2.0	3.21	3.22	0.01	30.51
20.0	3.16	3.17	0.01	38.80
50.0	3.19	3.20	0.01	35.47
100.0	3.26	3.26	0.00	32.67
200.0	3.31	3.33	0.02	29.07
345.9	3.43	3.45	0.02	25.75
500.0	3.57	3.58	0.01	23.64
576.4	3.65	3.66	0.01	22.99
653.3	3.69	3.69	0.00	22.48
730.1	3.77	3.77	0.00	22.18
800.0	3.72	3.70	0.02	21.91
845.3	3.82	3.80	0.02	21.82
1000.0	3.81	3.75	0.06	21.07

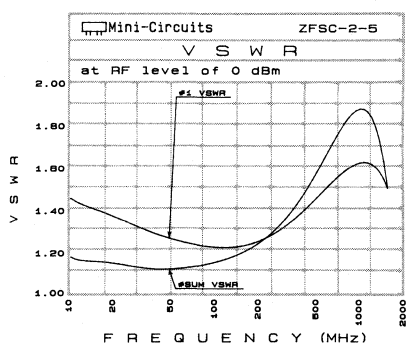
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
5.0	1.09	1.21	1.21
20.0	1.10	1.19	1.19
50.0	1.10	1.20	1.20
100.0	1.12	1.20	1.20
160.5	1.16	1.22	1.22
200.0	1.19	1.23	1.22
347.0	1.29	1.27	1.26
409.2	1.33	1.29	1.28
500.0	1.38	1.32	1.29
564.7	1.40	1.33	1.31
658.0	1.42	1.35	1.31
720.2	1.42	1.35	1.31
800.0	1.41	1.35	1.30
906.7	1.36	1.34	1.28
1000.0	1.3	1.31	1.24

ZFSC-2-5, MSC-2-5

10 to 1500MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
10.0	3.12	3.11	0.01	21.50
47.3	3.29	3.29	0.00	26.53
84.5	3.28	3.29	0.01	27.88
121.8	3.29	3.29	0.00	28.06
196.3	3.32	3.32	0.00	27.18
270.8	3.33	3.33	0.00	25.83
345.3	3.43	3.43	0.00	24.57
568.8	3.73	3.73	0.00	21.71
755.0	3.93	3.93	0.00	20.51
904.0	4.01	4.02	0.01	20.10
1015.8	4.04	4.05	0.01	20.09
1239.3	4.19	4.22	0.03	20.96
1351.0	4.22	4.26	0.04	21.40
1425.5	4.25	4.28	0.03	21.29
1500.0	4.30	4.34	0.04	20.39

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
10.0	1.18	1.45	1.45
47.3	1.12	1.27	1.27
84.5	1.15	1.23	1.23
121.8	1.18	1.23	1.22
196.3	1.25	1.26	1.25
270.8	1.33	1.31	1.3
345.3	1.42	1.36	1.35
568.8	1.67	1.51	1.49
755.0	1.81	1.59	1.55
904.0	1.88	1.62	1.58
1015.8	1.87	1.62	1.58
1239.3	1.83	1.62	1.57
1351.0	1.72	1.60	1.55
1425.5	1.60	1.55	1.52
1500.0	1.50	1.46	1.45

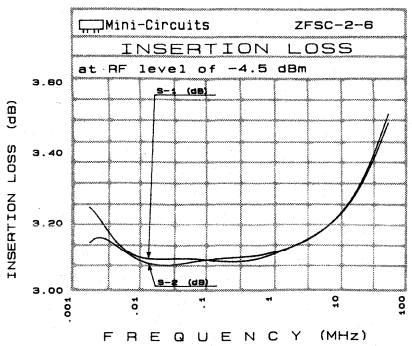
In Stock...Immediate Delivery

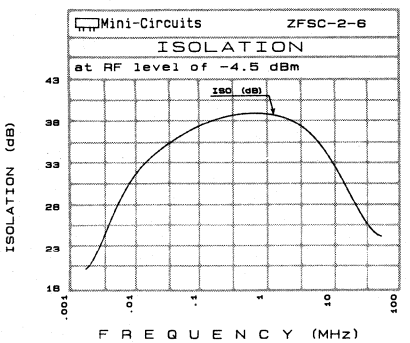
Power Splitter/Combiners

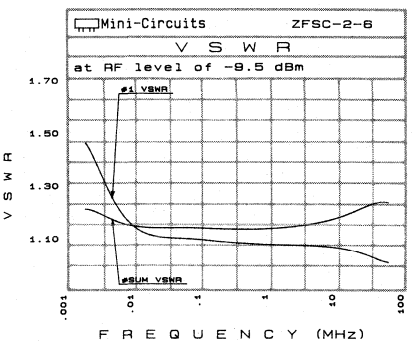
ZFSC-2-6

50 ohms

0.002 to 60MHz







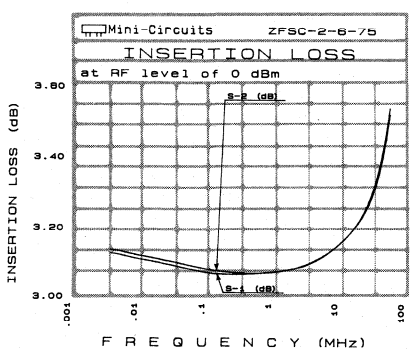
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.002	3.25	3.16	0.09	20.01
0.005	3.14	3.14	0.00	26.55
0.010	3.11	3.10	0.01	31.12
0.015	3.09	3.07	0.02	33.44
0.2	3.10	3.10	0.00	38.17
1.1	3.12	3.12	0.00	38.92
6.0	3.17	3.17	0.00	36.29
10.1	3.22	3.22	0.00	33.75
16.1	3.26	3.26	0.00	30.95
20.0	3.28	3.29	0.01	29.59
30.0	3.33	3.35	0.02	27.20
40.1	3.40	3.42	0.02	25.67
50.0	3.44	3.46	0.02	24.81
54.0	3.46	3.48	0.02	24.62
60.0	3.48	3.51	0.03	24.50

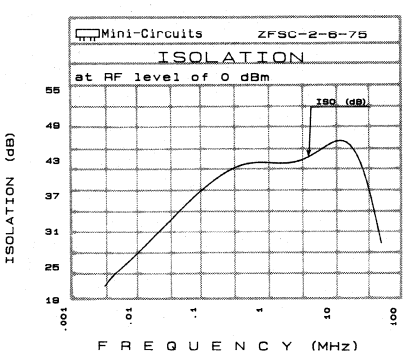
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.002	1.22	1.47	1.48
0.005	1.18	1.25	1.24
0.010	1.14	1.15	1.14
0.015	1.14	1.11	1.11
1.1	1.14	1.08	1.08
5.7	1.16	1.07	1.07
10.1	1.18	1.06	1.06
15.0	1.19	1.06	1.06
20.0	1.20	1.05	1.05
30.0	1.22	1.04	1.04
39.5	1.23	1.02	1.02
45.0	1.24	1.01	1.01
50.0	1.24	1.01	1.00
54.5	1.24	1.01	1.01
60.0	1.23	1.02	1.03

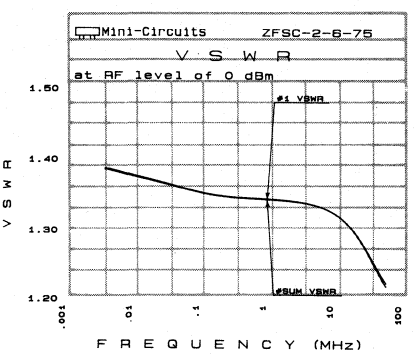
ZFSC-2-6-75

75 ohms

0.004 to 60MHz





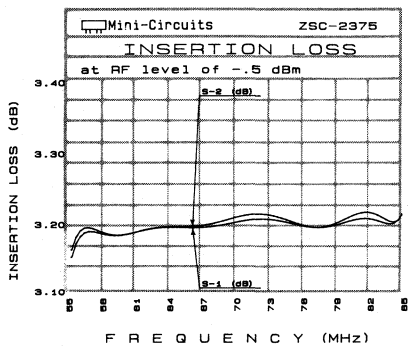


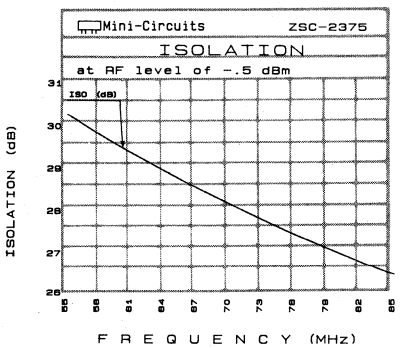
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.004	3.13	3.14	0.01	22.13
0.2	3.07	3.08	0.01	39.24
0.5	3.07	3.07	0.00	42.42
2.0	3.08	3.08	0.00	42.78
5.0	3.11	3.12	0.01	43.93
10.1	3.15	3.15	0.00	45.66
15.5	3.19	3.19	0.00	46.74
20.0	3.22	3.23	0.01	46.38
25.2	3.24	3.24	0.00	44.70
30.9	3.28	3.28	0.00	41.92
40.7	3.35	3.37	0.02	37.15
46.5	3.38	3.41	0.03	34.64
50.0	3.42	3.44	0.02	33.30
56.1	3.48	3.50	0.02	31.09
60.0	3.51	3.54	0.03	29.82

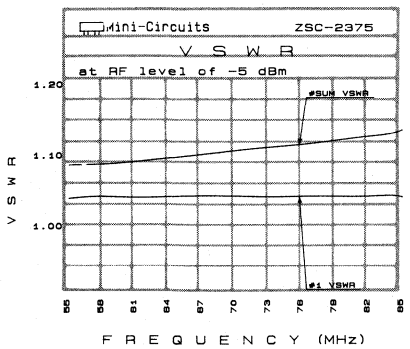
FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.004	1.37	1.39	1.39
0.2	1.33	1.35	1.35
0.5	1.33	1.35	1.35
2.0	1.33	1.34	1.34
5.0	1.31	1.34	1.34
10.1	1.30	1.33	1.33
15.5	1.28	1.31	1.31
20.0	1.27	1.30	1.30
25.2	1.26	1.29	1.29
30.9	1.25	1.27	1.27
40.7	1.22	1.25	1.25
46.5	1.21	1.24	1.24
50.0	1.21	1.24	1.23
56.1	1.20	1.23	1.23
60.0	1.20	1.23	1.23

Mini-Circuits

ZSC-2375 75 ohms 55 to 85MHz



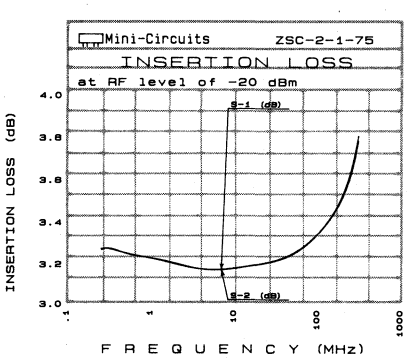


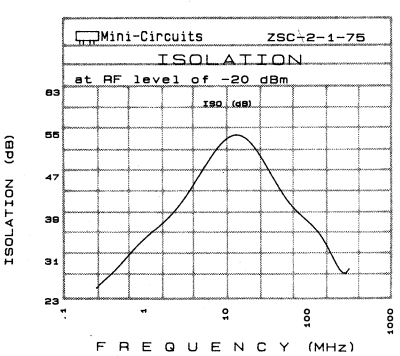


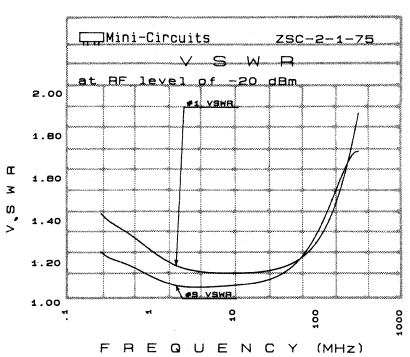
FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
55.0	3.17	3.18	0.01	30.27
57.5	3.18	3.19	0.01	29.90
60.0	3.18	3.18	0.00	29.49
62.5	3.19	3.19	0.00	29.16
65.0	3.21	3.21	0.00	28.82
67.5	3.22	3.22	0.00	28.48
70.0	3.20	3.21	0.01	28.17
71.7	3.22	3.22	0.00	27.97
73.3	3.22	3.22	0.00	27.78
75.0	3.19	3.20	0.01	27.58
77.5	3.20	3.20	0.00	27.29
80.0	3.20	3.21	0.01	27.03
82.5	3.21	3.22	0.01	26.74
83.4	3.20	3.20	0.00	26.65
85.0	3.22	3.22	0.00	26.49

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
55.0	1.08	1.04	1.04
57.3	1.09	1.04	1.04
59.7	1.09	1.04	1.04
61.9	1.09	1.04	1.04
65.0	1.10	1.04	1.04
67.3	1.10	1.04	1.04
68.9	1.10	1.04	1.04
70.4	1.10	1.04	1.04
72.0	1.11	1.04	1.04
73.5	1.12	1.04	1.04
75.0	1.11	1.04	1.04
77.3	1.12	1.04	1.04
79.6	1.12	1.04	1.04
81.9	1.12	1.04	1.04
85.0	1.13	1.04	1.04

ZSC-2-1-75 75 ohms 0.25 to 300MHz







FREQUENCY (MHz)	INSERTION LOSS (dB) S-1	INSERTION LOSS (dB) S-2	AMPLITUDE UNBALANCE (dB) 1-2	ISOLATION (dB)
0.3	3.28	3.28	0.00	26.02
5.0	3.17	3.18	0.01	47.23
10.1	3.18	3.18	0.00	55.78
20.0	3.20	3.20	0.00	52.41
45.3	3.25	3.24	0.01	44.45
77.4	3.30	3.29	0.01	40.51
89.9	3.33	3.33	0.00	39.18
102.5	3.36	3.36	0.00	38.01
123.3	3.39	3.39	0.00	36.35
141.0	3.44	3.44	0.00	35.27
161.4	3.46	3.47	0.01	33.80
175.4	3.48	3.48	0.00	33.08
200.0	3.53	3.51	0.02	31.92
250.0	3.66	3.64	0.02	28.99
300.0	3.80	3.78	0.02	28.86

FREQUENCY (MHz)	VSWR S	VSWR 1	VSWR 2
0.3	1.25	1.43	1.43
5.0	1.09	1.15	1.16
10.1	1.10	1.15	1.15
20.0	1.11	1.16	1.16
45.3	1.17	1.21	1.19
77.4	1.27	1.28	1.26
89.9	1.31	1.32	1.29
102.5	1.36	1.36	1.32
123.3	1.42	1.43	1.37
141.0	1.48	1.49	1.42
161.4	1.54	1.56	1.48
175.4	1.58	1.61	1.52
200.0	1.64	1.70	1.60
250.0	1.71	1.78	1.76
300.0	1.74	1.89	1.90

In Stock...Immediate Delivery

Mini-Circuits

SECTION 3

AMPLIFIERS

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Amplifier Selection Guide

		MODEL NO.	FREQ. (MHz) f_l f_u	GAIN (dB) MIN.	MAX[1] POWER (dBm)	N.F. (dB) TYP.	3rd ORDER I.P. (dBm)	VSWR[2] IN	VSWR[2] OUT	DC POWER V VOLT	DC POWER I (mA)	CASE STYLE	STD. CONN.	OPTIO
MONOLITHIC	PIN	ERA-1	DC-8000	9	+11.7	5.3	+26	1.6:1	1.5:1	+3.6	40	VV105		
		ERA-2	DC-6000	12	+12.8	4.7	+26	1.4:1	1.4:1	+3.6	40	VV105		
		ERA-3	DC-3000	17	+12.1	3.8	+23	1.7:1	1.7:1	+3.5	35	VV105		
		ERA-4	DC-4000	11	+17.0	5.5	+32.5	1.6:1	1.4:1	+5.0	65	VV105		
		ERA-5	DC-4000	16	+18.4	4.5	+33	1.2:1	1.3:1	+4.9	65	VV105		
		ERA-6	DC-4000	10	+18.5	8.4	+36.5	1.3:1	1.6:1	+5.5	70	VV105		
		MAR-1	DC-1000	13.0	+1.5	5.5	+14	1.3:1	1.3:1	+5.0	17	VV105		SMT●
		MAR-2	DC-2000	8.5	+4.5	6.5	+17	1.3:1	1.4:1	+5.0	25	VV105		SMT●
		MAR-3▼	DC-2000	8.0	+10	6.0	+23	1.5:1	1.7:1	+5.0	35	VV105		SMT●
		MAR-4	DC-1000	7.0	+12.5	6.5	+25.5	1.6:1	2.0:1	+5.25	50	VV105		SMT●
		MAR-6▼	DC-2000	9.0	+2	3.0	+14.5	1.5:1	1.4:1	+3.5	16	VV105		SMT●
		MAR-7▼	DC-2000	8.5	+5.5	5.0	+19	1.4:1	1.5:1	+4.0	22	VV105		SMT●
		MAR-8	DC-1000	19.0	+12.5	3.3	+27	3.1:1	3.1:1	+7.8	36	VV105		SMT●
		MAV-11	50-1000	9.0	+17.5	3.6	+30	1.5:1	1.7:1	+5.5	60	BBB123		SMT●
	SMT●	ERA-1SM	DC-8000	9.0	+11.3	5.5	+26	1.6:1	1.5:1	+3.6	40	WW107		
		ERA-2SM	DC-6000	12.0	+12.4	4.6	+26	1.5:1	1.5:1	+3.6	40	WW107		
		ERA-3SM	DC-3000	16.0	+11.5	3.8	+23	1.5:1	1.5:1	+3.5	35	WW107		
		ERA-4SM	DC-4000	11	+16.8	5.2	+33	1.6:1	1.3:1	+5.0	65	WW107		
		ERA-5SM	DC-4000	16	+18.4	4.3	+32.5	1.3:1	1.2:1	+4.9	65	WW107		
		ERA-6SM	DC-4000	10	+17.9	8.4	+36	1.3:1	1.6:1	+5.5	70	WW107		
		RAM-1	DC-1000	13.0	+1.5	5.5	+14	1.3:1	1.3:1	+5.0	17	AF190		
		RAM-2	DC-2000	8.5	+4.5	6.5	+17	1.2:1	1.4:1	+5.0	25	AF190		
		RAM-3	DC-2000	8.0	+10	6.0	+23	1.6:1	1.7:1	+5.0	35	AF190		
		RAM-4	DC-1000	7.0	+12.5	6.5	+25.5	1.4:1	1.9:1	+5.25	50	AF190		
		RAM-6	DC-2000	9.0	+2	2.8	+14.5	1.4:1	1.3:1	+3.5	16	AF190		
		RAM-7	DC-2000	8.5	+5.5	4.5	+19	2.0:1	1.8:1	+4.0	22	AF190		
		RAM-8	DC-1000	19.0	+12.5	3.0	+27	3.1:1	3.1:1	+7.8	36	AF190		
		VNA-25	500-2500	11.5	+15.5	5.5	+27	1.5:1*	1.6:1	+5.0	85	XX112		
VAR. GAIN	CON	ZFL-1000G	10-1000	17.0	+3	12.0	+13	2.0:1	2.0:1	+15.00	100	Y39	SMA	—
		ZFL-1000GH	10-1200	24.0	+13	15.0	+25	2.2:1	2.0:1	+15.00	170	Y39	SMA	—
LOW NOISE (N.F.<4.0 dB)	PIN	MAN-1LN	0.5-500	28.0	+8	2.8	+18	1.8:1	1.8:1	+12.00	60	A05		
		AMP-76	5-500	26.0	+13.5	3.1	+28	2.0:1	2.0:1	+15.00	68	PP120		
		AMP-77	5-500	15.0	+16	3.3	+32	2.0:1	2.0:1	+15.00	56	PP120		
		AMP-75	5-500	19.0	+12	2.4	+28	2.0:1	2.0:1	+15.00	29	PP120		
		AMP-15	5-1000	13.0	+8	2.8	+22	2.0:1	2.0:1	+15.00	29	PP120		
		AMP-11-2	5-1000	14.0	+3.5	3.0	+13	2.0:1	2.0:1	+15.00	12	PP120		
		MAN-1HLN	10-500	10.0	+15	3.7	+30	1.8:1	1.8:1	+12.00	70	A06		
		TO-0812LN	800-1200	20.0	+8	1.6	+18	2.5:1	2.5:1	+15.00	70	QQ96		
		TO-1217LN	1200-1700	20.0	+10	1.6	+25	2.5:1	2.5:1	+15.00	70	QQ96		
		TO-1724LN	1700-2400	20.0	+10	1.6	+22	2.5:1	2.5:1	+15.00	70	QQ96		
	CON	ZFL-500LN	0.1-500	24.0	+5	2.9	+14	1.5:1	1.6:1	+15.00	60	Y39	SMA	BNC
		ZFL-1000LN	0.1-1000	20.0	+3	2.9	+14	1.5:1	2.0:1	+15.00	60	Y39	SMA	—
		ZFL-500HLN	10-500	19.0	+16	3.8	+30	1.5:1	1.5:1	+15.00	110	Y39	SMA	—
		ZEL-0812LN	800-1200	20.0	+8	1.5	+18	2.5:1	2.5:1	+15.00	70	EEE132	SMA	—
		ZHL-0812HLN	800-1200	30.0	+26	1.5	+36	2.4:1	2.4:1	+15.00	725	NN92	SMA	
		ZEL-1217LN	1200-1700	20.0	+10	1.5	+25	2.5:1	2.5:1	+15.00	70	EEE132	SMA	—
		ZHL-1217HLN	1200-1700	30.0	+26	1.5	+36	2.4:1	2.4:1	+15.00	725	NN92	SMA	
		ZEL-1724LN	1700-2400	20.0	+10	1.5	+22	2.5:1	2.5:1	+15.00	70	EEE132	SMA	—
		ZHL-1724HLN	1700-2400	30.0	+26	1.5	+36	2.4:1	2.4:1	+15.00	725	NN92	SMA	
		MAN-2AD	2-1000	9.0	-2	6.5	+14	2.0:1	2.0:1	+15.00	22	A05		
		MAN-11AD	2-2000	8.0	-3.5	6.5	+14	3.0:1	2.0:1	+15.00	22	A05		
		MAN-1AD	5-500	16.0	+7	7.2	+20	1.6:1	1.7:1	+12.00	85	A05		

[1] Minimum output power at 1 dB gain compression
[2] For ERA models, VSWR given as DC-3GHz
● SMT Surface Mount
▼ Alternate package style SOT 143, see VAM series.
* Increase below 1500 MHz

Using the Selection Guide

Locate the Mini-Circuits' amplifier best suited for your particular application quickly with this convenient Selection Guide. Amplifiers are grouped into ten mojor categories and then listed in the sequence of frequency span.

If your amplifier requirements are not met by the catalog models listed, we encourage you to contact our Application Engineering Department. You will find them courte and eager to support your needs with their depth of knowledge coupled with our extensive database on engineering and catalog models.

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		MODEL NO.	FREQ. (MHz) f_L f_u	GAIN (dB) MIN.	MAX[1] POWER (dBm)	N.F. (dB) TYP.	3rd ORDER I.P. (dBm)	VSWR IN	VSWR OUT	DC POWER V VOLT	DC POWER I (mA)	CASE STYLE	STD. CONN.	OPTION
HIGH ISOLATION	PIN	MAN-2AD	2-1000	9.0	-2	6.5	+14	2.0:1	2.0:1	+15.00	22	A05		
		MAN-11AD	2-2000	8.0	-3.5	6.5	+14	3.0:1	2.0:1	+15.00	22	A05		
		MAN-1AD	5-500	16.0	+7	7.2	+20	1.6:1	1.7:1	+12.00	85	A05		
	CON	ZFL-2AD	2-1000	10.0	-2	6.5	+14	2.0:1	2.0:1	+15.00	22	Y39	SMA	—
		ZFL-11AD	2-2000	8.0	-3.5	6.5	+14	2.5:1	2.0:1	+15.00	22	Y39	SMA	—
		ZFL-1HAD	10-500	10.0	+20	7.5	+30	1.3:1	1.35:1	+15.00	115	SS98	SMA	—
		ZFL-2HAD	50-1000	11.0	+20	5.0	+33	2.0:1	2.0:1	+15.00	110	SS98	SMA	
		ZHL-1HLD	225-400	23.0	+27	2.5	+40	2.0:1	2.0:1	+24.00	525	T34	SMA	—
LOW POWER	PIN	MAN-1	0.5-500	28.0	+8	4.5	+18	1.8:1	1.8:1	+12.00	60	A05		
		MAN-2	0.5-1000	18.0	+9	6.0	+19	1.8:1	1.8:1	+12.00	85	A05		
		AMP-74	5-500	27.0	+7	5.0	+20	2.0:1	2.0:1	+15.00	44	PP120		
		AMP-3G	30-3000	8.0	+9.5	3.5	+20	2.6:1	2.5:1	+15.00	55	PP120		
	CON	ZFL-500	0.05-500	20.0	+9	5.3	+18	1.9:1	1.9:1	+15.00	60	Y39	SMA	BNC
		ZFL-1000	0.1-1000	17.0	+9	6.0	+18	1.5:1	2.0:1	+15.00	105	Y39	SMA	—
		ZFL-750	0.2-750	18.0	+9	6.0	+18	1.5:1	2.0:1	+15.00	90	Y39	SMA	—
		ZJL-7G	20-7000	7.5	+9	5.0	+24	1.5:1	1.5:1	+12.00	50	BW459	SMA	—
		ZJL-6G	20-6000	10.0	+10	4.5	+24	1.5:1	1.4:1	+12.00	50	BW459	SMA	—
		ZJL-3G	20-3000	14.0	+8	3.8	+22	1.4:1	1.6:1	+12.00	45	BW459	SMA	—
MEDIUM POWER	PIN	AMP-2000	10-2000	20.0	+15	5.0	+25	2.0:1	2.0:1	+15.00	100	QQ96		
	CON	ZHL-6A	.0025-500	21.0	+23	7.5	+34	1.8:1	2.0:1	+24.00	350	S32	BNC	—
		ZFL-1000H	10-1000	28.0	+20	5.0	+33	2.0:1	2.0:1	+15.00	150	SS98	SMA	—
		ZFL-1000VH	10-1000	20.0	+25	4.5	+38	1.8:1	2.0:1	+15.00	320	SS98	SMA	—
		ZFL-2000	10-2000	20.0	+16	7.0	+25	2.0:1	2.0:1	+15.00	100	Y39	SMA	—
		ZFL-2500	500-2500	28.0	+15	8.0	+27	2.5:1	2.5:1	+5.00	220	Y39	SMA	—
		ZFL-2500VH	10-2500	20.0	+24	5.5	+35	1.7:1	2.0:1	+15.00	300	SS98	SMA	—
		ZHL-1042J	10-4200	25.0	+20	4.5	+30	2.5:1	2.5:1	+15.00	300	NN92	SMA	—
		ZJL-4G	20-4000	10.0	+11	5.5	+30.5	1.4:1	1.6:1	+12.00	75	BW459	SMA	—
		ZJL-4HG	20-4000	13.0	+12	4.5	+30.5	1.5:1	1.4:1	+12.00	75	BW459	SMA	—
		ZJL-5G	20-5000	7.0	+9.5	8.5	+32	1.6:1	1.3:1	+12.00	80	BW459	SMA	—
		ZKL-2R7	10-2700	20.0	+13	5.0	+30	1.3:1	1.4:1	+12.00	120	BY493	SMA	—
		ZKL-2R5	10-2500	26.0	+15	5.0	+31	1.4:1	1.4:1	+12.00	120	BY493	SMA	—
		ZKL-2	10-2000	30.0	+15	4.0	+31	1.4:1	1.4:1	+12.00	120	BY493	SMA	—
		ZKL-1R5	10-1500	36.0	+15	3.0	+31	1.4:1	1.6:1	+12.00	115	BY493	SMA	—
		ZRON-8G	2000-8000	20.0	+20	6.0	+30	2.0:1	2.0:1	+15.00	310	AV243	SMA	—
MEDIUM HIGH POWER	CON	ZHL-32A	.05-130	25.0	+29	10.0	+38	2.0:1	2.0:1	+24.00	600	S32	BNC	SMA,N
		ZHL-3A	.4-150	24.0	+29.5	11.0	+38	2.0:1	2.0:1	+24.00	600	S32	BNC	SMA,N
		ZHL-1A	2-500	16.0	+28	11.0	+38	2.0:1	2.0:1	+24.00	600	S32	BNC	SMA,N
		ZHL-2	10-1000	16.0	+29	9.0	+38	2.0:1	2.0:1	+24.00	600	T34	BNC	SMA,N
		ZHL-2-8	10-1000	27.0	+29	10.0	+38	2.0.1	2.0:1	+24.00	600	T34	BNC	SMA,N
		ZHL-2-12	10-1200	24.0	+29	10.0	+38	2.0:1	2.0:1	+24.00	750	T34	SMA	—
		ZHL-42W	10-4200	30.0	+28	8.0	+38	2.5:1	2.5:1	+15.00	880	U36	SMA	—
		ZHL-4240W	10-4200	40.0	+28	8.0	+38	2.5:1	2.5:1	+15.00	900	U36	SMA	—
		ZHL-42	700-4200	30.0	+28	10.0	+38	2.5:1	2.5:1	+15.00	880	U36	SMA	—
		ZHL-4240	700-4200	40.0	+28	8.0	+38	2.5:1	2.5:1	+15.00	900	U36	SMA	—
		ZVE-8G	2000-8000	30.0	+30	4.0	+40	2.0:1	2.0:1	+12.00	2000	BN333	SMA	—
HIGH POWER	CON	ZHL-5W-1	1-500	40.0	+37	8.0	+49	2.0:1	2.5:1	+24.00	3300	DDD131	SMA	—
		ZHL-1-2W	5-500	29.0	+33	12.0	+44	2.0:1	2.0:1	+24.00	900	T35	BNC	SMA,N
		ZHL-900-10W	480-900	19.0	+38	10.0	+50	2.0:1	2.0:1	+24.00	5500	DDD131	SMA	—
		ZHL-1000-3W	500-1000	38.0	+35	9.0	+45	2.0:1	2.5:1	+24.00	2000	DDD131	SMA	—
		ZHL-7-2W	600-800	28.0	+33	12.0	+43	2.0:1	2.0:1	+24.00	900	T35	BNC	SMA,N
HIGH POWER	CON	LZY-1	20-512	39.0	+44	8.6	+54	2.0:1	9.0:1	+26.00	7300	BT412	SMA	—
		LZY-2	500-1000	40.0	+43	8.0	+54	2.0:1	3.5:1	+28.00	8000	BT451	SMA	—
DISTORTION FEED FORWARD	CON	ZHL-1-50P3	50-500	22.0	+30	7.0	+50	1.5:1	1.5:1	+24.00	1300	U200	SMA	—
		ZHL-2-50P3	50-1000	21.0	+25	8.0	+43	2.0:1	2.0:1	+24.00	650	U200	SMA	—

› Environmental Specifications on the following page.

Environmental Specifications

MODEL	OPERATING TEMP.	AMBIENT	CASE	STORAGE TEMP.	STABILIZATION BAKE (NON-OPER.) 125°C 24 hr.	TEMPERATURE CYCLING (NON-OPER.) -55°C TO +100°C	CONSTANT ACCELERATION (Y1 PLANE) ONLY	BURN-IN (DC. ON) 85°C * 160 hr.	SEAL TEST FINE	SEAL TEST GROSS
AMP	-54°C—85°C		✔	-55°C—100°C	✔	✔	✔	✔	✔	✔
ERA	-45°C—85°C		✔	-65°C—100°C	✔	✔	✔	✔	N.A.	N.A.
LZY	-10°C—50°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
MAN	-54°C—85°C		✔	-55°C—100°C	✔	✔	✔	✔	✔	✔
MAR	-20°C—85°C		✔	-55°C—100°C	✔	✔	✔	✔	N.A.	N.A.
MAV	-20°C—85°C		✔	-55°C—100°C	✔	✔	✔	✔	N.A.	N.A.
RAM	-54°C—125°C		✔	-65°C—150°C	✔	✔	✔	✔	✔	✔
TO	-54°C—85°C		✔	-55°C—100°C	✔	✔	✔	✔	✔	✔
VAM	-20°C—85°C		✔	-55°C-100°C	✔	✔	✔	✔	N.A.	N.A.
VNA	-40°C—70°C		✔	-55 °C—150°C	✔	✔	✔	✔	N.A.	N.A.
ZEL	-54°C—85°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL	-20°C—71°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL-2000	-55°C—100°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL-2500	-20°C—65°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZHL	-20°C—65°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZHL-HLN	-54°C—65°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZJL	-40°C—75°C	✔		-55 °C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZKL	-40°C—75°C	✔		-55°C—100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZRON	0°C—60°C		✔	-55 °C—125°C	✔	✔	✔	✔	N.A.	✔
ZVE-8G	-55°C—90°C		✔	-65 °C—150°C	✔	✔	N.A.	✔	N.A.	N.A.

* Or max. operating temp., whichever is le

NOTES: Units are designed and manufactured to meet the environmental specifications as indicated.

Mini-Circuits®
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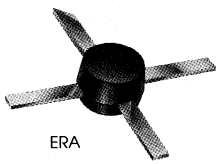
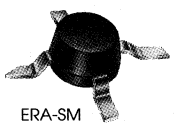
MONOLITHIC AMPLIFIERS 50Ω Drop-In & Surface Mount

BROADBAND DC to 8 GHz


ERA


ERA-SM

All specifications at 25°C

MODEL NO.	✪ FREQ. GHz f_l - f_u	GAIN, dB Typical over frequency, GHz 0.1	1	2	3	4	6	8	Min.@ 2 GHz	Flatness DC-2 GHz	MAXIMUM POWER, dBm at 2 GHz* Output (1 dB Comp.) Typ.	Min.	Input (no dmg.)	DYNAMIC RANGE at 2 GHz* NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In DC-3 GHz	3-f_u** GHz	Out DC-3 GHz	3-f_u** GHz	MAXIMUM RATING[3] I mA	P mW	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE θjc, typ. °C/W	CAPD DATA (see RF/IF Designer handbook)	Case Style Note B	CONNECTION	Price $ Qty. (30)
ERA-1	DC-8	12.2	12.1	11.8	11.5	11.3	11.0	10.2	9	±0.3	11.7	9.7	15	5.3	26	1.6	1.8	1.5	1.9	75	330	40	3.6	455	3-56	VV105	cb	1.37
ERA-2	DC-6	16.2	16.0	15.6	15.1	14.6	14.0	—	12	±0.3	12.8	11	15	4.7	26	1.4	1.4	1.4	1.6	75	330	40	3.6	455	3-56	VV105	cb	1.52
ERA-3	DC-3	22.9	22.2	20.8	19.2	—	—	—	17	±1.1	12.1	9	13	3.8	23	1.7	—	1.7	—	75	330	35	3.5	432	3-56	VV105	cb	1.67
ERA-4	DC-4	13.8	13.7	13.5	13.3	13.0	—	—	11	±0.2	17.0	15	20	5.5	32.5	1.6	1.6	1.4	1.6	120	650	65	5.0	278	3-57	VV105	cb	3.85
ERA-5	DC-4	20.2	19.8	18.8	17.7	16.4	—	—	16	±0.75	18.4	16.5	13	4.5	33	1.2	1.2	1.3	1.5	120	650	65	4.9	278	3-57	VV105	cb	3.85
ERA-6	DC-4	11.1	11.1	11.3	11.5	11.3	—	—	10	±0.2	18.5	16.5	20	8.4	36.5	1.3	1.3	1.6	1.6	120	850	70	5.5	220	3-57	VV105	cb	3.85
ERA-1SM	DC-8	12.3	12.1	11.8	11.2	10.8	10.4	9.2	9	±0.3	11.3	9.3	15	5.5	26	1.6	1.9	1.5	1.9	75	330	40	3.6	460	3-56	WW107	cb	1.42
ERA-2SM	DC-6	16.2	15.8	15.2	14.4	13.6	13.0	—	12	±0.5	12.4	10.5	15	4.6	26	1.5	1.6	1.5	1.7	75	330	40	3.6	460	3-56	WW107	cb	1.57
ERA-3SM	DC-3	22.8	21.8	20.2	18.4	—	—	—	16	±1.3	11.5	9	13	3.8	23	1.5	—	1.5	—	75	330	35	3.5	437	3-56	WW107	cb	1.72
ERA-4SM	DC-4	14.0	13.8	13.5	13.2	12.7	—	—	11	±0.3	16.8	15	20	5.2	33	1.6	1.6	1.3	1.5	120	650	65	5.0	283	3-57	WW107	cb	3.90
ERA-5SM	DC-4	20.2	19.5	18.5	17.3	16.2	—	—	16	±1.0	18.4	16.5	13	4.3	32.5	1.3	1.3	1.2	1.3	120	650	65	4.9	283	3-57	WW107	cb	3.90
ERA-6SM	DC-4	11.2	11.2	11.3	11.4	11.2	—	—	10	±0.2	17.9	16	20	8.4	36	1.3	1.3	1.6	1.5	120	850	70	5.5	225	3-57	WW107	cb	3.90

features

- miniature microwave amplifier
- available in drop-in & surface mount (sm) versions
- frequency range, DC to 8 GHz, usable to 10 GHz
- up to 18.5 dBm typ. (16.5 dBm min) output power

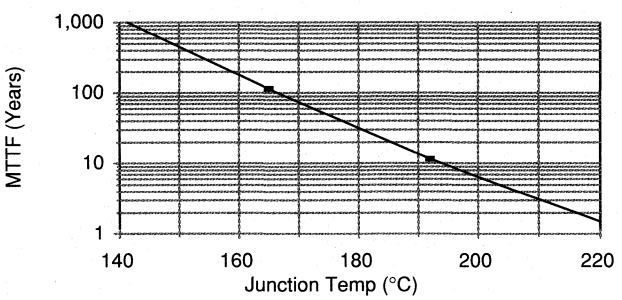
absolute maximum ratings

operating temperature: -45°C to 85°C
storage temperature: -65° to 150°C
device voltage: 3.0V min., 4.1V max. for ERA 1,2,3
4.2V min., 5.5V max. for ERA 4,5
5.0V min., 6.0V max. for ERA-6

marking identification

Model	Alphanumeric Code
ERA-1, ERA-1SM	E1
ERA-2, ERA-2SM	E2
ERA-3, ERA-3SM	E3
ERA-4, ERA-4SM	E4
ERA-5, ERA-5SM	E5
ERA-6, ERA-6SM	E6

MTTF vs. JUNCTION TEMP. (ERA)



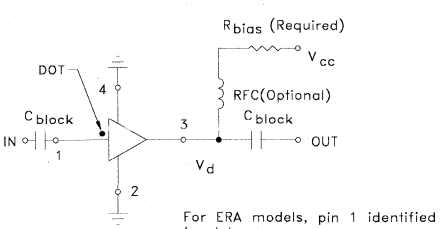
NOTES:

* at 1 GHz for ERA 4, 5, 6, 4SM, 5SM, 6SM.
** f_u is the upper frequency limit for each model as shown in the table.
✪ Low frequency cutoff determined by external coupling capacitors.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Model number designated by alphanumeric code marking.
2. ERA-SM models available on tape and reel.
3. Operation at max. rating will severely decrease MTTF (ref to MTTF graph)

designers kits available

KIT NO.	Model Type	No. of Units in Kit	Description	Price $ per kit
K1-ERA	ERA	30	10 of each 1,2,3	49.95
K2-ERA	ERA	20	10 of each 4,5	69.95
K1-ERASM	ERA-SM	30	10 of each 1SM, 2SM,3SM	49.95
K2-ERASM	ERA-SM	20	10 of each 4SM, 5SM	69.95

Typical Biasing Configuration
ERA



For ERA models, pin 1 identified by dot.

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

MONOLITHIC AMPLIFIERS 50 Ω

BROADBAND DC to 2.5 GHz

MAR-SM

MAV-SM

up to +17.5 dBm output

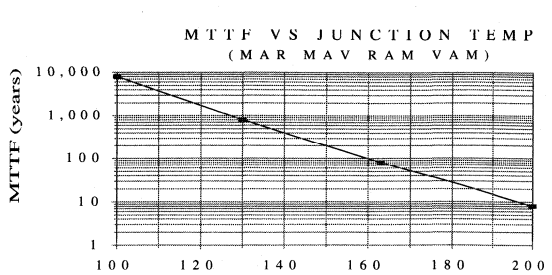
MODEL NO.	✪FREQ. MHz	GAIN, dB Typical (at MHz) 100	1000	2000	note 1 MIN.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Pri $ (Qty
MAR-1SM	DC-1000	18.5	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.2	40	200	17	5.00	115	3-22	WW107	cb	1.0
MAR-2SM	DC-2000	12.5	12.0	11.0	8.5	+4.5	+13	6.5	+17.0	1.5	1.4	60	325	25	5.00	105	3-22	WW107	cb	1.1
MAR-3SM	DC-2000	12.5	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.5	1.7	70	400	35	5.00	115	3-22	WW107	cb	1.2
MAR-4SM	DC-1000	8.3	8.0	—	7.0	+12.5	+13	7.0	+25.5	1.5	1.9	85	500	50	5.25	100	3-23	WW107	cb	1.3
MAR-6SM	DC-2000	20.0	16.0	11.0	9.0	+2.0	+13	3.0	+14.5	1.7	1.7	50	200	16	3.50	120	3-23	WW107	cb	1.2
MAR-7SM	DC-2000	13.5	12.5	11.0	8.5	+5.5	+13	5.0	+19.0	1.7	1.7	60	275	22	4.00	120	3-23	WW107	cb	1.3
MAR-8SM	DC-1000	32.5	22.5	—	19.0	+12.5	+13	3.3	+27.0	#	#	65	500	36	7.80	140	3-24	WW107	cb	1.3
MAV-11SM	50-1000	12.7	10.5	—	9.0	+17.5	+13	3.6	+30.0	1.5	1.7	80	550	60	5.50	125	3-25	RRR137	cb	1.6

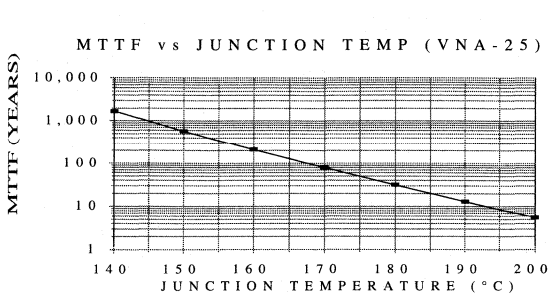
NOTES:

☆ Increases below 1500 MHz.
* RAM models are hermetically sealed.
▮ Max. Voltage 7V (DC power at pin 1).
❖ Price of RAM models is for 1-9 quantity.
\# Dash-8 models input and output impedances are not 50 ohms, see S-parameter data. Conditionally stable, source and load VSWR<3:1 required.
Dash-6 models conditionally stable, source and load VSWR<5:1 required.
✪ Low frequency cutoff determined by external coupling capacitors.
✻ Specification at 500 MHz.
✻✻ Specification at 2500 MHz.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Minimum gain at highest frequency. Full temperature range, except room temperature for Dash-4 models.
2. Model number designated by color dot or alphanumeric code marking.
3. Frequency at which output power, NF and IP3 are specified:
500 MHz for MAR-1SM, MAR-6SM, RAM-1, RAM-6, MAV-11SM, VAM-6,
1000 MHz for all other models.
4. Dash-6 models potentially unstable with very high VSWR terminations.
6. Thermal resistance θjc is from hottest junction in the device to the mounting surface of the leads.
7. Permanent damage may occur if any of these limits are exceeded.

marking identification

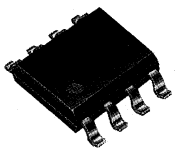
Model	Alphanumeric Code	OR	Color Dot
MAR-1SM	A01		Brown
MAR-2SM	A02		Red
MAR-3SM	A03		Orange
MAR-4SM	A04		Yellow
MAR-6SM	A06		White
MAR-7SM	A07		Violet
MAR-8SM	A08		Blue
RAM-1	1 or A01		—
RAM-2	2 or A02		—
RAM-3	3 or A03		—
RAM-4	4 or A04		—
RAM-6	6 or A06		—
RAM-7	7 or A07		—
RAM-8	8 or A08		—
MAV-11SM	A		—
VAM-3	A03		—
VAM-6	A06		—
VAM-7	A07		—





* RAM

VAM



VNA

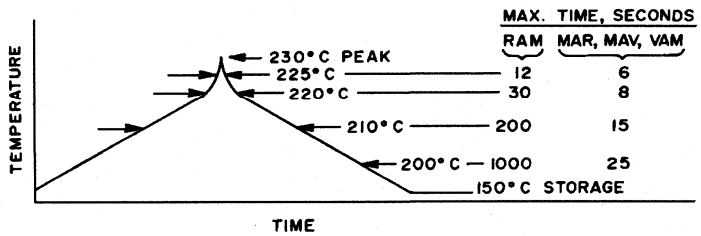
up to +18.2 dBm output

MODEL NO.	⊙FREQ. MHz	GAIN, dB Typical (at MHz) 100	1000	2000	note 1 MIN.	MAXIMUM POWER, dBm note 5 Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
RAM-1	DC-1000	19.0	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.3	40	200	17	5.00	150	3-22	AF190	cb	4.95
RAM-2	DC-2000	12.5	11.8	11.0	8.5	+4.5	+13	6.5	+17.0	1.2	1.4	60	325	25	5.00	145	3-22	AF190	cb	4.95
RAM-3	DC-2000	12.5	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.6	1.7	80	425	35	5.00	150	3-22	AF190	cb	4.95
RAM-4	DC-1000	8.5	8.0	—	7.0	+12.5	+13	6.5	+25.5	1.4	1.9	100	540	50	5.25	140	3-23	AF190	cb	4.95
RAM-6	DC-2000	20.0	16.0	11.0	9.0	+2.0	+13	2.8	+14.5	1.4	1.3	50	200	16	3.50	155	3-23	AF190	cb	4.95
RAM-7	DC-2000	13.5	12.5	11.0	8.5	+5.5	+13	4.5	+19.0	2.0	1.8	60	275	22	4.00	155	3-23	AF190	cb	4.95
RAM-8	DC-1000	32.5	23.0	—	19.0	+12.5	+13	3.0	+27.0	#	#	65	420	36	7.80	175	3-24	AF190	cb	4.95
VAM-3	DC-2000	11.5	11.0	9.5	7.5	+9.0	+13	6.0	+22.0	1.5	1.7	60	240	35	4.70	500	3-26	MMM168	cb	1.19
VAM-6	DC-2000	19.5	15.0	10.0	8.0	+2.0	+13	3.0	+14.0	1.6	1.5	40	125	16	3.30	505	3-26	MMM168	cb	1.16
VAM-7	DC-2000	13.0	12.0	9.8	7.8	+5.5	+13	5.0	+18.0	1.5	1.5	50	175	22	3.80	505	3-26	MMM168	cb	1.31
VNA-25	500-2500	14.0*	18.0	16.0**	11.5	+18.2	+10	5.5	+27.0	1.5☆	1.6	105	1000	85	5.0	125	3-58	XX211	hj	4.25

features

- cascadable
- excellent repeatability
- wide bandwidth, DC to 2500 MHz
- unconditionally stable, most models
- low cost
- hermetically sealed, RAM models
- low noise figure, 2.8 dB typ
- high output power, up to +18 dBm typ

REFLOW - SOLDERING PROFILE



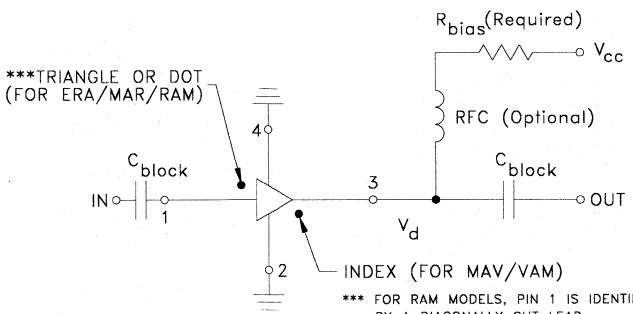
pin connections

PORT	cb	hj
RF IN	1	3
RF OUT	3	6
DC	3	1
GND EXT	2,4	2,4,5,7,8
NOT USED	—	—

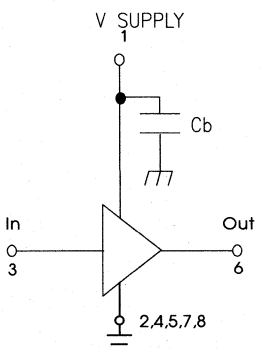
NSN GUIDE

MCL NO.	NSN
MAR-1SM	5962-01-414-8635
MAR-3SM	5962-01-423-1569

Typical Biasing Configuration
ERA/MAR/MAV/RAM/VAM



Biasing Configuration
VNA



DESIGNERS KITS AVAILABLE
SEE PAGES 16&17

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MONOLITHIC AMPLIFIERS 50 Ω

BROADBAND DC to 2 GHz

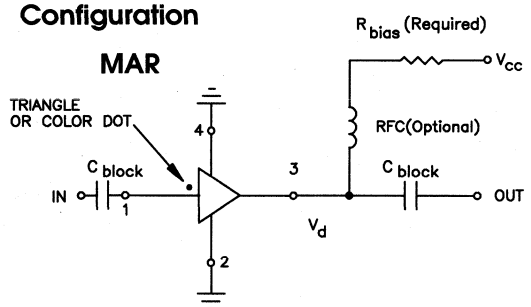
MAR

up to +12.5 dBm output

MODEL NO.	✪FREQ. MHz f_l	f_u	GAIN, dB Typical (at MHz) 100	500	1000	2000	note 1 MIN.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
❑ MAR-1	DC	1000	18.5	17.5	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.3	40	200	17	5.00	105	3-22	VV105	cb	0.99
❑ MAR-2	DC	2000	12.5	12.3	12.0	11.0	8.5	+4.5	+13	6.5	+17.0	1.3	1.4	60	325	25	5.00	95	3-22	VV105	cb	1.12
❑ MAR-3	DC	2000	12.5	12.2	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.5	1.7	70	400	35	5.00	105	3-22	VV105	cb	1.19
❑ MAR-4	DC	1000	8.3	8.2	8.0	—	7.0	+12.5	+13	6.5	+25.5	1.6	2.0	85	500	50	5.25	90	3-23	VV105	cb	1.29
❑ MAR-6	DC	2000	20.0	18.5	16.0	11.0	9.0	+2.0	+13	3.0	+14.5	1.5	1.4	50	200	16	3.50	110	3-23	VV105	cb	1.66
❑ MAR-7	DC	2000	13.5	13.1	12.5	11.0	8.5	+5.5	+13	5.0	+19.0	1.4	1.5	60	275	22	4.00	110	3-23	VV105	cb	1.31
❑ MAR-8	DC	1000	32.5	28.0	22.5	—	19.0	+12.5	+13	3.3	+27.0	#	#	65	500	36	7.80	130	3-24	VV105	cb	1.27

Typical Biasing Configuration

MAR



NOTES:

** Typical gain at 1500 MHz

❑ Non-hermetic

\# Dash-8 models input and output impedances are not 50 ohms, see S-parameter data. Conditionally stable, source and load VSWR<3:1 required. Dash-6 models conditionally stable, source and load VSWR<5:1 required.

✪ Low frequency cutoff determined by external coupling capacitors.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.

D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.

1. Minimum gain at highest frequency. Full temperature range, except room temperature for Dash-4 models.
2. Model number designated by color dot or alphanumeric code marking.
3. Frequency at which output power, NF and IP3 are specified: 500MHz for MAR-1, MAR-6, MAV-11, 1000MHz for all other models.
4. Dash-6 models potentially unstable with very high VSWR terminations.
6. Thermal resistance θjc is from hottest junction of the device to the mounting surface of the leads.
7. Permanent damage may occur if any of these limits are exceeded.

DESIGNERS KITS AVAILABLE SEE PAGES 16&17

marking identification

Model	Alphanumeric Code	OR	Color Dot
MAR-1	A01		Brown
MAR-2	A02		Red
MAR-3	A03		Orange
MAR-4	A04		Yellow
MAR-6	A06		White
MAR-7	A07		Violet
MAR-8	A08		Blue
MAV-11	A		—

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MAV

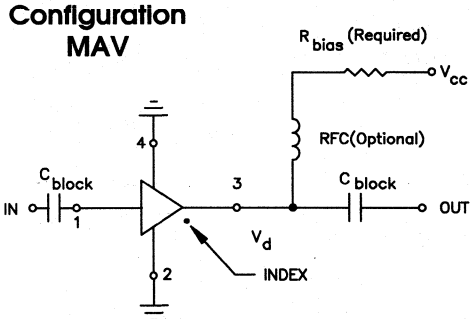
up to +17.5 dBm output

MODEL NO.	●FREQ. MHz f_l	f_u	GAIN, dB Typical (at MHz) 100	500	1000	2000	note 1 MIN.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
❑ MAV-11	50-1000		12.7	12.0	10.5	—	9.0	+17.5	+13	3.6	+30.0	1.5	1.7	80	550	60	5.50	115	3-25	BBB123	cb	1.57

features

- cascadable
- excellent repeatability
- wide bandwidth DC-2000 MHz
- unconditionally stable, except MAR-6, MAR-8
- low cost, MAR, MAV models
- low noise figure, 2.8 to 3.6 dB typ. MAR-6, MAR-8, MAV-11
- high output power, +17 dBm typ., MAV-11

Typical Biasing Configuration MAV



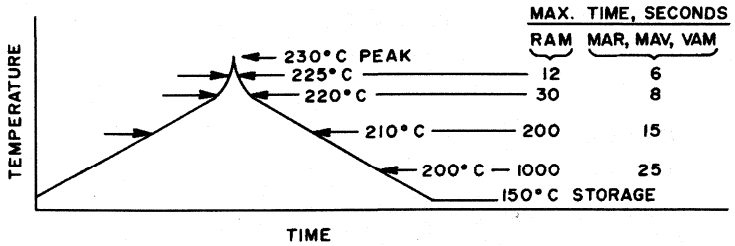
pin connections

PORT	cb
RF IN	1
RF OUT	3
DC	3
CASE GND	2,4
NOT USED	—

NSN GUIDE

MCL NO.	NSN
MAR-2	5962-01-417-4110
MAR-3	5962-01-339-2933
MAR-4	5962-01-414-8631
MAR-6	5962-01-416-1462
MAR-8	5998-01-360-6957
MAV-11	5998-01-360-6958

REFLOW - SOLDERING PROFILE



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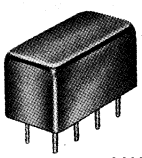
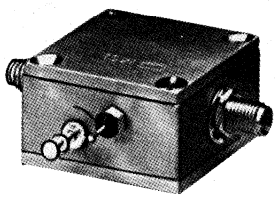
LOW-NOISE AMPLIFIERS 50 Ω

BROADBAND, LINEAR 0.1 to 2400 MHz

AMP


MAN


ZFL

up to +16 dBm output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	NF dB Typ.	GAIN, dB Min.	GAIN, dB Flatness m	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	INTERCEPT POINT, dBm IP3 Typ.	VSWR Typ. In	VSWR Typ. Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
AMP-11-2	5	1000	3	14	±1.0	±1.0	-3.5	+13	+13	2:1	2:1	15	12	3-27	PP120	cd	44.95
AMP-15	5	1000	2.8	13	±0.6	±1.2	+8	+13	+22	2:1	2:1	15	29	3-27	PP120	cd	49.95
AMP-75	5	500	2.4	19	±0.4	±1.0	+12	+13	+28	2:1	2:1	15	29	3-27	PP120	cd	49.95
AMP-76	5	500	3.1	26	±0.7	±1.0	+13.5	+6	+28	2:1	2:1	15	68	3-35	PP120	cd	78.95
AMP-77	5	500	3.3	15	±0.4	±1.0	+16	+13	+32	2:1	2:1	15	56	3-28	PP120	cd	55.95
MAN-1LN**	0.5	500	3.0	28	±0.5	±1.4	+7	+15	+18	1.8:1	1.8:1	12	60	3-28	A05	cc	19.95
MAN-1HLN	10	500	3.7	10	±0.5	±0.8	+15	+15	+30	1.8:1	1.8:1	12	70	3-28	A06	cc	19.95
ZFL-500HLN	10	500	3.8	19	—	±0.4	+16	+15	+30	2:1	2:1	15	110	3-29	Y460	-	99.95
ZFL-500LN*	0.1	500	2.9	24	—	±0.5	+5	+5	+14	1.5:1	1.6:1	15	60	3-29	Y460	-	79.95
ZFL-1000LN	0.1	1000	2.9	20	—	±0.5	+3	+5	+14	1.5:1	2:1	15	60	3-29	Y460	-	89.95

m = mid range ($2 f_L$ to $f_U/2$)

features

- ideal for printed-circuit designs (MAN & AMP series)
- smooth response over entire band, no external resonances
- low impedance, less susceptible to EMI
- easy to use, 50 ohm input/output
- all models are cascadable

NSN GUIDE

MCL NO.	NSN
AMP-15	5895-01-350-9550
AMP-75	5895-01-350-9551
AMP-77	5895-01-350-9549
ZFL-1000LN	5996-01-412-3031

NOTES:

* VSWR 1.6:1 maximum from 0.1 to 0.2 MHz. Also available with BNC connectors.

** Below 5 MHz, 1 dB compression point decreases to 6.5 dBm.

△ Available only with SMA connectors

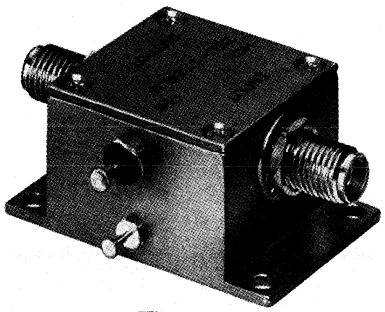
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.

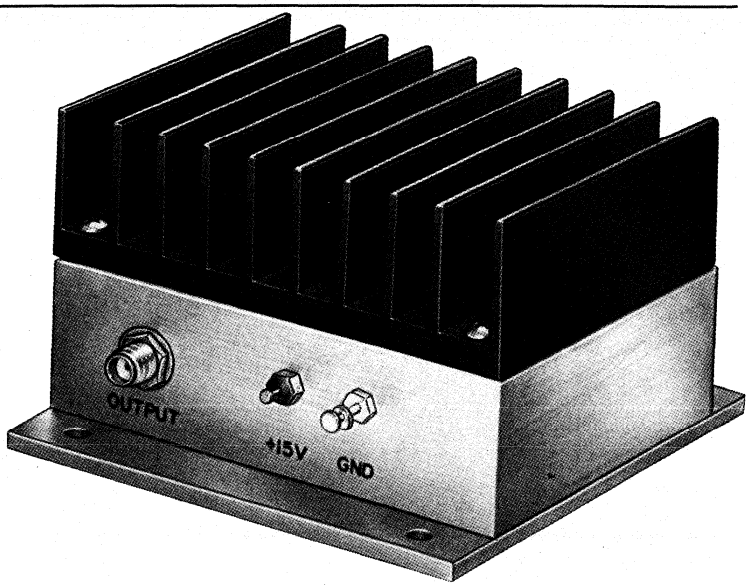
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.

1. Absolute maximum power, voltage and current rating:
   1a. AMP models, 17V DC.
   1b. MAN models, 12.5V DC.
2. With no load at output, derates maximum input power (no damage) by 10 dB.
3. ZEL and TO models, NF specified at room temperature, increases to 2 dB typical at +85 deg.C.
4. ZHL models, NF specified at room temperature, increases to 2.3 dB maximum at +65 deg.C.

TO



ZEL



ZHL

up to +26 dBm output

MODEL NO.	FREQ. MHz f_L	f_U	NF dB Max.	GAIN, dB Min.	Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	Input (no damage)	INTERCEPT POINT, dBm IP3 Typ.	VSWR Typ. In	Out	DC POWER Volt V.	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
TO-0812LN	800-1200		1.6	20	±1.0	+8	+13	+18	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
TO-1217LN	1200-1700		1.6	20	±1.0	+10	+13	+25	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
TO-1724LN	1700-2400		1.6	20	±1.0	+10	+13	+22	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
△ ZEL-0812LN	800-1200		1.5	20	±1.0	+8	+13	+18	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
△ ZEL-1217LN	1200-1700		1.5	20	±1.0	+10	+13	+25	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
△ ZEL-1724LN	1700-2400		1.5	20	±1.0	+10	+13	+22	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
△ ZHL-0812HLN	800-1200		1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50
△ ZHL-1217HLN	1200-1700		1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50
△ ZHL-1724HLN	1700-2400		1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50

features

- very low noise
- high dynamic range (ZHL-HLN series)
- ideal for printed-circuit designs (TO series)
- smooth response over entire band, no external resonance
- easy to use, 50 ohms input/output
- all models are cascadable

pin connections

PORT	cc	cd	ce
RF IN	1	2	5
RF OUT	8	4	11
DC	5	1	2
CASE GND	2,3,4,6	3	1,3,4,6,7,8,9,10,12
NOT USED	7	—	—

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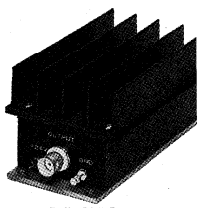
AMP-case QQ96

AMP-case PP120

MAN

ZFL-case Y39/460


ZHL-1HLD

VARIABLE GAIN 10 to 1200 MHz

up to 20 mW (+13 dBm) output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	GAIN, dB Control range	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
ZFL-1000GH *	10-1200		24	±1.5	30**	+13	+10	15	+25	2.2:1	2:1	15	170	3-33	Y39	-	219.00
ZFL-1000G *	10-1000		17	±1.5	30**	+3	+10	12	+13	2:1	2:1	15	100	3-33	Y39	-	199.00

* ZFL-1000GH and ZFL-1000G, all specifications at 0 Volts control voltage.
** Response time (10% to 90%) 25µsec., control voltage 0 to 5 volts.

HIGH ISOLATION 2 to 2000 MHz

up to 500 mW (+27 dBm) output

	MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max. m	GAIN, dB Flatness Max. Total Range	MAX. POWER, dBm Output (1 dB Comp.) L_W	MAX. POWER, dBm Output (1 dB Comp.) U	MAX. POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR (Typ.) In	VSWR (Typ.) Out	ACTIVE DIRECTIVITY* dB L_W Typ.	L_W Min.	U Typ.	U Min.	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
	MAN-1AD	5-500		16	±0.5	±1.0	+7	+6	+15	7.2	+20	1.6:1	1.7:1	35	25	30	20	12	85	3-34	A05	cc	26.45
	MAN-11AD	2-2000		8	±0.5	±1.5	-2	-3.5	+10	6.5	+14	3.0:1	2.0:1	21	14	16	12	15	22	3-34	A06	cc	31.95
	MAN-2AD	2-1000		9	±0.4	±0.7	-2	-3.5	+10	6.5	+14	2.0:1	2.0:1	24	19	19	14	15	22	3-34	A06	cc	23.95
	ZFL-11AD	2-2000		8	±0.5	±1.3	-2	-3.5	+10	6.5	+14	2.5:1	2.0:1	21	14	16	12	15	22	3-34	Y39	-	91.95
	ZFL-2AD	2-1000		10	±0.4	±0.5	-2	-3.5	+10	6.5	+14	2.0:1	2.0:1	24	19	19	14	15	22	3-34	Y39	-	83.95
	ZFL-1HAD**	10-500		10	—	±1.0	+20	+20	+17	7.5	+30	1.3:1	1.35:1	30	20	25	18	15	115	3-35	SS98	-	210.00
NEW	ZFL-2HAD***	50-1000		11	±0.7	±1.0	+20	+20	+15	5.0	+33	2.0:1	2.0:1	30	20	21	15	15	110	3-49	SS98	-	264.95
△	ZHL-1HLD	225-400		23	—	±1.0	+27	+27	+10	2.5	+40	2.0:1	2.0:1	34	28	34	28	24	525	3-35	T34	-	395.00

L_W = low range (f_L to $f_U/2$) m = mid range ($2f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* Active Directivity (dB) = Isolation (dB) - Gain (dB)
** Input VSWR of ZFL-1HAD in 10-20 MHz band increases to 1.45:1 at -55 deg.C. Below 50 MHz, NF increases to 11 dB typ at 10 MHz.
*** ZFL-2HAD can be used without the heatsink

NOTES:
✤ Hermetically sealed with field replaceable connectors.
✣ Max. voltage Vdc
▲ Available only with BNC connectors
△ Available only with SMA connectors
▼ SMA standard: Also available with BNC or type N connectors, please consult factory.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Absolute maximum power, voltage and current rating:
   1a. AMP models, 17V DC
   1b. MAN models, 12.5V DC
   1c. ZHL models, 28V DC (except ZHL-1HAD, 17V DC)
   1d. ZFL models, 17V DC (except ZFL-AD, 16V DC)
   1e. ZJL models, 13V DC
2. With no load output, derate maximum input power (no damage) by 10 dB.

NSN GUIDE

MCL NO.	NSN
ZFL-1000H	5895-01-299-5588
ZFL-2000	5895-01-220-2213
ZFL-2000B	5895-01-220-2213
ZHL-6A	5895-01-330-3533

pin connections

PORT	cc	cd	ce
RF IN	1	2	5
RF OUT	8	4	11
DC	5	1	2
CASE GND	2,3,4,6	3	1,3,4,6,7

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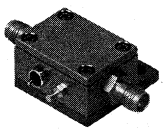
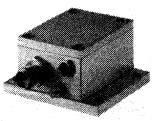

ZJL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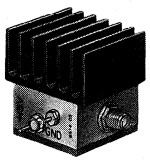
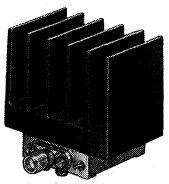
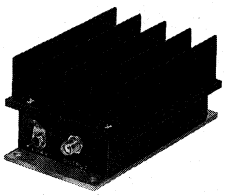
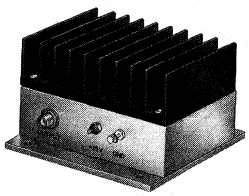

ZFL-case SS98


✤ ZRON


ZHL-A


ZHL-1042J

LOW POWER 50 kHz to 7000 MHz

up to 16 mW (+12 dBm) output

	MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Typ.	GAIN, dB Min.	GAIN, dB Flatness Typ.(1)	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.) L_w	MAXIMUM POWER, dBm Output (1 dB Comp.) U	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE(1) NF dB Typ.	DYNAMIC RANGE(1) IP3 dBm Typ.	VSWR (Typ.) In	VSWR (Typ.) Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
NEW	ZJL-7G	20-7000		10	7.5	±1.0	--	+8	+9	+15	5.0	+24	1.5:1	1.5:1	12	50	3-50	BW459	-	99.95
NEW	ZJL-6G	20-6000		13	10	±1.6	--	+9	+10	+15	4.5	+24	1.5:1	1.4:1	12	50	3-50	BW459	-	114.95
NEW	ZJL-3G	20-3000		19	14	±2.2	--	+8	+8	+13	3.8	+22	1.4:1	1.6:1	12	45	3-51	BW459	-	114.95
▼	ZFL-500	0.05-500		--	20	--	±1.0	—	+9	+5	5.3	+18	1.9:1	1.9:1	15	80	3-37	Y460	-	69.95
	ZFL-750	0.2-750		--	18	--	±0.5	—	+9 ***	+5	6.0	+18	1.5:1	2:1	15	90	3-37	Y460	-	74.95
	ZFL-1000	0.1-1000		--	17	--	±0.6	—	+9 *	+5	6.0	+18	1.5:1	2:1*	15	105	3-37	Y460	-	79.95
	AMP-3G	30-3000		--	8	--	±0.75	+9.5	+9.5	+13	3.5**	+20	2.6:1	2.5:1	15	55	3-38	PP120	cd	89.95
	AMP-74	5-500		--	27	--	±1.0	+7.0	+7.0	+13	5.0	+20	2:1	2:1	15	44	3-36	PP120	cd	54.95
	MAN-1	0.5-500		--	28	--	±1.4	+8	+8	+15	4.5	+18	1.8:1	1.8:1	12	60	3-36	A05	cc	15.95
	MAN-2	0.5-1000		--	18	--	±1.5	+9	+7	+15	6.0	+19	1.8:1	1.8:1	12	85	3-36	A05	cc	19.95

L_w = low range (f_L to $f_U/2$) U = upper range ($f_U/2$ to f_U)

*ZFL-1000 output VSWR 2.8:1 maximum over 750-1000 MHz; 1 dB compression +7 dBm at 500-1000 MHz ***+7 dBm from 500 to 750 MHz.
**NF increases with decreasing frequency, 5 dB typical at 300 MHz, and 10 dB typical at 30 MHz. (1)ZJL models: Flatness specified to 0.75 f_U, dynamic range at 2 GHz.

MEDIUM POWER 2.5 kHz to 8000 MHz

up to 320 mW (+25 dBm) output

	MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Typ.	GAIN, dB Min.	GAIN, dB Flatness Typ.(1)	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE(1) NF dB Typ.	DYNAMIC RANGE(1) IP3 dBm Typ.	VSWR (Typ.) In	VSWR (Typ.) Out	DC POWER Volt V.✤	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
	AMP-2000	10-2000		--	20	--	±1.5	+15	+5	5	+25	2:1	2:1	15	100	3-38	QQ96	ce	139.95
	ZFL-2000	10-2000		--	20	--	±1.5	+16*	+5	7	+25	2:1	2:1	15	120	3-40	Y39	-	219.00
	ZFL-2500	500-2500		--	28	--	±1.5	+15	+5	8	+27	2.5:1	2.5:1	5	220	3-54	Y460	-	99.95
NEW	ZFL-2500VH	10-2500		--	20	--	±1.5	+24	+10	5.5	+35	1.7:1•	2:1•	15	300	3-54	SS98	-	264.95
	ZFL-1000H	10-1000		--	28	--	±1.0	+20	+5	5	+33	2:1	2:1	15	160	3-39	SS98	-	219.00
	ZFL-1000VH	10-1000		--	20	--	±1.0	+25	+15	4.5	+38	2:1**	2.5:1	15	320	3-39	SS98	-	229.00
✤	ZRON-8G	2000-8000		--	20	--	±1.5★	+20	+10	6	+30	2:1	2:1	15	310	3-55	AV243	-	495.00
▲	ZHL-6A	.0025-500		--	21	--	±1.0	+23	+10	7.5***	+34	1.8:1	2:1***	24	350	3-41	S32	-	199.00
	ZHL-1042J	10-4200		--	25	--	±1.5	+20	+10	6	+30	2.5:1	2.5:1	15	330	3-40	NN92	-	495.00
								L_w	U										
NEW	ZJL-4G	20-4000		12.4	10.0	±0.25	--	+13.5	+11	+20	5.5	+30.5	1.4:1	1.6:1	12	75	3-51	BW459	-	129.95
NEW	ZJL-4HG	20-4000		17.0	13.0	±1.5	--	+15.0	+12	+13	4.5	+30.5	1.5:1	1.4:1	12	75	3-49	BW459	-	129.95
NEW	ZJL-5G	20-5000		9.0	7.0	±0.55	--	+15.0	+9.5	+20	8.5	+32	1.6:1	1.3:1	12	80	--	BW459	-	129.95
NEW	ZKL-2R7	10-2700		24.0	20.0	--	±0.7	+13	+13	+13	5.0	+30	1.3:1	1.4:1	12	120	3-53	BY493	-	149.95
NEW	ZKL-2R5	10-2500		30.0	26.0	--	±1.5	+15	+15	+13	5.0	+31	1.4:1	1.4:1	12	120	3-53	BY493	-	149.95
NEW	ZKL-2	10-2000		33.5	30.0	--	±1.0	+15	+15	+13	4.0	+31	1.4:1	1.4:1	12	120	3-52	BY493	-	149.95
NEW	ZKL-1R5	10-1500		40.0	36.0	--	±1.2	+15	+15	+13	3.0	+31	1.4:1	1.6:1	12	115	3-52	BY493	-	149.95

L_w = low range (f_L to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* +15 dBm below 1000 MHz
** Input VSWR 2:1 max, increasing below 20 MHz to 2.25:1 max at 10 MHz
*** NF specified above 10 MHz and output VSWR 2.2:1 above 400 MHz(1)

• Max. VSWR In 2.0:1, Out 2.5:1
★ Measured at 25°C.
(1) ZJL models: Flatness specified to 0.75 f_U, dynamic range at 2 GHz.

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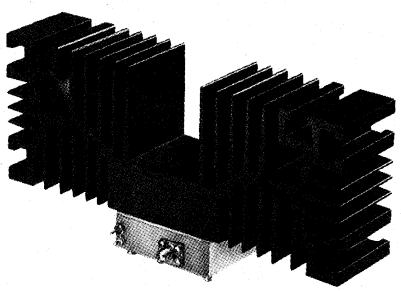
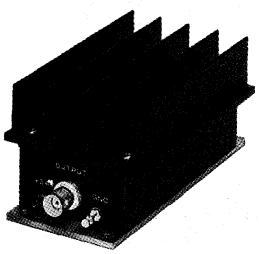
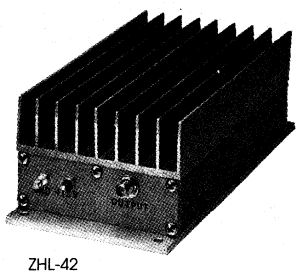
MEDIUM HIGH POWER 50 kHz to 8 GHz



✤ ZVE



ZHL



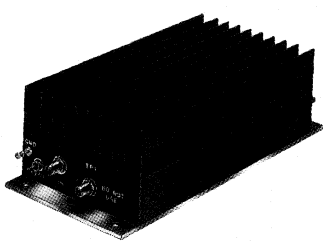
ZHL-42

up to 1W (+30 dBm) output

	MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
✤	ZVE-8G	2000	8000	30	±2.0	+30*	+20	4	40	2:1	2:1	12	2.0	3-55	BN333	—	1095.00
	ZHL-1A	2	500	16	±1.0	+28	+20	11	+38	2:1	2.1	24	0.60	3-41	S32	—	229.00
	ZHL-2	10	1000	16	±1.0	+29	+15	9	+38	2:1	2:1	24	0.60	3-43	T34	—	349.00
	ZHL-2-8	10	1000	27	±1.0	+29	+5	10	+38	2:1	2:1	24	0.60	3-43	T34	—	525.00
△	ZHL-2-12	10	1200	24	±1.0	+29*	+10	10	+38	2:1	2:1	24	0.75	3-43	T34	—	625.00
	ZHL-3A	0.4	150	24	±1.0	+29.5	+10	11	+38	2:1	2:1	24	0.60	3-42	S32	—	229.00
	ZHL-32A	0.05	130	25	±1.0	+29	+10	10	+38	2:1	2:1	24	0.60	3-42	S32	—	229.00
	ZHL-42	700	4200	30	±1.0 ★	+28	+5	10	+38	2.5:1	2.5:1	15	0.88	3-44	U36	—	895.00
	ZHL-4240	700	4200	40	±1.5 ★	+28	-5	8	+38	2.5:1	2.5:1	15	0.90	3-45	U36	—	1395.00
	ZHL-42W	10	4200	30	±1.5 ★	+28**	0	8***	+38	2.5:1	2.5:1	15	0.88	3-44	U36	—	1095.00
	ZHL-4240W	10	4200	40	±1.5 ★	+28**	-5	8***	+38	2.5:1	2.5:1	15	0.90	3-45	U36	—	1495.00

* +28.5 dBm maximum at 1000-1200 MHz
** +27 dBm at 10-700 MHz
*** Below 100 MHz NF increases to 15 dB at 10 MHz

☆ At +25°C, +29 dBm typ. at 90°C case
★ Measured at 25°C.



ZHL-50P3

feed-forward, low-distortion

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	MAX. POWER, dBm Output (1 dB Comp.)	MAX. POWER, dBm Input (no damage)	DYNAMIC RANGE Intercept Point dBm, Min NF dB Typ.	DYNAMIC RANGE 2nd** order In-Band	DYNAMIC RANGE 3rd* order	VSWR In/Out	DC POWER Volt V.	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
ZHL-1-50P3	50	500	22	±1.0	+27***	+15	7	+70	+50	1.5:1	24	1.30	3-47	U200	—	695.00
ZHL-2-50P3	50	1000	21	±1.0	+25	+15	8	+63	+43	2.0:1	24	0.65	3-47	U200	—	895.00

* IP3 measured at +15 dBm output each fundamental tone, at room temperature.
** IP2 +50 dBm typical for out band products.
*** +30 dBm at 50-250 MHz.

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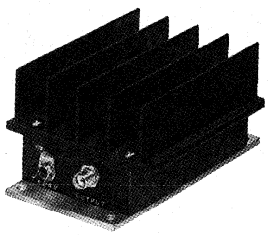
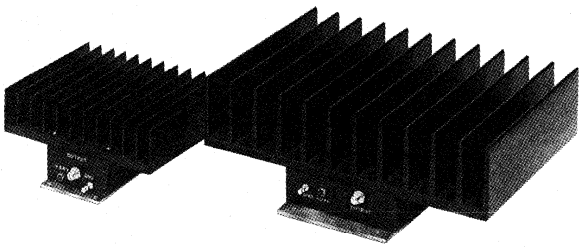
HIGH POWER 1 to 1000 MHz



ZHL-A



ZHL-2W

ZHL-3W
ZHL-5W
ZHL-10W

up to 5W (+37 dBm) output

MODEL NO.	FREQ. MHz f_L f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
ZHL-1-2W	5-500	29	±1.0	+33	+10	12	+44	2:1	2:1	24	0.9	3-46	T35	—	525.00
ZHL-7-2W	600-800	28	±1.0	+33	+10	12	+43	2:1	2:1	24	0.9	3-46	T35	—	590.00
ZHL-1000-3W	500-1000	38	±1.0*	+35**	0	9	+45	2:1	2.5:1	24	2.0	3-46	DDD338	—	695.00
ZHL-5W-1	1-500	40	±1.5	+37	0	9	+49	2:1	2.5:1	24	3.3	3-48	DDD131	—	995.00
ZHL-900-10W	480-900	19	±1.0	+38	+25	10	+50	2:1	2:1	24	5.5	3-48	DDD338	—	1995.00

* 1.5 dB over temperature range -20 to +65 deg. C.
** +37 dBm typical

NOTES:
- ✣ Hermetically sealed with field replaceable connectors.
- ✣ Max. voltage Vdc
- △ Available only with SMA connectors
- ▲ Available only with BNC connectors
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
- D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
- 1. With no load output, derate maximum input power (no damage) by 10 dB, by 15 dB for ZHL-5W-1.

NSN GUIDE

MCL NO.	NSN
ZHL-1A	6130-01-088-2322
ZHL-1A(BNC)	5895-01-123-0792
ZHL-1A(SMA)	5895-01-201-4500
ZHL-2-12	5996-01-400-0753
ZHL-3A	5895-01-194-1718
ZHL-32A	5895-01-238-7973
ZHL-42(SMA)	5895-01-253-2397
ZHL-1042J	5996-01-412-3038
ZHL-4240	5895-01-263-5871
ZHL-5W-1	5825-01-339-2539

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HIGH POWER 0.5 to 1000 MHz

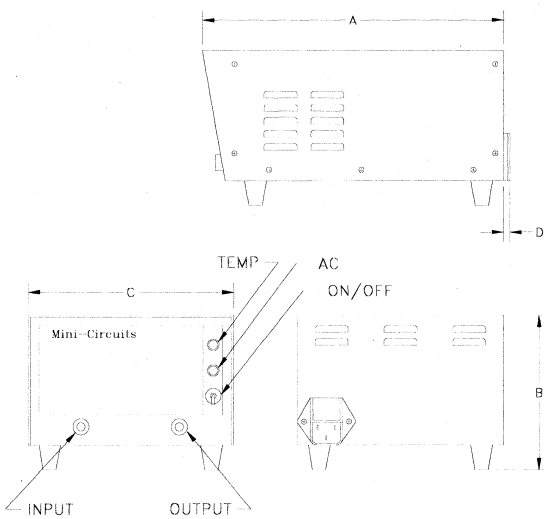
TIA

up to 10W (+40 dBm) output

MODEL NO.	FREQ. MHz f_l	f_u	GAIN, dB Min.	Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.) Typ.	Min.	Input Max. (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR In	Out	AC POWER Volt (Note 1)	Freq. Hz	VA max.	CAPD DATA (see RF/IF Designer handbook) Page	Case Style	CONNECTION	Price $ Qty (1-9)
TIA-900-10	100-900		28	±2.5	+42	+40	+25	13	51	2.5:1	2.5:1	110	50/60	475	3-17	AP176	—	3,695.
TIA-1000-4	100-1000		19	±1.5	+39	+36	+25	12	48	2.5:1	2.5:1	110	50/60	400	3-17	AP176	—	1,995.
TIA-1000-1R8	0.50-1000		35	±2.0	+35	+32	+7	8*	45	1.9:1	2.5:1	110	50/60	140	3-17	AP175	—	1,495.

features

- Wide bandwidth, 0.5-1000 MHz
- Instrument model, with built-in power supply,110/220V operation
- High Power Output, (at 3.5 dB compression)
  45 dBm TYPICAL FOR TIA-900-10
  42 dBm TYPICAL FOR TIA-1000-4
  37 dBm TYPICAL FOR TIA-1000-1R8
- High Gain, 38 dB TYPICAL FOR TIA-1000-1R8
  34 dB TYPICAL FOR TIA-900-10
- High Reverse Isolation, 80 dB TYPICAL FOR TIA-900-10 AND TIA-1000-1R8
  55 dB TYPICAL FOR TIA-1000-4
- 100% Burn-In at +25°C, 48 hours
- Thermally self-protected, led indicator



NOTES:

* NF above 400 MHz. At low frequency, NF Increases to 16 dB Typ.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

C. Prices and Specifications subject to change without notice.

1. Add dash 2 (-2) to model no. for 220V operation.
2. Gain and maximum output power specified at 25°C±5°C., over temperature, specifications degrade approximately 1dB, gain flatness ±2.5dB maximum for TIA-10001R8 and TIA-1000-4.
3. With no load, max. input (no damage) reduce by 10 dB.
4. VSWR specified at:
   350-900 MHz FOR TIA-900-10
   350-1000 MHz FOR TIA-1000-4
   340-1000 MHz FOR TIA-1000-1R8
5. Operating temperature: 0°C to +55°C.
   Storage temperature: -40°C to +70°C.
6. All TIA models are protected under U.S. patent 5, 101, 171.

Outline drawing and dimensions.

Case No.		A	B	C	D	wt. grams.	NOTES
AP175	inch	9.8	5.0	6.7	0.2	3500	
	mm	248.9	127.0	170.2	5.1		A10,D7,G1,G2
AP176	inch	19.5	6.0	12.5	0.2	9500	
	mm	495.3	152.4	317.5	5.1		A10,D7,G1,G2

A10. Case material: aluminum alloy. Finish: grey paint.
D7. Connectors: BNC only.
G1. Keep area adjacent to fan and louvers clear to permit air flow to pass. Caution: Do not insert anything especially conductors or fingers into case opening. Physical injury, shock or death may occur.
G.2 Configured for either 110 volt or 220 volt AC operation; specify when ordering.

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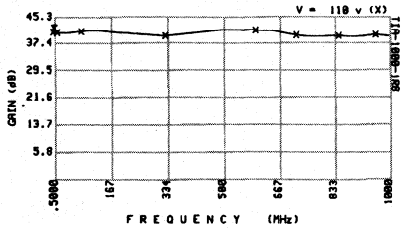
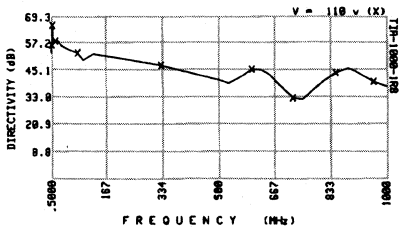
TIA-1000-1R8

GAIN



DIRECTIVITY



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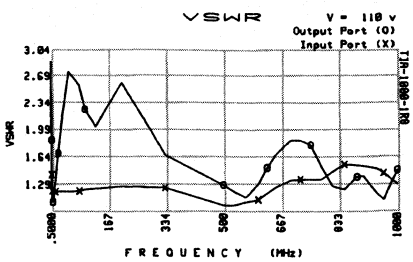
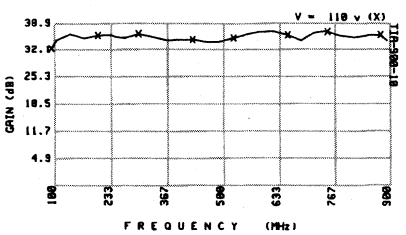


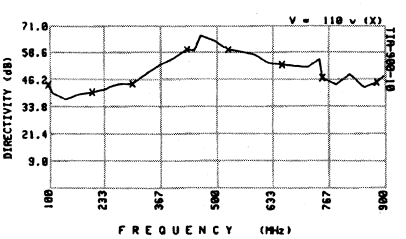
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)	Pout (dBm) (@1dB COMPR)
0.5	40.65	56.72	1.42	2.89	—	36.10
12.6	40.48	58.36	1.20	1.36	17.34	36.62
99.5	40.98	50.05	1.23	2.26	14.13	36.19
207.6	40.33	51.07	1.27	2.61	10.29	34.61
332.2	39.43	47.81	1.25	1.67	8.38	33.50
500.0	41.26	41.27	1.03	1.29	7.60	33.68
600.9	41.12	46.09	1.10	1.30	7.43	34.12
693.4	40.22	37.38	1.35	1.86	7.22	34.10
816.5	39.40	40.92	1.46	1.27	7.20	34.08
1000.0	39.47	38.45	1.30	1.48	7.30	33.50

TIA-900-10

GAIN



DIRECTIVITY



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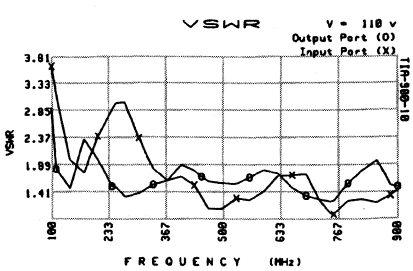
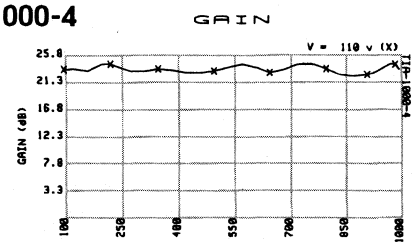


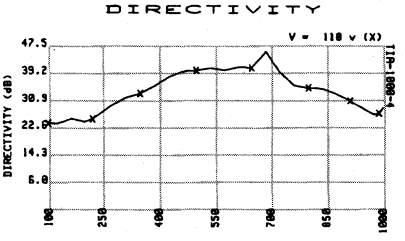
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)	Pout (dBm) (@1dB COMPR)
100.0	32.45	44.22	3.67	2.92	12.95	42.71
143.6	36.07	37.71	2.01	1.50	12.56	42.25
251.1	35.50	43.52	3.01	1.53	16.19	43.63
337.6	35.47	49.49	1.85	1.57	14.65	41.86
449.8	34.52	59.78	1.36	1.71	13.29	41.91
498.9	34.28	64.65	1.16	1.60	12.79	41.94
594.7	36.86	58.18	1.45	1.83	11.30	42.30
692.9	34.67	52.96	1.76	1.38	13.14	43.78
788.7	35.85	44.67	1.29	1.59	9.42	44.30
900.0	34.61	48.53	1.47	1.54	11.37	42.16

TIA-1000-4

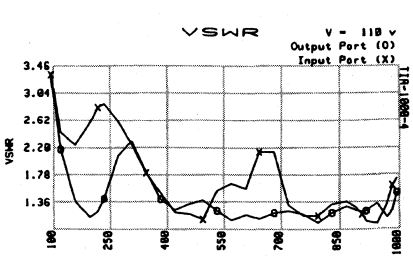
GAIN



DIRECTIVITY



VSWR

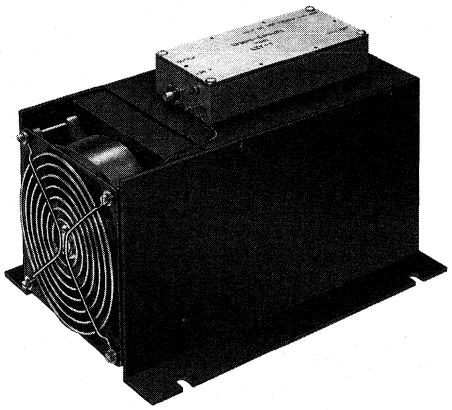


FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)	Pout (dBm) (@1dB COMPR)
100.0	23.15	23.27	3.33	3.27	13.27	40.63
202.2	24.07	23.74	2.57	1.14	14.65	40.14
313.4	22.86	31.20	2.25	2.30	14.30	37.90
389.3	23.04	34.78	1.51	1.41	13.14	38.79
500.5	22.93	39.37	1.11	1.40	12.02	38.58
614.5	23.49	40.43	1.58	1.18	11.69	40.33
725.7	24.15	38.75	1.33	1.24	9.76	41.58
801.6	23.34	34.20	1.17	1.06	7.26	42.06
912.8	22.38	30.28	1.19	1.23	8.32	41.00
1000.0	23.23	28.13	1.74	1.52	8.82	37.01

In Stock...Immediate Delivery

For custom versions of standard models consult our applications dept.

VERY HIGH POWER 50W, 20 to 1000MHz



LZY

up to 50W (+47 dBm) output

	MODEL NO.	FREQ. MHz f_L	f_U	GAIN, dB Min.	Flatness Max.	POWER, dBm Min. Output (1 dB Comp.)	Max. Output (Typ.)	Max. Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR In	Out	DC POWER Volt V.	Max Current** (A)	CAPD DATA (see RF/IF Designer handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
NEW	LZY-1	20 - 512		39	±1.5	+44	+47	+10	8.6*	54	2.0:1	❄	+26	7.3	3-19	BT412	—	1995.00
NEW	LZY-2	500 -1000		40	±1.5	+43	+45	+10	8.0	54	2.0:1	3.5:1	+28	8.0	3-19	BT451	—	2195.00

features

- saturated power 50W typ. (LZY-1) and 32W typ. (LZY-2)
- high power with low distortion, -32 dBc typ. (LZY-1) and -45 dBc typ. (LZY-2) harmonics at 20 watts
- wide bandwidth, usable 10 - 525 MHz and 475 - 1050 MHz
- high gain, 42 dB typ. (LZY-1) and 47 dB typ. (LZY-2)
- unconditionally stable
- self protected against excessive drive, high case temp., reverse polarity and shorting/ unshorting transients at dc input
- electronic shutoff by grounding the shut-off terminal, reduces output by 50 dB. Open circuiting terminal restores full power within 100 μ sec.
- cool operation with integral fan, 15° C typ. rise
- graceful degradation, +20 to +30V DC
- can withstand short and open circuit at output for 2 minutes while delivering 20 watts

NOTES:

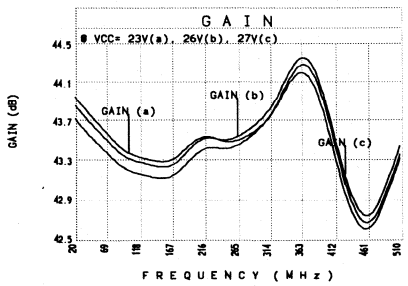
* 80-512 MHz, at 20 MHz 11.6 dB typ.
** At 25W output for LZY-1 and 20W for LZY-2; includes fan
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute max. dc voltage: +30V
2. Operating air-ambient temp. for specified performance: -10°C to 50°C
3. Max. storage temp.: -55°C to 100°C
❄ VSWR 9:1 typ. up to 450 MHz, all specifications for 50 ohm load.

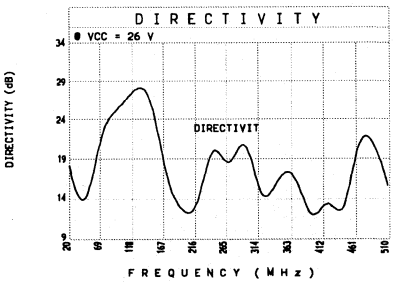
CAPD now available! computer-automated performance data

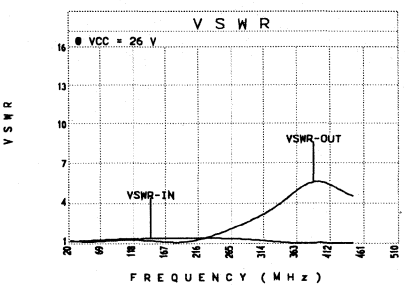
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

LZY-1



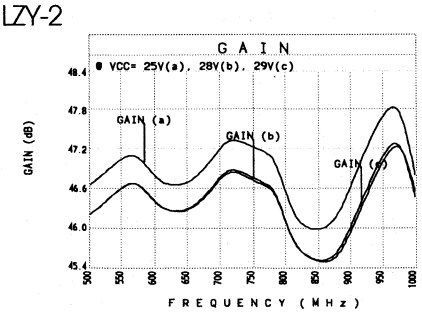


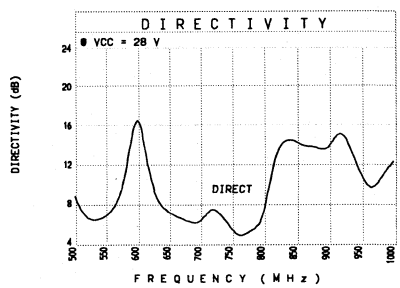


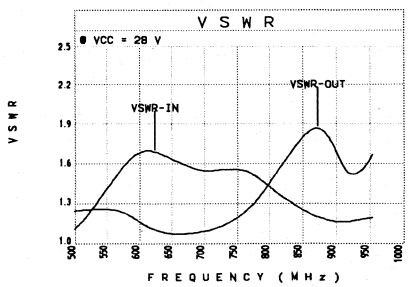
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	23V	26V	27V	σ1	23V	26V	27V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
20.00	44.00	43.91	43.77	0.57	23.33	18.53	18.11	1.22	0.97	1.30	2.28	11.81	46.30
45.00	43.79	43.71	43.57	0.54	11.17	10.78	30.20	1.29	0.62	1.15	1.82	10.05	46.42
70.00	43.61	43.54	43.41	0.49	7.23	24.02	14.59	1.35	0.46	1.25	0.77	9.37	47.24
95.00	43.42	43.36	43.24	0.43	17.29	25.52	9.62	1.42	0.39	1.33	0.65	9.02	48.21
120.00	43.37	43.32	43.20	0.38	10.80	28.46	10.74	1.46	0.34	1.34	0.77	8.84	48.69
145.00	43.32	43.27	43.15	0.35	8.42	29.48	13.93	1.48	0.30	1.28	1.39	8.75	48.80
170.00	43.33	43.27	43.16	0.32	10.03	16.43	24.07	1.49	0.29	1.15	3.48	8.70	48.37
195.00	43.53	43.49	43.37	0.33	14.83	12.25	25.41	1.48	0.35	1.14	3.61	8.73	48.45
220.00	43.62	43.60	43.50	0.34	7.23	12.07	28.19	1.48	0.50	1.40	1.65	8.82	47.85
245.00	43.51	43.53	43.44	0.36	9.90	23.38	24.25	1.47	0.71	1.81	1.35	8.85	47.29
270.00	43.55	43.59	43.50	0.39	4.22	16.46	18.21	1.44	0.92	2.30	1.04	8.91	46.84
295.00	43.65	43.72	43.64	0.38	16.19	24.51	14.28	1.37	1.13	2.86	0.79	8.96	46.69
320.00	43.81	43.89	43.82	0.35	21.60	11.91	18.66	1.25	1.49	3.48	0.60	8.93	46.48
345.00	44.19	44.30	44.23	0.30	11.14	17.33	17.71	1.11	2.39	4.34	0.47	8.86	46.19
370.00	44.32	44.49	44.42	0.25	7.98	18.54	17.17	1.07	3.05	5.47	0.41	8.80	45.64
395.00	43.90	44.09	44.02	0.25	17.36	9.91	9.65	1.12	2.56	6.03	0.44	8.70	45.19
420.00	43.13	43.32	43.25	0.25	20.54	15.46	25.19	1.08	4.65	5.39	0.50	8.60	45.19
445.00	42.65	42.81	42.74	0.23	15.90	9.73	17.76	1.06	2.01	4.59	0.56	8.40	45.43
470.00	42.56	42.68	42.61	0.22	16.10	26.90	12.62	1.20	4.75	4.41	0.55	8.19	45.38
512.00	43.38	43.51	43.42	0.33	6.69	15.73	21.49	1.48	1.64	13.09	0.54	7.78	46.00

σ equals standard deviation at nominal voltage, see Amplifier terms

LZY-2







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	25V	28V	29V	σ1	25V	28V	29V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
500.00	46.71	46.25	46.25	0.20	10.19	9.10	9.74	1.11	3.59	1.25	2.40	6.89	44.85
520.00	46.86	46.40	46.40	0.16	3.69	5.99	6.85	1.20	2.67	1.26	1.79	6.84	45.19
560.00	47.23	46.80	46.79	0.20	4.75	7.13	12.62	1.49	1.74	1.27	1.56	6.86	44.73
580.00	47.09	46.68	46.69	0.17	3.31	10.37	4.95	1.62	1.43	1.23	2.35	6.90	44.64
600.00	46.82	46.42	46.43	0.15	9.84	20.59	5.82	1.71	1.19	1.17	3.47	6.99	44.55
620.00	46.68	46.28	46.28	0.10	14.20	8.08	14.23	1.73	0.95	1.11	4.86	7.14	44.22
660.00	46.73	46.31	46.29	0.04	7.80	7.12	7.68	1.63	0.32	1.06	4.98	7.26	44.73
700.00	47.31	46.87	46.84	0.15	5.07	5.58	31.47	1.55	0.18	1.10	4.85	7.30	44.72
720.00	47.45	46.99	46.95	0.14	4.89	8.97	9.59	1.57	0.63	1.11	4.83	7.31	44.68
760.00	47.22	46.74	46.70	0.18	10.86	4.13	17.40	1.58	1.51	1.21	2.04	7.36	44.50
780.00	47.20	46.72	46.69	0.22	8.41	5.76	5.47	1.52	1.58	1.31	3.23	7.30	44.52
800.00	46.57	46.13	46.12	0.32	13.90	5.77	20.27	1.44	1.44	1.45	2.94	7.30	43.78
820.00	46.04	45.62	45.62	0.36	8.14	15.95	10.83	1.36	1.22	1.60	1.88	7.33	43.80
860.00	45.99	45.50	45.48	0.31	17.67	13.95	6.92	1.23	1.30	1.88	1.32	7.41	44.00
880.00	46.22	45.64	45.58	0.27	14.30	14.22	9.78	1.19	1.73	1.90	1.64	7.44	44.08
900.00	46.67	46.04	45.95	0.16	7.45	13.25	5.41	1.17	2.22	1.77	2.25	7.49	45.07
920.00	47.19	46.55	46.45	0.06	4.18	17.28	6.01	1.16	2.36	1.46	3.68	7.57	45.33
960.00	48.00	47.38	47.29	0.31	20.58	8.48	14.53	1.20	1.42	1.63	1.93	7.84	45.63
980.00	47.86	47.37	47.36	0.19	9.66	10.95	8.83	1.22	2.07	2.15	2.46	7.92	44.53
1000.00	46.85	46.51	46.60	0.49	25.54	12.59	14.78	1.21	3.62	1.68	2.42	8.05	43.35

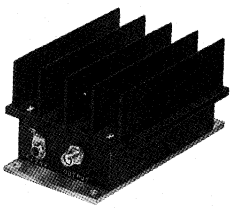
σ equals standard deviation at nominal voltage, see Amplifier terms

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

PULSE AMPLIFIERS

Coaxial

INVERTING & NON-INVERTING up to 200 mW, 2.5 KHz to 700 MHz



ZPUL

Up to 200 mW

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	RISE/FALL TIME ns Max	PULSE WIDTH* µs, Max.	POLARITY	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF** dB Typ.	DYNAMIC RANGE Intercept 3rd order Typ.	VSWR In	VSWR Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style ▲ Note B	CONNECTION	Price $ Qty (1-9)
ZPUL-21	0.0025	700	21	±1	1.5	6	Inverting	23	+10	7.3	34	2:1	2:1	24	350	3-21	S32	—	249.(
ZPUL-30P	0.0025	700	29	±1	1.5	6	Non-inverting	23	+10	7.2	34	2:1	2:1	24	400	3-21	S32	—	295.(

L_w = low range (f_L to $f_U/2$) m = mid range ($2f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* pulse width for less than 10% droop
** NF tested above 10 MHz

features

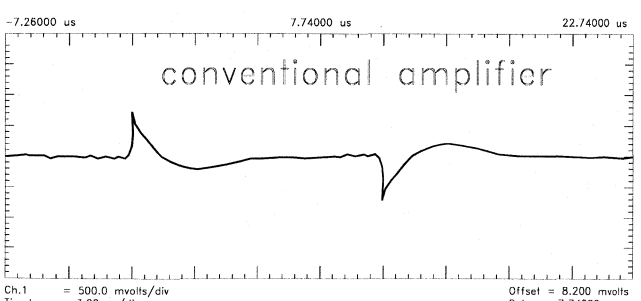
- wide bandwidth 2.5 KHz to 700 MHz, useable to 1 GHz
- excellent flatness ±0.6 dB typical
- can handle wide pulse width & (15 µs typ.) with excellent rise/fall time (1.1 ns typ.)
- inverting (ZPUL-21) & non-inverting (ZPUL-30P) configurations
- delay time, 1.5 ns typical

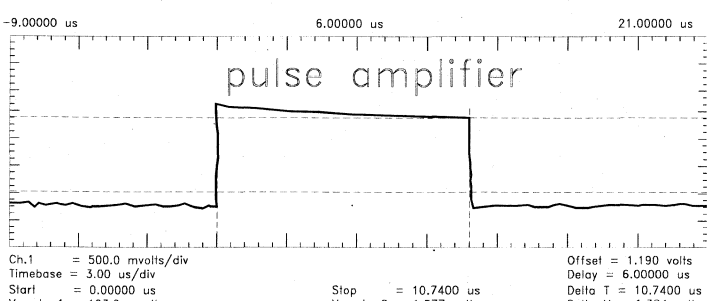
applications

- computers
- digital communication
- medical test set-ups

NOTES:
▲ Available only with BNC connectors
A. General Quality Control Procedures, Environmental Specifications, Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are give in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Operating temperature: -20°C to 65°C
Storage temperature: -55°C to 100°C

typical amplifier response to a pulse input





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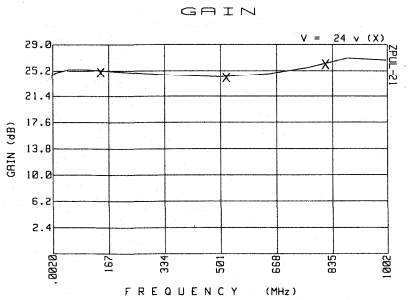
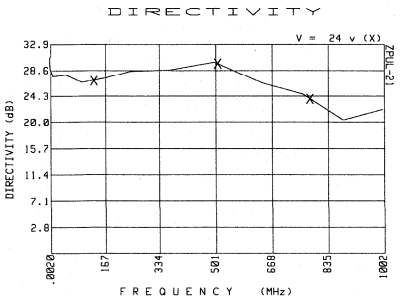
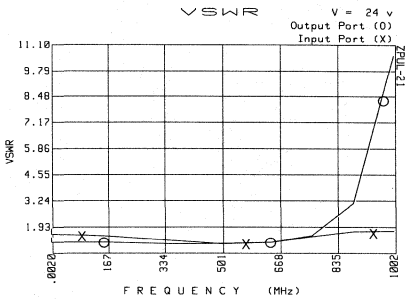
ZPUL-21

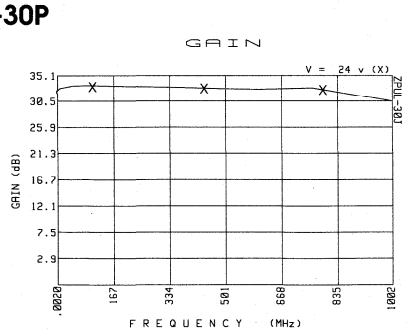


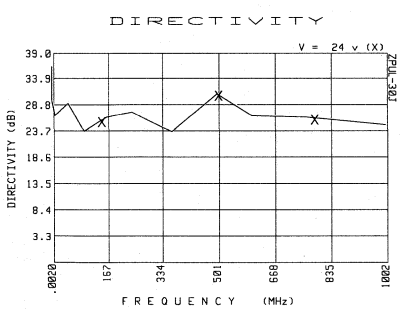


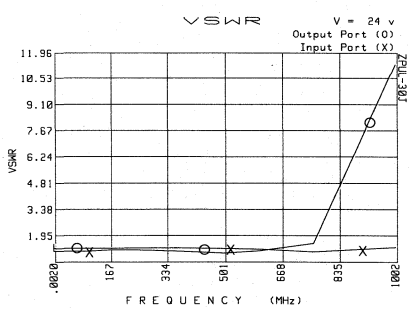


FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)		Pout (@1dB COMPR) (MHz)	Pout (@1dB COMPR) (dBm)
0.002	24.14	30.72	1.85	1.40	10.00	7.37	0.002	24.63
0.012	24.47	29.52	1.61	1.20	106.00	7.15	0.012	24.76
0.050	24.42	29.95	1.58	1.18	202.00	7.20	0.050	24.70
1.008	24.43	28.89	1.58	1.17	298.00	7.27	1.008	24.82
10.078	24.92	27.56	1.57	1.17	418.00	7.29	8.930	25.50
50.000	25.41	27.85	1.54	1.18	466.00	7.26	50.000	25.58
98.875	25.40	26.60	1.52	1.18	514.00	7.23	98.875	25.44
167.875	25.17	27.34	1.48	1.17	562.00	7.22	176.500	25.30
251.250	24.92	28.45	1.39	1.15	610.00	7.18	300.125	24.91
366.250	24.56	28.65	1.26	1.10	658.00	7.17	349.000	24.64
501.375	24.29	30.00	1.09	1.11	706.00	7.12	501.375	24.34
645.125	24.76	26.40	1.18	1.17	754.00	7.05	661.750	24.14
763.000	25.71	24.64	1.45	1.50	802.00	6.97	817.625	23.06
883.750	27.09	20.40	1.70	3.10	898.00	6.77	944.125	20.65
1001.625	26.82	22.14	1.73	10.56	970.00	6.67	1073.500	14.21

ZPUL-30P







FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)		Pout (@1dB COMPR) (MHz)	Pout (@1dB COMPR) (dBm)
0.002	32.16	32.16	1.53	1.39	10.00	7.41	0.003	24.26
0.010	32.60	32.60	1.32	1.17	97.00	7.16	0.050	24.67
0.050	32.49	32.49	1.30	1.15	126.00	7.16	1.026	24.83
0.118	32.47	32.47	1.31	1.14	155.00	7.15	9.866	25.30
1.106	32.51	32.51	1.30	1.14	213.00	7.17	50.000	25.61
10.172	32.98	32.98	1.29	1.14	271.00	7.20	98.875	25.51
50.000	33.45	33.45	1.30	1.15	329.00	7.23	133.375	25.36
98.875	33.48	33.48	1.31	1.15	416.00	7.24	297.250	24.96
167.875	33.35	33.35	1.31	1.21	503.00	7.23	377.750	24.42
248.375	33.28	33.28	1.32	1.21	561.00	7.21	501.375	24.38
366.250	33.13	33.13	1.32	1.14	619.00	7.20	541.625	24.06
501.375	32.91	32.91	1.29	1.04	706.00	7.16	625.000	23.98
604.785	32.81	32.81	1.25	1.16	793.00	7.20	708.375	23.89
763.000	33.01	33.01	1.11	1.57	909.00	7.29	872.250	23.46
1001.625	30.68	30.68	1.35	11.38	996.00	7.24	952.750	20.75

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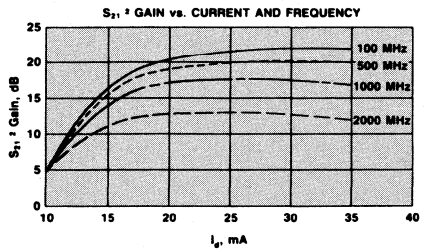
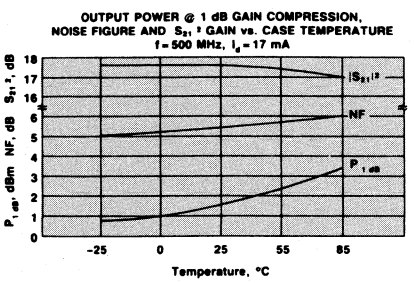
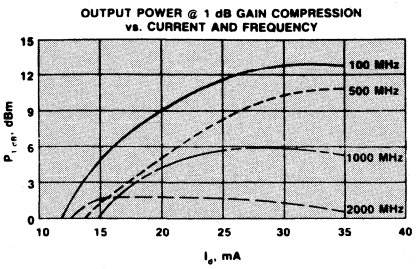
Amplifiers

MAR-1 (T_A = 25°C, I_d = 17 mA)

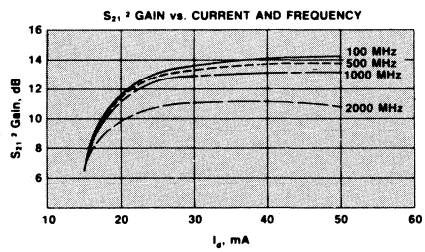


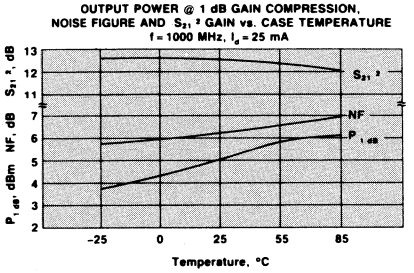


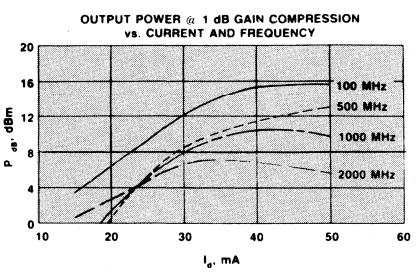


Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−23.10	0.07	164	18.5	171	−21.94	0.08	4	−23.10	0.07	−14
500	−24.44	0.06	106	17.5	141	−21.94	0.08	15	−23.10	0.07	−68
1000	−24.44	0.06	72	15.5	111	−20.00	0.10	24	−20.92	0.09	−124
1500	−27.96	0.04	59	13.7	87	−17.72	0.13	26	−20.00	0.10	−161
2000	−24.44	0.06	149	12.3	67	−15.92	0.16	21	−15.92	0.16	−177
2500	−20.00	0.10	142	10.6	49	−14.89	0.18	18	−15.92	0.16	155
3000	−18.42	0.12	139	9.3	34	−13.98	0.20	12	−16.48	0.15	144
3500	−13.98	0.20	129	7.9	19	−13.15	0.22	5	−15.92	0.16	135
4000	−11.06	0.28	120	6.6	3	−12.04	0.25	−4	−15.39	0.17	127

MAR-2 (T_A = 25°C, I_d = 25 mA)

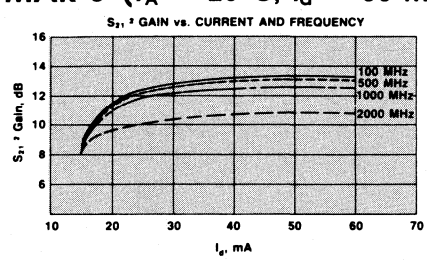


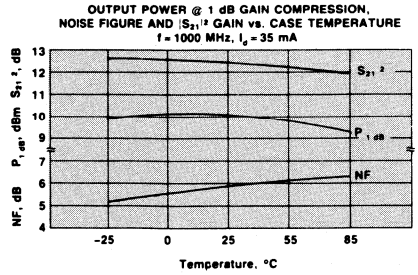


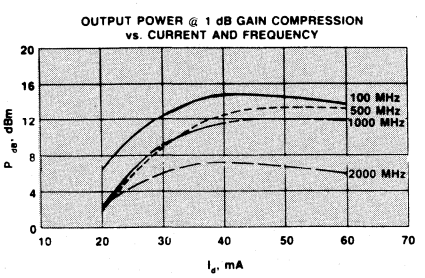


Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−18.42	0.12	173	13.0	174	−18.42	0.12	1	−17.72	0.13	−8
500	−19.17	0.11	154	12.8	156	−18.42	0.12	5	−18.42	0.12	−38
1000	−20.00	0.10	130	12.5	131	−17.72	0.13	7	−18.42	0.12	−75
1500	−21.94	0.08	120	11.8	109	−17.08	0.14	10	−18.42	0.12	−112
2000	−24.44	0.06	126	11.0	90	−16.48	0.15	9	−17.72	0.13	−121
2500	−20.92	0.09	147	10.4	67	−15.39	0.17	6	−17.72	0.13	−165
3000	−17.08	0.14	147	9.4	46	−14.42	0.19	−1	−17.72	0.13	171
3500	−13.56	0.21	136	8.2	30	−13.98	0.20	−5	−17.72	0.13	155
4000	−11.37	0.27	123	7.3	14	−13.56	0.21	−10	−18.42	0.12	142

MAR-3 (T_A = 25°C, I_d = 35 mA)







Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−23.10	0.07	172	13.0	174	−18.42	0.12	1	−16.48	0.15	−11
500	−24.44	0.06	156	12.8	152	−18.42	0.12	5	−15.92	0.16	−45
1000	−26.02	0.05	146	12.5	128	−17.72	0.13	10	−14.98	0.18	−88
1500	−27.96	0.04	172	11.8	103	−17.08	0.14	12	−13.56	0.21	−120
2000	−24.44	0.06	173	10.5	83	−14.98	0.18	11	−12.04	0.25	−142
2500	−15.39	0.17	175	10.3	59	−14.42	0.19	5	−11.70	0.26	−173
3000	−12.40	0.24	157	9.1	38	−13.98	0.20	−0	−12.04	0.25	168
3500	−9.90	0.32	140	7.8	21	−13.56	0.21	−6	−12.04	0.25	152
4000	−8.18	0.39	124	6.5	3	−13.15	0.22	−14	−12.04	0.25	138

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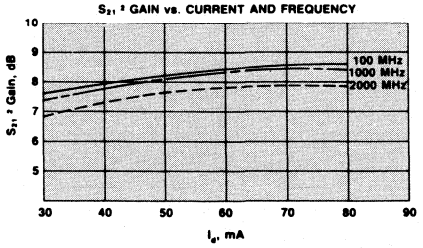
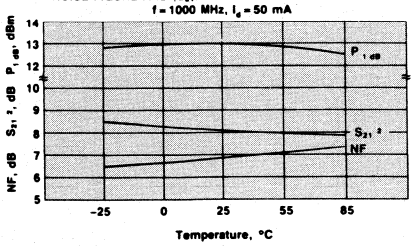
MAR-4 (T_A = 25°C, I_d = 50 mA)

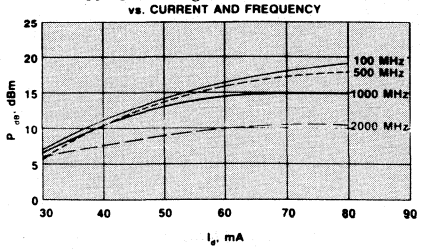
S_{21} ² GAIN vs. CURRENT AND FREQUENCY



OUTPUT POWER @ 1 dB GAIN COMPRESSION, NOISE FIGURE AND $|S_{21}|^2$ GAIN vs. CASE TEMPERATURE
f = 1000 MHz, I_d = 50 mA



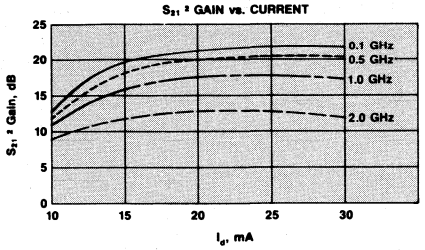
OUTPUT POWER @ 1 dB GAIN COMPRESSION vs. CURRENT AND FREQUENCY



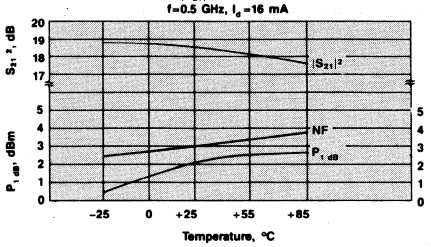
Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−14.42	0.19	177	8.2	174	−15.92	0.16	0	−20.00	0.10	−14
500	−14.89	0.18	169	8.2	156	−15.92	0.16	1	−17.72	0.13	−54
1000	−15.39	0.17	159	8.1	135	−15.92	0.16	3	−14.89	0.18	−94
1500	−15.39	0.17	157	8.0	112	−15.39	0.17	4	−12.40	0.24	−121
2000	−14.42	0.19	151	7.7	90	−14.42	0.19	3	−11.06	0.28	−145
2500	−12.40	0.24	159	7.6	69	−13.98	0.20	−1	−9.37	0.34	−165
3000	−10.17	0.31	151	6.9	46	−13.15	0.22	−6	−9.12	0.35	176
3500	−8.18	0.39	139	6.0	27	−12.77	0.23	−11	−8.64	0.37	160
4000	−6.74	0.46	126	4.9	8	−12.04	0.25	−23	−8.40	0.38	147

MAR-6 (T_A = 25°C, I_d = 16 mA)

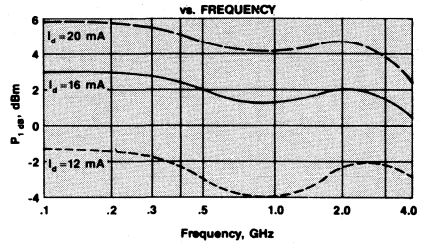
S_{21} ² GAIN vs. CURRENT



OUTPUT POWER @ 1 dB GAIN COMPRESSION, NOISE FIGURE AND $|S_{21}|^2$ GAIN vs. CASE TEMPERATURE
f=0.5 GHz, I_d =16 mA



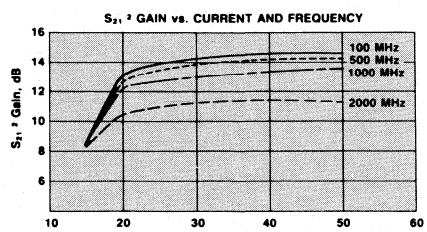
OUTPUT POWER @ 1 dB GAIN COMPRESSION vs. FREQUENCY



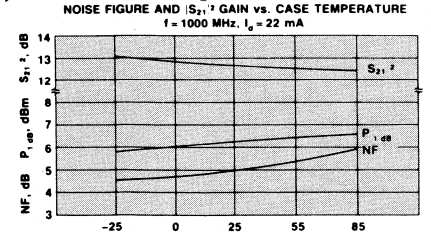
Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−27.96	.04	171	20.1	171	−22.5	.075	5	−27.96	.04	−30
500	−26.02	.05	−105	18.7	138	−21.3	.086	21	−20.00	.10	−104
1000	−17.72	.13	−118	16.4	107	−18.8	.115	28	−17.08	.14	−150
1500	−13.56	.21	−140	14.1	84	−17.1	.140	28	−16.48	.15	180
2000	−10.75	.29	−163	12.0	65	−15.8	.163	26	−15.92	.16	157
2500	−9.37	.34	−176	10.3	55	−15.2	.174	28	−15.92	.16	150
3000	−7.74	.41	169	8.7	42	−14.8	.181	25	−16.48	.15	143
3500	−6.74	.46	157	7.2	30	−14.2	.194	22	−17.72	.13	144
4000	−6.20	.49	146	6.1	18	−13.8	.203	20	−20.00	.10	156

MAR-7 (T_A = 25°C, I_d = 22 mA)

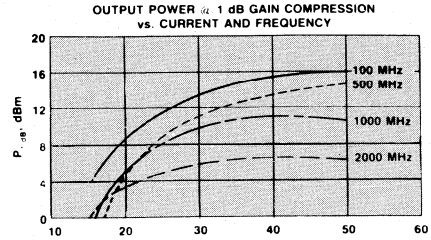
S_{21} ² GAIN vs. CURRENT AND FREQUENCY



OUTPUT POWER @ 1 dB GAIN COMPRESSION, NOISE FIGURE AND $|S_{21}|^2$ GAIN vs. CASE TEMPERATURE
f = 1000 MHz, I_d = 22 mA



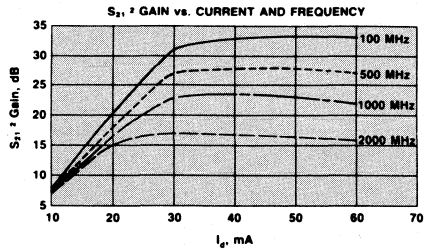
OUTPUT POWER @ 1 dB GAIN COMPRESSION vs. CURRENT AND FREQUENCY

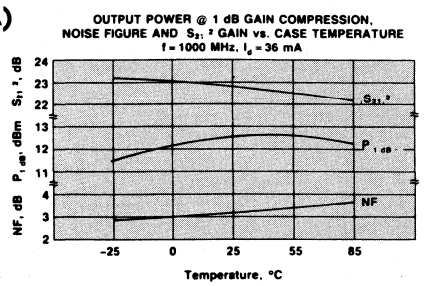


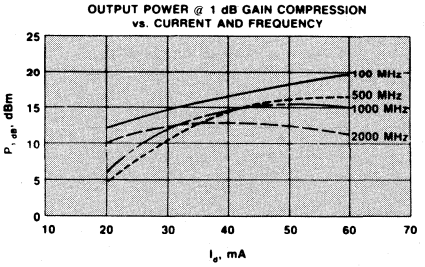
Freq. MHz	S_{11} (Input Return Loss)			S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	dB	Mag	Ang	dB	Ang	dB	Mag	Ang	dB	Mag	Ang
100	−26.02	0.05	169	13.5	173	−19.17	0.11	1	−17.08	0.14	−7
500	−30.46	0.03	133	13.1	150	−18.42	0.12	6	−17.72	0.13	−41
1000	−40.00	0.01	58	12.5	122	−17.72	0.13	10	−19.17	0.11	−94
1500	−24.44	0.06	−113	11.8	95	−16.48	0.15	10	−17.72	0.13	−148
2000	−16.48	0.15	−144	10.5	70	−15.39	0.17	7	−15.39	0.17	174
2500	−11.37	0.27	−165	9.6	48	−14.89	0.18	1	−14.42	0.19	154
3000	−8.64	0.37	169	8.1	27	−13.98	0.20	−6	−14.89	0.18	144
3500	−6.94	0.45	150	6.5	10	−14.42	0.19	−11	−15.39	0.17	144
4000	−5.98	0.51	134	5.0	−4	−14.42	0.19	−15	−15.39	0.17	152

Amplifiers

MAR-8 (T_A = 25°C, I_d = 36 mA)

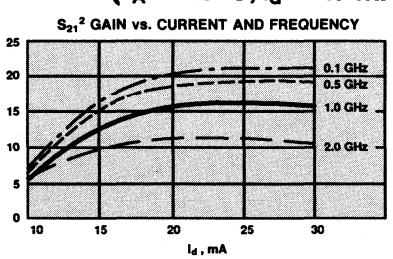


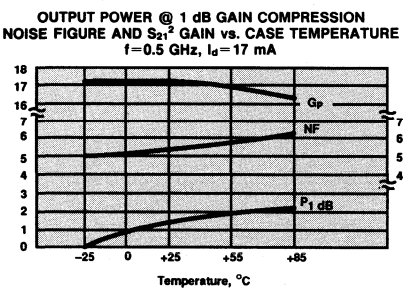


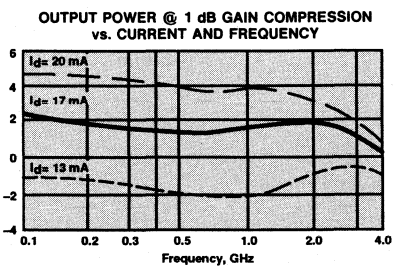


Freq. MHz	S11 (Input Return Loss) dB	Mag	Ang	S21 (Power Gain) dB	Ang	S12 (Isolation Out-In) dB	Mag	Ang	S22 (Output Return Loss) dB	Mag	Ang	K
100	−15.92	0.61	−21	33.0	162	−40.00	0.01	38	−4.73	0.58	−24	0.79
500	−8.18	0.39	−77	27.8	109	−27.96	0.04	52	−9.37	0.34	−96	0.75
1000	−11.37	0.27	−113	23.0	80	−24.44	0.06	51	−13.56	0.21	−147	0.89
1500	−11.70	0.26	−139	19.4	62	−21.94	0.08	46	−14.89	0.18	174	0.96
2000	−10.46	0.30	−155	16.9	47	−20.00	0.10	41	−15.39	0.17	153	0.97
2500	−9.63	0.33	−180	14.8	32	−18.42	0.12	32	−14.42	0.19	127	1.01
3000	−8.87	0.36	167	12.9	20	−17.72	0.13	27	−17.08	0.14	111	1.07
3500	−7.54	0.42	153	11.4	6	−17.08	0.14	21	−17.72	0.13	107	1.06
4000	−6.94	0.45	141	9.8	−5	−16.48	0.15	14	−19.17	0.11	106	1.10

MAV-1 (T_A = 25°C, I_d = 17 mA)

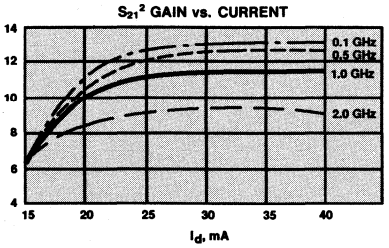


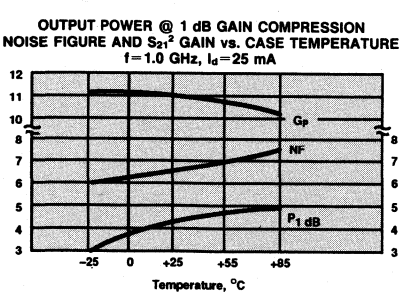


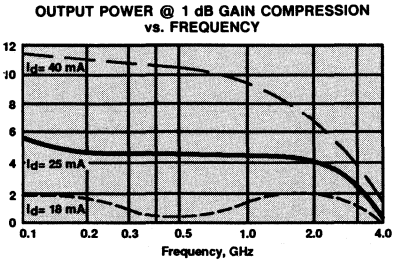


Freq. MHz	S11 (Input Return Loss) Mag	Ang	S21 (Power Gain) dB	Ang	S12 (Isolation Out-In) dB	Mag	Ang	S22 (Output Return Loss) Mag	Ang
100	.06	141	18.4	170	−22.3	.077	5	.07	−9
200	.08	112	18.1	160	−22.3	.077	9	.07	−15
400	.12	77	17.4	142	−21.6	.083	16	.07	−32
1000	.17	28	14.3	102	−18.9	.114	29	.08	−61
1500	.17	5	12.1	78	−16.6	.148	30	.08	−73
2000	.13	−12	10.2	59	−14.9	.179	25	.07	−90
2500	.08	−20	8.9	46	−13.6	.209	25	.05	−112
3000	.02	−37	7.7	31	−12.7	.232	18	.05	−134
3500	.05	128	6.7	15	−11.9	.253	10	.06	−160
4000	.12	113	5.7	−1	−11.3	.272	2	.06	−175

MAV-2 (T_A = 25°C, I_d = 25 mA)







Freq. MHz	S11 (Input Return Loss) Mag	Ang	S21 (Power Gain) dB	Ang	S12 (Isolation Out-In) dB	Mag	Ang	S22 (Output Return Loss) Mag	Ang
100	.12	170	12.5	174	−18.5	.119	2	.12	−7
200	.12	160	12.4	168	−18.5	.119	4	.12	−14
400	.11	140	12.2	156	−18.1	.124	6	.12	−29
1000	.10	84	11.2	123	−17.0	.142	14	.13	−61
1500	.09	42	10.2	99	−16.1	.157	16	.12	−79
2000	.07	16	9.1	77	−14.8	.181	15	.11	−96
2500	.05	17	8.2	63	−13.9	.202	16	.09	−115
3000	.02	95	7.3	46	−13.2	.220	13	.08	−141
3500	.08	112	6.5	29	−12.4	.239	7	.09	−167
4000	.14	100	5.7	12	−11.8	.258	0	.11	171

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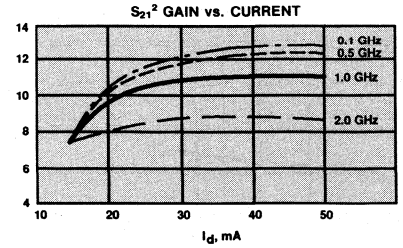
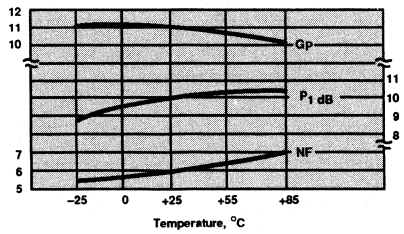
MAV-3 (T_A = 25°C, I_d = 35 mA)

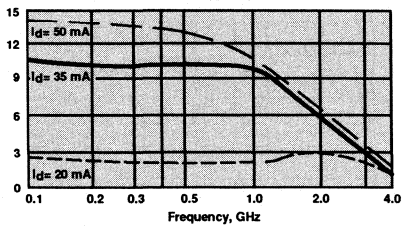
S_{21}^2 GAIN vs. CURRENT



OUTPUT POWER @ 1 dB GAIN COMPRESSION
NOISE FIGURE AND S_{21}^2 GAIN vs. CASE TEMPERATURE
f=1.0 GHz, I_d=35 mA



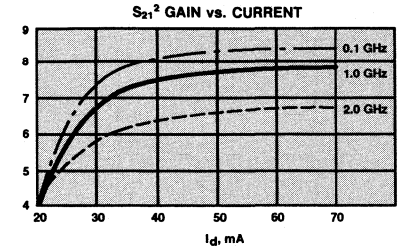
OUTPUT POWER @ 1 dB GAIN COMPRESSION
vs. FREQUENCY



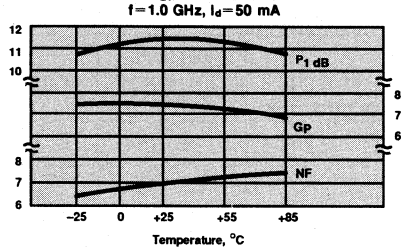
Freq.	S_{11} (Input Return Loss)		S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)	
MHz	Mag	Ang	dB	Ang	dB	Mag	Ang	Mag	Ang
100	.10	173	12.5	173	−18.5	.120	3	.12	−13
200	.10	162	12.5	167	−18.2	.123	4	.12	−24
400	.09	142	12.2	153	−18.0	.125	7	.13	−46
1000	.06	92	11.1	118	−16.8	.144	16	.17	−91
1500	.03	58	10.0	93	−15.5	.169	19	.19	−117
2000	.03	175	8.8	71	−14.1	.197	18	.20	−139
2500	.05	163	7.8	55	−13.2	.218	18	.21	−158
3000	.12	148	6.8	38	−12.2	.246	15	.22	−174
3500	.19	129	5.9	20	−11.2	.275	7	.24	171
4000	.26	110	5.0	3	−10.6	.296	1	.26	158

MAV-4 (T_A = 25°C, I_d = 50 mA)

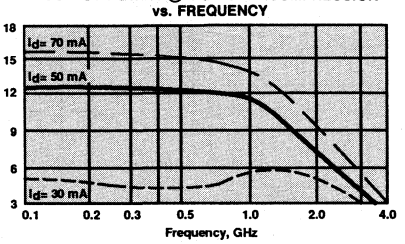
S_{21}^2 GAIN vs. CURRENT



OUTPUT POWER @ 1 dB GAIN COMPRESSION
NOISE FIGURE AND S_{21}^2 GAIN vs. CASE TEMPERATURE
f=1.0 GHz, I_d=50 mA



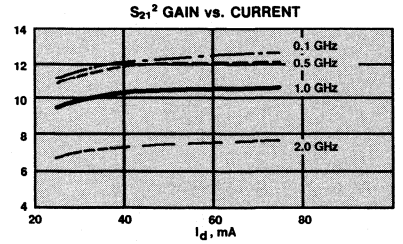
OUTPUT POWER @ 1 dB GAIN COMPRESSION
vs. FREQUENCY



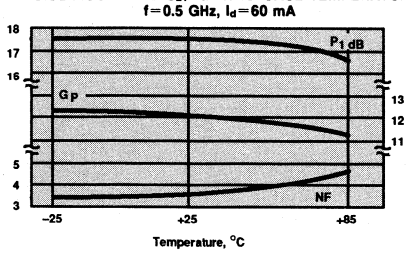
Freq.	S_{11} (Input Return Loss)		S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)	
MHz	Mag	Ang	dB	Ang	dB	Mag	Ang	Mag	Ang
100	.16	175	8.3	174	−16.2	.156	0	.13	−13
200	.16	170	8.2	168	−16.2	.155	2	.13	−25
400	.15	161	8.1	156	−16.0	.158	4	.14	−47
1000	.11	141	7.7	122	−15.4	.169	9	.21	−91
1500	.07	141	7.2	96	−14.6	.186	13	.24	−118
2000	.09	161	6.6	71	−13.3	.215	12	.26	−140
2500	.14	159	5.9	53	−12.4	.240	13	.28	−157
3000	.22	146	5.1	33	−11.7	.260	7	.29	−176
3500	.30	128	4.3	13	−10.9	.286	0	.32	167
4000	.38	109	3.2	−6	−10.4	.301	−7	.33	153

MAV-11 (T_A = 25°C, I_d = 60 mA)

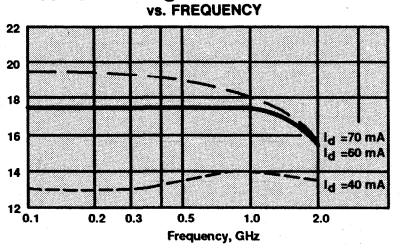
S_{21}^2 GAIN vs. CURRENT



OUTPUT POWER @ 1 dB GAIN COMPRESSION
NOISE FIGURE AND S_{21}^2 GAIN vs. CASE TEMPERATURE
f=0.5 GHz, I_d=60 mA



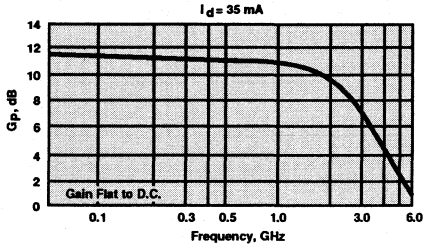
OUTPUT POWER @ 1 dB GAIN COMPRESSION
vs. FREQUENCY

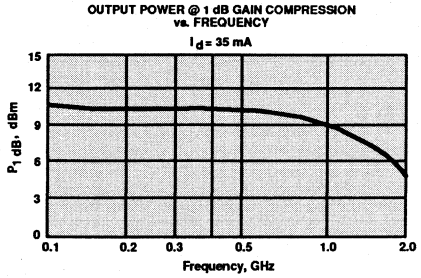


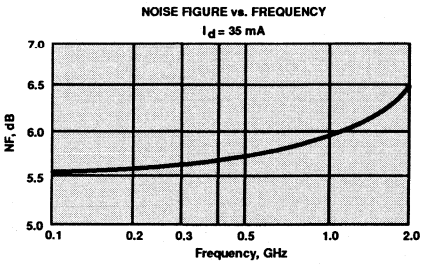
Freq.	S_{11} (Input Return Loss)		S_{21} (Power Gain)		S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
MHz	Mag	Ang	dB	Ang	dB	Mag	Ang	Mag	Ang	k
0.5	.76	−22	19.3	167	−24.4	.060	54	.77	−22	0.48
5.0	.20	−79	13.7	164	−16.5	.149	12	.21	−83	0.96
50.0	.04	−75	12.7	174	−16.4	.151	2	.05	−136	1.09
100.0	.04	−81	12.6	171	−16.4	.152	2	.05	−137	1.09
500.0	.09	−124	12.1	141	−15.8	.162	6	.15	−144	1.06
1000.0	.18	−161	10.7	106	−14.7	.184	6	.26	−173	1.03
1500.0	.28	171	9.1	77	−13.5	.211	2	.35	163	0.99
2000.0	.37	149	7.6	52	−13.0	.224	−5	.43	140	0.99
2500.0	.45	133	6.1	33	−12.7	.231	−10	.47	125	1.02
3000.0	.52	118	4.6	14	−12.6	.234	−16	.50	112	1.05

Amplifiers

VAM-3 (T_A = 25°C, I_d = 35 mA)

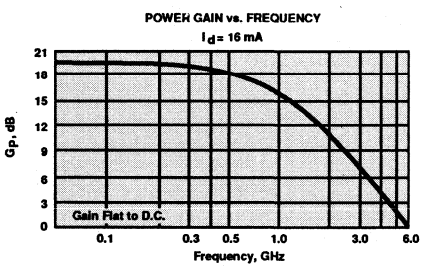


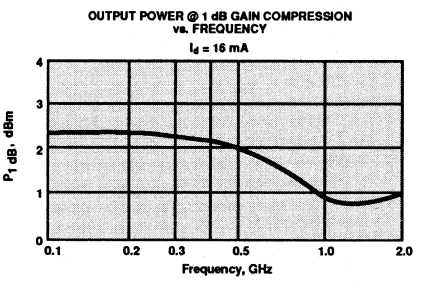


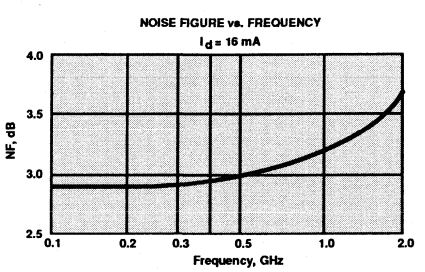


	S_{11} (Input Return Loss)			S_{21} (Power Gain)			S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang
0.1	-24.44	.06	25	11.7	3.84	175	-17.9	.127	2	-12.40	.24	-7
0.2	-23.10	.07	31	11.7	3.83	170	-17.9	.128	3	-12.77	.23	-13
0.4	-23.10	.07	38	11.6	3.78	159	-17.8	.129	6	-12.40	.24	-28
0.6	-23.10	.07	30	11.4	3.72	149	-17.6	.132	8	-12.40	.24	-40
0.8	-21.94	.08	21	11.2	3.65	140	-17.3	.136	11	-12.40	.24	-53
1.0	-21.94	.08	10	11.0	3.56	130	-17.0	.141	13	-12.40	.24	-65
1.5	-20.92	.09	-32	10.4	3.31	106	-15.9	.160	17	-12.40	.24	-91
2.0	-20.92	.09	-105	9.5	2.99	84	-14.9	.179	16	-12.77	.23	-115
2.5	-17.72	.13	-151	8.5	2.66	70	-14.1	.197	19	-12.77	.23	-133
3.0	-14.43	.19	-176	7.4	2.35	51	-13.5	.212	15	-13.15	.22	-145

VAM-6 (T_A = 25°C, I_d = 16 mA)

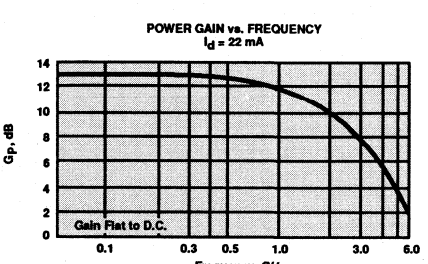


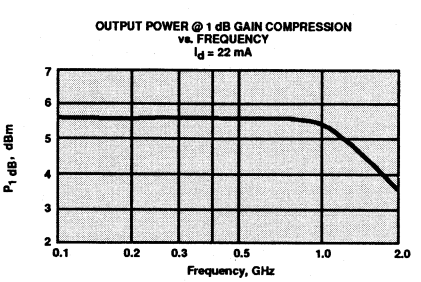


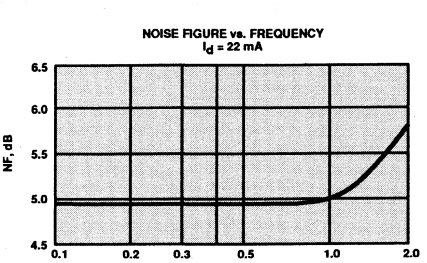


	S_{11} (Input Return Loss)			S_{21} (Power Gain)			S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang
0.1	-27.96	.04	-176	19.6	9.53	170	-23.0	.071	6	-27.96	.04	-57
0.2	-30.46	.03	-163	19.3	9.25	160	-22.7	.073	10	-23.10	.07	-82
0.3	-30.46	.03	-149	18.9	8.79	150	-22.8	.072	14	-20.92	.09	-97
0.4	-27.96	.04	-132	18.5	8.38	141	-21.9	.080	17	-19.17	.11	-111
0.5	-26.02	.05	-127	18.0	7.96	133	-21.6	.083	21	-17.72	.13	-122
0.6	-23.10	.07	-123	17.3	7.33	125	-21.2	.087	23	-16.48	.15	-131
0.8	-20.00	.10	-129	16.2	6.46	111	-19.7	.103	25	-15.39	.17	-147
1.0	-17.72	.13	-139	15.0	5.64	98	-19.0	.112	28	-14.90	.18	-160
1.5	-13.15	.22	-164	12.5	4.22	73	-17.1	.139	25	-14.43	.19	175
2.0	-10.17	.31	171	10.1	3.20	53	-16.1	.157	21	-14.43	.19	160

VAM-7 (T_A = 25°C, I_d = 22 mA)







	S_{11} (Input Return Loss)			S_{21} (Power Gain)			S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang	(dB)	Mag	Ang
0.1	-30.46	.03	1	13.0	4.47	174	-18.6	.118	1	-14.43	.19	-8
0.2	-27.96	.04	1	12.9	4.42	168	-18.5	.119	2	-14.43	.19	-18
0.4	-27.96	.04	-4	12.8	4.38	157	-18.4	.120	4	-14.43	.19	-36
0.6	-26.02	.05	-19	12.6	4.28	146	-18.1	.125	9	-14.43	.19	-52
0.8	-23.10	.07	-32	12.3	4.14	135	-17.7	.130	10	-13.98	.20	-68
1.0	-21.94	.08	-44	12.0	3.99	123	-17.4	.135	12	-14.43	.19	-82
1.5	-17.72	.13	-88	10.9	3.52	98	-16.1	.157	13	-14.43	.19	-113
2.0	-14.90	.18	-130	9.8	3.08	75	-15.2	.173	8	-14.90	.18	-138
2.5	-12.04	.25	-155	8.6	2.68	61	-14.7	.184	9	-14.90	.18	-151
3.0	-9.90	.32	-178	7.2	2.30	42	-14.7	.185	5	-15.39	.17	-158

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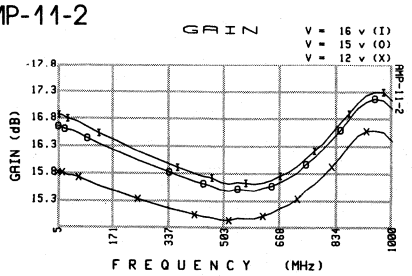
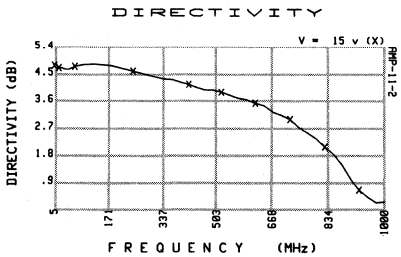
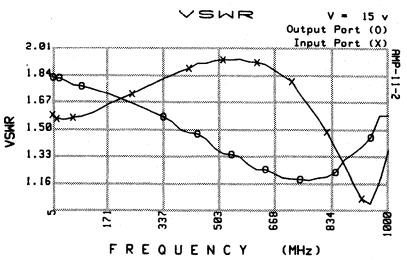
AMP-11-2



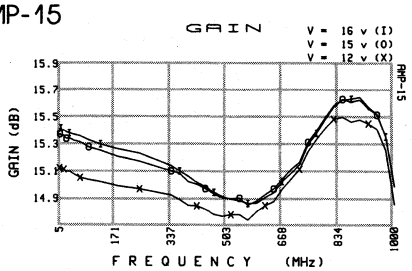


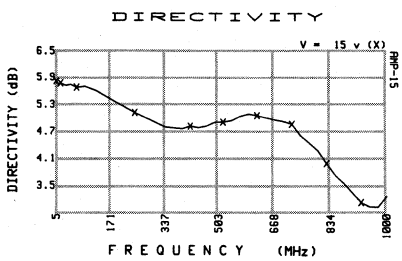


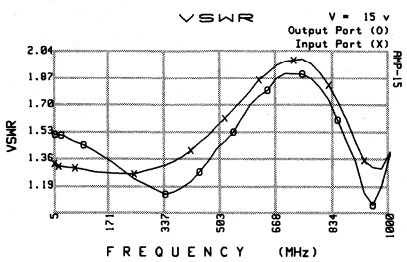
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
5.0	15.78	16.63	16.84	.45	4.7	4.8	4.9	1.58	.13	1.82	.13	—	— .05
13.2	15.78	16.61	16.84	.47	4.7	4.7	4.7	1.56	.11	1.81	.12	2.36	— .11
48.2	15.73	16.55	16.75	.47	4.7	4.6	4.7	1.55	.14	1.79	.12	2.38	— .10
176.2	15.44	16.18	16.37	.48	4.8	4.8	4.7	1.65	.11	1.71	.10	2.54	0.00
387.7	15.05	15.67	15.82	.33	4.5	4.2	4.1	1.86	.13	1.49	.07	2.49	.15
489.7	14.92	15.47	15.61	.41	4.4	4.0	3.9	1.92	.12	1.38	.06	2.40	.50
617.3	14.99	15.49	15.59	.27	4.0	3.5	3.5	1.91	.12	1.24	.05	2.50	1.09
744.9	15.46	15.93	16.03	.29	3.2	2.7	2.6	1.71	.11	1.18	.03	2.60	2.23
872.4	16.27	16.75	16.86	.41	2.0	1.5	1.4	1.28	.13	1.31	.09	2.54	3.52
1000.0	16.35	16.96	17.11	.40	1.0	.3	.1	1.37	.09	1.59	.12	2.58	4.92

σ equals standard deviation, see Amplifier terms

AMP-15



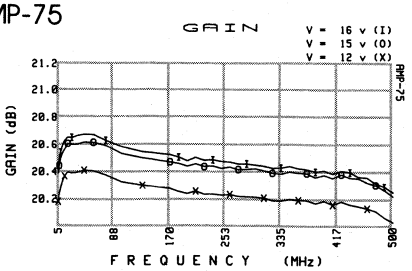


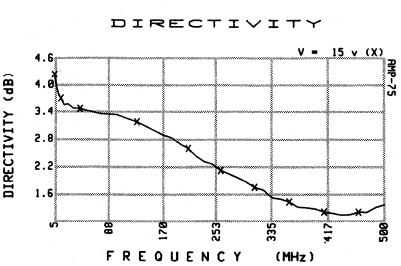


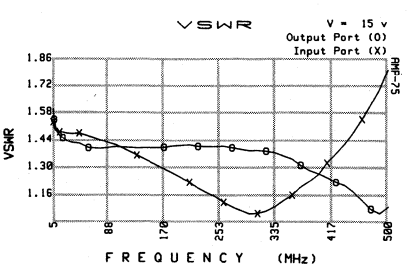
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
5.0	15.10	15.34	15.38	.08	5.9	5.8	5.8	1.32	.08	1.51	.11	—	11.17
13.2	15.09	15.34	15.37	.08	5.8	5.8	5.8	1.31	.08	1.51	.11	3.27	11.15
48.2	15.05	15.30	15.34	.08	5.8	5.8	5.7	1.30	.08	1.48	.11	3.23	11.24
176.2	14.96	15.18	15.24	.15	5.5	5.4	5.4	1.27	.09	1.34	.14	3.31	11.01
387.7	14.82	14.99	15.03	.26	4.9	4.8	4.8	1.37	.09	1.18	.13	3.19	10.62
489.7	14.74	14.88	14.89	.30	5.0	4.9	5.0	1.56	.10	1.42	.07	3.21	11.06
617.3	14.82	14.90	14.88	.36	5.0	5.1	5.2	1.85	.14	1.75	.24	3.26	12.39
744.9	15.22	15.28	15.27	.48	4.5	4.6	4.8	1.99	.14	1.89	.31	3.00	14.22
872.4	15.44	15.58	15.60	.52	3.5	3.6	3.7	1.60	.15	1.47	.14	2.95	15.82
1000.0	14.83	14.96	14.96	.64	3.2	3.3	3.3	1.40	.28	1.39	.33	3.07	15.12

σ equals standard deviation, see Amplifier terms

AMP-75





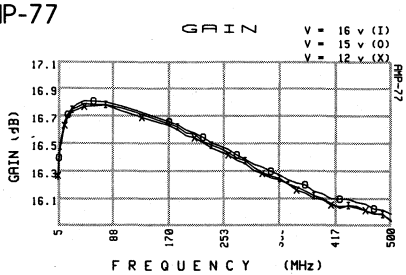


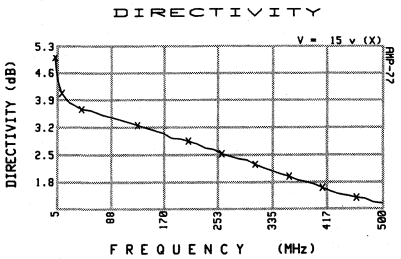
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
5.0	20.23	20.44	20.48	.11	4.1	4.2	4.2	1.52	.05	1.59	.02	—	13.88
11.3	20.38	20.59	20.65	.11	3.7	3.7	3.8	1.47	.06	1.47	.03	2.83	14.23
33.4	20.45	20.65	20.72	.11	3.5	3.4	3.5	1.46	.06	1.42	.03	2.81	14.80
98.8	20.38	20.58	20.64	.13	3.3	3.3	3.3	1.40	.05	1.40	.03	2.91	14.90
195.4	20.29	20.49	20.53	.21	2.7	2.7	2.7	1.24	.04	1.40	.05	2.92	14.99
246.2	20.28	20.47	20.52	.26	2.2	2.2	2.2	1.14	.04	1.40	.06	2.94	14.83
309.6	20.25	20.46	20.49	.31	1.8	1.7	1.7	1.05	.01	1.37	.08	2.95	14.51
373.1	20.24	20.44	20.47	.33	1.3	1.3	1.3	1.19	.09	1.30	.09	2.92	14.64
436.5	20.21	20.40	20.45	.30	1.2	1.1	1.1	1.41	.13	1.20	.11	2.98	15.03
500.0	20.08	20.27	20.29	.23	1.4	1.3	1.3	1.79	.17	1.09	.20	3.13	15.57

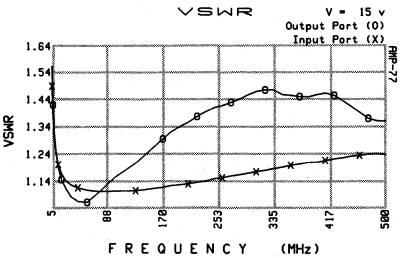
σ equals standard deviation, see Amplifier terms

Amplifiers

AMP-77



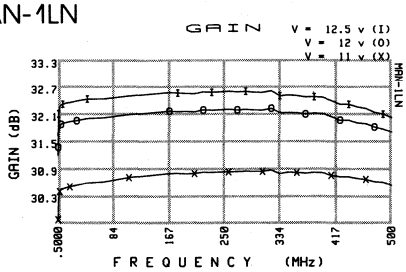


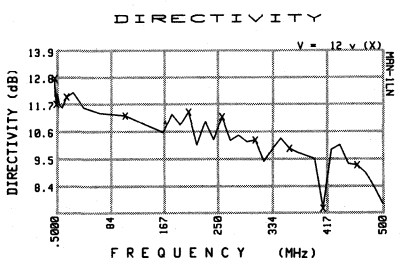


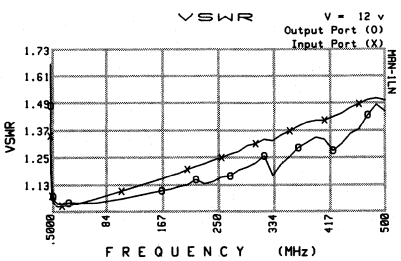
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
5.0	16.26	16.25	16.23	.22	5.0	5.0	5.1	1.49	.03	1.57	.02	—	18.30
11.3	16.55	16.58	16.55	.21	4.3	4.3	4.3	1.25	.02	1.25	.02	3.30	18.96
33.4	16.75	16.79	16.76	.21	3.8	3.8	3.8	1.13	.02	1.09	.03	3.27	19.66
98.8	16.74	16.77	16.76	.20	3.5	3.5	3.5	1.11	.02	1.16	.03	3.30	19.68
195.4	16.55	16.59	16.57	.20	2.9	3.0	3.0	1.13	.03	1.35	.05	3.24	19.62
246.2	16.43	16.47	16.46	.21	2.5	2.7	2.7	1.15	.03	1.41	.05	3.24	19.49
309.6	16.27	16.32	16.28	.21	2.2	2.3	2.4	1.18	.03	1.47	.06	3.27	19.24
373.1	16.13	16.19	16.14	.19	1.8	1.9	2.0	1.21	.04	1.45	.06	3.25	19.08
436.5	16.04	16.08	16.04	.15	1.4	1.6	1.7	1.23	.05	1.44	.06	3.26	19.11
500.0	15.92	15.98	15.93	.08	1.1	1.3	1.4	1.24	.06	1.36	.06	3.28	19.25

σ equals standard deviation, see Amplifier terms

MAN-1LN



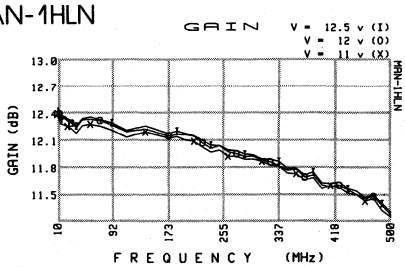


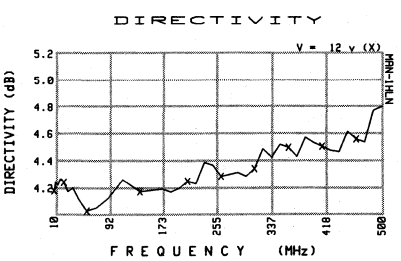


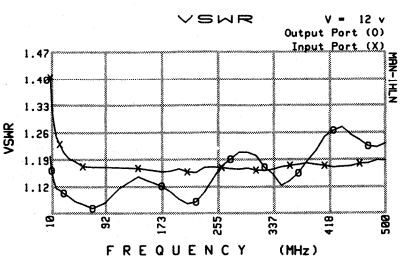
FREQUENCY (MHz)	GAIN (dB) 11.0V	12.0V	12.5V	σ1	DIRECTIVITY (dB) 11.0V	12.0V	12.5V	IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
.5	29.88	31.30	31.73	.32	13.2	12.9	12.6	1.35	.08	1.67	.04	—	8.01
1.9	30.44	31.89	32.32	.30	12.5	12.1	11.9	1.13	.01	1.18	.02	—	8.42
11.4	30.58	32.02	32.45	.30	12.5	11.7	11.4	1.04	.02	1.05	.04	2.82	8.32
68.3	30.71	32.13	32.54	.29	12.7	11.5	11.5	1.07	.02	1.05	.03	2.91	8.54
192.6	30.89	32.27	32.66	.29	12.2	11.0	11.1	1.18	.04	1.12	.01	2.81	8.47
243.8	30.93	32.30	32.69	.30	11.6	10.4	10.9	1.24	.05	1.15	.02	2.84	8.45
307.9	30.94	32.29	32.68	.33	11.3	10.4	10.3	1.31	.07	1.23	.05	2.88	8.50
371.9	30.90	32.20	32.58	.35	11.1	9.9	10.3	1.39	.09	1.30	.06	2.95	8.45
436.0	30.82	32.07	32.42	.37	10.4	10.2	9.8	1.45	.10	1.31	.07	3.01	8.49
500.0	30.63	31.80	32.12	.41	9.3	7.8	7.3	1.50	.14	1.46	.14	3.08	8.52

σ equals standard deviation, see Amplifier terms

MAN-1HLN







FREQUENCY (MHz)	GAIN (dB) 11.0V	12.0V	12.5V	σ1	DIRECTIVITY (dB) 11.0V	12.0V	12.5V	IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
10.0	12.42	12.46	12.48	.33	4.2	4.2	4.2	1.41	.04	1.20	.06	3.91	17.02
19.3	12.29	12.37	12.39	.36	4.2	4.3	4.2	1.25	.06	1.12	.07	3.87	17.33
46.5	12.28	12.35	12.36	.37	4.1	4.1	4.1	1.19	.08	1.08	.07	3.86	17.41
111.8	12.16	12.22	12.23	.35	4.2	4.3	4.3	1.17	.09	1.12	.09	4.07	17.42
198.5	12.13	12.19	12.20	.35	4.2	4.2	4.2	1.17	.09	1.09	.05	4.14	17.29
248.7	12.01	12.06	12.06	.32	4.3	4.4	4.4	1.17	.09	1.14	.08	3.93	17.27
311.5	11.88	11.90	11.91	.34	4.3	4.4	4.3	1.16	.09	1.20	.03	3.97	17.23
374.4	11.68	11.71	11.73	.32	4.4	4.4	4.6	1.18	.09	1.16	.05	4.03	17.29
437.2	11.53	11.57	11.58	.32	4.5	4.5	4.5	1.17	.08	1.28	.04	4.07	17.35
500.0	11.27	11.29	11.32	.32	4.8	4.8	4.7	1.19	.08	1.23	.04	4.13	17.38

σ equals standard deviation, see Amplifier terms

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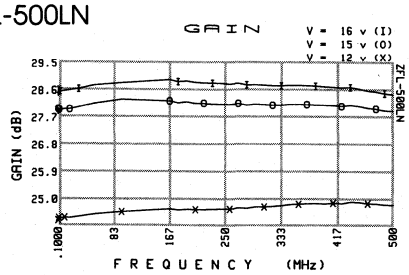
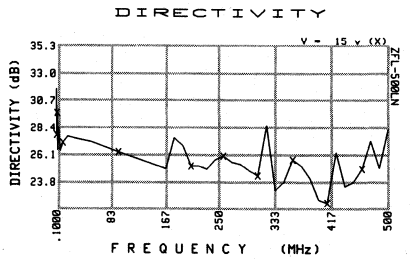
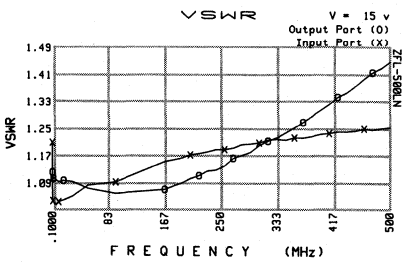
ZFL-500LN



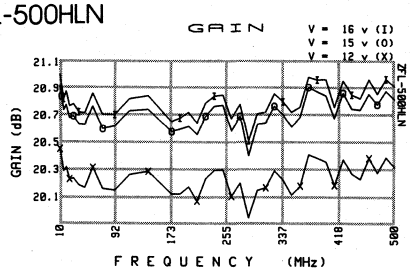


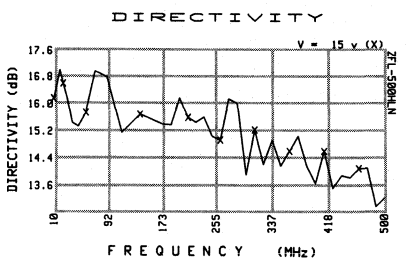


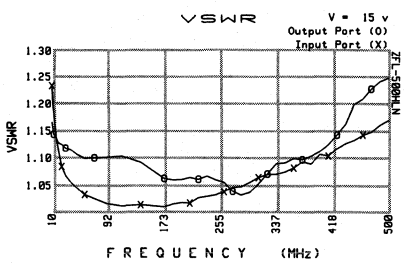
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
.1	24.30	27.80	28.40	.17	34.4	27.8	30.8	1.22	.02	1.17	.01	—	7.74
.6	24.41	27.98	28.60	.17	30.0	28.8	28.4	1.05	.02	1.10	.01	—	7.97
5.4	24.37	27.94	28.56	.16	29.0	26.5	25.5	1.03	.02	1.10	.02	—	8.09
53.3	24.49	28.15	28.75	.19	26.9	27.2	26.4	1.09	.03	1.08	.01	2.89	7.94
192.4	24.65	28.21	28.89	.24	26.2	26.9	26.5	1.17	.04	1.10	.03	3.03	7.72
243.6	24.66	28.12	28.81	.21	29.6	25.7	25.5	1.19	.04	1.13	.02	3.04	7.77
307.7	24.73	28.10	28.75	.20	27.2	24.4	25.0	1.21	.04	1.21	.02	3.03	7.82
371.8	24.83	28.11	28.74	.19	26.8	25.2	25.1	1.23	.05	1.28	.02	3.00	7.89
435.9	24.88	28.09	28.68	.19	27.2	23.5	23.3	1.25	.05	1.36	.02	2.98	7.88
500.0	24.79	27.89	28.44	.16	26.5	28.3	24.6	1.26	.04	1.45	.02	2.98	8.01

σ equals standard deviation, see Amplifier terms

ZFL-500HLN



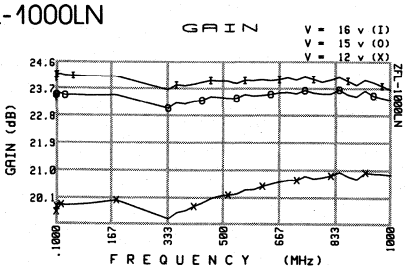


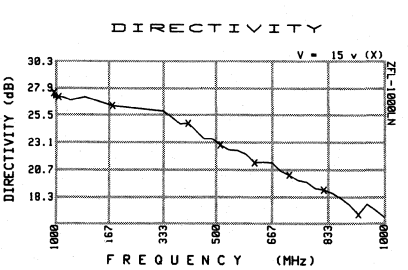


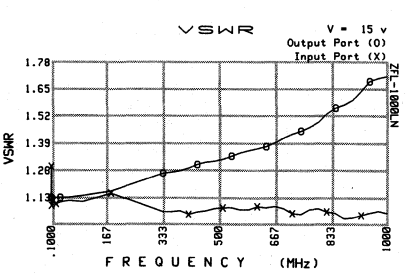
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
10.0	20.50	20.97	21.05	.04	16.7	16.2	16.3	1.24	.02	1.17	.04	3.83	16.78
19.3	20.37	20.82	20.92	.06	17.1	17.0	16.0	1.12	.02	1.13	.04	3.84	17.09
46.5	20.21	20.68	20.76	.07	17.5	15.3	15.9	1.05	.03	1.11	.04	3.83	17.14
111.8	20.31	20.78	20.87	.08	16.2	15.2	16.5	1.02	.04	1.11	.04	3.89	17.19
198.5	20.22	20.66	20.77	.07	15.6	16.2	15.3	1.02	.05	1.06	.02	3.88	17.17
248.7	20.35	20.82	20.90	.08	15.8	15.1	14.9	1.04	.05	1.07	.02	3.92	17.13
311.5	20.22	20.69	20.77	.10	15.8	15.2	15.0	1.07	.05	1.06	.03	3.95	16.97
374.4	20.46	20.96	21.03	.06	14.3	15.1	14.2	1.10	.05	1.10	.03	3.96	16.95
437.2	20.32	20.79	20.90	.04	14.2	13.9	13.6	1.13	.05	1.17	.04	3.97	16.91
500.0	20.36	20.87	20.96	.04	13.8	13.2	12.3	1.17	.05	1.25	.04	3.97	16.91

σ equals standard deviation, see Amplifier terms

ZFL-1000LN





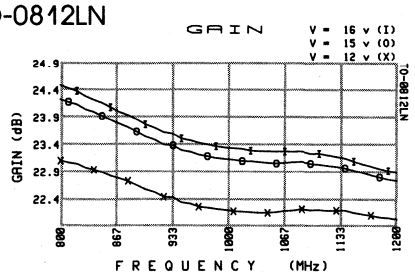


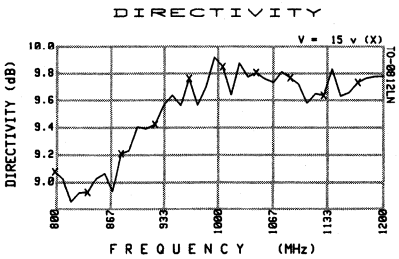
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
.1	19.66	23.31	23.96	.28	29.3	27.5	27.9	1.28	.02	1.19	.01	—	4.76
.7	19.90	23.56	24.24	.27	28.8	27.1	26.9	1.11	.02	1.13	.03	—	4.95
7.9	19.89	23.55	24.21	.28	28.6	27.1	27.2	1.11	.02	1.13	.03	—	5.02
95.7	19.91	23.50	24.14	.25	28.5	27.2	26.7	1.11	.01	1.14	.03	2.98	4.91
384.7	19.69	23.21	23.81	.29	25.9	24.8	24.1	1.07	.04	1.26	.02	3.07	6.08
487.2	20.16	23.42	23.97	.34	25.0	23.5	22.8	1.08	.02	1.30	.03	3.09	6.60
615.4	20.48	23.49	24.02	.37	22.8	21.3	21.3	1.09	.04	1.36	.04	3.08	7.14
743.6	20.81	23.65	24.11	.37	21.3	19.8	19.3	1.05	.03	1.45	.05	3.05	7.47
871.8	20.79	23.50	23.96	.38	19.5	18.2	17.4	1.03	.04	1.57	.06	3.07	7.43
1000.0	20.84	23.32	23.66	.30	18.1	16.6	16.2	1.06	.02	1.71	.08	3.11	7.00

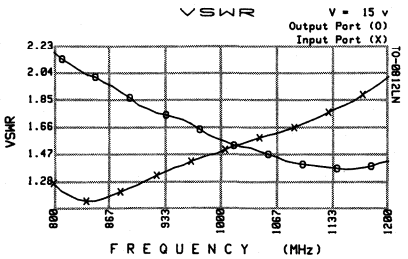
σ equals standard deviation, see Amplifier terms

Amplifiers

TO-0812LN



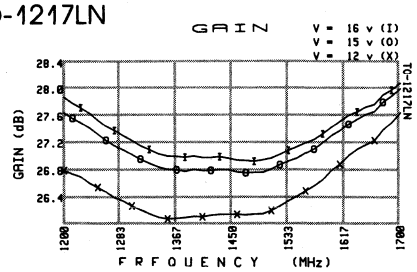


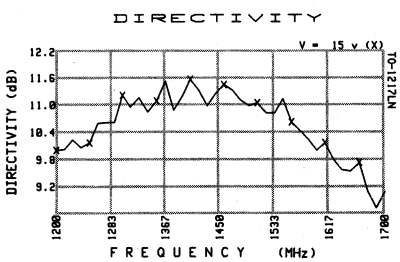


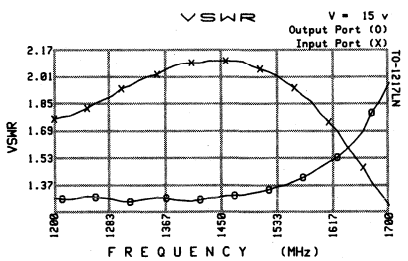
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
800.0	23.09	24.22	24.48	1.02	9.9	9.1	8.7	1.26	.47	2.18	.20	1.49	11.86
829.0	22.97	24.04	24.28	1.11	9.7	8.9	8.9	1.15	.37	2.06	.17	1.47	12.11
869.2	22.77	23.77	23.99	1.17	9.7	8.9	9.0	1.18	.25	1.94	.14	1.36	12.31
911.5	22.51	23.47	23.69	1.13	10.1	9.4	9.5	1.29	.18	1.78	.11	1.25	12.51
953.8	22.30	23.25	23.46	1.07	10.1	9.5	9.6	1.39	.13	1.71	.09	1.18	12.59
994.9	22.18	23.11	23.33	.99	10.2	9.9	9.8	1.47	.09	1.58	.08	1.16	12.74
1046.2	22.13	23.04	23.25	.92	10.1	9.8	9.9	1.58	.08	1.49	.08	1.16	12.61
1097.4	22.17	23.02	23.20	.88	9.7	9.7	9.6	1.68	.12	1.40	.09	1.24	12.39
1148.7	22.12	22.89	23.06	.85	9.5	9.6	9.8	1.81	.20	1.36	.11	1.33	12.14
1200.0	22.00	22.70	22.85	.80	9.5	9.8	9.9	2.01	.29	1.42	.14	1.44	11.98

σ equals standard deviation, see Amplifier terms

TO-1217LN



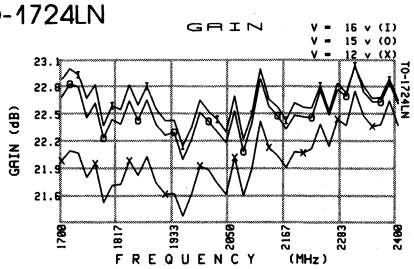


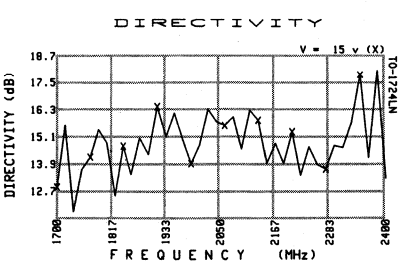


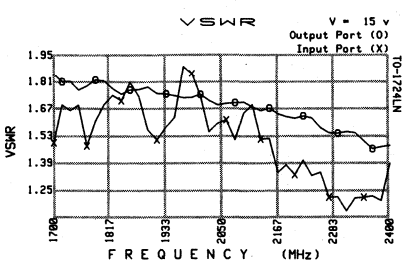
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
1200.0	26.83	27.68	27.91	.28	9.9	10.0	9.8	1.76	.27	1.30	.09	1.18	13.08
1236.6	26.64	27.45	27.67	.30	10.4	10.1	10.1	1.80	.29	1.30	.07	1.11	13.30
1287.0	26.38	27.13	27.34	.31	10.6	10.6	10.5	1.90	.25	1.29	.09	1.07	13.41
1339.6	26.14	26.88	27.07	.32	11.1	10.9	10.9	2.01	.22	1.29	.11	1.11	13.55
1392.3	26.15	26.84	27.04	.32	11.5	11.2	11.3	2.09	.21	1.28	.13	1.22	13.64
1443.6	26.18	26.83	27.00	.34	11.0	11.3	11.5	2.11	.21	1.30	.12	1.32	13.79
1507.7	26.23	26.84	27.00	.37	10.8	11.1	11.3	2.06	.23	1.33	.11	1.41	13.94
1571.8	26.59	27.13	27.27	.41	10.1	10.5	10.8	1.90	.25	1.42	.09	1.46	14.19
1635.9	27.13	27.57	27.68	.52	9.1	9.6	10.1	1.61	.28	1.58	.08	1.43	14.50
1700.0	27.66	28.02	28.10	.70	7.9	9.1	9.4	1.25	.26	1.97	.12	1.40	14.65

σ equals standard deviation, see Amplifier terms

TO-1724LN







FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
1700.0	22.01	22.71	22.91	.80	13.1	12.9	14.4	1.49	.11	1.85	.24	1.35	12.75
1751.2	21.83	22.49	22.70	.78	15.0	13.7	15.9	1.69	.13	1.77	.25	1.34	12.91
1821.9	21.75	22.42	22.58	.77	14.8	12.5	14.7	1.74	.12	1.78	.27	1.37	12.97
1895.5	21.76	22.41	22.58	.71	15.7	14.4	15.4	1.56	.10	1.78	.29	1.37	13.19
1969.2	21.64	22.24	22.38	.74	16.0	15.0	18.3	1.89	.13	1.73	.28	1.36	13.53
2041.0	21.64	22.21	22.33	.83	15.6	15.8	14.8	1.60	.12	1.69	.28	1.31	13.79
2130.8	22.16	22.61	22.69	.84	12.5	15.9	15.9	1.52	.14	1.66	.27	1.21	14.18
2220.5	22.15	22.49	22.59	.96	15.8	13.4	15.3	1.41	.14	1.64	.23	1.17	14.61
2310.3	22.77	23.08	23.07	1.07	15.4	14.7	16.3	1.15	.15	1.55	.18	1.23	15.02
2400.0	22.40	22.64	22.67	1.34	14.7	13.3	16.5	1.39	.11	1.48	.40	1.34	15.01

σ equals standard deviation, see Amplifier terms

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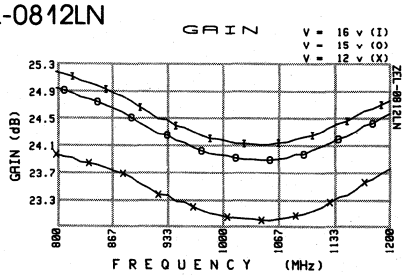
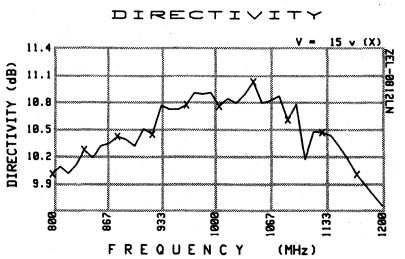
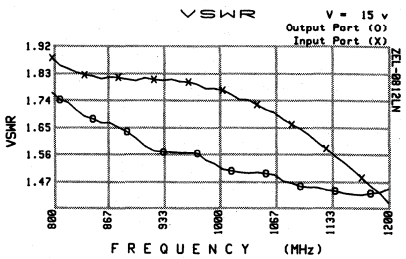
Distribution Centers/NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-252-835094 Fax 44-252-837010

ZEL-0812LN



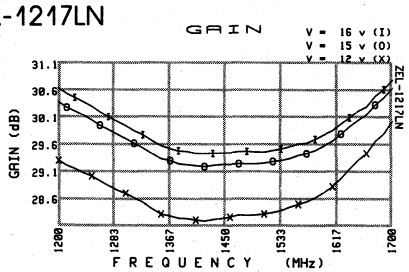


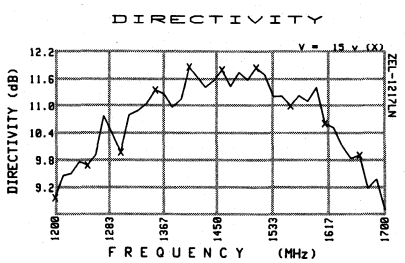


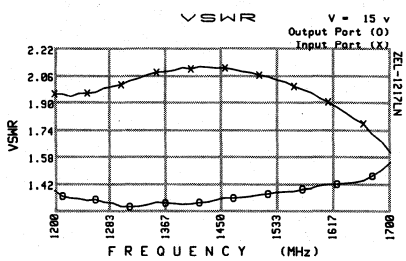
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
800.0	24.02	25.00	25.24	1.03	10.8	10.0	9.7	1.88	.16	1.77	.13	1.43	14.93
829.0	23.91	24.86	25.11	1.06	10.7	10.1	10.2	1.83	.11	1.71	.12	1.41	14.82
869.2	23.78	24.69	24.92	1.09	10.9	10.3	10.1	1.82	.08	1.67	.12	1.40	14.78
911.5	23.52	24.40	24.64	1.14	10.9	10.5	10.6	1.81	.08	1.59	.11	1.39	14.73
953.8	23.31	24.19	24.41	1.19	11.1	10.7	10.5	1.80	.10	1.57	.10	1.33	14.85
994.9	23.13	24.01	24.24	1.27	11.4	10.9	10.4	1.78	.12	1.53	.10	1.31	14.97
1046.2	23.05	23.93	24.15	1.40	11.1	11.0	10.5	1.73	.16	1.50	.09	1.27	14.98
1097.4	23.14	24.02	24.27	1.55	11.0	10.7	10.5	1.65	.18	1.46	.08	1.23	15.25
1148.7	23.41	24.28	24.50	1.61	10.3	10.3	10.1	1.53	.18	1.43	.08	1.22	15.39
1200.0	23.81	24.61	24.80	1.54	9.6	9.6	9.4	1.40	.26	1.45	.11	1.24	15.20

σ equals standard deviation, see Amplifier terms

ZEL-1217LN



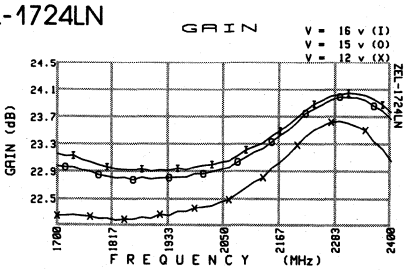


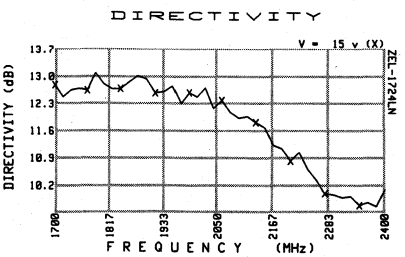


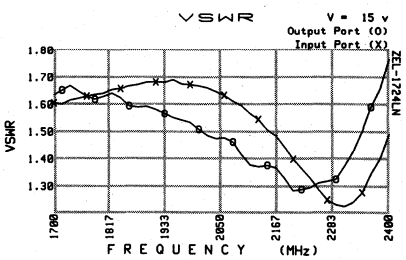
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
1200.0	29.28	30.36	30.62	1.56	9.7	9.0	9.2	1.97	.35	1.40	.14	1.30	11.67
1236.6	29.06	30.12	30.37	1.53	10.5	9.8	9.7	1.97	.31	1.35	.10	1.20	11.72
1287.0	28.74	29.77	30.00	1.48	10.4	10.4	10.1	2.01	.29	1.33	.07	1.11	11.81
1339.6	28.41	29.42	29.65	1.41	11.4	11.1	11.2	2.08	.29	1.32	.07	1.08	11.74
1392.3	28.23	29.21	29.45	1.35	11.5	11.2	11.3	2.12	.30	1.32	.08	1.09	11.83
1443.6	28.23	29.21	29.42	1.33	11.8	11.6	11.7	2.12	.31	1.35	.09	1.14	12.05
1507.7	28.31	29.24	29.44	1.28	11.5	11.9	11.7	2.08	.32	1.37	.12	1.22	12.07
1571.8	28.53	29.41	29.61	1.23	11.3	11.3	11.5	2.00	.32	1.41	.15	1.32	12.47
1635.9	29.13	29.91	30.07	1.27	10.1	10.1	10.1	1.86	.29	1.44	.22	1.43	12.79
1700.0	30.01	30.62	30.77	1.37	8.1	8.8	8.7	1.63	.20	1.57	.34	1.49	13.13

σ equals standard deviation, see Amplifier terms

ZEL-1724LN





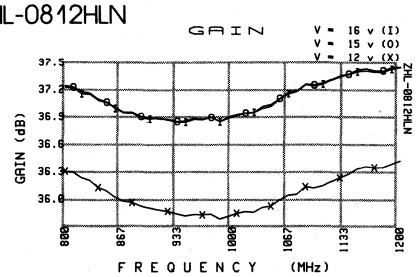


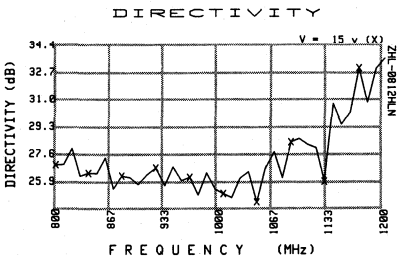
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	Pout(dBm) (@1dBCOMPR)
1700.0	22.23	22.96	23.14	1.45	12.7	12.8	12.7	1.61	.26	1.64	.17	1.28	11.46
1751.2	22.22	22.90	23.05	1.36	12.5	12.7	12.7	1.63	.22	1.65	.18	1.31	11.45
1821.9	22.16	22.78	22.91	1.29	12.6	12.7	13.0	1.66	.19	1.65	.19	1.40	11.64
1895.5	22.19	22.77	22.88	1.25	12.5	13.0	13.1	1.69	.18	1.60	.20	1.45	11.65
1969.2	22.29	22.79	22.90	1.23	12.3	12.4	13.0	1.68	.14	1.55	.20	1.47	11.79
2041.0	22.43	22.91	23.01	1.24	11.7	12.2	12.6	1.65	.16	1.48	.20	1.46	11.86
2130.8	22.78	23.21	23.29	1.29	10.8	11.9	12.2	1.55	.21	1.38	.20	1.39	12.00
2220.5	23.39	23.73	23.77	1.35	10.0	11.1	11.1	1.37	.22	1.29	.19	1.32	12.00
2310.3	23.58	23.96	24.02	1.38	9.3	9.9	10.2	1.23	.20	1.38	.10	1.31	11.58
2400.0	23.02	23.65	23.75	1.40	9.8	10.2	10.0	1.50	.10	1.77	.20	1.44	10.58

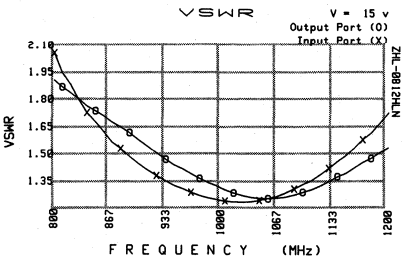
σ equals standard deviation, see Amplifier terms

Amplifiers

ZHL-0812HLN



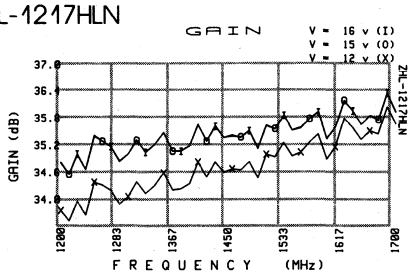


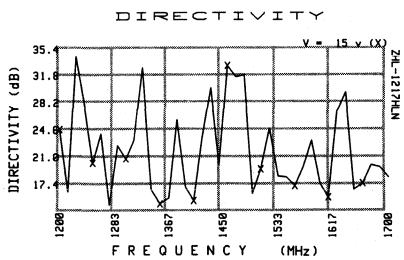


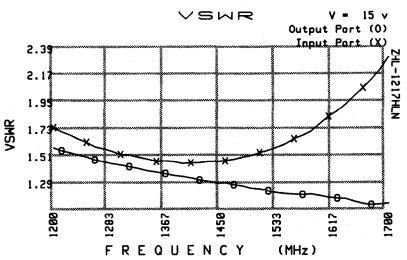
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	OUT	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
800.0	36.34	37.28	37.26	28.0	26.9	28.0	2.06	1.91	1.13	26.61
829.0	36.24	37.20	37.19	26.8	26.3	26.9	1.80	1.81	1.11	26.56
869.2	36.02	36.99	36.98	28.2	25.5	24.3	1.57	1.68	1.07	26.55
911.5	35.92	36.92	36.93	27.2	26.4	25.9	1.42	1.55	1.06	26.49
953.8	35.87	36.93	36.91	26.7	26.0	24.8	1.32	1.43	1.08	26.47
994.9	35.85	36.94	36.93	26.0	25.5	25.1	1.26	1.33	1.09	26.40
1046.2	35.96	37.08	37.06	28.0	24.7	27.7	1.26	1.27	1.11	26.39
1097.4	36.16	37.29	37.28	27.7	28.6	27.4	1.34	1.30	1.16	26.43
1148.7	36.37	37.46	37.44	30.1	29.5	29.6	1.50	1.41	1.23	26.50
1200.0	36.46	37.49	37.49	32.1	33.6	34.1	1.74	1.55	1.34	26.66

σ equals standard deviation, see Amplifier terms

ZHL-1217HLN



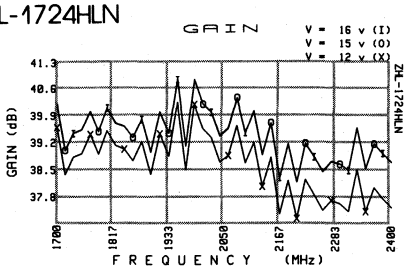


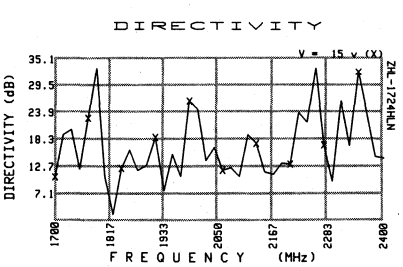


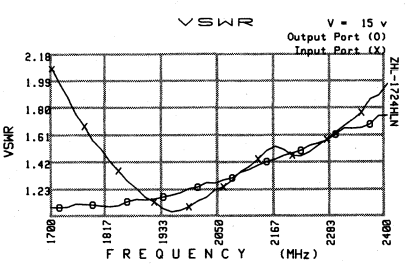
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	OUT	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
1200.0	33.75	34.80	34.82	28.7	24.8	26.1	1.75	1.59	1.30	26.55
1236.6	33.66	34.66	34.66	26.9	28.1	34.4	1.66	1.53	1.26	26.55
1287.0	33.89	34.84	34.83	20.9	22.7	16.8	1.56	1.46	1.24	26.60
1339.6	34.30	35.21	35.21	26.0	16.9	26.3	1.50	1.40	1.20	26.69
1392.3	34.34	35.18	35.19	22.7	17.2	15.1	1.46	1.36	1.16	26.91
1443.6	34.60	35.37	35.36	20.2	20.2	29.2	1.48	1.30	1.14	27.11
1507.7	35.00	35.64	35.63	17.9	19.6	24.0	1.55	1.26	1.13	27.47
1571.8	35.26	35.78	35.79	23.1	19.8	23.0	1.69	1.21	1.15	28.20
1635.9	35.60	35.95	35.95	19.3	29.8	14.3	1.95	1.18	1.22	28.89
1700.0	35.67	35.94	35.93	12.6	18.6	13.4	2.32	1.14	1.35	28.72

σ equals standard deviation, see Amplifier terms

ZHL-1724HLN







FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	OUT	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
1700.0	39.56	40.17	40.15	11.2	10.7	17.3	2.09	1.11	1.33	27.69
1751.2	38.88	39.50	39.50	15.2	12.3	12.2	1.77	1.14	1.21	27.57
1821.9	39.10	39.69	39.66	15.8	3.1	14.5	1.44	1.12	1.10	27.36
1895.5	38.37	38.94	38.93	23.5	13.2	9.0	1.19	1.17	1.08	27.31
1969.2	38.48	39.09	39.09	15.2	10.9	14.8	1.10	1.22	1.12	27.00
2041.0	38.68	39.37	39.35	24.6	16.9	21.5	1.24	1.29	1.16	26.97
2130.8	38.05	38.89	38.87	13.3	17.8	17.3	1.46	1.42	1.20	26.77
2220.5	38.23	39.17	39.16	10.6	24.2	10.6	1.48	1.52	1.21	26.52
2310.3	37.42	38.47	38.48	17.3	26.6	13.9	1.69	1.68	1.20	26.42
2400.0	37.51	38.68	38.69	13.8	14.9	14.8	1.98	1.76	1.19	26.15

σ equals standard deviation, see Amplifier terms

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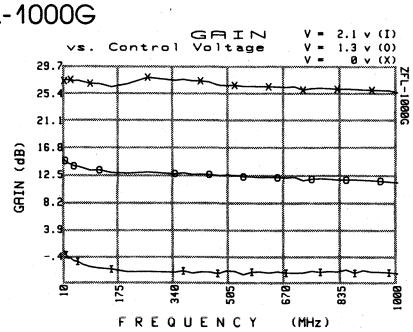
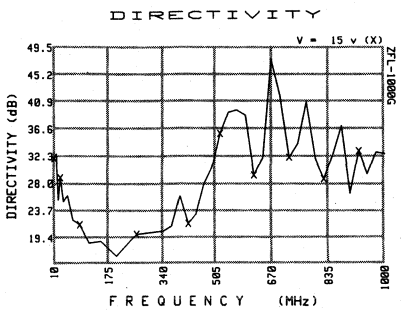
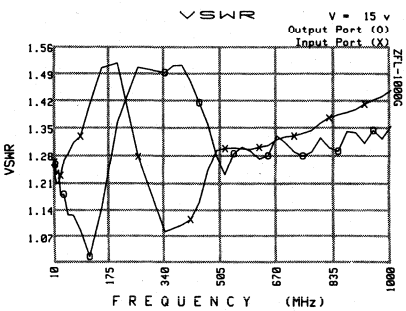
ZFL-1000G



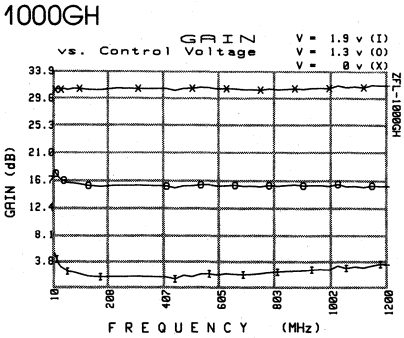


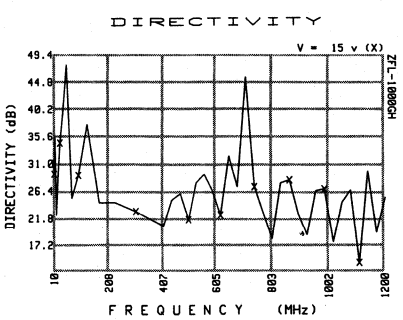


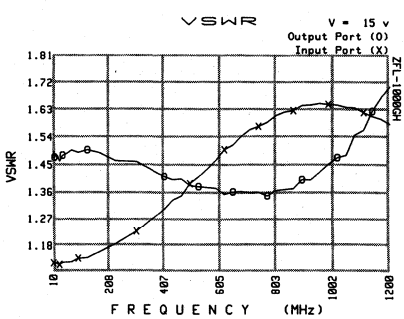
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	24.14	27.63	28.03	.26	37.3	32.1	33.4	1.26	.04	1.27	.09	9.36	10.50
17.2	24.20	27.68	28.06	.27	35.7	32.8	28.7	1.21	.02	1.23	.06	9.29	10.81
38.8	24.05	27.44	27.82	.17	28.8	25.2	23.6	1.27	.04	1.18	.08	9.09	10.89
87.6	23.89	27.22	27.58	.11	26.9	21.6	20.8	1.33	.05	1.09	.07	9.14	10.91
197.6	23.89	27.17	27.55	.60	20.0	16.7	17.4	1.52	.18	1.37	.10	9.14	10.82
365.4	24.04	27.75	28.16	.51	25.6	21.4	20.5	1.09	.10	1.51	.15	9.38	10.70
441.5	23.72	27.35	27.76	.34	26.9	23.2	24.2	1.16	.10	1.42	.08	9.45	10.69
517.7	23.27	26.75	27.14	.48	37.6	35.9	34.0	1.30	.05	1.23	.14	9.49	10.67
568.5	23.18	26.71	27.11	.38	47.9	39.7	33.0	1.30	.09	1.30	.10	9.53	10.51
619.2	23.09	26.65	27.05	.32	37.7	29.3	32.9	1.30	.04	1.27	.07	9.58	10.38
695.4	22.91	26.46	26.88	.31	51.0	41.8	35.0	1.33	.04	1.31	.04	9.68	10.16
771.5	22.75	26.35	26.76	.31	31.1	40.9	32.3	1.35	.03	1.29	.06	9.79	9.88
847.7	22.59	26.20	26.62	.30	52.0	32.5	36.6	1.39	.02	1.29	.06	9.90	9.55
923.8	22.46	26.12	26.55	.31	37.7	33.1	31.9	1.41	.02	1.31	.04	9.99	9.14
1000.0	22.16	25.92	26.36	.33	47.0	32.7	30.6	1.45	.02	1.36	.03	10.01	8.73

σ equals standard deviation, see Amplifier terms

ZFL-1000GH





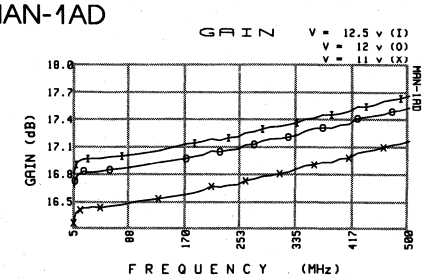


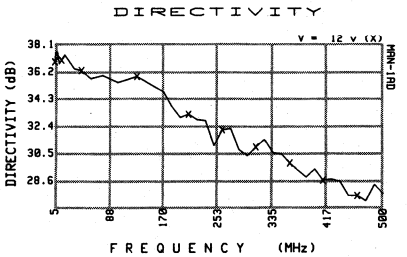
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	27.54	31.27	31.66	.84	39.9	29.3	31.9	1.12	0.00	1.49	.13	17.02	17.04
17.7	27.35	31.14	31.50	.86	29.6	22.4	31.2	1.12	0.00	1.48	.14	16.97	17.36
41.6	27.35	31.43	31.48	.92	36.6	39.5	46.9	1.12	0.00	1.48	.14	16.83	17.35
97.8	27.70	32.02	31.82	.96	27.4	29.0	27.5	1.14	0.00	1.49	.13	16.77	17.17
230.0	28.29	32.69	32.42	.98	28.2	24.4	20.4	1.18	.01	1.46	.12	16.45	16.94
437.2	28.19	32.70	32.38	.96	29.3	24.8	25.6	1.33	.01	1.40	.08	15.62	16.66
528.7	27.51	31.97	31.66	.97	26.0	27.7	25.2	1.41	.01	1.38	.07	15.19	16.71
620.3	27.82	32.29	31.97	.96	23.2	22.4	30.2	1.50	.02	1.35	.05	14.75	16.71
681.3	28.06	32.53	32.23	.95	30.6	27.1	30.3	1.54	.02	1.36	.04	14.50	16.65
742.3	27.49	31.98	31.66	.95	30.1	27.1	23.5	1.57	.02	1.36	.03	14.25	16.62
833.8	27.74	32.30	31.98	.97	28.0	27.7	21.5	1.62	.02	1.37	.03	13.94	16.46
925.4	27.20	31.88	31.54	1.01	31.3	19.0	27.5	1.64	.03	1.40	.02	13.60	16.23
1016.9	27.85	32.75	32.41	1.05	27.4	17.8	19.2	1.64	.03	1.47	.03	13.23	15.84
1108.5	27.50	32.66	32.31	1.12	32.9	14.2	21.0	1.62	.03	1.56	.04	12.84	15.32
1200.0	27.37	32.77	32.38	1.21	28.4	25.3	23.7	1.58	.04	1.71	.06	12.50	14.68

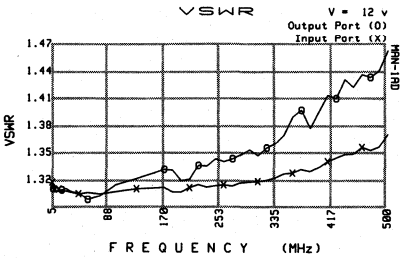
σ equals standard deviation, see Amplifier terms

Amplifiers

MAN-1AD



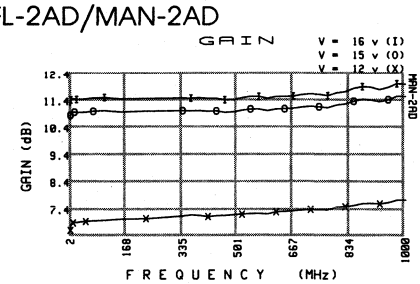


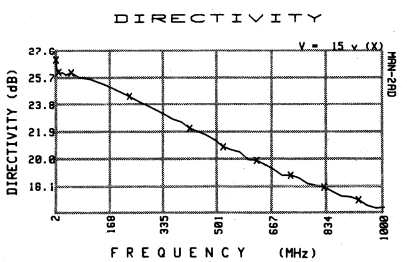


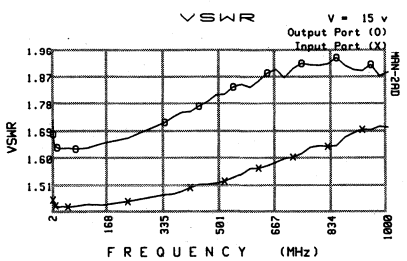
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	11.0V	12.0V	12.5V	σ1	11.0V	12.0V	12.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
5.0	16.25	16.65	16.78	.59	37.1	36.9	37.1	1.31	.03	1.31	.07	—	9.50
11.3	16.38	16.78	16.92	.61	36.0	36.7	36.8	1.31	.03	1.30	.07	7.41	9.48
33.4	16.43	16.81	16.96	.63	37.1	36.4	37.2	1.30	.02	1.30	.07	7.29	9.67
98.8	16.49	16.87	17.01	.62	36.3	35.4	36.0	1.30	.02	1.31	.07	7.46	9.59
195.4	16.61	17.00	17.15	.59	32.6	33.0	33.5	1.30	.02	1.32	.06	7.45	9.50
246.2	16.67	17.06	17.19	.57	33.8	31.0	32.2	1.31	.02	1.34	.06	7.24	9.52
309.6	16.79	17.18	17.31	.54	31.5	31.0	30.4	1.32	.03	1.34	.06	7.25	9.49
373.1	16.92	17.30	17.44	.51	30.1	29.3	29.7	1.33	.03	1.39	.05	7.31	9.36
436.5	17.04	17.41	17.53	.47	28.5	28.6	28.2	1.35	.03	1.43	.05	7.39	9.37
500.0	17.15	17.52	17.65	.43	27.5	27.7	27.1	1.37	.03	1.46	.04	7.49	9.40

σ equals standard deviation, see Amplifier terms

ZFL-2AD/MAN-2AD



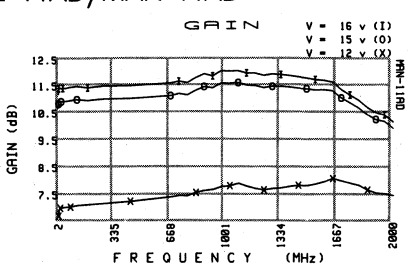


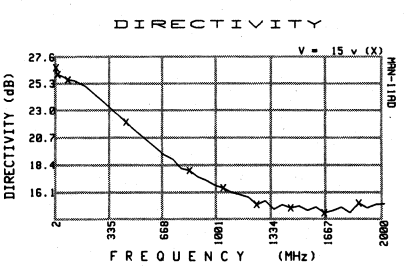


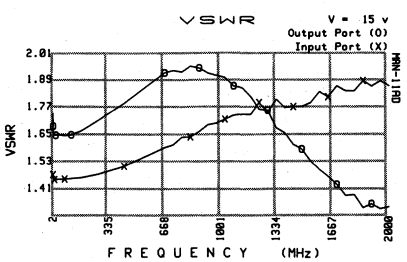
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
2.0	6.66	10.75	11.25	.08	26.8	26.9	27.3	1.47	.01	1.73	.01	—	— .40
6.5	6.92	10.99	11.49	.08	25.9	26.3	26.6	1.45	.01	1.65	.01	—	— .28
31.5	6.97	10.99	11.47	.07	25.7	25.9	26.4	1.45	.01	1.64	.01	5.94	— .05
152.2	7.06	11.01	11.49	.08	25.1	25.2	25.5	1.45	.01	1.66	.01	5.89	— .03
385.8	7.19	11.05	11.52	.11	22.9	22.6	22.6	1.50	.01	1.76	.01	5.85	— .07
488.2	7.23	11.01	11.45	.12	22.0	21.4	21.3	1.52	.01	1.82	.01	5.90	.02
616.2	7.33	11.10	11.56	.15	20.7	19.9	20.0	1.57	.01	1.86	.02	6.02	.01
744.1	7.41	11.19	11.65	.17	19.7	18.7	18.7	1.62	.01	1.92	.02	6.15	.02
872.1	7.62	11.46	11.93	.19	18.6	17.5	17.4	1.68	.01	1.92	.02	7.14	— .34
1000.0	7.76	11.56	12.02	.19	17.8	16.7	16.7	1.71	.02	1.89	.03	6.31	— .56

σ equals standard deviation, see Amplifier terms

ZFL-11AD/MAN-11AD







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
2.0	6.79	10.76	11.24	.08	26.5	26.6	27.2	1.47	.01	1.74	.01	—	— .31
7.6	7.04	10.99	11.47	.07	25.8	26.1	26.5	1.45	.01	1.65	.01	—	— .21
45.7	7.10	10.99	11.47	.07	25.6	25.9	26.3	1.45	.01	1.64	.01	5.56	— .01
273.2	7.24	11.07	11.54	.07	24.0	23.9	24.0	1.47	.01	1.71	.01	5.53	— .05
770.5	7.50	11.21	11.65	.10	19.3	18.1	18.0	1.63	.02	1.92	.04	5.75	.02
975.4	7.83	11.63	12.08	.09	17.8	16.7	16.6	1.69	.03	1.90	.04	5.88	— .49
1231.5	7.71	11.46	11.91	.10	16.8	15.1	14.9	1.79	.05	1.76	.04	5.88	— 1.40
1487.7	7.87	11.42	11.82	.13	16.3	15.0	14.7	1.77	.08	1.58	.04	6.09	— 1.87
1743.8	7.95	10.91	11.19	.20	15.7	14.9	14.8	1.84	.11	1.38	.03	6.49	— 1.41
2000.0	7.50	9.96	10.19	.23	15.2	15.2	15.2	1.86	.14	1.33	.03	6.62	— 1.50

σ equals standard deviation, see Amplifier terms

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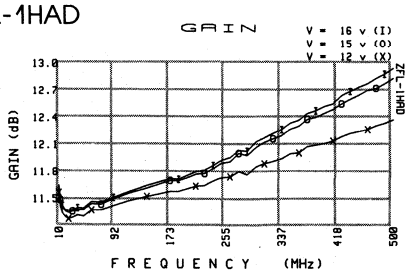
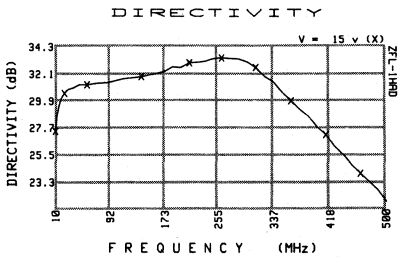
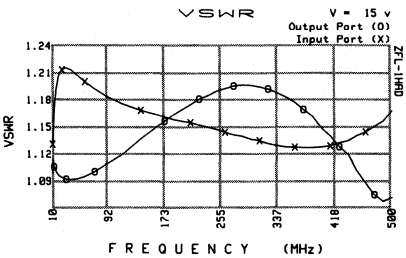
ZFL-1HAD



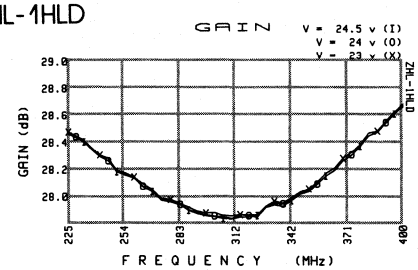


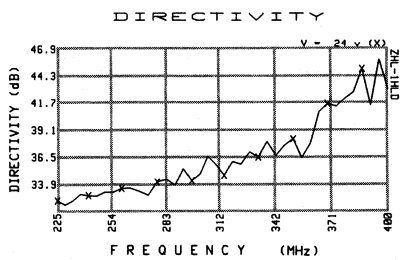


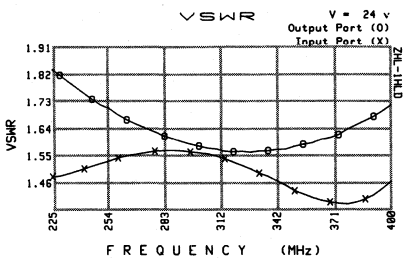
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	11.57	11.63	11.65	.17	27.4	27.5	27.4	1.13	.01	1.11	.03	6.77	20.80
19.3	11.30	11.37	11.38	.19	30.1	30.2	30.2	1.21	.01	1.10	.04	6.78	22.17
46.5	11.31	11.38	11.40	.20	31.1	31.2	31.2	1.21	.01	1.09	.04	6.75	22.56
111.8	11.48	11.56	11.58	.21	31.6	31.7	31.5	1.18	.01	1.12	.04	6.76	22.61
198.5	11.61	11.74	11.76	.26	32.4	32.6	32.8	1.16	0.00	1.17	.03	6.82	22.21
248.7	11.74	11.90	11.94	.31	32.7	33.3	33.4	1.15	0.00	1.19	.03	6.93	21.99
311.5	11.89	12.13	12.18	.36	31.4	32.6	33.0	1.14	.01	1.19	.03	7.05	21.71
374.4	12.08	12.38	12.45	.43	28.3	29.2	29.3	1.13	.01	1.17	.04	7.19	21.35
437.2	12.23	12.60	12.69	.47	25.2	25.5	25.6	1.13	.02	1.12	.05	7.33	21.27
500.0	12.37	12.83	12.94	.51	21.6	21.7	21.7	1.17	.02	1.07	.03	7.46	21.26

σ equals standard deviation, see Amplifier terms

ZHL-1HLD



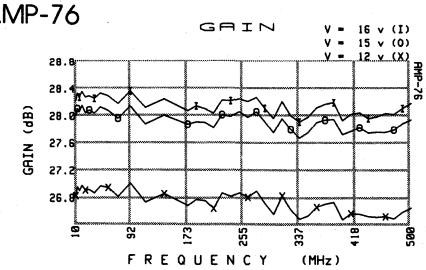


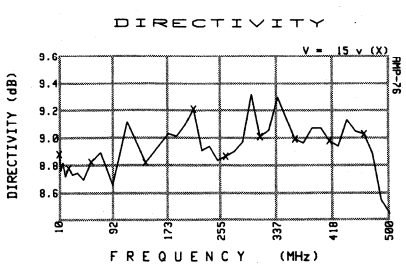


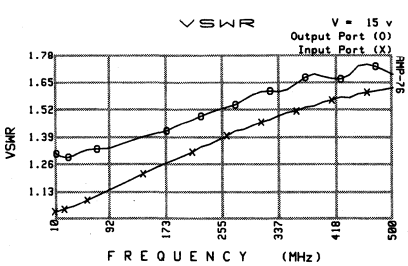
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
225.0	28.50	28.49	28.49	.74	32.2	32.4	31.7	1.48	.11	1.84	.16	1.96	29.63
237.3	28.38	28.37	28.37	.73	32.3	33.0	32.2	1.50	.14	1.78	.16	1.94	29.44
254.7	28.20	28.19	28.18	.74	33.1	33.2	33.2	1.54	.15	1.71	.16	1.94	29.22
273.5	28.01	28.00	28.00	.76	33.9	33.0	34.0	1.56	.16	1.65	.15	1.97	29.13
292.3	27.92	27.91	27.90	.76	35.7	35.5	35.2	1.57	.16	1.60	.14	2.00	29.04
310.3	27.88	27.87	27.86	.77	35.4	35.9	35.2	1.55	.16	1.58	.13	2.02	29.01
332.7	27.99	27.98	27.96	.77	37.2	36.6	37.2	1.49	.15	1.57	.12	2.03	28.96
355.1	28.13	28.12	28.11	.78	37.4	36.5	37.6	1.43	.15	1.59	.11	1.98	28.98
377.6	28.41	28.40	28.39	.79	41.0	42.2	40.1	1.39	.13	1.64	.12	1.92	28.90
400.0	28.71	28.69	28.68	.80	47.5	43.2	42.8	1.47	.10	1.72	.14	1.82	28.77

σ equals standard deviation, see Amplifier terms

AMP-76





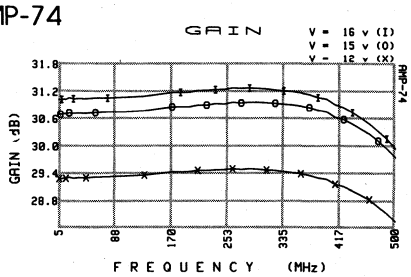


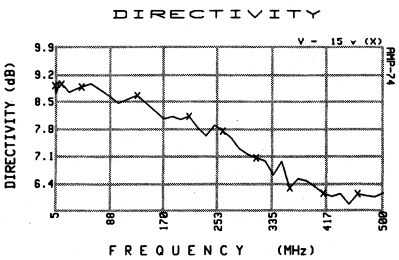
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	26.84	28.02	28.24	.05	9.4	8.8	8.8	1.04	.01	1.32	.01	3.06	16.64
19.3	26.99	28.17	28.37	.07	9.1	8.7	8.6	1.04	.01	1.30	.01	3.01	16.90
46.5	26.99	28.15	28.35	.05	9.3	8.7	8.6	1.07	.01	1.32	.01	2.97	16.83
111.8	26.75	27.90	28.14	.05	9.5	9.1	8.8	1.17	.01	1.37	.01	3.01	16.73
198.5	26.78	27.92	28.12	.05	9.5	9.1	8.9	1.31	.01	1.46	.01	2.96	16.71
248.7	26.89	28.08	28.27	.04	9.6	8.8	8.7	1.38	.02	1.52	.01	3.00	16.70
311.5	26.86	27.98	28.23	.09	9.6	9.0	8.7	1.47	.02	1.61	.01	3.04	16.73
374.4	26.74	27.96	28.19	.09	9.9	8.9	8.7	1.54	.03	1.68	.02	3.12	16.66
437.2	26.55	27.77	27.98	.12	9.9	9.1	8.8	1.58	.04	1.69	.03	3.21	16.55
500.0	26.67	27.96	28.20	.16	9.6	8.4	8.2	1.63	.04	1.69	.04	3.25	16.42

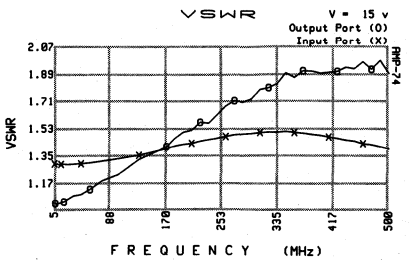
σ equals standard deviation, see Amplifier terms

Amplifiers

AMP-74



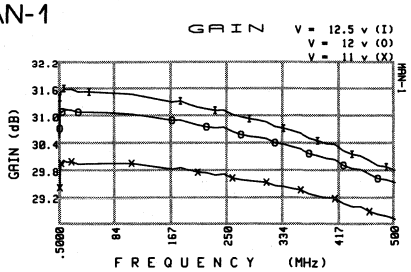


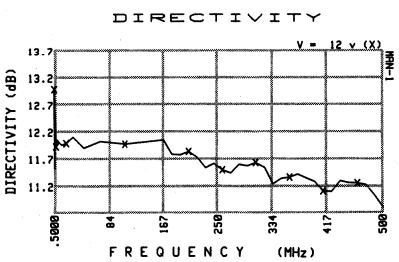


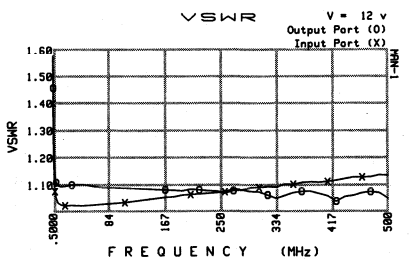
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
5.0	29.29	30.70	31.03	.05	9.4	8.9	9.0	1.29	.03	1.04	.02	—	9.84
11.3	29.29	30.72	31.04	.05	9.3	9.1	8.7	1.29	.03	1.03	.01	4.53	9.70
33.4	29.30	30.72	31.05	.06	9.1	8.8	8.8	1.29	.03	1.09	.01	4.46	9.83
98.8	29.33	30.75	31.07	.09	9.3	8.5	8.7	1.33	.04	1.22	.03	4.57	9.66
195.4	29.43	30.86	31.18	.23	8.8	8.1	8.3	1.42	.08	1.50	.07	4.69	9.57
246.2	29.47	30.92	31.25	.31	8.3	7.9	7.7	1.46	.10	1.62	.08	4.81	9.39
309.6	29.46	30.95	31.25	.33	7.7	7.1	6.8	1.50	.14	1.78	.09	4.91	8.98
373.1	29.35	30.84	31.13	.24	7.4	6.5	6.1	1.50	.17	1.91	.08	4.96	8.74
436.5	29.01	30.48	30.73	.14	6.9	6.2	5.9	1.45	.18	1.93	.09	4.96	8.64
500.0	28.33	29.74	29.94	.27	7.3	6.2	6.3	1.39	.16	1.89	.11	4.95	8.58

σ equals standard deviation, see Amplifier terms

MAN-1



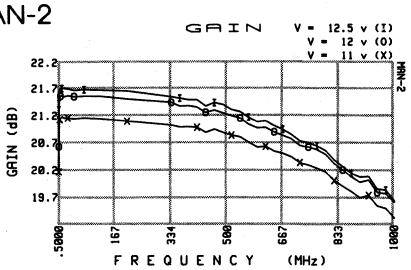


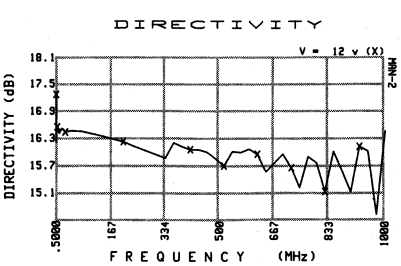


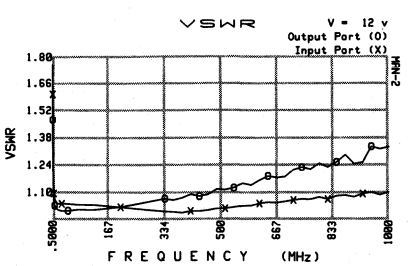
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	11.0V	12.0V	12.5V	σ1	11.0V	12.0V	12.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
.5	29.45	30.56	30.97	.48	13.3	13.0	12.7	1.40	.08	1.57	.04	—	8.35
1.9	29.93	31.07	31.52	.43	12.8	12.3	12.0	1.12	.03	1.18	.02	—	8.31
11.4	30.02	31.17	31.62	.42	12.4	12.0	11.8	1.03	.04	1.09	.03	2.80	8.16
68.3	29.99	31.11	31.54	.42	12.4	12.0	11.9	1.03	.04	1.09	.03	2.74	8.32
192.6	29.83	30.87	31.28	.42	12.0	11.8	11.5	1.06	.04	1.08	.03	2.77	8.41
243.8	29.74	30.77	31.15	.43	12.0	11.6	11.3	1.07	.04	1.08	.03	2.80	8.24
307.9	29.55	30.52	30.88	.43	11.9	11.6	11.3	1.09	.04	1.07	.03	2.84	8.28
371.9	29.29	30.19	30.53	.42	11.8	11.4	11.2	1.11	.05	1.07	.03	2.89	8.38
436.0	29.01	29.86	30.17	.39	11.5	11.3	11.1	1.12	.04	1.05	.04	2.95	8.51
500.0	28.74	29.54	29.82	.38	11.2	10.8	10.7	1.13	.05	1.05	.03	3.02	8.52

σ equals standard deviation, see Amplifier terms

MAN-2







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	11.0V	12.0V	12.5V	σ1	11.0V	12.0V	12.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
.5	20.16	20.56	20.71	.60	17.5	17.3	17.1	1.61	.03	1.77	.04	—	9.12
2.2	21.09	21.48	21.63	.59	16.9	16.5	16.6	1.16	.02	1.11	.06	—	9.45
16.6	21.15	21.54	21.70	.63	16.7	16.5	16.3	1.05	.03	1.02	.06	6.40	9.56
122.7	21.13	21.55	21.66	.64	16.6	16.4	16.2	1.04	.03	1.02	.05	6.32	9.46
384.9	20.98	21.37	21.48	.65	16.5	16.1	16.0	1.00	.04	1.08	.03	6.44	9.33
487.4	20.88	21.24	21.39	.69	16.2	15.9	15.8	1.02	.04	1.12	.01	6.47	9.31
615.6	20.62	20.96	21.09	.72	16.2	16.0	15.9	1.05	.04	1.17	.02	6.50	9.42
743.7	20.28	20.61	20.69	.74	15.6	15.2	15.3	1.07	.04	1.23	.04	6.49	9.34
871.9	19.79	20.05	20.12	.81	15.8	15.6	15.4	1.09	.06	1.30	.08	6.52	9.21
1000.0	19.31	19.59	19.62	.80	16.9	16.5	16.5	1.11	.08	1.34	.13	6.56	8.74

σ equals standard deviation, see Amplifier terms

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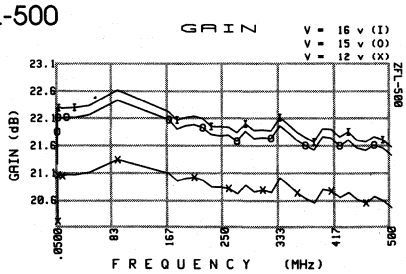
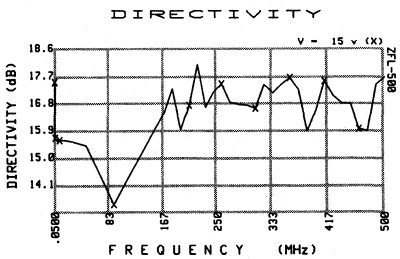
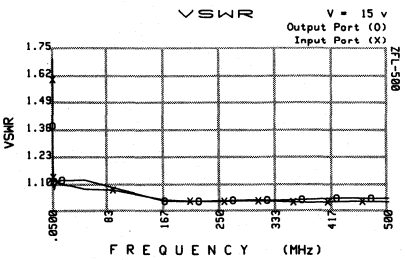
Mini-Circuits

ZFL-500



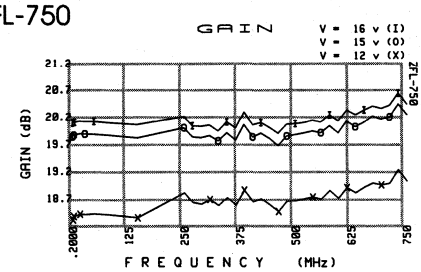


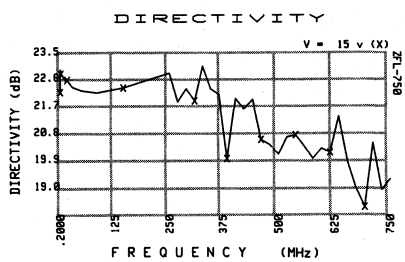


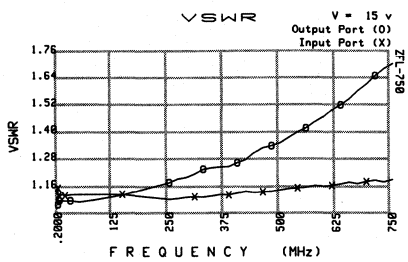
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
.050	20.18	21.24	21.41	.50	18.1	17.5	17.4	1.59	.08	1.69	.04	—	10.52
.325	21.00	22.06	22.23	.55	16.4	15.7	15.6	1.17	.03	1.11	.04	—	10.82
3.944	21.03	22.08	22.27	.55	16.3	15.6	15.5	1.09	.05	1.11	.05	—	10.84
47.856	21.08	22.13	22.30	.55	16.1	15.4	15.3	1.07	.06	1.11	.04	5.72	10.87
192.338	20.96	21.93	22.07	.53	15.4	15.9	17.1	1.01	.01	1.01	0.00	5.74	10.31
243.615	20.79	21.74	21.90	.55	16.8	17.2	16.8	1.01	.01	1.01	0.00	5.76	10.28
307.712	20.74	21.70	21.84	.52	16.2	16.6	16.6	1.01	0.00	1.02	0.00	5.77	10.26
371.808	20.58	21.55	21.70	.53	16.4	17.2	17.6	1.01	.01	1.02	0.00	5.77	10.23
435.904	20.69	21.65	21.80	.52	15.7	16.8	16.1	1.01	0.00	1.03	0.00	5.78	10.14
500.000	20.40	21.36	21.52	.52	17.1	17.7	16.7	1.01	.01	1.02	0.00	5.79	10.05

σ equals standard deviation, see Amplifier terms

ZFL-750



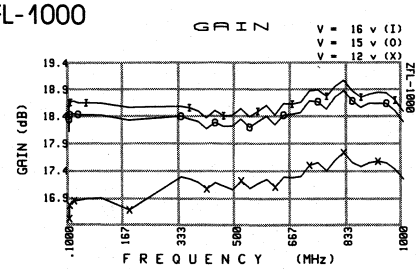


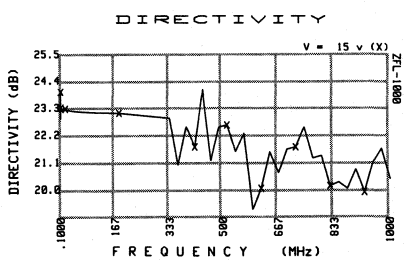


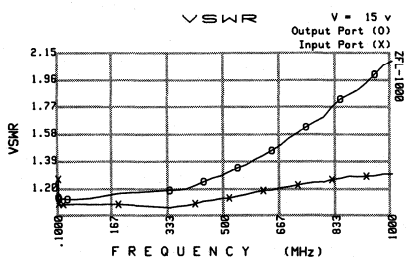
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
.2	18.30	19.78	20.01	.33	22.9	22.2	22.0	1.14	.03	1.10	.01	—	10.39
1.0	18.36	19.85	20.08	.31	23.9	22.9	22.6	1.10	.03	1.08	.02	—	10.50
9.3	18.38	19.86	20.10	.27	23.7	22.6	22.5	1.11	.04	1.09	.02	—	10.61
83.5	18.38	19.84	20.07	.24	23.1	22.1	21.9	1.11	.03	1.09	.02	6.17	10.55
288.6	18.57	19.79	20.00	.10	22.7	22.3	20.7	1.10	.01	1.19	.02	6.22	10.14
365.5	18.55	19.74	19.97	.09	22.4	22.1	20.4	1.11	.01	1.23	.02	6.25	10.07
461.6	18.44	19.64	19.87	.10	22.6	20.6	20.8	1.12	.01	1.32	.02	6.25	9.94
557.7	18.66	19.88	20.07	.14	21.8	20.4	19.7	1.14	.01	1.40	.02	6.20	9.87
653.9	18.87	20.06	20.29	.17	22.1	19.8	20.3	1.17	.01	1.54	.03	6.13	9.54
750.0	18.98	20.20	20.39	.20	19.4	19.3	19.5	1.18	.01	1.69	.04	6.09	9.26

σ equals standard deviation, see Amplifier terms

ZFL-1000





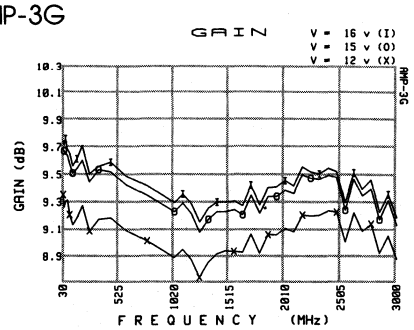


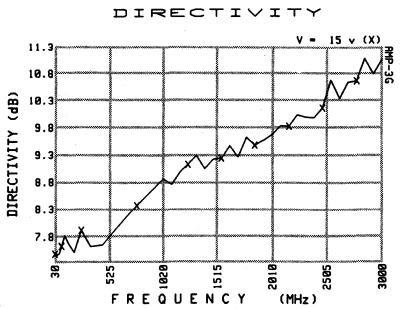
FREQUENCY (MHz)	GAIN (dB) 12.0V	15.0V	16.0V	σ1	DIRECTIVITY (dB) 12.0V	15.0V	16.0V	SWR IN	σ2	OUT	σ3	N.F. (db)	P_{out}(dBm) (@1dBCOMPR)
.1	16.48	18.08	18.31	.15	25.1	23.9	23.8	1.26	.04	1.17	.01	—	10.39
.7	16.72	18.38	18.60	.19	24.6	23.3	23.1	1.10	.03	1.12	.03	—	10.43
7.9	16.79	18.40	18.64	.21	24.4	23.3	23.1	1.09	.03	1.13	.03	—	10.53
95.7	16.86	18.38	18.60	.21	24.1	23.1	23.0	1.09	.03	1.13	.03	6.15	10.50
384.7	17.14	18.26	18.45	.14	22.8	22.5	23.0	1.08	.02	1.19	.03	6.21	9.78
487.2	17.01	18.18	18.37	.16	23.3	22.5	22.8	1.13	.02	1.28	.03	6.20	9.75
615.4	17.06	18.20	18.38	.18	22.3	20.0	23.2	1.18	.03	1.42	.04	6.13	9.45
743.6	17.50	18.62	18.85	.18	23.9	22.5	21.2	1.23	.05	1.62	.04	6.04	9.11
871.8	17.43	18.52	18.70	.17	21.2	20.0	19.3	1.28	.05	1.85	.04	8.29	8.60
1000.0	17.19	18.25	18.44	.19	20.0	20.4	20.1	1.29	.06	2.08	.04	6.09	7.99

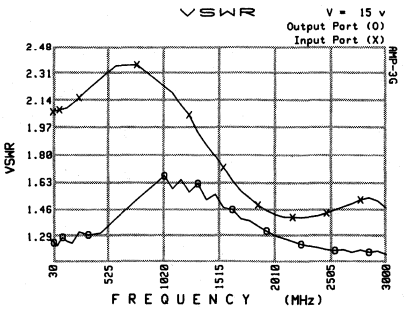
σ equals standard deviation, see Amplifier terms

Amplifiers

AMP-3G



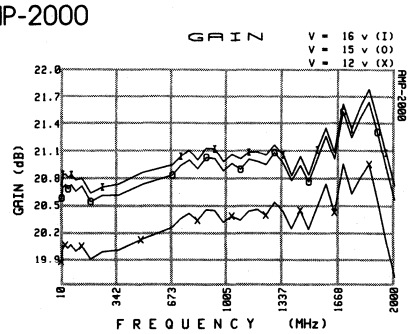


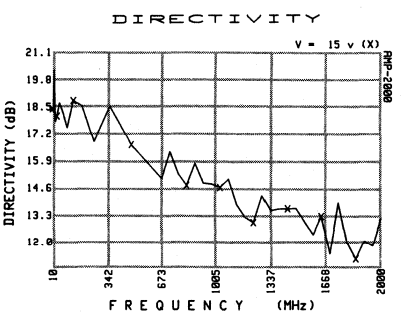


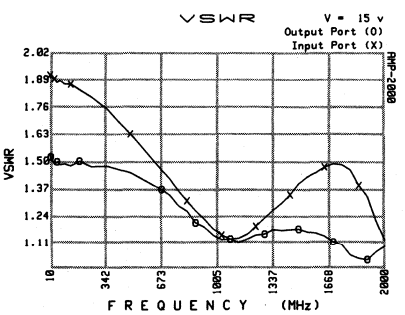
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
30.0	9.39	9.72	9.78	.38	7.8	7.5	7.4	2.07	.08	1.28	.01	10.05	15.54
51.6	9.34	9.69	9.80	.38	7.8	7.5	7.3	2.08	.08	1.24	.02	9.44	15.40
116.5	9.17	9.55	9.60	.38	8.2	7.8	7.8	2.09	.07	1.29	.02	7.92	15.37
262.8	9.13	9.49	9.55	.36	8.3	7.9	7.9	2.16	.07	1.33	.02	6.04	15.18
592.9	9.13	9.46	9.53	.36	8.3	8.0	7.9	2.36	.06	1.41	.04	4.35	15.02
1096.2	8.99	9.33	9.39	.37	9.0	8.7	8.7	2.19	.06	1.59	.10	3.79	14.55
1324.6	8.90	9.21	9.29	.37	9.4	9.3	9.2	1.94	.06	1.62	.12	3.52	14.59
1553.1	8.98	9.28	9.35	.38	9.3	9.2	9.2	1.72	.06	1.47	.11	3.49	15.07
1705.4	9.10	9.39	9.46	.39	9.3	9.2	9.2	1.58	.06	1.40	.10	3.58	15.41
1857.7	9.10	9.38	9.44	.39	9.6	9.5	9.5	1.49	.05	1.36	.10	3.52	15.51
2086.2	9.12	9.40	9.45	.37	9.9	9.8	9.9	1.41	.05	1.28	.10	3.30	15.33
2314.6	9.24	9.50	9.54	.34	9.9	10.0	10.1	1.41	.05	1.23	.08	3.11	15.68
2543.1	9.04	9.28	9.33	.32	10.4	10.7	10.8	1.46	.07	1.21	.07	3.37	15.99
2771.5	9.18	9.43	9.50	.32	10.4	10.6	10.8	1.52	.09	1.21	.07	3.54	16.27
3000.0	8.92	9.17	9.22	.35	10.6	11.0	11.2	1.47	.07	1.18	.03	3.34	16.32

σ equals standard deviation, see Amplifier terms

AMP-2000







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	19.85	20.55	20.70	.37	19.6	18.4	19.3	1.92	.06	1.54	.18	8.26	15.59
19.1	20.02	20.69	20.82	.33	19.4	20.2	18.1	1.91	.06	1.51	.11	8.01	16.22
50.5	20.01	20.66	20.79	.35	19.4	18.7	18.5	1.88	.05	1.50	.09	7.15	16.25
133.4	20.03	20.69	20.78	.35	18.3	18.8	17.9	1.87	.05	1.48	.09	6.19	16.27
352.3	19.98	20.59	20.71	.32	18.3	18.5	16.6	1.75	.05	1.48	.06	5.10	16.47
724.4	20.33	20.92	21.02	.45	16.0	16.3	16.0	1.42	.07	1.34	.06	4.32	16.98
877.4	20.42	21.01	21.11	.44	15.9	15.7	13.6	1.27	.07	1.21	.07	4.28	17.03
1030.5	20.36	20.94	21.04	.40	14.5	14.6	14.6	1.15	.06	1.13	.05	4.43	17.31
1132.6	20.41	20.99	21.07	.35	14.9	13.8	14.0	1.14	.05	1.11	.07	4.62	17.38
1234.6	20.36	20.93	21.03	.35	14.2	12.9	14.2	1.19	.07	1.15	.04	4.64	17.41
1387.7	20.21	20.75	20.80	.37	14.1	13.6	14.5	1.30	.08	1.17	.02	4.32	17.59
1540.8	20.46	20.99	21.09	.42	13.3	12.9	13.4	1.43	.10	1.17	.04	4.64	17.89
1693.8	20.93	21.51	21.59	.45	12.0	11.4	12.2	1.49	.11	1.12	.06	5.05	17.70
1846.9	20.93	21.61	21.76	.32	10.7	11.1	11.7	1.38	.09	1.03	.04	4.51	17.26
2000.0	19.68	20.54	20.69	.22	13.3	13.1	13.1	1.12	.04	1.09	.03	4.90	16.11

σ equals standard deviation, see Amplifier terms

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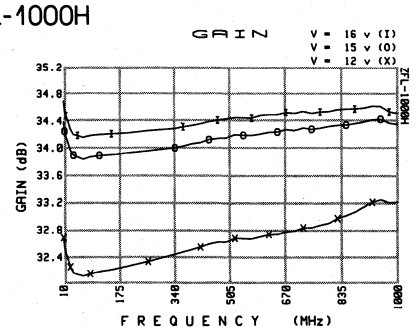
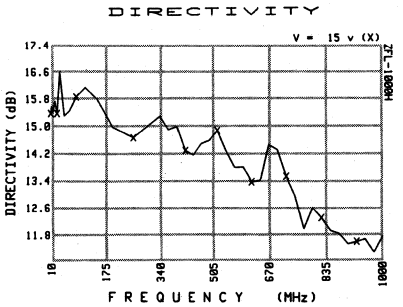
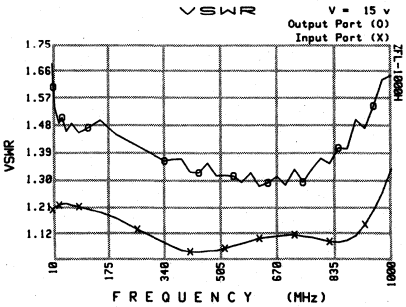
ZFL-1000H



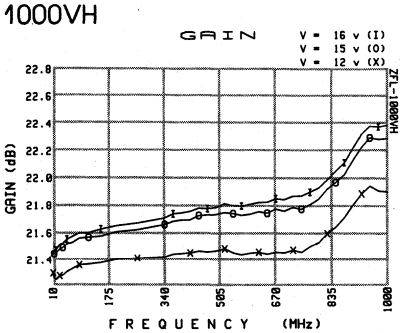


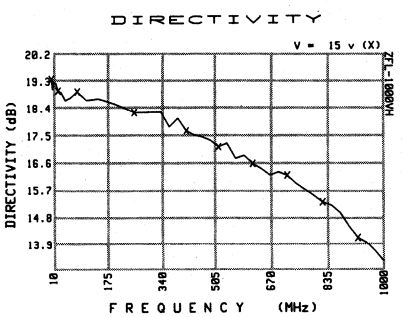


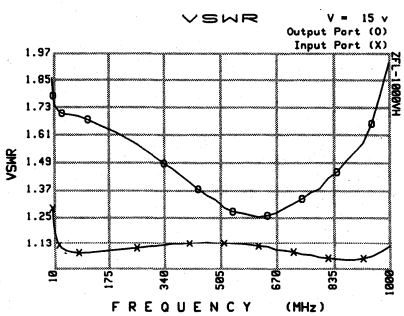
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	32.70	34.40	34.71	.24	16.1	15.3	15.4	1.21	.03	1.69	.16	4.82	21.35
17.2	32.46	34.18	34.49	.21	16.4	15.4	15.6	1.22	.02	1.54	.08	4.77	21.44
38.8	32.18	33.91	34.21	.21	16.3	16.6	15.5	1.22	.02	1.51	.05	4.63	21.13
87.6	32.17	33.88	34.20	.21	16.8	15.8	16.3	1.21	.02	1.46	.05	4.63	21.14
197.6	32.28	33.94	34.24	.20	16.4	14.9	14.8	1.18	.03	1.45	.03	4.58	21.07
365.4	32.49	34.04	34.32	.17	15.4	14.8	15.6	1.08	.04	1.37	.06	4.67	20.84
441.5	32.61	34.13	34.40	.19	15.5	14.1	15.3	1.07	.05	1.33	.08	4.72	20.57
517.7	32.69	34.21	34.46	.20	14.4	14.8	13.9	1.08	.06	1.32	.09	4.74	20.37
568.5	32.68	34.20	34.45	.21	14.1	13.7	14.3	1.09	.07	1.29	.12	4.75	20.24
619.2	32.75	34.24	34.50	.23	14.2	13.3	13.5	1.11	.08	1.28	.11	4.74	20.38
695.4	32.79	34.27	34.52	.24	13.9	14.2	13.0	1.12	.10	1.28	.17	4.75	20.63
771.5	32.88	34.30	34.54	.25	13.3	11.9	12.7	1.11	.10	1.34	.18	4.79	20.95
847.7	33.02	34.35	34.58	.23	12.5	11.9	12.9	1.10	.08	1.41	.16	4.81	21.49
923.8	33.21	34.43	34.63	.22	11.7	11.5	11.7	1.15	.05	1.47	.12	4.85	21.95
1000.0	33.21	34.36	34.52	.31	11.1	11.7	11.3	1.34	.12	1.65	.14	4.90	22.42

σ equals standard deviation, see Amplifier terms

ZFL-1000VH





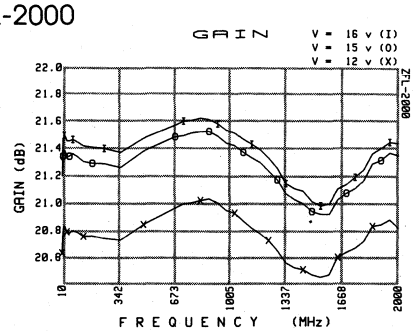


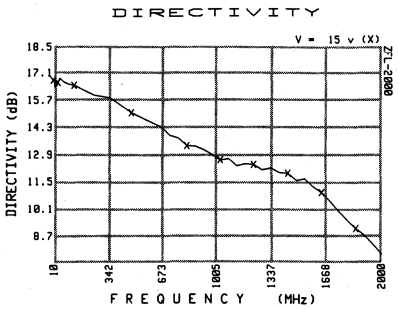
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	21.30	21.45	21.46	.16	19.1	19.4	19.3	1.29	.02	1.86	.06	4.70	26.78
17.2	21.25	21.45	21.47	.13	19.0	19.3	18.7	1.18	.01	1.74	.04	4.68	27.09
38.8	21.28	21.49	21.52	.11	18.8	18.9	18.8	1.11	.01	1.70	.04	4.61	27.16
87.6	21.36	21.56	21.60	.11	18.8	19.0	18.6	1.09	.01	1.69	.04	4.62	27.15
197.6	21.40	21.60	21.65	.11	18.6	18.5	18.6	1.10	.01	1.62	.04	4.60	27.25
365.4	21.44	21.68	21.73	.14	18.0	17.8	17.9	1.13	.02	1.46	.04	4.76	27.69
441.5	21.46	21.72	21.77	.18	17.5	17.5	17.3	1.13	.03	1.37	.04	4.82	27.74
517.7	21.48	21.74	21.81	.20	16.9	17.1	17.3	1.13	.03	1.29	.03	4.87	27.50
568.5	21.44	21.72	21.79	.21	17.0	16.7	17.0	1.12	.03	1.26	.02	4.90	27.38
619.2	21.45	21.75	21.82	.22	16.7	16.5	16.8	1.11	.03	1.25	.02	4.94	27.14
695.4	21.45	21.75	21.83	.24	16.3	16.3	16.3	1.09	.04	1.28	.02	5.00	27.04
771.5	21.49	21.80	21.89	.26	15.6	15.7	15.5	1.08	.04	1.35	.04	5.09	26.93
847.7	21.63	21.96	22.04	.32	14.8	15.1	15.1	1.06	.05	1.44	.07	5.24	26.89
923.8	21.87	22.22	22.31	.41	14.3	14.1	14.2	1.06	.06	1.57	.09	5.40	26.85
1000.0	21.89	22.28	22.38	.46	13.4	13.3	13.3	1.11	.06	1.92	.16	5.57	26.47

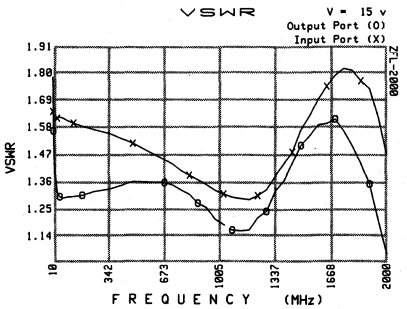
σ equals standard deviation, see Amplifier terms

Amplifiers

ZFL-2000



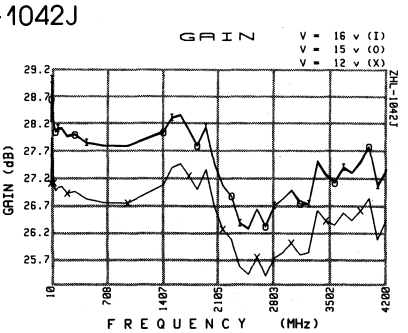


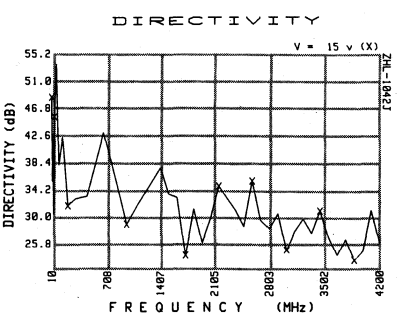


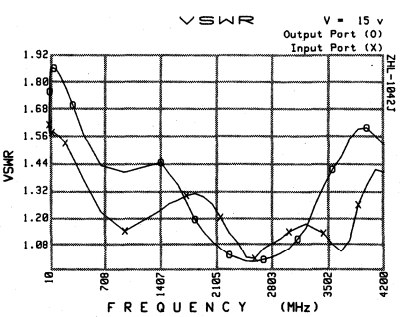
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ 1	12.0V	15.0V	16.0V	IN	σ 2	OUT	σ 3	(db)	(@1dBCOMPR)
10.0	20.67	21.23	21.35	.77	17.5	16.7	16.8	1.65	.09	1.78	.29	5.52	15.80
19.1	20.87	21.42	21.53	.68	16.8	16.4	16.6	1.62	.08	1.44	.11	5.24	16.11
50.5	20.82	21.38	21.49	.67	17.1	16.8	16.6	1.62	.08	1.30	.05	4.28	15.83
133.4	20.79	21.34	21.45	.62	17.0	16.5	16.2	1.60	.07	1.30	.07	3.96	15.95
352.3	20.77	21.30	21.41	.46	16.1	15.8	15.8	1.56	.06	1.33	.09	4.14	16.30
724.4	21.03	21.53	21.64	.19	14.5	13.9	13.9	1.43	.15	1.35	.08	4.23	16.76
877.4	21.07	21.56	21.65	.27	13.8	13.3	13.0	1.37	.20	1.27	.08	4.28	16.72
1030.5	20.97	21.46	21.55	.37	13.0	12.6	12.6	1.31	.16	1.19	.07	4.39	16.69
1132.6	20.85	21.37	21.47	.44	12.9	12.3	12.3	1.29	.09	1.16	.07	4.44	16.60
1234.6	20.76	21.27	21.37	.57	12.5	12.4	12.4	1.30	.08	1.21	.08	4.49	16.73
1387.7	20.56	21.06	21.14	.66	12.2	11.9	12.1	1.43	.14	1.36	.05	4.59	16.74
1540.8	20.50	20.96	21.02	.56	11.6	11.6	11.5	1.63	.16	1.54	.05	4.78	16.74
1693.8	20.68	21.11	21.17	.48	10.2	10.5	10.5	1.79	.18	1.61	.09	4.90	16.99
1846.9	20.87	21.32	21.40	.51	8.6	9.1	9.1	1.77	.17	1.43	.10	4.99	16.99
2000.0	20.86	21.38	21.47	.42	7.5	7.8	8.1	1.47	.13	1.07	.16	5.30	16.80

σ equals standard deviation, see Amplifier terms

ZHL-1042J







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ 1	12.0V	15.0V	16.0V	IN	σ 2	OUT	σ 3	(db)	(@1dBCOMPR)
10.0	27.55	28.68	28.68	1.15	33.4	32.6	33.8	1.60	.10	1.57	.14	19.14	22.32
21.4	28.01	29.08	29.09	1.08	30.7	19.8	26.4	1.56	.03	1.83	.13	17.99	23.20
67.0	27.31	28.36	28.37	1.01	28.3	27.7	27.5	1.57	.04	1.84	.14	13.37	22.82
209.9	27.41	28.43	28.44	1.09	32.3	29.8	34.4	1.52	.05	1.78	.16	7.36	22.75
657.2	27.06	28.06	28.06	.96	29.8	23.0	30.5	1.24	.10	1.43	.07	5.90	21.80
1514.1	27.81	28.70	28.71	1.04	29.5	29.1	27.4	1.53	.22	1.62	.16	5.28	20.96
1836.4	27.53	28.29	28.28	1.08	30.0	26.7	27.7	1.88	.26	1.47	.19	5.40	21.14
2158.7	26.69	27.44	27.44	.85	25.5	26.2	27.9	1.94	.23	1.29	.22	5.39	20.59
2373.6	26.44	27.26	27.27	.73	25.0	26.0	28.5	1.83	.20	1.20	.22	5.30	20.84
2588.5	26.30	27.16	27.18	.85	29.7	23.1	24.8	1.65	.17	1.10	.24	5.34	21.04
2910.8	26.45	27.38	27.41	.76	23.9	28.1	23.2	1.48	.15	1.12	.17	5.41	20.61
3233.1	26.74	27.60	27.60	.40	23.5	31.5	25.7	1.45	.18	1.34	.06	5.43	20.72
3555.4	26.87	27.63	27.64	.48	28.6	25.9	25.8	1.47	.22	1.64	.10	5.43	20.61
3877.7	27.26	28.14	28.15	.92	22.2	20.8	22.2	1.31	.17	1.75	.20	5.55	21.22
4200.0	27.17	28.06	28.08	.85	21.9	18.3	21.2	1.46	.44	1.66	.25	5.58	20.82

σ equals standard deviation, see Amplifier terms

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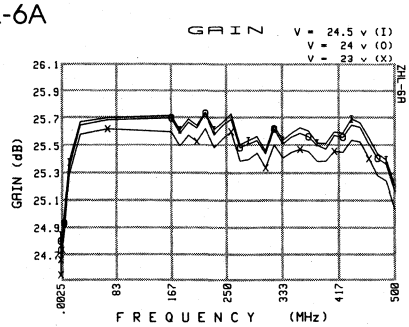
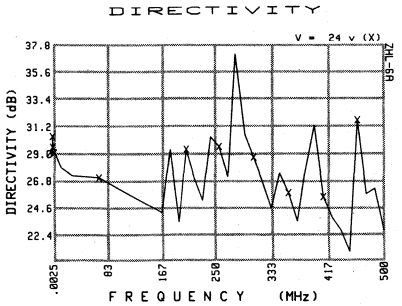
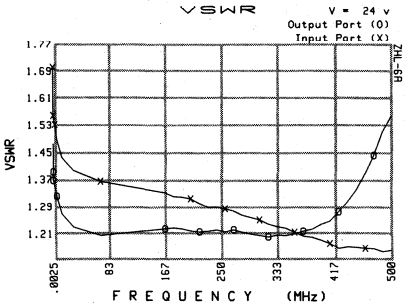
ZHL-6A



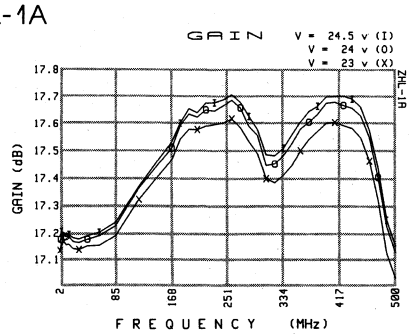


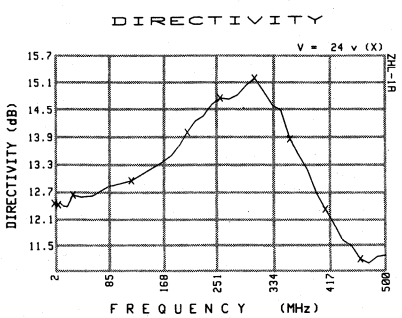


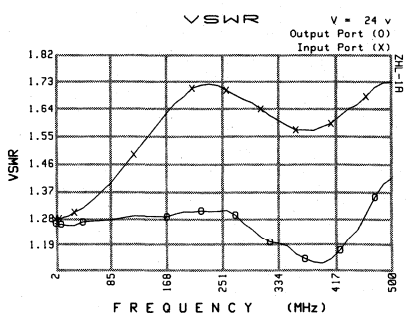
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
.0025	24.57	24.64	24.69	.20	30.4	30.5	30.4	1.71	.04	1.48	.05	—	24.48
.0138	24.73	24.82	24.86	.19	29.8	29.8	29.7	1.57	.04	1.38	.06	—	24.62
.1792	24.67	24.75	24.79	.20	29.3	29.2	29.2	1.56	.04	1.37	.06	—	24.65
2.3254	24.75	24.81	24.85	.23	28.9	29.1	28.9	1.54	.05	1.35	.06	—	24.75
30.1795	25.60	25.66	25.69	.13	27.3	27.3	27.2	1.40	.04	1.23	.05	7.58	25.48
179.4888	25.51	25.60	25.63	.14	28.1	29.3	25.4	1.32	.14	1.23	.08	7.55	25.13
217.9501	25.64	25.75	25.76	.14	25.1	27.0	24.1	1.30	.14	1.22	.08	7.61	24.97
256.4115	25.61	25.71	25.75	.14	35.6	29.5	24.9	1.29	.13	1.22	.08	7.62	24.87
282.0524	25.41	25.52	25.55	.15	26.5	37.0	35.0	1.27	.12	1.22	.09	7.63	24.88
307.6933	25.35	25.45	25.47	.16	29.8	28.6	28.7	1.25	.12	1.21	.09	7.64	24.85
346.1546	25.46	25.57	25.60	.15	32.0	27.3	28.4	1.23	.10	1.21	.10	7.64	24.61
384.6160	25.39	25.51	25.53	.17	27.5	27.8	24.6	1.20	.09	1.23	.12	7.62	24.58
423.0773	25.46	25.57	25.60	.19	22.7	23.7	24.8	1.17	.08	1.28	.16	7.59	24.57
461.5387	25.41	25.52	25.57	.23	22.5	31.6	19.6	1.17	.07	1.39	.22	7.57	24.43
500.0000	25.04	25.17	25.21	.31	25.0	22.7	22.5	1.16	.07	1.56	.29	7.53	24.37

σ equals standard deviation, see Amplifier terms

ZHL-1A





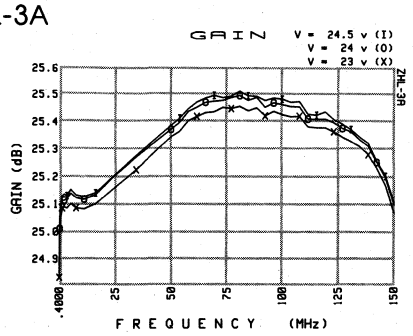


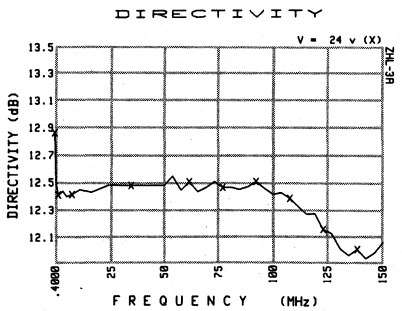
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
2.0	17.10	17.13	17.15	.08	12.5	12.5	12.5	1.28	.09	1.27	.04	—	30.24
4.0	17.12	17.15	17.17	.09	12.5	12.5	12.4	1.28	.09	1.26	.05	—	30.24
11.0	17.12	17.15	17.15	.08	12.5	12.5	12.5	1.28	.09	1.26	.05	8.25	29.99
30.6	17.10	17.13	17.14	.07	12.6	12.7	12.5	1.30	.10	1.26	.04	8.21	30.13
85.0	17.15	17.19	17.20	.17	12.8	12.9	12.8	1.40	.10	1.28	.04	8.26	29.66
180.8	17.50	17.56	17.56	.19	13.6	13.5	13.5	1.66	.12	1.30	.07	8.02	29.08
219.1	17.55	17.61	17.64	.16	14.4	14.3	14.2	1.72	.13	1.31	.10	8.01	29.17
257.4	17.58	17.65	17.67	.17	14.8	14.8	14.7	1.70	.13	1.31	.10	8.05	29.86
282.9	17.50	17.55	17.59	.22	15.1	14.8	15.0	1.67	.11	1.27	.14	8.11	30.31
308.5	17.36	17.41	17.45	.30	15.1	15.2	15.1	1.64	.09	1.22	.15	8.17	30.39
346.8	17.41	17.49	17.52	.33	14.4	14.5	14.3	1.59	.07	1.19	.11	8.20	30.68
385.1	17.53	17.60	17.63	.43	13.3	13.2	13.2	1.57	.13	1.14	.07	8.18	30.68
423.4	17.55	17.63	17.66	.45	12.0	12.0	12.1	1.62	.19	1.18	.05	8.18	30.78
461.7	17.42	17.51	17.54	.45	11.3	11.2	11.3	1.68	.18	1.30	.11	8.27	30.37
500.0	16.99	17.09	17.11	.43	11.5	11.3	11.3	1.73	.13	1.41	.22	8.51	29.64

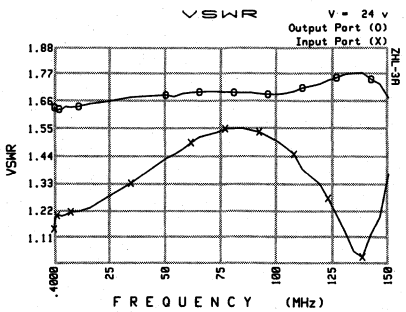
σ equals standard deviation, see Amplifier terms

Amplifiers

ZHL-3A



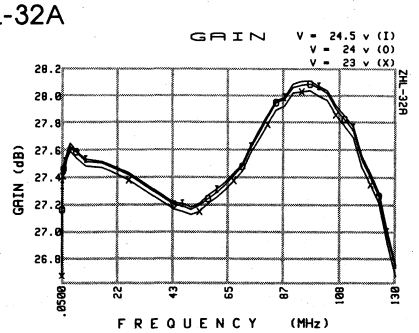


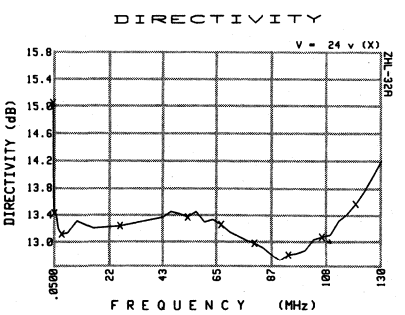


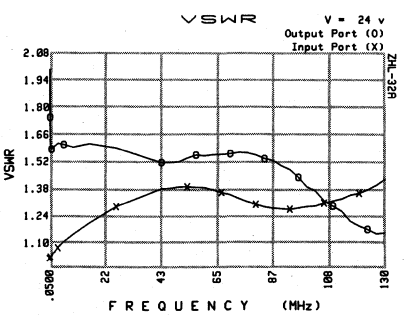
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
.4	24.85	24.87	24.88	1.11	12.8	12.8	12.9	1.14	.03	1.63	.01	—	31.24
.8	25.06	25.08	25.10	.97	12.5	12.4	12.5	1.18	.02	1.63	.01	—	31.65
2.6	25.10	25.13	25.15	.95	12.5	12.4	12.3	1.20	.02	1.63	.01	—	31.74
7.8	25.10	25.14	25.15	.95	12.4	12.4	12.4	1.21	.02	1.64	.02	—	32.08
23.9	25.17	25.21	25.21	.97	12.5	12.4	12.4	1.27	.02	1.66	.03	5.11	32.17
54.1	25.38	25.41	25.43	1.00	12.5	12.5	12.4	1.45	.07	1.68	.08	5.21	31.97
65.6	25.45	25.48	25.50	.99	12.5	12.4	12.4	1.51	.09	1.70	.10	5.22	31.74
77.1	25.46	25.50	25.51	1.00	12.5	12.4	12.4	1.55	.13	1.69	.12	5.25	31.98
84.8	25.45	25.49	25.51	1.01	12.5	12.4	12.4	1.55	.14	1.69	.12	5.29	31.77
92.5	25.43	25.46	25.49	1.01	12.5	12.5	12.4	1.53	.17	1.69	.13	5.33	31.76
104.0	25.43	25.47	25.48	1.03	12.4	12.4	12.4	1.48	.20	1.69	.14	5.42	31.53
115.5	25.39	25.42	25.44	1.08	12.3	12.2	12.3	1.35	.22	1.72	.14	5.57	31.73
127.0	25.36	25.39	25.40	1.12	12.0	12.1	12.1	1.20	.13	1.75	.14	5.84	31.61
138.5	25.29	25.32	25.33	1.18	11.9	12.0	11.9	1.03	.25	1.77	.15	6.27	31.78
150.0	25.08	25.11	25.12	1.34	12.0	12.0	12.0	1.36	.32	1.67	.14	6.88	31.01

σ equals standard deviation, see Amplifier terms

ZHL-32A







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
.050	26.65	26.67	26.69	.45	15.1	15.1	15.1	1.02	.10	2.00	.32	—	32.21
.142	27.27	27.30	27.31	.28	13.8	13.8	13.8	1.03	.03	1.65	.24	—	32.68
.675	27.41	27.44	27.45	.26	13.5	13.5	13.4	1.04	.01	1.58	.22	—	32.83
3.214	27.57	27.60	27.63	.20	13.1	13.1	13.2	1.08	.01	1.62	.23	—	32.99
15.315	27.45	27.48	27.49	.26	13.3	13.2	13.2	1.20	.03	1.61	.20	5.85	32.76
46.699	27.12	27.16	27.18	.55	13.5	13.5	13.4	1.38	.06	1.52	.11	6.00	31.88
56.695	27.18	27.21	27.24	.54	13.4	13.5	13.4	1.39	.08	1.56	.12	6.04	31.83
66.691	27.35	27.38	27.40	.48	13.2	13.3	13.3	1.36	.10	1.56	.12	6.04	31.43
73.355	27.55	27.59	27.60	.38	13.0	13.1	13.1	1.33	.13	1.57	.13	6.02	31.30
80.019	27.76	27.81	27.83	.29	13.0	13.0	12.9	1.30	.15	1.56	.13	5.99	31.33
90.015	28.00	28.04	28.06	.23	12.9	12.7	12.8	1.28	.18	1.50	.14	6.00	30.98
100.012	27.97	28.03	28.05	.26	12.9	12.9	13.0	1.29	.19	1.39	.18	6.08	30.47
110.008	27.75	27.80	27.83	.32	13.2	13.1	13.2	1.32	.19	1.29	.24	6.19	30.06
120.004	27.32	27.37	27.40	.44	13.6	13.6	13.5	1.36	.19	1.19	.30	6.31	30.17
130.000	26.64	26.71	26.72	.64	14.2	14.2	14.2	1.43	.17	1.15	.33	6.45	29.82

σ equals standard deviation, see Amplifier terms

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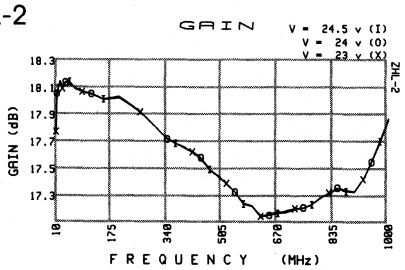
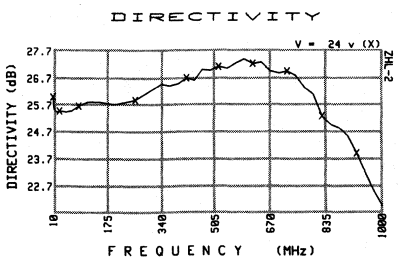
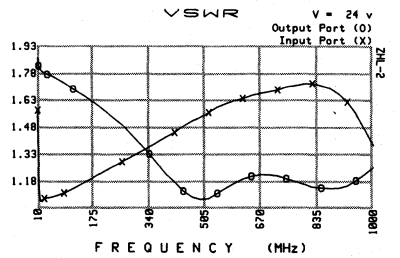
ZHL-2



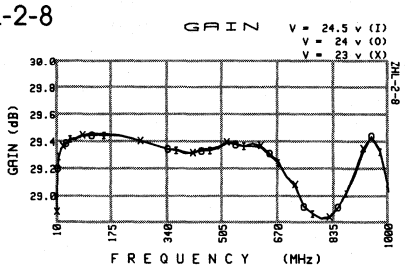


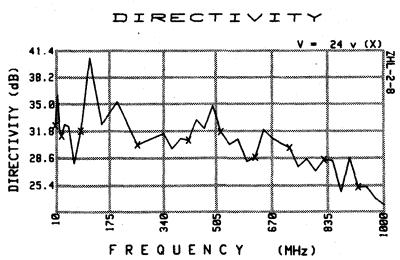


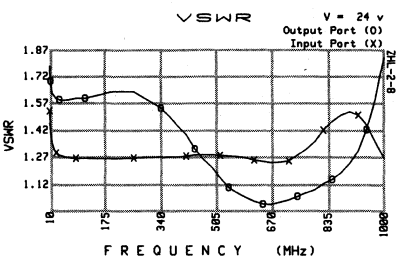
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	17.75	17.77	17.76	.31	26.1	26.0	26.1	1.58	.09	1.87	.07	9.19	30.71
22.6	18.12	18.13	18.12	.34	25.4	25.5	25.4	1.08	.02	1.80	.07	8.56	30.73
66.8	18.07	18.07	18.07	.35	25.7	25.5	25.6	1.11	.02	1.76	.07	7.95	30.87
197.6	18.00	18.01	18.00	.31	25.7	25.8	25.7	1.23	.02	1.59	.06	8.11	31.07
390.8	17.63	17.63	17.64	.27	26.6	26.5	26.5	1.43	.02	1.22	.04	8.46	30.68
492.3	17.42	17.42	17.43	.30	27.0	27.0	26.9	1.54	.03	1.09	.04	8.54	30.19
619.2	17.43	17.43	17.42	.39	27.4	27.3	27.4	1.65	.07	1.20	.05	8.58	29.67
746.2	17.19	17.19	17.19	.52	26.6	26.8	26.7	1.71	.05	1.20	.04	8.69	29.40
873.1	17.31	17.32	17.31	.44	24.9	24.9	24.8	1.70	.03	1.15	.03	9.06	29.40
1000.0	17.84	17.83	17.85	.36	21.9	22.0	21.8	1.39	.05	1.26	.03	9.69	29.28

σ equals standard deviation, see Amplifier terms

ZHL-2-8



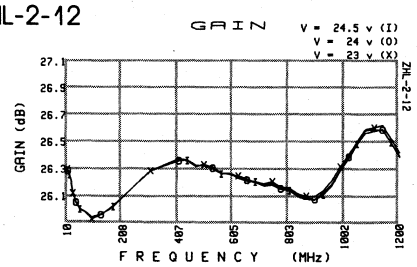


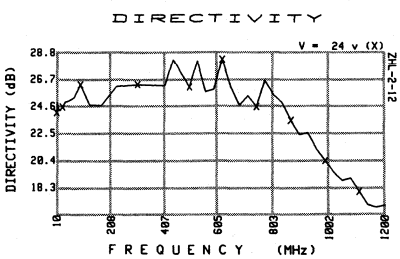


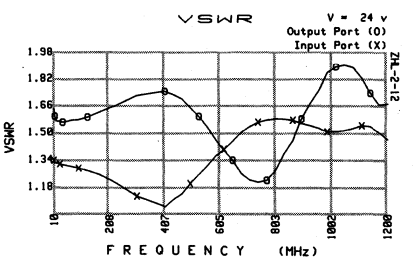
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	28.91	28.90	28.90	.15	32.5	32.5	33.9	1.52	.07	1.77	.02	6.17	30.73
22.6	29.36	29.36	29.36	.11	35.4	32.2	31.7	1.31	.08	1.61	.01	5.73	31.05
66.8	29.45	29.44	29.44	.10	34.9	28.0	34.7	1.26	.08	1.58	0.00	5.26	31.27
197.6	29.47	29.46	29.47	.11	31.2	35.3	33.0	1.26	.08	1.63	.01	5.22	31.10
390.8	29.34	29.33	29.34	.16	36.4	30.9	32.6	1.27	.06	1.44	.04	5.27	30.40
492.3	29.38	29.37	29.37	.19	30.5	34.8	32.5	1.28	.05	1.21	.05	5.32	30.02
619.2	29.39	29.38	29.38	.19	28.5	28.7	30.8	1.25	.05	1.02	.05	5.38	29.65
746.2	28.95	28.94	28.94	.16	27.6	27.6	27.9	1.28	.06	1.05	.10	5.51	29.56
873.1	29.05	29.03	29.03	.18	26.3	24.6	25.9	1.50	.07	1.18	.10	5.74	29.69
1000.0	29.06	29.05	29.05	.15	21.7	23.1	22.2	1.26	.05	1.82	.13	6.09	29.32

σ equals standard deviation, see Amplifier terms

ZHL-2-12





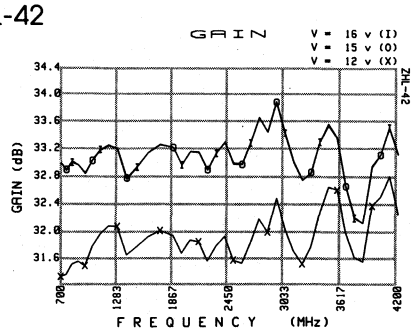


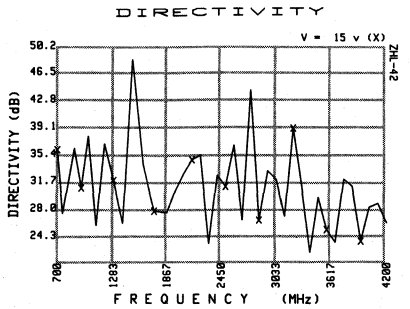
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	26.29	26.30	26.30	.37	25.0	24.2	25.0	1.33	.01	1.64	.02	10.92	31.53
23.5	26.21	26.21	26.21	.37	24.3	24.3	25.1	1.32	.01	1.56	.04	10.57	31.76
73.5	25.97	25.97	25.97	.44	25.4	25.3	25.5	1.30	.02	1.57	.05	10.11	31.76
230.0	26.12	26.12	26.12	.53	26.1	26.2	25.7	1.20	.03	1.66	.08	9.88	31.63
467.7	26.31	26.32	26.30	.41	26.8	27.1	25.1	1.14	.03	1.69	.12	9.41	30.46
589.7	26.25	26.25	26.25	.36	27.8	25.9	25.1	1.36	.06	1.45	.12	9.22	29.55
742.3	26.19	26.18	26.17	.39	24.8	24.6	26.6	1.56	.11	1.20	.07	8.98	29.35
894.9	26.08	26.06	26.06	.51	22.7	22.4	23.9	1.55	.10	1.58	.16	9.20	29.57
1047.4	26.49	26.47	26.47	.64	19.9	18.9	19.7	1.51	.08	1.90	.23	9.55	30.36
1200.0	26.40	26.38	26.37	.66	17.6	17.0	16.7	1.45	.05	1.66	.27	9.97	29.89

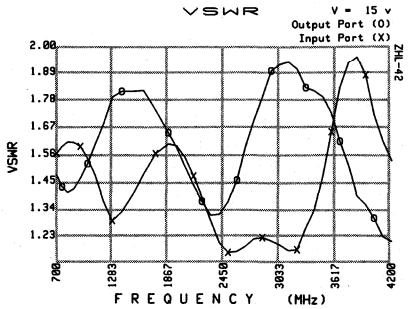
σ equals standard deviation, see Amplifier terms

Amplifiers

ZHL-42



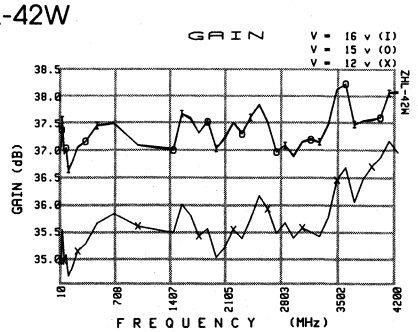


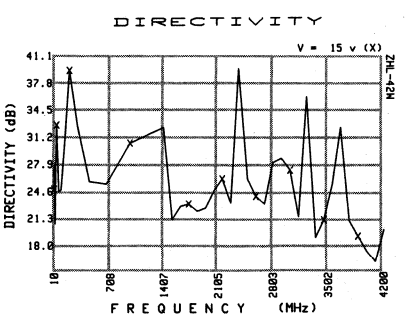


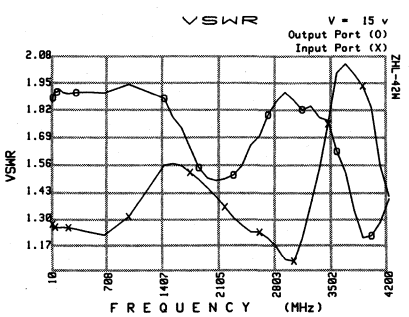
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
700.0	31.34	33.00	32.99	1.07	34.7	35.9	41.9	1.55	.03	1.47	.09	8.63	28.60
814.0	31.52	33.02	33.00	.96	34.3	31.4	23.7	1.60	.03	1.40	.06	8.12	28.78
1020.8	31.78	33.03	33.04	.80	34.5	37.7	35.4	1.53	.03	1.51	.04	7.74	29.48
1280.1	32.07	33.21	33.20	.74	34.6	31.7	32.4	1.28	.02	1.78	.10	7.54	29.71
1605.2	31.92	33.15	33.14	.95	32.2	33.8	41.8	1.47	.02	1.81	.14	7.49	30.02
1956.4	31.68	32.97	32.96	.94	28.0	30.3	29.7	1.58	.03	1.58	.14	7.67	29.81
2225.6	31.57	32.90	32.89	.99	49.4	35.1	30.3	1.38	.05	1.36	.10	7.58	29.28
2494.9	31.58	32.98	32.99	1.00	29.3	30.8	24.8	1.15	.06	1.36	.07	7.55	28.32
2674.4	31.83	33.29	33.29	1.11	33.8	26.3	22.8	1.18	.05	1.58	.07	7.54	28.40
2853.8	31.99	33.45	33.46	1.19	31.2	26.3	42.0	1.21	.05	1.78	.09	7.55	29.02
3123.1	31.71	33.00	33.01	1.01	30.0	26.8	28.5	1.16	.05	1.92	.08	7.59	29.90
3392.3	32.27	33.29	33.30	.97	33.3	21.9	35.8	1.32	.06	1.80	.09	7.58	29.85
3661.5	31.99	32.65	32.64	1.21	35.5	23.3	29.6	1.82	.09	1.60	.16	7.41	29.43
3930.8	32.37	32.95	32.93	1.05	28.1	23.4	31.2	1.87	.08	1.35	.17	7.53	28.30
4200.0	32.24	33.12	33.13	1.04	28.1	25.9	21.5	1.52	.09	1.20	.08	7.52	28.61

σ equals standard deviation, see Amplifier terms

ZHL-42W







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	34.97	37.07	37.10	1.13	29.8	24.9	32.9	1.27	.05	1.86	.17	10.35	27.85
21.4	35.54	37.56	37.57	1.18	33.7	20.6	45.0	1.26	.05	1.90	.18	10.07	28.46
67.0	35.09	37.04	37.06	1.28	43.1	24.6	32.2	1.26	.05	1.91	.16	8.96	28.48
209.9	35.15	37.07	37.06	1.32	35.5	39.3	31.2	1.26	.05	1.90	.14	7.51	28.43
657.2	35.83	37.51	37.49	1.43	26.9	25.5	33.1	1.22	.04	1.90	.07	7.10	28.93
1514.1	36.00	37.68	37.68	1.54	23.2	21.1	25.6	1.56	.09	1.79	.18	7.14	29.83
1836.4	35.56	37.53	37.56	1.54	34.5	22.1	23.8	1.49	.11	1.54	.10	7.35	30.08
2158.7	35.54	37.51	37.53	1.55	20.6	26.1	26.1	1.35	.09	1.49	.15	7.23	29.98
2373.6	35.73	37.62	37.61	1.37	18.7	39.5	21.0	1.27	.08	1.55	.16	7.14	29.32
2588.5	35.92	37.53	37.51	1.14	18.1	24.0	27.0	1.23	.07	1.69	.16	7.08	29.09
2910.8	35.39	36.89	36.92	1.07	31.3	28.5	26.1	1.10	.07	1.90	.13	6.99	28.79
3233.1	35.41	37.14	37.16	1.11	23.1	36.0	17.8	1.37	.08	1.84	.15	7.05	28.87
3555.4	36.69	38.23	38.23	1.49	26.3	25.3	24.3	2.00	.15	1.62	.12	6.87	28.82
3877.7	36.70	37.58	37.55	1.81	27.8	19.0	18.9	1.93	.24	1.21	.15	6.91	28.42
4200.0	36.96	38.09	38.07	1.70	30.2	19.8	35.4	1.40	.25	1.39	.34	6.97	28.13

σ equals standard deviation, see Amplifier terms

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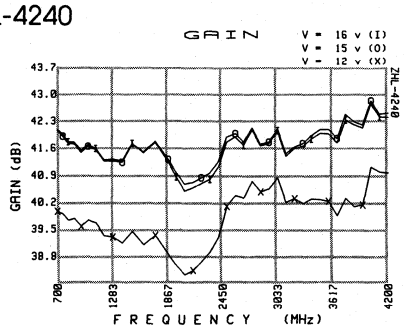
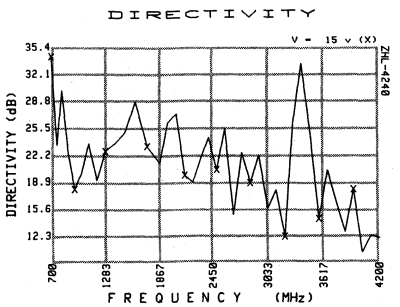
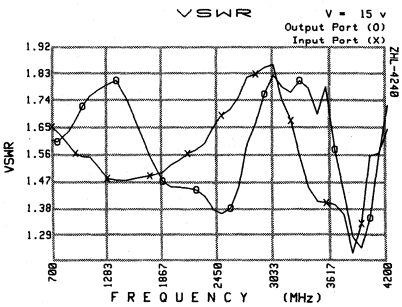
ZHL-4240



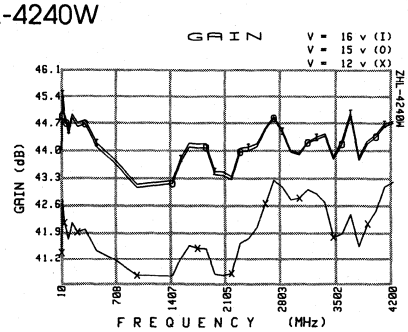


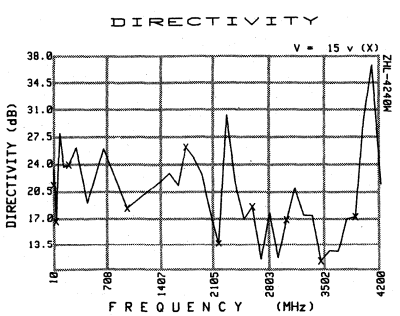


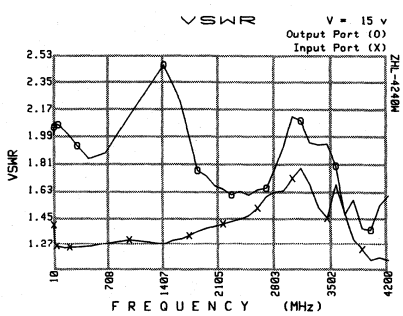
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
700.0	39.92	42.00	42.04	1.65	19.2	34.2	28.7	1.65	.28	1.60	.10	8.85	29.80
814.0	39.70	41.68	41.72	1.77	24.9	30.0	22.5	1.61	.25	1.61	.03	8.69	30.21
1020.8	39.70	41.60	41.64	1.89	31.0	19.9	28.9	1.55	.20	1.71	.14	8.54	31.22
1280.1	39.25	41.22	41.26	2.11	39.9	22.6	19.8	1.47	.18	1.79	.19	8.34	31.45
1605.2	39.05	41.46	41.43	1.99	24.3	28.6	15.4	1.47	.13	1.65	.22	8.19	31.59
1956.4	38.51	40.92	40.81	1.97	28.9	26.1	30.5	1.52	.07	1.44	.16	8.30	31.27
2225.6	38.61	40.79	40.64	1.84	17.4	18.7	27.3	1.57	.06	1.43	.16	8.20	31.16
2494.9	40.04	41.85	41.71	1.63	19.4	20.3	20.9	1.68	.11	1.36	.23	8.01	30.04
2674.4	40.26	41.72	41.63	1.73	14.0	14.7	26.2	1.74	.14	1.44	.30	7.98	30.19
2853.8	40.42	41.66	41.62	1.78	22.8	18.7	14.1	1.82	.15	1.66	.35	8.05	30.69
3123.1	40.14	41.41	41.35	1.78	26.4	17.7	29.2	1.73	.09	1.78	.26	8.07	31.55
3392.3	40.23	41.88	41.79	1.93	27.1	33.2	22.6	1.44	.08	1.78	.09	8.04	31.58
3661.5	39.81	41.80	41.70	2.36	21.0	20.2	16.8	1.39	.13	1.57	.12	7.99	31.25
3930.8	40.08	42.14	42.07	1.95	25.1	17.9	14.0	1.32	.14	1.24	.07	7.95	30.29
4200.0	40.90	42.45	42.34	1.62	20.2	11.9	22.1	1.64	.18	1.72	.30	8.14	30.37

σ equals standard deviation, see Amplifier terms

ZHL-4240W





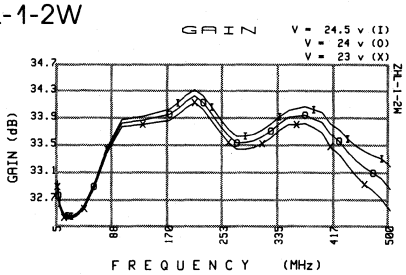


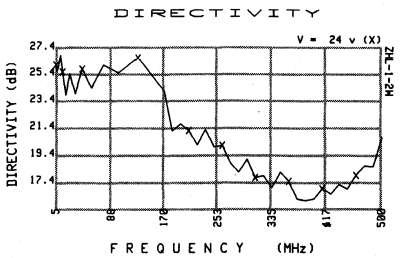
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
10.0	41.37	44.02	44.14	.75	24.0	21.3	29.4	1.40	.06	2.00	.35	16.72	28.41
21.4	42.72	45.38	45.47	1.09	27.5	21.4	16.9	1.27	.04	2.08	.21	16.09	28.74
67.0	41.99	44.71	44.80	1.07	27.3	22.5	14.5	1.25	.02	2.06	.06	13.57	28.88
209.9	41.91	44.62	44.72	.91	26.3	23.9	23.2	1.25	.02	1.99	.05	9.58	28.71
657.2	41.20	43.72	43.81	.59	20.7	25.9	25.7	1.27	.02	1.87	.08	7.79	29.29
1514.1	41.22	43.71	43.80	.94	31.7	22.8	20.3	1.30	.04	2.34	.08	7.49	29.33
1836.4	41.48	44.08	44.18	.98	18.7	24.7	14.7	1.36	.06	1.76	.08	7.54	29.66
2158.7	40.82	43.27	43.34	.84	17.9	13.7	16.6	1.41	.09	1.64	.16	7.56	30.07
2373.6	41.74	44.01	44.10	.82	24.6	21.5	12.5	1.44	.10	1.62	.19	7.42	29.52
2588.5	42.64	44.55	44.59	1.07	20.9	18.5	17.8	1.51	.08	1.63	.21	7.35	29.50
2910.8	42.74	43.97	44.01	.79	18.3	11.8	23.9	1.62	.09	1.92	.38	7.43	29.60
3233.1	42.90	44.30	44.36	.65	18.8	17.4	13.7	1.67	.14	1.94	.21	7.32	30.49
3555.4	41.87	44.18	44.28	.48	32.5	12.6	19.0	1.67	.21	1.79	.18	7.28	29.32
3877.7	42.12	44.19	44.26	.98	19.7	17.1	18.2	1.23	.09	1.37	.13	7.26	28.67
4200.0	43.19	44.71	44.76	1.00	15.8	21.3	17.5	1.16	.17	1.59	.20	7.29	28.48

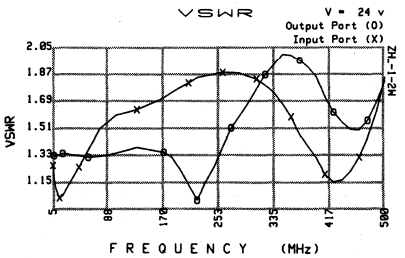
σ equals standard deviation, see Amplifier terms

Amplifiers

ZHL-1-2W



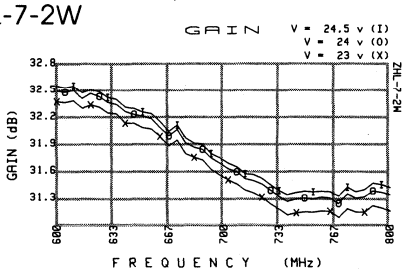


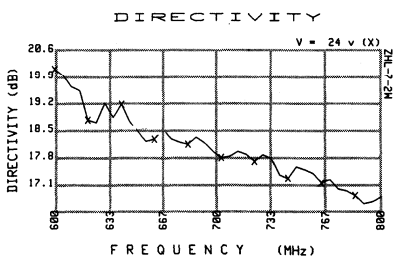


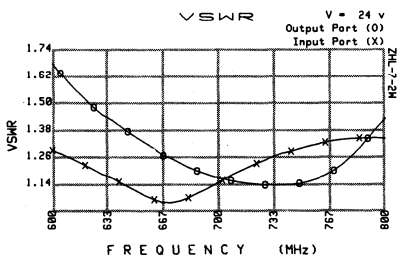
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
5.0	32.84	32.87	32.92	.45	25.3	26.0	26.1	1.25	.03	1.33	.01	—	34.98
11.3	32.45	32.47	32.50	.38	25.9	26.7	26.0	1.07	.08	1.32	.05	6.11	35.08
33.4	32.41	32.42	32.45	.37	25.8	23.8	24.3	1.16	.05	1.32	.05	6.06	35.42
98.8	33.72	33.78	33.83	.40	24.9	25.4	22.6	1.58	.09	1.33	.01	5.63	35.07
195.4	34.00	34.10	34.19	.62	21.9	21.6	22.5	1.77	.13	1.22	.06	5.82	34.36
246.2	33.64	33.73	33.84	.91	20.0	19.9	19.5	1.86	.16	1.24	.11	5.95	34.34
309.6	33.47	33.57	33.67	.82	17.1	17.7	18.0	1.82	.17	1.76	.11	6.09	34.54
373.1	33.77	33.89	34.02	.92	15.9	16.1	17.6	1.46	.17	1.95	.11	6.45	34.85
436.5	33.15	33.35	33.54	.76	17.6	17.2	17.6	1.15	.12	1.54	.13	6.98	34.71
500.0	32.49	32.80	33.14	.44	22.5	20.6	20.8	1.83	.21	1.81	.26	7.28	33.90

σ equals standard deviation, see Amplifier terms

ZHL-7-2W



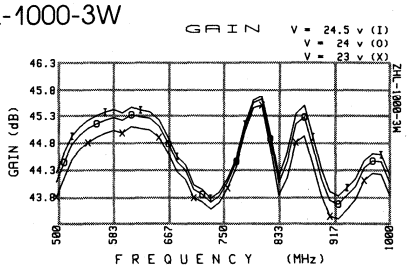


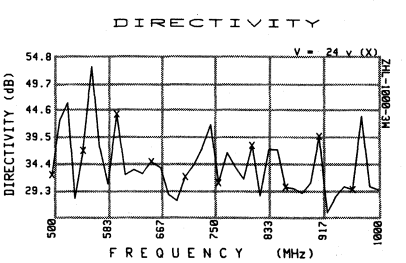


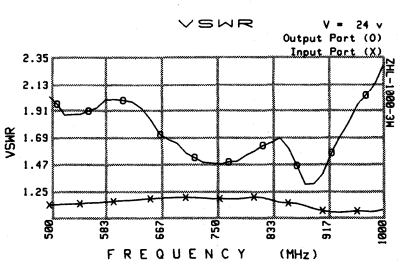
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
600.0	32.36	32.48	32.54	.55	19.8	20.1	19.8	1.28	.15	1.67	.09	4.42	33.17
614.8	32.29	32.39	32.46	.51	19.5	19.5	19.9	1.23	.14	1.54	.09	4.44	33.29
635.0	32.22	32.33	32.38	.53	18.8	18.8	19.2	1.16	.17	1.42	.08	4.48	33.43
655.9	32.05	32.17	32.22	.51	18.3	18.2	18.4	1.08	.19	1.31	.09	4.50	33.62
676.9	31.78	31.90	31.96	.43	17.9	18.2	18.1	1.05	.18	1.22	.12	4.54	33.87
697.4	31.54	31.67	31.73	.36	18.2	18.0	18.1	1.13	.12	1.16	.15	4.55	34.03
723.1	31.30	31.44	31.50	.29	18.0	17.7	17.4	1.22	.05	1.13	.19	4.57	33.97
748.7	31.13	31.29	31.36	.29	17.7	17.6	17.2	1.29	.05	1.13	.24	4.65	33.86
774.4	31.17	31.33	31.41	.33	17.0	17.0	16.9	1.33	.11	1.22	.28	4.74	33.72
800.0	31.14	31.32	31.40	.36	16.8	16.8	16.9	1.33	.22	1.42	.25	4.93	33.71

σ equals standard deviation, see Amplifier terms

ZHL-1000-3W







FREQUENCY	GAIN (dB)			DIRECTIVITY (dB)			SWR		N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	23.0V	24.0V	24.5V	IN	OUT	(db)	(@1dBCOMPR)
500.0	43.81	44.09	44.26	30.3	32.4	45.8	1.15	2.02	10.53	36.49
534.3	44.69	44.96	45.11	30.3	27.9	35.3	1.15	1.88	10.15	36.58
583.8	45.04	45.27	45.42	33.1	30.7	30.9	1.17	2.00	8.99	36.32
637.8	45.04	45.26	45.38	45.2	32.7	33.6	1.19	1.93	8.55	36.64
692.3	44.13	44.30	44.40	33.6	27.6	26.1	1.21	1.65	8.42	37.12
743.6	43.70	43.83	43.90	37.8	42.1	30.9	1.20	1.49	8.78	37.28
807.7	45.51	45.62	45.68	28.8	38.1	29.4	1.21	1.58	9.97	36.90
871.8	44.93	45.29	45.50	43.3	30.0	34.4	1.16	1.47	8.37	35.77
935.9	43.58	43.84	43.98	46.1	28.5	31.2	1.09	1.71	8.13	35.81
1000.0	43.85	44.08	44.22	33.9	29.9	42.1	1.11	2.29	8.13	35.49

σ equals standard deviation, see Amplifier terms

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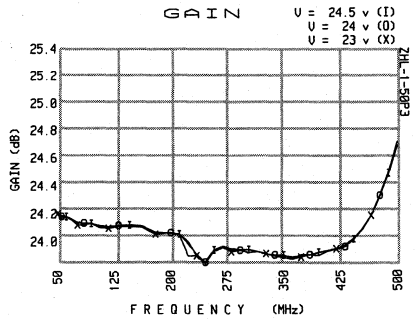
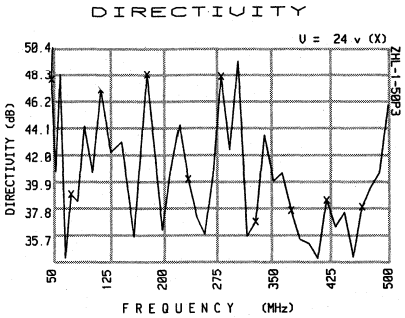
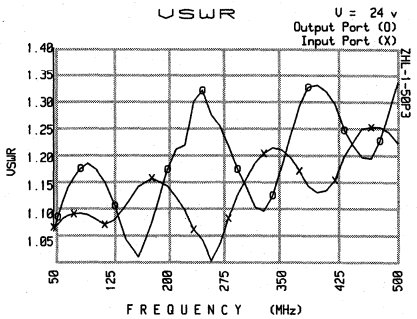
FEED FORWARD
high intercept points

Mini-Circuits

ZHL-1-50P3



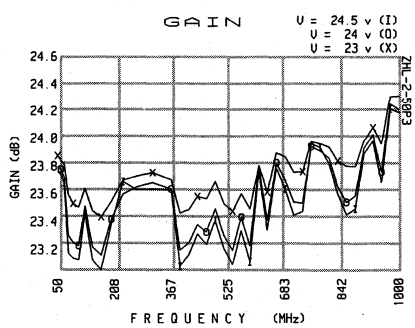


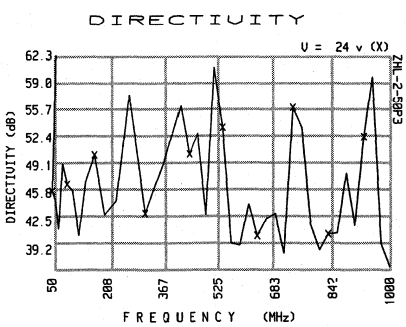


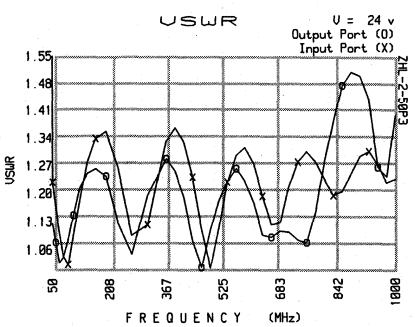
FREQ	GAIN (dB)				DIRECTIVITY			SWR				N.F.	Pout (dBm)	FREQ	IP2	IP3
MHz	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	(MHz)	(dBm)	(dBm)
50.0	24.17	24.18	24.19	.07	37.9	48.0	39.8	1.08	.01	1.07	.01	6.66	34.05	80	95.0	55.0
61.9	24.15	24.16	24.16	.07	39.6	48.4	40.1	1.10	.02	1.13	.02	6.46	34.23	90		
76.6	24.10	24.11	24.12	.07	36.7	39.3	40.3	1.10	.02	1.17	.02	6.30	34.45			
94.8	24.11	24.11	24.11	.07	43.4	44.4	38.9	1.10	.02	1.19	.02	6.29	34.66			
117.3	24.07	24.08	24.09	.07	50.6	47.2	39.7	1.09	.02	1.16	.02	6.27	34.90			
145.2	24.09	24.09	24.10	.07	39.5	43.2	37.0	1.12	.02	1.06	.03	6.19	34.68	280	93.4	56.0
179.8	24.03	24.04	24.04	.08	50.6	48.4	44.3	1.17	.02	1.09	.04	6.08	34.76	290		
211.5	24.02	24.03	24.03	.08	41.2	41.2	43.3	1.13	.06	1.22	.06	5.99	34.92			
234.6	23.87	23.88	23.87	.12	43.3	40.4	37.3	1.08	.04	1.31	.08	6.40	33.92			
269.2	23.93	23.94	23.94	.10	38.2	40.6	42.4	1.05	.05	1.26	.05	6.48	33.95			
292.3	23.91	23.91	23.92	.11	41.6	42.6	43.6	1.14	.05	1.18	.04	6.42	33.77	480	88.0	52.0
315.4	23.90	23.90	23.90	.12	39.6	36.1	40.9	1.20	.03	1.12	.05	6.50	33.53	490		
338.5	23.87	23.88	23.88	.13	42.0	43.7	40.3	1.22	.04	1.14	.04	6.61	33.02			
361.5	23.85	23.86	23.85	.13	39.5	40.8	43.2	1.21	.05	1.24	.07	6.69	32.52			
384.6	23.88	23.88	23.88	.16	40.9	35.8	43.6	1.15	.07	1.33	.11	6.60	31.89			
407.7	23.90	23.91	23.91	.19	34.9	34.4	35.6	1.15	.05	1.32	.11	6.50	31.45	Pout at +15dBm		
430.8	23.95	23.93	23.94	.22	33.6	36.7	38.3	1.21	.02	1.25	.07	6.66	31.13			
453.8	24.06	24.06	24.06	.23	37.3	34.4	38.0	1.26	.05	1.20	.05	7.09	30.85			
476.9	24.30	24.30	24.29	.24	36.6	39.7	40.0	1.26	.08	1.23	.08	7.50	30.74			
500.0	24.68	24.66	24.65	.30	41.6	45.9	39.1	1.23	.08	1.34	.08	7.75	30.42			

σ equals standard deviation, see amplifier terms.

ZHL-2-50P3





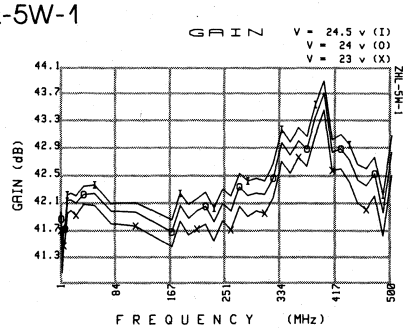


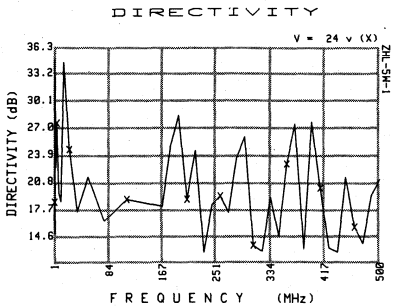
FREQ	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout (dBm)	FREQ	IP2	IP3
MHz	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	(MHz)	(dBm)	(dBm)
50.0	23.89	23.81	23.78	.44	41.6	46.1	41.3	1.23	.04	1.13	.03	7.33	25.67	80	70.0	45.0
67.9	23.83	23.73	23.70	.43	43.6	41.7	41.7	1.11	.01	1.03	.04	7.02	25.80	90		
92.3	23.55	23.27	23.16	.61	52.8	46.8	43.7	1.03	.01	1.09	.02	6.71	25.88			
125.4	23.66	23.53	23.48	.48	43.2	40.9	42.2	1.19	.05	1.22	.03	6.50	26.04			
170.4	23.45	23.18	23.08	.60	54.2	50.4	37.5	1.34	.09	1.27	.07	6.37	26.49			
231.5	23.72	23.62	23.71	.41	45.5	44.9	40.0	1.27	.06	1.13	.09	6.39	26.82	450	64.0	48.0
314.6	23.78	23.70	23.66	.38	43.4	43.4	48.8	1.13	.03	1.20	.13	6.41	27.36	500		
391.0	23.48	23.22	23.10	.56	44.6	52.8	58.2	1.37	.10	1.26	.16	6.61	27.83			
464.1	23.59	23.35	23.26	.46	40.7	52.9	48.9	1.12	.11	1.02	.19	6.86	27.51			
512.8	23.55	23.32	23.23	.45	49.8	60.8	44.1	1.12	.06	1.19	.25	6.95	27.88			
561.5	23.62	23.45	23.36	.40	42.6	39.9	44.5	1.30	.12	1.27	.27	7.15	27.38	980	77.0	44.0
610.3	23.82	23.81	23.78	.28	45.3	44.5	37.6	1.28	.11	1.18	.16	7.38	27.37	990		
659.0	23.91	23.84	23.81	.20	42.3	42.8	40.1	1.13	.12	1.09	.21	7.29	27.85			
707.7	23.77	23.56	23.47	.27	39.4	38.7	43.1	1.22	.10	1.11	.28	7.12	28.13			
756.4	24.00	23.96	23.98	.25	42.4	53.6	47.1	1.31	.15	1.08	.26	7.13	27.71			
805.1	23.95	23.88	23.83	.20	50.8	39.1	42.6	1.24	.11	1.28	.15	7.00	27.87	Pout at +15dBm		
853.8	23.82	23.56	23.47	.18	52.2	41.1	55.2	1.21	.08	1.48	.08	6.98	28.22			
902.6	24.00	23.94	23.90	.22	43.2	42.0	43.4	1.30	.12	1.50	.15	7.24	28.26			
951.3	23.97	23.77	23.70	.16	38.7	59.6	39.6	1.27	.13	1.27	.23	7.28	28.01			
1000.0	24.32	24.22	24.20	.55	38.4	37.1	35.3	1.24	.11	1.40	.13	7.26	27.96			

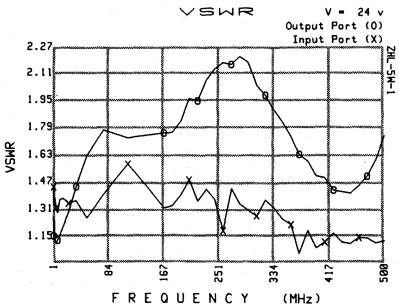
σ equals standard deviation, see amplifier terms.

Amplifiers

ZHL-5W-1



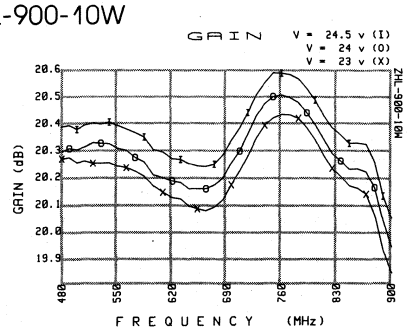


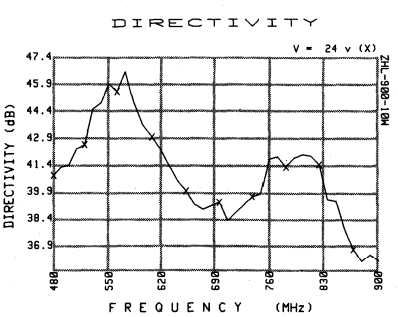


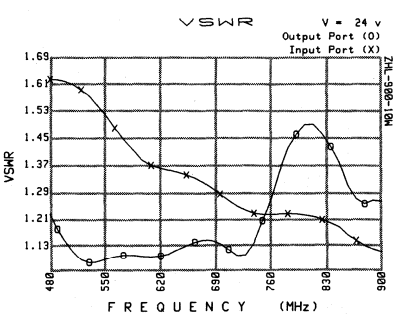
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
1.0	41.68	41.83	41.95	.72	13.2	18.5	16.7	1.43	.11	1.26	.10	—	37.73
2.2	41.42	41.60	41.66	.66	18.7	34.8	25.5	1.34	.10	1.13	.04	—	38.66
7.2	41.54	41.70	41.78	.51	25.2	19.5	32.9	1.28	.07	1.12	.09	—	38.73
23.4	41.90	42.08	42.19	.97	22.1	24.5	20.3	1.34	.10	1.28	.06	10.25	39.34
76.1	41.78	41.96	42.07	.90	11.9	16.3	21.6	1.39	.04	1.77	.05	9.60	39.29
180.1	41.82	42.04	42.22	.97	18.0	24.7	19.1	1.32	.08	1.75	.11	8.59	37.67
218.5	41.77	42.03	42.23	.94	15.6	24.3	15.6	1.35	.08	1.94	.17	8.42	37.39
256.9	41.69	41.96	42.18	.98	18.8	19.1	24.9	1.18	.03	2.16	.15	8.22	37.95
282.5	41.88	42.19	42.40	1.02	16.8	23.4	27.9	1.34	.12	2.20	.15	8.05	37.63
308.1	41.93	42.20	42.40	1.18	28.4	13.5	9.9	1.26	.07	2.03	.10	7.88	37.80
346.5	42.52	42.78	42.97	1.47	12.0	14.5	24.1	1.25	.13	1.81	.05	7.62	38.04
384.8	43.08	43.34	43.53	1.39	10.8	13.0	18.9	1.18	.04	1.59	.02	7.43	37.81
423.2	42.58	42.87	43.08	1.05	18.3	13.1	14.6	1.16	.06	1.41	.07	7.34	38.01
461.6	41.98	42.34	42.59	.98	15.5	15.5	18.0	1.14	.04	1.44	.15	7.33	36.80
500.0	42.49	42.82	43.07	.74	14.1	20.8	20.3	1.12	.06	1.73	.20	7.39	37.82

σ equals standard deviation, see Amplifier terms

ZHL-900-10W







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	P_{out}(dBm)
(MHz)	23.0V	24.0V	24.5V	σ1	23.0V	24.0V	24.5V	IN	σ2	OUT	σ3	(db)	(@1dBCOMPR)
480.0	20.26	20.29	20.38	.45	40.1	40.8	40.0	1.63	.15	1.23	.08	7.82	40.07
499.3	20.25	20.29	20.37	.50	41.0	41.3	41.1	1.62	.16	1.14	.06	7.81	40.08
529.7	20.24	20.32	20.39	.51	43.2	44.5	43.4	1.57	.16	1.08	.03	7.84	40.10
561.9	20.23	20.29	20.37	.48	45.6	45.4	45.5	1.48	.12	1.10	.05	7.88	39.98
596.1	20.16	20.20	20.29	.48	45.7	43.6	44.2	1.39	.06	1.10	.06	7.89	39.88
630.8	20.11	20.17	20.26	.48	40.8	41.3	41.1	1.36	.08	1.11	.06	7.91	39.70
663.1	20.07	20.15	20.23	.53	39.5	39.1	39.7	1.33	.09	1.14	.06	7.91	40.00
695.4	20.16	20.24	20.32	.57	38.8	39.2	38.7	1.28	.07	1.14	.06	7.89	39.97
716.9	20.27	20.35	20.43	.60	38.9	38.7	39.2	1.25	.07	1.10	.07	7.84	40.14
738.5	20.38	20.46	20.54	.61	38.7	39.5	39.4	1.23	.10	1.14	.03	7.74	40.56
770.8	20.42	20.49	20.57	.63	41.3	41.8	41.1	1.22	.12	1.35	.12	7.56	40.42
803.1	20.33	20.38	20.48	.68	41.8	41.9	42.1	1.22	.10	1.49	.17	7.49	40.52
835.4	20.19	20.25	20.35	.83	39.6	39.4	39.3	1.20	.07	1.43	.13	7.68	40.37
867.7	20.13	20.21	20.31	.72	37.0	36.6	36.6	1.15	.08	1.27	.07	8.02	39.71
900.0	19.83	19.93	20.04	.48	35.7	35.9	35.8	1.11	.12	1.26	.17	8.28	39.58

σ equals standard deviation, see Amplifier terms

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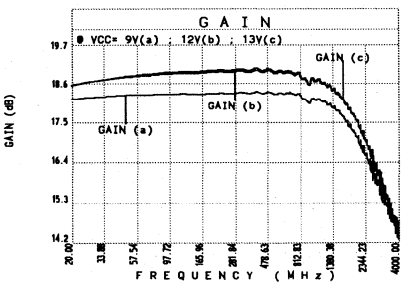
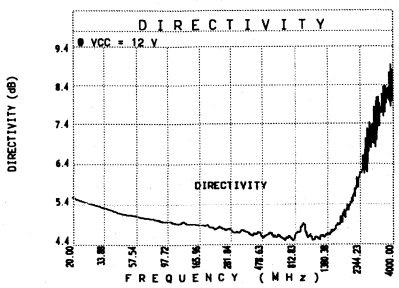
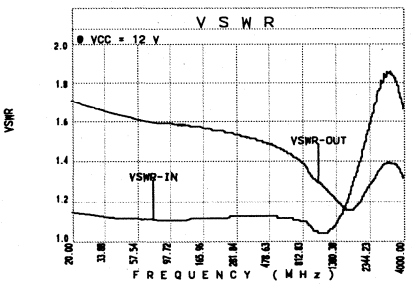
ZJL-4HG



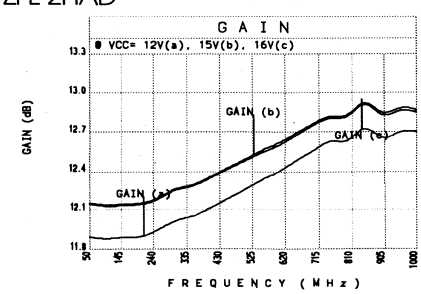


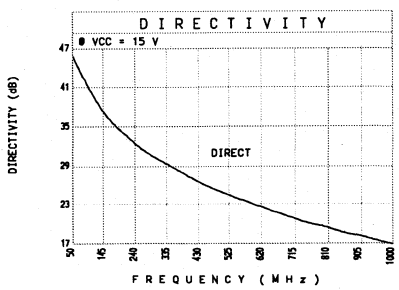


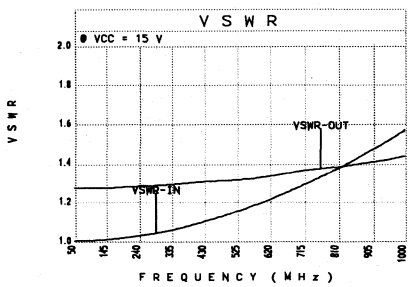
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
20.00	18.27	18.70	18.69	0.08	5.23	5.50	5.63	1.14	0.01	1.70	0.02	4.27	18.27
310.00	18.41	19.01	19.05	0.07	4.90	4.81	4.85	1.10	0.02	1.54	0.01	3.76	18.57
610.00	18.36	18.93	18.97	0.07	4.80	4.73	4.75	1.10	0.02	1.47	0.01	3.87	18.67
910.00	18.14	18.68	18.72	0.07	5.03	4.94	4.97	1.07	0.02	1.36	0.01	3.93	18.80
1210.00	18.11	18.66	18.69	0.06	4.80	4.64	4.63	1.06	0.03	1.26	0.01	3.90	18.73
1510.00	17.87	18.40	18.43	0.06	4.95	4.74	4.72	1.16	0.03	1.18	0.01	4.01	18.61
1810.00	17.38	17.92	17.95	0.07	5.57	5.27	5.22	1.32	0.03	1.16	0.01	4.02	18.50
2110.00	17.02	17.51	17.52	0.08	5.77	5.51	5.49	1.49	0.03	1.23	0.00	4.00	18.26
2410.00	16.56	16.99	17.00	0.07	6.37	6.15	6.14	1.66	0.04	1.31	0.01	4.11	17.82
2710.00	16.22	16.57	16.55	0.07	6.62	6.49	6.49	1.81	0.05	1.38	0.02	4.31	17.24
3010.00	15.89	16.15	16.12	0.07	6.98	6.98	7.00	1.88	0.05	1.42	0.03	4.38	16.60
3210.00	15.48	15.72	15.67	0.07	7.43	7.41	7.46	1.89	0.05	1.42	0.03	4.32	16.10
3510.00	14.95	15.15	15.09	0.07	8.13	8.16	8.23	1.87	0.05	1.42	0.03	4.35	15.23
3710.00	14.69	14.86	14.79	0.07	8.30	8.36	8.43	1.83	0.04	1.40	0.03	4.35	14.56
4000.00	14.23	14.38	14.30	0.07	8.95	8.96	9.03	1.71	0.04	1.35	0.04	4.51	13.61

σ equals standard deviation at nominal voltage, see Amplifier terms

ZFL-2HAD







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
50.00	11.90	12.16	12.15	0.13	46.96	46.17	47.31	1.01	1.26	1.28	0.31	6.78	21.73
100.00	11.88	12.14	12.13	0.13	39.05	41.03	40.97	1.02	1.82	1.28	0.32	5.91	21.67
200.00	11.89	12.15	12.14	0.14	33.28	34.48	34.47	1.03	1.04	1.29	0.39	5.30	21.57
250.00	11.95	12.19	12.18	0.13	31.11	32.02	32.39	1.04	0.69	1.29	0.45	5.16	21.53
300.00	12.03	12.28	12.27	0.13	29.45	30.49	30.62	1.06	0.50	1.30	0.53	5.03	21.51
400.00	12.12	12.36	12.35	0.11	26.26	27.57	28.13	1.10	0.17	1.31	0.74	4.80	21.36
450.00	12.19	12.43	12.42	0.11	25.11	26.19	26.74	1.12	0.07	1.32	0.90	4.66	21.31
500.00	12.26	12.49	12.48	0.10	23.97	25.18	25.67	1.15	0.09	1.32	1.09	4.56	21.32
600.00	12.40	12.62	12.60	0.06	22.01	23.30	23.72	1.21	0.21	1.34	1.12	4.34	21.24
650.00	12.49	12.70	12.68	0.07	21.05	22.34	22.79	1.25	0.27	1.35	0.96	4.22	21.19
700.00	12.56	12.77	12.76	0.11	20.08	21.48	21.83	1.29	0.32	1.37	0.80	4.13	21.14
750.00	12.66	12.85	12.83	0.17	19.16	20.46	21.01	1.33	0.36	1.38	0.64	4.05	21.14
800.00	12.60	12.80	12.79	0.23	18.65	20.13	20.59	1.37	0.37	1.39	0.48	3.97	21.12
900.00	12.62	12.81	12.79	0.29	17.30	18.68	19.29	1.47	0.36	1.42	0.56	3.82	21.11
1000.00	12.71	12.88	12.86	0.29	15.87	17.33	17.91	1.58	0.34	1.45	0.94	3.64	21.06

σ equals standard deviation at nominal voltage, see Amplifier terms

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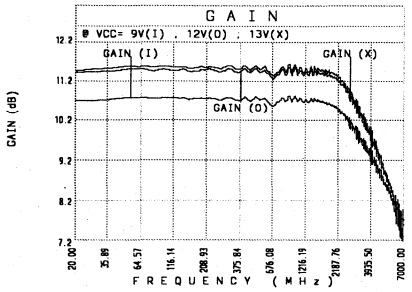
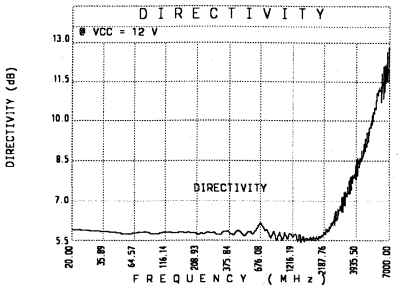
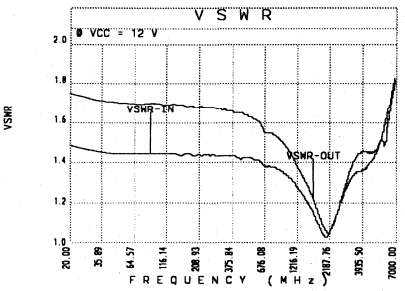


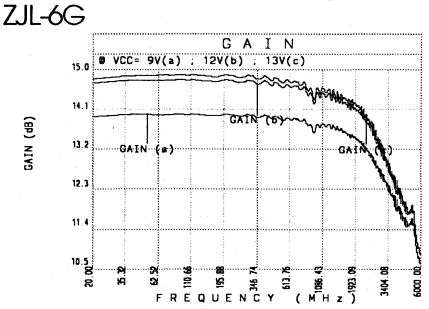


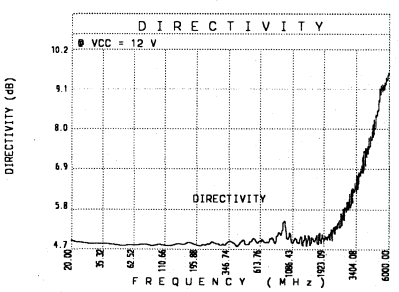


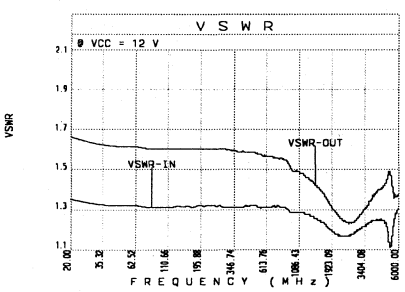
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)	
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
20.00	10.75	11.43	11.49	0.07	6.19	6.07	6.10	1.46	0.02	1.73	0.02	20.00	4.99	12.64
620.00	10.76	11.44	11.51	0.08	6.14	6.01	6.01	1.39	0.02	1.58	0.02	620.00	4.92	12.82
1220.00	10.81	11.49	11.56	0.07	5.93	5.71	5.71	1.27	0.02	1.37	0.02	1220.00	4.87	12.78
1820.00	10.66	11.38	11.46	0.07	6.05	5.70	5.62	1.08	0.03	1.14	0.02	1820.00	5.05	12.31
2420.00	10.34	11.02	11.09	0.06	6.56	6.19	6.13	1.13	0.03	1.14	0.03	2420.00	4.92	12.03
2870.00	9.92	10.56	10.62	0.06	7.29	6.95	6.90	1.25	0.04	1.28	0.04	2870.00	5.04	11.98
3470.00	9.62	10.14	10.18	0.06	7.73	7.54	7.50	1.32	0.05	1.41	0.05	3470.00	5.20	12.38
3920.00	9.12	9.55	9.57	0.06	8.76	8.65	8.65	1.33	0.05	1.45	0.05	3920.00	5.08	12.66
4520.00	9.00	9.33	9.33	0.06	8.96	8.97	9.01	1.39	0.05	1.47	0.04	4520.00	5.22	12.79
4970.00	8.66	8.93	8.92	0.09	9.77	9.88	9.89	1.51	0.06	1.49	0.04	4970.00	5.59	12.66
5570.00	8.30	8.54	8.52	0.11	10.71	10.85	10.90	1.74	0.08	1.54	0.03	5570.00	5.68	12.05
6000.00	7.98	8.15	8.15	0.08	11.07	11.24	11.30	1.79	0.10	1.55	0.04	6000.00	5.85	11.47
6320.00	7.50	7.66	7.63	0.11	12.01	12.21	11.21	1.81	0.05	1.68	0.03	6320.00	6.06	11.05
6620.00	7.86	7.96	7.97	0.14	11.51	11.73	10.90	1.88	0.15	1.70	0.04	6620.00	6.34	10.67
7000.00	7.78	7.88	7.91	0.20	12.11	12.39	11.37	1.91	0.16	1.78	0.05	7000.00	6.52	10.19

σ equals standard deviation, at nominal voltage, see Amplifier terms

ZJL-6G







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
20.00	14.03	14.80	14.90	0.08	4.98	4.94	4.96	1.40	0.03	1.72	0.03	4.36	13.17
470.00	14.06	14.84	14.94	0.08	4.90	4.82	4.83	1.37	0.03	1.64	0.03	4.20	13.31
920.00	13.68	14.39	14.48	0.07	5.42	5.37	5.39	1.33	0.03	1.56	0.03	4.30	13.35
1370.00	13.71	14.38	14.46	0.07	5.08	4.99	4.98	1.29	0.02	1.47	0.03	4.13	13.34
1820.00	13.57	14.28	14.37	0.05	5.10	4.83	4.78	1.21	0.01	1.36	0.02	4.16	13.26
2120.00	13.42	14.10	14.19	0.04	5.19	4.96	4.89	1.17	0.00	1.29	0.02	4.21	13.21
2570.00	12.98	13.62	13.69	0.04	5.84	5.55	5.48	1.16	0.02	1.24	0.03	4.35	13.20
3020.00	12.65	13.16	13.21	0.04	6.20	6.09	6.05	1.19	0.03	1.27	0.02	4.33	13.24
3470.00	12.32	12.81	12.86	0.04	6.55	6.36	6.33	1.23	0.03	1.34	0.02	4.47	13.52
3920.00	11.78	12.19	12.21	0.04	7.55	7.40	7.40	1.26	0.03	1.40	0.03	4.41	13.51
4220.00	11.74	12.15	12.18	0.05	7.62	7.49	7.46	1.26	0.03	1.42	0.03	4.45	13.61
4820.00	11.50	11.82	11.81	0.09	8.38	8.29	8.30	1.25	0.04	1.47	0.04	4.80	13.21
5120.00	11.58	11.88	11.86	0.09	9.05	8.98	8.95	1.18	0.05	1.53	0.04	4.88	12.80
5570.00	10.90	11.14	11.12	0.05	9.40	9.27	9.30	1.20	0.02	1.42	0.04	4.96	12.39
6000.00	10.48	10.71	10.69	0.09	9.76	9.64	9.67	1.28	0.03	1.40	0.02	5.03	12.04

σ equals standard deviation, at nominal voltage, see Amplifier terms

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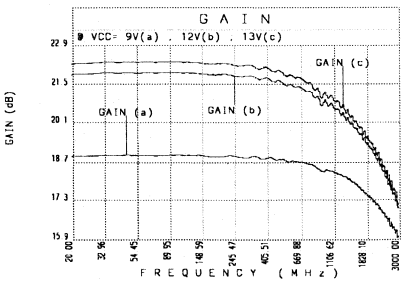
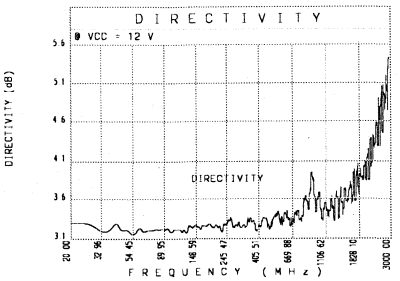
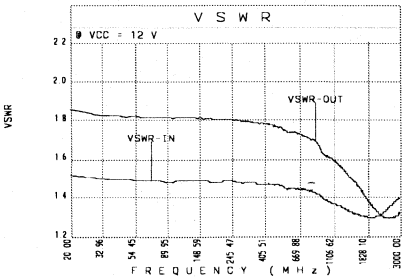
ZJL-3G



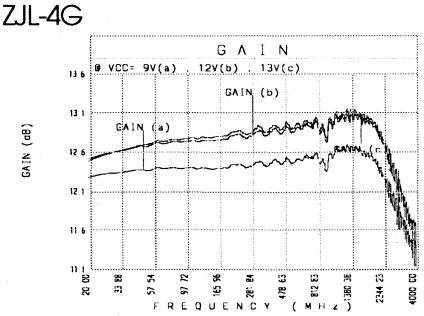


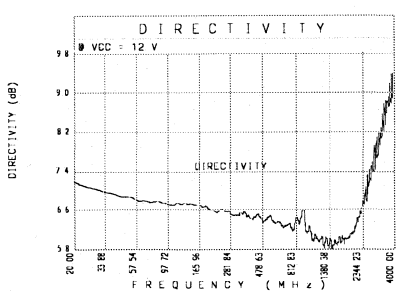


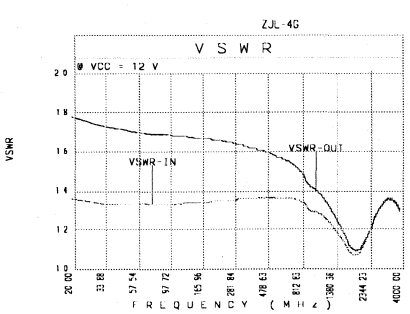
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)	
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
20.00	18.93	21.93	22.31	0.14	3.78	3.28	3.36	1.51	0.02	1.85	0.02	20.00	2.73	9.67
220.00	18.95	21.93	22.30	0.14	3.78	3.25	3.33	1.48	0.02	1.80	0.02	220.00	2.68	9.69
420.00	18.87	21.75	22.10	0.13	3.81	3.28	3.32	1.46	0.02	1.77	0.03	420.00	2.81	9.86
820.00	18.58	21.13	21.42	0.12	4.04	3.54	3.57	1.42	0.02	1.68	0.03	820.00	2.84	10.18
1020.00	18.38	20.75	21.02	0.11	4.13	3.65	3.63	1.37	0.02	1.59	0.03	1020.00	2.78	9.98
1120.00	18.31	20.64	20.90	0.11	4.12	3.55	3.53	1.36	0.02	1.57	0.03	1120.00	2.82	10.04
1320.00	18.16	20.40	20.67	0.12	4.21	3.49	3.43	1.34	0.02	1.52	0.03	1320.00	2.79	9.92
1520.00	17.92	19.93	20.16	0.11	4.36	3.70	3.66	1.33	0.02	1.46	0.03	1520.00	2.90	9.72
1920.00	17.38	19.21	19.41	0.11	4.78	3.87	3.75	1.32	0.03	1.36	0.02	1920.00	2.94	9.58
2120.00	17.18	18.92	19.11	0.11	4.74	3.86	3.79	1.33	0.03	1.32	0.01	2120.00	2.93	9.71
2220.00	17.06	18.77	18.95	0.10	4.83	3.90	3.79	1.34	0.04	1.31	0.01	2220.00	2.90	9.89
2420.00	16.76	18.25	18.42	0.10	5.11	4.37	4.25	1.37	0.04	1.30	0.02	2420.00	2.90	9.98
2620.00	16.58	17.94	18.08	0.10	4.97	4.35	4.34	1.40	0.04	1.30	0.02	2620.00	2.91	10.01
2820.00	16.26	17.50	17.63	0.10	5.37	4.83	4.73	1.42	0.04	1.31	0.02	2820.00	3.01	10.21
3000.00	15.94	16.95	17.06	0.10	5.88	5.54	5.45	1.44	0.04	1.32	0.03	3000.00	3.09	10.45

σ equals standard deviation at nominal voltage, see Amplifier terms

ZJL-4G







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)
(MHz)	12.0V	15.0V	16.0V	σ1	12.0V	15.0V	16.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
20.00	12.22	12.49	12.48	0.14	6.96	7.21	7.38	1.38	0.03	1.79	0.02	5.03	16.85
320.00	12.43	12.83	12.87	0.08	6.59	6.59	6.61	1.37	0.02	1.65	0.04	4.94	17.37
620.00	12.43	12.84	12.88	0.07	6.53	6.50	6.51	1.37	0.02	1.57	0.04	5.04	17.61
820.00	12.48	12.88	12.92	0.07	6.45	6.41	6.41	1.35	0.03	1.51	0.03	5.05	17.73
1120.00	12.56	12.98	13.02	0.08	6.26	6.16	6.16	1.29	0.03	1.39	0.03	5.04	17.85
1420.00	12.64	13.07	13.12	0.08	6.06	5.91	5.90	1.21	0.03	1.28	0.03	5.02	17.72
1720.00	12.58	13.02	13.10	0.08	6.21	5.98	5.89	1.12	0.02	1.16	0.02	5.03	17.51
2020.00	12.47	12.94	13.00	0.10	6.38	6.09	6.02	1.07	0.02	1.10	0.01	5.03	17.23
2320.00	12.29	12.76	12.83	0.12	6.78	6.45	6.38	1.14	0.03	1.16	0.03	5.08	17.02
2620.00	12.11	12.54	12.60	0.12	7.05	6.84	6.76	1.24	0.03	1.24	0.03	5.13	16.57
2920.00	12.04	12.41	12.46	0.11	7.45	7.31	7.25	1.31	0.02	1.31	0.03	5.23	16.06
3120.00	11.91	12.25	12.29	0.11	7.68	7.62	7.57	1.34	0.02	1.34	0.02	5.29	15.69
3420.00	11.65	11.95	11.98	0.10	8.44	8.38	8.36	1.35	0.02	1.36	0.02	5.33	14.92
3720.00	11.40	11.68	11.70	0.09	8.86	8.83	8.84	1.33	0.02	1.34	0.02	5.29	14.20
4000.00	11.21	11.45	11.47	0.09	9.37	9.36	9.38	1.29	0.02	1.30	0.01	5.34	13.39

σ equals standard deviation at nominal voltage see Amplifier terms

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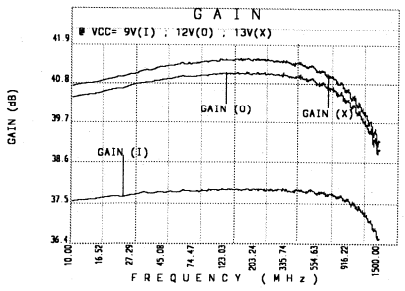
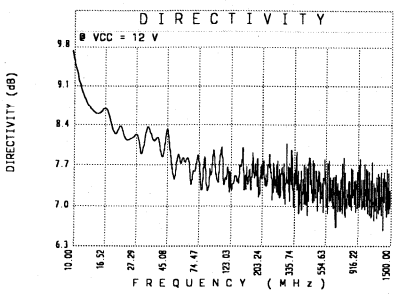
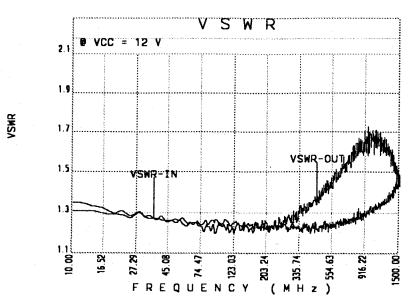


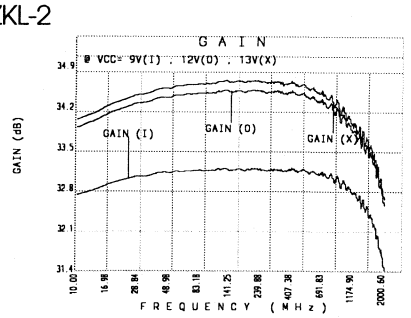


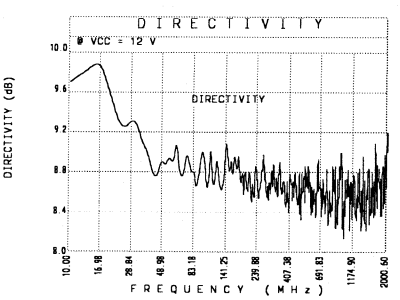


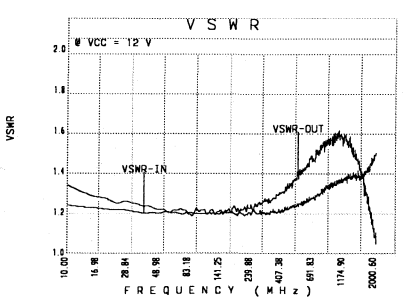
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)	
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
10.00	37.59	40.52	40.79	0.21	8.99	9.13	9.00	1.37	0.05	1.29	0.04	10.00	3.01	17.61
110.00	37.86	41.08	41.41	0.26	8.20	7.84	8.05	1.33	0.06	1.19	0.03	110.00	2.83	18.26
260.00	37.87	41.10	41.44	0.27	8.23	7.64	7.64	1.31	0.05	1.23	0.02	260.00	2.88	18.39
360.00	37.79	40.98	41.32	0.29	8.07	7.44	7.66	1.30	0.07	1.31	0.03	360.00	2.94	18.49
510.00	37.79	40.90	41.22	0.28	8.04	7.49	7.44	1.31	0.05	1.44	0.04	510.00	2.97	18.63
610.00	37.75	40.77	41.08	0.28	8.08	7.27	7.57	1.31	0.04	1.48	0.02	610.00	3.04	18.76
710.00	37.68	40.62	40.91	0.29	7.99	7.39	7.41	1.32	0.05	1.57	0.05	710.00	3.05	18.85
810.00	37.63	40.50	40.77	0.28	8.05	7.27	7.43	1.34	0.04	1.61	0.03	810.00	3.03	18.82
910.00	37.56	40.33	40.58	0.26	7.93	7.36	7.45	1.35	0.05	1.66	0.08	910.00	3.01	18.84
1010.00	37.41	40.08	40.30	0.26	7.91	7.47	7.34	1.35	0.05	1.69	0.06	1010.00	3.01	18.82
1110.00	37.24	39.84	40.05	0.24	8.01	7.32	7.32	1.39	0.05	1.66	0.06	1110.00	2.99	18.78
1210.00	37.07	39.65	39.86	0.21	8.19	7.38	7.27	1.41	0.05	1.66	0.08	1210.00	2.98	18.76
1310.00	36.94	39.43	39.64	0.21	8.16	7.45	7.28	1.43	0.07	1.58	0.09	1310.00	2.99	18.71
1410.00	36.72	39.21	39.44	0.18	8.27	7.08	6.95	1.48	0.06	1.52	0.07	1410.00	3.02	18.57
1500.00	36.48	38.93	39.15	0.16	8.20	7.23	6.97	1.49	0.09	1.46	0.07	1500.00	3.06	18.66

σ equals standard deviation, see Amplifier terms

ZKL-2







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)	
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
10.00	32.56	33.74	33.82	0.25	10.25	10.64	10.70	1.23	0.08	1.34	0.04	10.00	4.57	18.23
210.00	32.91	34.27	34.40	0.31	9.60	9.26	9.30	1.21	0.08	1.26	0.05	210.00	3.95	18.27
410.00	32.89	34.24	34.38	0.31	9.28	9.17	9.11	1.22	0.08	1.33	0.03	410.00	4.03	18.52
510.00	32.86	34.18	34.32	0.31	9.45	9.05	9.13	1.25	0.08	1.37	0.02	510.00	4.03	18.58
710.00	32.79	34.05	34.17	0.30	9.22	8.97	9.00	1.28	0.07	1.48	0.01	710.00	4.09	18.71
810.00	32.78	34.01	34.13	0.30	9.25	9.09	8.98	1.30	0.08	1.51	0.03	810.00	4.10	18.62
1010.00	32.65	33.80	33.91	0.28	9.24	9.14	9.10	1.34	0.09	1.57	0.03	1010.00	4.11	18.78
1210.00	32.47	33.59	33.69	0.26	9.16	8.98	8.98	1.35	0.11	1.58	0.06	1210.00	4.08	18.65
1410.00	32.32	33.42	33.53	0.26	9.15	8.86	8.73	1.36	0.13	1.50	0.06	1410.00	4.09	18.70
1510.00	32.23	33.31	33.43	0.25	9.28	8.83	8.77	1.36	0.14	1.43	0.05	1510.00	4.10	18.48
1610.00	32.07	33.19	33.30	0.25	9.29	8.67	8.64	1.35	0.14	1.36	0.08	1610.00	4.22	18.46
1710.00	31.94	33.09	33.20	0.25	9.37	8.74	8.66	1.37	0.13	1.29	0.08	1710.00	4.26	18.42
1810.00	31.77	32.94	33.05	0.25	9.51	8.65	8.59	1.39	0.12	1.20	0.07	1810.00	4.32	18.54
1910.00	31.51	32.69	32.81	0.24	9.61	9.02	8.79	1.42	0.09	1.14	0.06	1910.00	4.37	18.22
												2000.00	4.33	18.60

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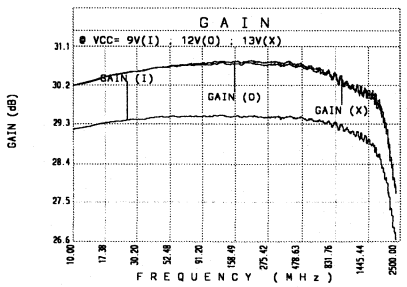
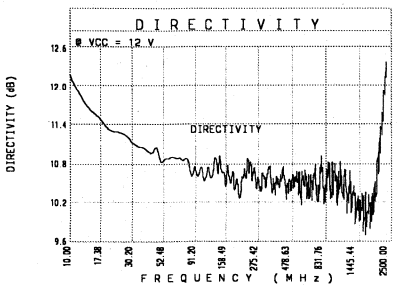
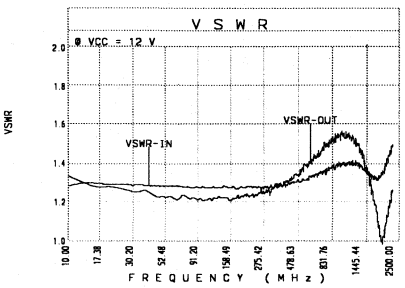


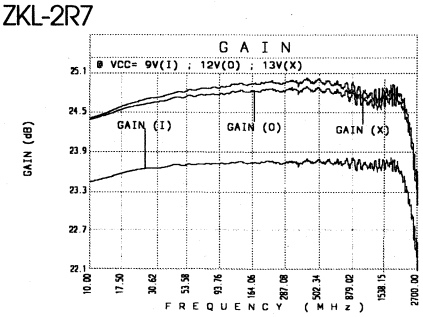


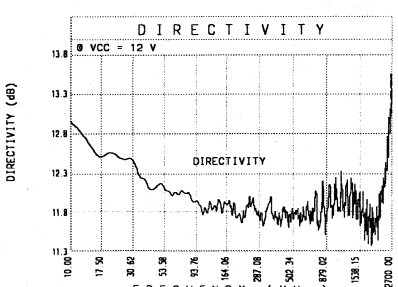


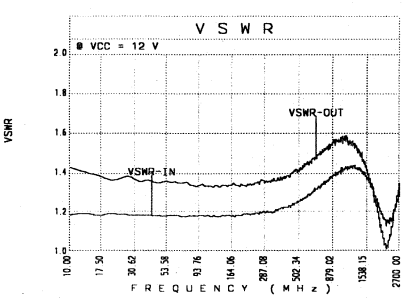
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)	
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
10.00	29.24	30.29	30.35	0.12	11.67	11.80	11.57	1.32	0.07	1.34	0.04	10.00	5.36	18.24
210.00	29.61	30.88	30.99	0.18	10.71	10.37	10.45	1.30	0.06	1.24	0.03	210.00	4.66	18.61
410.00	29.61	30.86	30.99	0.17	10.77	10.30	10.31	1.32	0.06	1.30	0.02	410.00	4.76	18.77
610.00	29.55	30.76	30.86	0.16	10.55	10.36	10.35	1.35	0.06	1.40	0.02	610.00	4.82	18.72
810.00	29.52	30.66	30.76	0.15	10.51	10.29	10.20	1.40	0.05	1.48	0.02	810.00	4.83	18.76
910.00	29.49	30.59	30.69	0.15	10.47	10.32	10.33	1.43	0.06	1.51	0.03	910.00	4.86	18.65
1110.00	29.33	30.38	30.47	0.15	10.43	10.34	10.36	1.44	0.07	1.55	0.04	1110.00	4.82	18.69
1310.00	29.24	30.28	30.37	0.15	10.37	10.19	10.21	1.44	0.08	1.52	0.04	1310.00	4.80	18.74
1510.00	29.12	30.12	30.24	0.13	10.27	9.93	9.86	1.42	0.09	1.45	0.05	1510.00	4.82	18.58
1710.00	28.94	30.00	30.09	0.15	10.20	9.74	9.69	1.39	0.09	1.33	0.05	1710.00	4.94	18.35
1810.00	28.81	29.88	29.95	0.18	10.28	9.76	9.71	1.37	0.10	1.27	0.05	1810.00	4.99	18.37
2010.00	28.32	29.44	29.55	0.20	10.85	10.11	10.03	1.33	0.05	1.12	0.02	2010.00	5.03	18.15
2160.00	28.01	29.08	29.17	0.22	11.26	10.57	10.48	1.35	0.03	1.07	0.05	2160.00	5.03	18.17
2310.00	27.41	28.51	28.59	0.29	11.89	11.24	11.09	1.38	0.05	1.13	0.06	2310.00	4.98	17.72
2500.00	26.71	27.76	27.82	0.29	12.76	12.08	12.05	1.44	0.08	1.25	0.07	2510.00	5.03	17.45

σ equals standard deviation at nominal voltage, see Amplifier terms

ZKL-2R7







FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			SWR				N.F.	Pout(dBm)	
(MHz)	9.0V	12.0V	13.0V	σ1	9.0V	12.0V	13.0V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)	
10.00	23.43	24.35	24.33	0.08	12.93	13.06	13.09	1.19	0.02	1.47	0.02	10.00	5.54	16.51
210.00	23.77	24.89	24.99	0.02	12.05	11.69	11.75	1.18	0.02	1.36	0.02	210.00	4.88	17.07
460.00	23.76	24.88	24.97	0.03	11.97	11.65	11.64	1.24	0.01	1.41	0.02	460.00	4.97	17.26
710.00	23.77	24.83	24.92	0.04	11.97	11.72	11.76	1.32	0.01	1.49	0.02	710.00	5.02	17.66
910.00	23.78	24.80	24.88	0.05	12.01	11.85	11.83	1.41	0.02	1.54	0.03	910.00	5.08	17.65
1010.00	23.74	24.73	24.82	0.06	12.05	11.81	11.84	1.41	0.02	1.57	0.02	1010.00	5.08	17.78
1210.00	23.70	24.66	24.74	0.07	11.92	11.83	11.89	1.45	0.04	1.56	0.04	1210.00	5.05	17.75
1460.00	23.67	24.61	24.69	0.07	12.09	12.01	11.93	1.44	0.06	1.49	0.04	1460.00	5.01	17.78
1710.00	23.76	24.72	24.82	0.05	11.80	11.57	11.55	1.37	0.08	1.37	0.05	1710.00	5.10	17.43
1910.00	23.70	24.69	24.79	0.05	11.91	11.56	11.48	1.29	0.09	1.25	0.06	1910.00	5.21	17.40
2010.00	23.56	24.59	24.70	0.07	12.05	11.64	11.55	1.26	0.09	1.17	0.06	2010.00	5.25	17.28
2210.00	23.34	24.41	24.52	0.11	12.43	11.85	11.73	1.20	0.08	1.06	0.05	2210.00	5.26	17.42
2360.00	23.16	24.18	24.28	0.12	12.82	12.26	12.10	1.20	0.05	1.09	0.04	2360.00	5.29	17.07
2560.00	22.75	23.72	23.81	0.13	13.52	12.96	12.87	1.25	0.02	1.21	0.05	2560.00	5.31	16.62
2700.00	22.09	23.09	23.16	0.17	14.33	13.66	13.74	1.32	0.03	1.30	0.06	2700.00	5.36	16.49

σ equals standard deviation at nominal voltage see Amplifier terms

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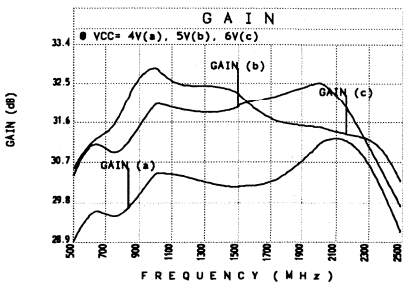
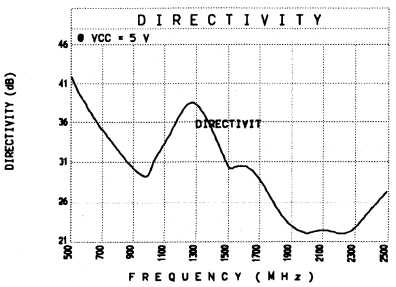
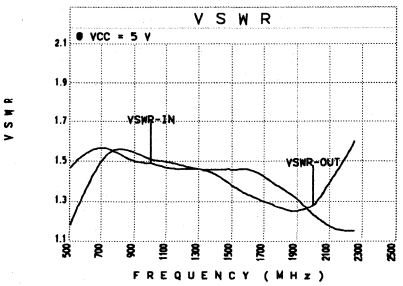
ZFL-2500



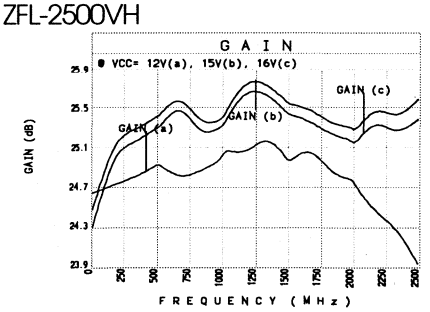


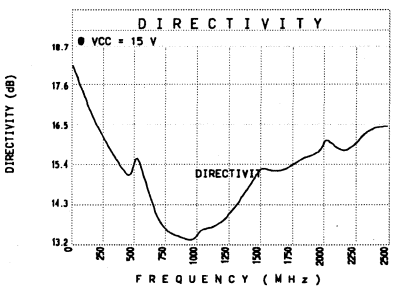


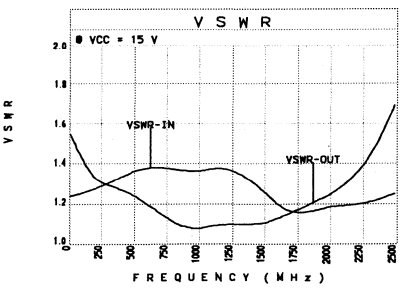
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	4V	5V	6V	σ1	4V	5V	6V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
500.00	28.92	30.43	30.59	0.46	36.73	42.23	40.95	1.48	1.40	1.19	1.00	6.08	16.40
625.00	29.82	31.41	31.34	0.77	41.02	37.01	49.91	1.58	1.27	1.42	0.21	6.25	17.22
750.00	29.32	30.73	31.38	1.16	45.97	34.04	44.45	1.58	1.84	1.59	0.06	6.41	17.65
875.00	29.85	31.40	32.68	0.77	29.38	30.82	43.66	1.51	2.28	1.57	0.32	6.59	17.65
1000.00	30.49	32.08	32.93	0.24	31.84	28.74	42.15	1.50	2.39	1.52	0.48	6.84	17.53
1010.00	30.48	32.06	32.83	0.22	34.51	31.45	40.63	1.50	2.40	1.52	0.49	6.89	17.53
1132.50	30.45	31.95	32.47	0.33	28.07	34.48	46.73	1.47	2.79	1.51	0.40	7.25	17.42
1255.00	30.32	31.86	32.49	0.37	34.55	40.35	42.13	1.47	3.00	1.47	0.51	7.68	17.26
1377.50	30.20	31.84	32.47	0.38	42.68	36.54	40.51	1.47	3.80	1.46	0.90	8.12	17.25
1500.00	30.15	31.95	32.34	0.45	33.08	30.64	38.03	1.47	4.41	1.39	1.30	8.45	17.15
1510.00	30.19	32.05	32.26	0.46	34.08	30.33	39.34	1.47	4.53	1.39	1.30	8.43	17.21
1632.50	30.19	32.15	31.83	0.59	25.14	31.44	34.32	1.48	5.66	1.33	1.78	8.59	17.28
1755.00	30.33	32.24	31.62	0.70	26.65	27.32	35.09	1.40	6.26	1.29	1.90	8.56	17.17
1877.50	30.69	32.43	31.56	0.71	25.90	23.05	30.59	1.35	5.88	1.24	1.89	8.47	17.01
2000.00	31.13	32.56	31.53	0.61	20.85	22.18	28.08	1.24	7.00	1.29	0.95	8.36	16.86
2010.00	31.20	32.56	31.52	0.58	29.35	22.29	27.47	1.23	7.13	1.29	0.88	8.37	16.78
2132.50	31.33	32.22	31.38	0.48	21.96	22.88	27.51	1.16	6.00	1.44	0.80	8.22	16.50
2255.00	31.01	31.43	31.32	0.37	20.48	21.56	26.74	1.16	3.15	1.59	0.54	8.11	16.22
2377.50	30.21	30.58	31.15	0.59	26.43	24.85	26.58	1.16	2.22	1.86	0.30	8.09	16.08
2500.00	29.13	29.72	30.29	0.84	22.69	27.61	27.12	1.16	1.70	2.05	0.30	7.97	16.24

σ equals standard deviation at nominal voltage, see Amplifier terms

ZFL-2500VH



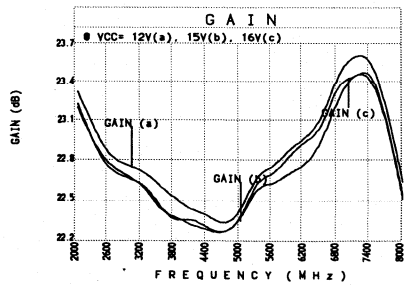


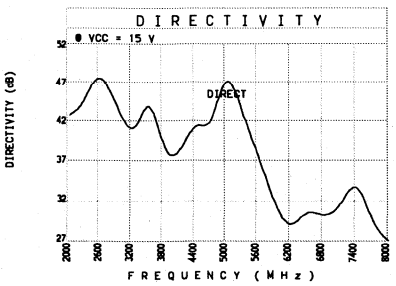


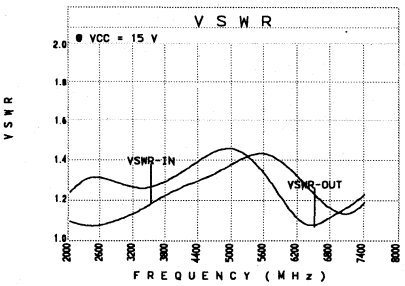
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	12V	15V	16V	σ1	12V	15V	16V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
10.00	24.67	24.50	24.32	0.09	17.38	18.27	18.56	1.25	0.56	1.56	1.09	6.31	26.96
173.33	24.75	25.24	25.12	0.04	17.14	16.67	16.52	1.27	0.64	1.32	0.19	4.86	27.17
336.66	24.83	25.31	25.18	0.13	16.79	15.73	16.12	1.32	1.01	1.30	0.78	4.99	27.13
500.00	24.95	25.45	25.34	0.30	15.43	14.82	15.04	1.37	1.15	1.25	2.08	5.00	27.07
510.00	24.97	25.45	25.32	0.31	16.10	16.30	15.45	1.38	1.15	1.24	2.18	5.00	27.09
673.33	24.80	25.70	25.62	0.38	16.31	13.77	13.71	1.40	1.10	1.17	5.20	5.00	26.91
836.66	24.90	25.34	25.22	0.54	15.98	13.45	14.21	1.38	0.99	1.09	6.56	4.95	26.51
1000.00	25.00	25.42	25.35	0.34	15.44	13.28	13.29	1.37	0.59	1.08	2.58	4.93	26.30
1010.00	25.13	25.46	25.38	0.36	15.80	13.69	13.12	1.37	0.57	1.08	2.82	4.97	26.31
1173.33	25.04	25.84	25.74	0.22	15.56	13.69	14.04	1.40	0.09	1.10	6.22	4.98	26.25
1336.66	25.29	25.79	25.69	0.23	15.70	14.42	14.35	1.36	0.74	1.10	6.63	5.01	26.11
1500.00	25.00	25.58	25.47	0.12	15.99	15.33	14.80	1.27	1.64	1.11	7.43	5.08	25.78
1510.00	24.98	25.57	25.47	0.13	15.87	15.42	15.80	1.26	1.71	1.11	7.51	5.10	25.79
1673.33	25.16	25.53	25.40	0.26	15.62	15.21	15.24	1.16	4.04	1.15	8.83	5.12	25.25
1836.66	24.85	25.36	25.26	0.28	15.68	15.71	15.13	1.16	3.12	1.20	10.44	5.13	24.66
2000.00	24.81	25.35	25.21	0.44	14.94	15.80	16.75	1.19	1.15	1.25	7.21	5.11	25.48
2010.00	24.76	25.28	25.15	0.40	15.39	16.39	16.24	1.19	1.11	1.26	6.99	5.13	25.53
2173.33	24.46	25.57	25.44	0.71	15.41	15.61	15.92	1.20	1.84	1.33	4.51	5.16	26.08
2336.66	24.32	25.41	25.25	0.86	15.45	16.51	17.29	1.22	2.85	1.46	2.74	5.26	26.09
2500.00	23.94	25.62	25.42	1.23	15.23	16.57	17.90	1.26	2.68	1.71	2.11	5.18	25.81

σ equals standard deviation at nominal voltage, see Amplifier terms

ZRON-8G



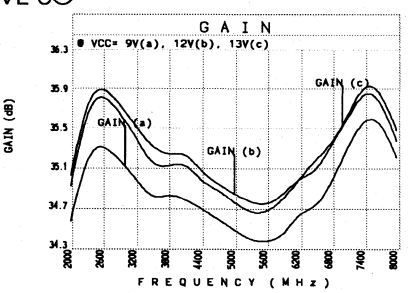


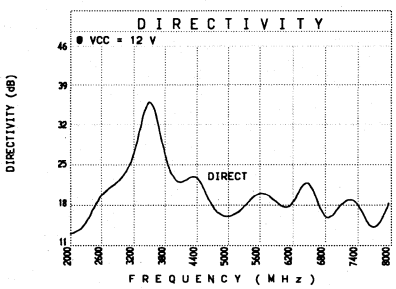


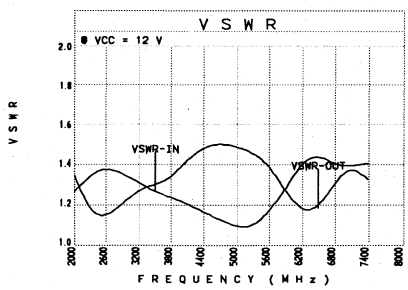
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	12V	15V	16V	σ1	12V	15V	16V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
2000.00	23.34	23.22	23.25	1.04	35.11	43.07	51.20	1.10	4.21	1.25	1.76	6.14	22.93
2300.00	23.07	22.94	22.94	0.71	37.29	44.44	47.49	1.08	8.49	1.33	1.31	6.08	24.04
2600.00	22.80	22.75	22.70	0.65	41.21	50.92	35.19	1.08	7.78	1.33	0.83	5.87	24.91
3200.00	22.75	22.65	22.66	0.66	40.71	37.62	34.94	1.14	5.61	1.27	0.65	5.70	24.87
3500.00	22.62	22.43	22.47	0.78	47.36	47.65	36.37	1.19	4.75	1.27	0.52	5.73	24.80
3800.00	22.52	22.38	22.33	0.87	40.29	37.36	41.74	1.24	4.12	1.31	0.31	5.54	24.95
4100.00	22.43	22.32	22.38	0.93	40.76	37.91	41.52	1.28	3.69	1.36	0.40	5.25	24.73
4400.00	22.40	22.28	22.29	0.94	46.70	43.00	45.49	1.31	3.12	1.42	0.76	5.14	25.11
4700.00	22.30	22.25	22.25	0.99	40.84	40.36	51.15	1.35	2.45	1.47	0.82	5.07	25.27
5000.00	22.41	22.34	22.34	0.99	38.97	50.29	42.51	1.40	1.87	1.48	0.51	4.92	25.41
5300.00	22.72	22.63	22.68	0.99	40.42	43.26	35.79	1.44	1.48	1.44	0.15	4.75	24.91
5600.00	22.75	22.62	22.69	0.98	34.51	37.98	36.17	1.46	1.18	1.35	0.78	4.74	25.05
5900.00	22.90	22.72	22.85	0.88	41.02	31.52	38.38	1.41	1.40	1.22	1.89	4.80	25.24
6200.00	22.98	22.77	22.96	0.87	32.05	28.07	30.92	1.33	1.87	1.10	4.39	4.69	25.33
6500.00	23.11	22.94	23.03	0.86	36.43	31.34	31.50	1.24	2.69	1.07	4.50	4.66	25.43
6800.00	23.50	23.30	23.44	0.91	31.16	29.89	30.90	1.16	3.84	1.13	2.09	4.76	25.34
7100.00	23.64	23.50	23.45	1.02	32.17	31.13	33.26	1.12	4.41	1.17	1.91	4.92	25.03
7400.00	23.64	23.49	23.56	1.07	30.38	35.71	33.64	1.19	3.12	1.24	3.10	5.07	25.25
7700.00	23.24	23.14	23.14	1.01	29.12	29.07	27.99	1.34	1.88	1.34	5.28	5.43	24.92
8000.00	22.65	22.52	22.55	0.95	26.89	27.09	28.07	1.53	2.35	1.37	4.70	5.87	24.48

σ equals standard deviation at nominal voltage, see Amplifier terms

ZVE-8G





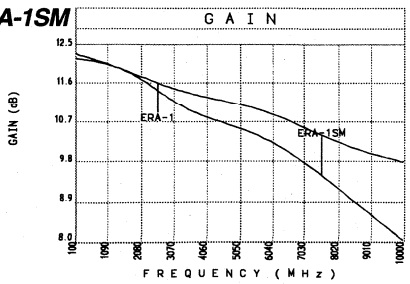


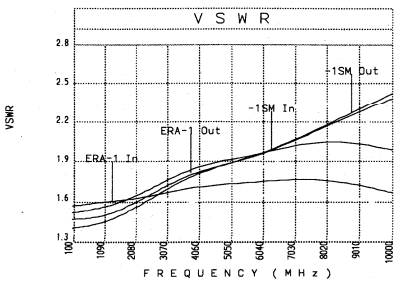
FREQUENCY	GAIN (dB)				DIRECTIVITY (dB)			VSWR				N.F.	Pout(dBm)
(MHz)	9V	12V	13V	σ1	9V	12V	13V	IN	σ2	OUT	σ3	(dB)	(@1dB COMPR)
2000.00	34.58	35.04	34.94	0.63	21.17	13.08	23.22	1.28	1.94	1.36	1.43	5.23	31.11
2300.00	35.27	35.84	35.74	0.95	15.79	13.96	25.25	1.36	0.69	1.16	2.67	4.89	32.06
2600.00	35.41	36.02	35.95	0.70	38.40	21.59	22.72	1.41	2.81	1.13	4.50	4.44	32.27
3200.00	35.01	35.54	35.44	0.43	21.62	22.58	23.06	1.32	4.41	1.30	1.68	4.16	32.63
3500.00	34.79	35.33	35.13	0.36	18.47	43.10	22.88	1.27	2.92	1.30	0.76	4.11	32.74
3800.00	34.86	35.25	35.14	0.39	24.10	24.79	22.73	1.25	0.69	1.35	0.87	4.05	32.72
4100.00	34.81	35.30	35.19	0.42	14.69	21.03	19.73	1.21	1.65	1.44	1.42	4.05	32.13
4400.00	34.71	35.08	34.98	0.40	24.70	25.04	13.90	1.17	5.13	1.51	1.65	4.09	32.36
4700.00	34.60	34.96	34.90	0.44	22.20	17.32	27.22	1.13	10.96	1.52	1.63	4.10	32.37
5000.00	34.50	34.86	34.78	0.51	16.55	15.64	13.74	1.10	5.19	1.51	1.04	4.08	32.56
5300.00	34.38	34.78	34.66	0.51	17.92	17.37	17.63	1.09	3.99	1.48	0.44	4.15	31.74
5600.00	34.37	34.74	34.67	0.57	18.45	21.29	18.54	1.18	11.67	1.41	0.34	4.16	32.04
5900.00	34.42	34.85	34.80	0.58	17.50	18.96	21.59	1.29	7.83	1.28	1.49	4.23	32.01
6200.00	34.68	35.03	35.01	0.54	27.97	16.36	17.00	1.43	6.09	1.17	3.34	4.37	32.08
6500.00	34.71	35.07	35.21	0.48	22.22	25.71	12.13	1.47	2.50	1.19	4.61	4.33	31.98
6800.00	34.97	35.37	35.37	0.52	17.84	13.49	17.96	1.41	0.70	1.32	6.35	4.26	31.97
7100.00	35.35	35.63	35.66	0.77	14.46	18.78	24.44	1.40	0.59	1.42	3.41	4.34	31.50
7400.00	35.65	35.95	36.02	0.79	39.19	20.14	12.79	1.42	2.66	1.33	1.98	4.36	31.59
7700.00	35.63	35.84	35.93	0.61	15.85	11.80	13.09	1.42	3.08	1.29	0.50	4.22	31.48
8000.00	35.24	35.41	35.52	0.71	19.80	18.53	15.16	1.27	5.27	1.34	1.79	4.20	31.57

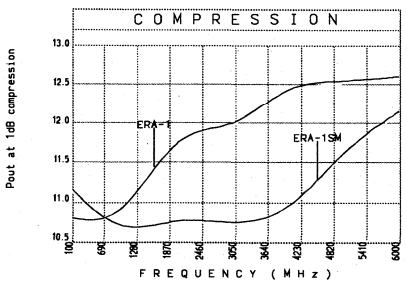
σ equals standard deviation at nominal voltage, see Amplifier terms

Amplifiers

ERA-1SM

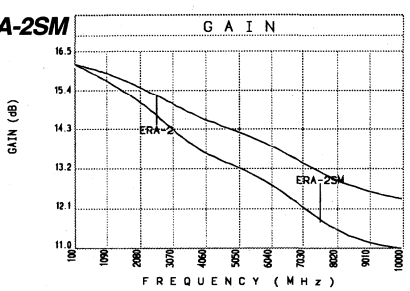


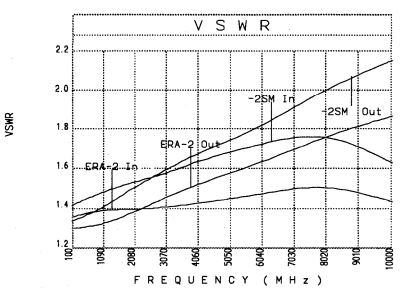


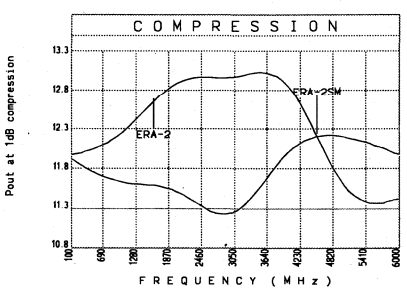


Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-13.97	0.20	177.96	12.31	4.13	170.76	-16.97	0.14	-2.91	-15.84	0.16	172.55	1.06
550	-13.43	0.21	159.71	12.12	4.04	137.76	-16.60	0.15	-30.72	-15.42	0.17	158.11	1.04
1000	-12.92	0.23	144.17	11.97	3.97	104.55	-16.66	0.15	-55.46	-14.62	0.19	142.15	1.04
2000	-11.63	0.26	115.37	11.50	3.76	31.11	-16.70	0.15	-111.57	-12.59	0.23	118.14	1.01
3000	-10.30	0.31	94.66	10.94	3.52	-42.64	-16.75	0.15	-168.73	-10.90	0.29	102.41	0.98
4000	-9.47	0.34	82.30	10.33	3.28	-114.36	-16.87	0.14	134.07	-9.44	0.34	87.77	0.96
5000	-9.17	0.35	74.43	9.53	3.00	175.55	-17.16	0.14	75.93	-8.35	0.38	69.43	0.98
6000	-9.34	0.34	69.53	8.94	2.80	107.96	-17.39	0.14	17.51	-7.42	0.43	54.63	1.00
7220	-10.05	0.31	63.58	9.04	2.83	26.04	-18.12	0.12	-55.87	-6.81	0.46	33.66	1.05
8000	-9.80	0.32	60.25	9.10	2.85	-25.22	-18.78	0.12	-101.98	-6.39	0.48	23.31	1.06

ERA-2SM

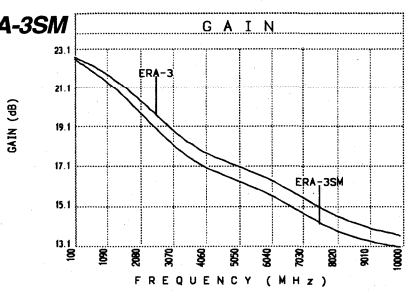


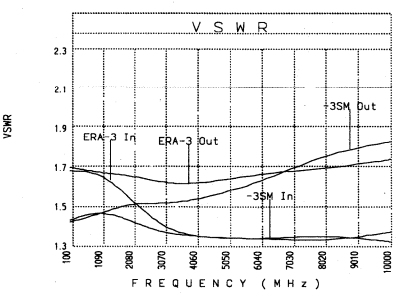


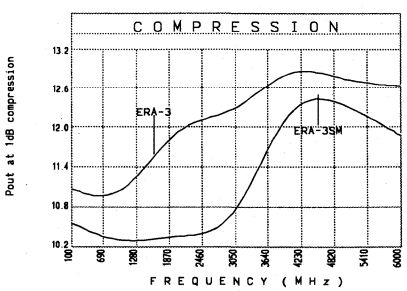


Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-17.46	0.13	176.77	16.14	6.41	170.10	-19.36	0.11	-2.02	-19.03	0.11	174.06	1.03
550	-16.15	0.16	152.26	15.95	6.27	135.76	-19.03	0.11	-28.55	-18.19	0.12	154.95	1.02
1000	-15.45	0.17	132.82	15.69	6.09	100.80	-19.05	0.11	-52.12	-17.07	0.14	138.34	1.02
2000	-13.66	0.21	99.88	14.90	5.56	23.41	-18.33	0.12	-105.24	-14.85	0.18	115.14	0.99
3000	-12.34	0.24	79.89	13.99	5.01	-50.95	-18.64	0.12	-160.52	-13.10	0.22	102.29	1.00
4000	-11.85	0.26	71.57	13.03	4.48	-123.74	-18.52	0.12	144.60	-11.53	0.27	89.80	1.02
5000	-11.74	0.26	69.51	11.86	3.92	166.38	-18.68	0.12	87.38	-10.34	0.30	71.96	1.08
6000	-12.16	0.25	69.51	11.11	3.59	98.14	-18.67	0.12	29.47	-9.27	0.34	58.13	1.11
7220	-13.03	0.22	76.69	11.07	3.58	15.13	-19.28	0.11	-41.09	-8.96	0.36	36.99	1.18
8000	-11.73	0.26	79.33	10.97	3.54	-36.97	-19.93	0.10	-85.53	-8.48	0.38	27.38	1.20

ERA-3SM

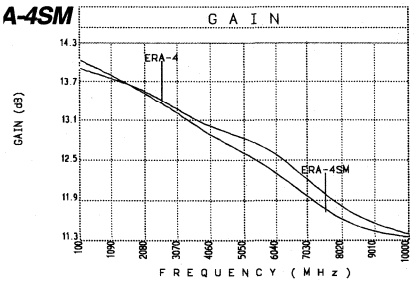


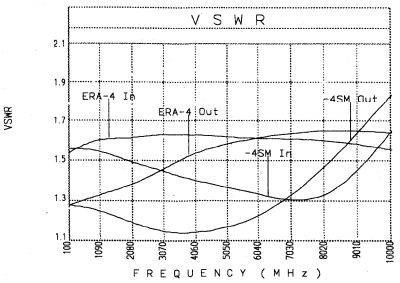


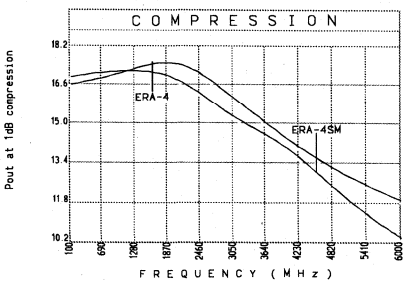


Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-13.57	0.21	174.98	22.57	13.44	168.49	-24.83	0.06	-6.88	-13.54	0.21	172.92	0.93
550	-13.16	0.22	143.84	22.13	12.78	128.25	-24.15	0.06	-20.53	-13.45	0.21	148.84	0.92
1000	-13.21	0.22	119.72	21.46	11.83	88.76	-23.91	0.06	-39.52	-13.20	0.22	127.78	0.93
2000	-13.91	0.20	80.56	19.44	9.38	5.82	-22.50	0.07	-88.03	-12.83	0.23	99.76	0.95
3000	-14.90	0.18	63.12	17.48	7.48	-70.08	-21.40	0.09	-140.31	-12.59	0.23	86.91	0.99
4000	-15.99	0.16	66.26	15.69	6.09	-142.98	-20.38	0.10	164.98	-11.83	0.26	78.08	1.03
5000	-15.68	0.16	78.95	14.00	5.01	147.59	-20.07	0.10	108.25	-11.05	0.28	62.38	1.10
6000	-15.06	0.18	89.08	12.77	4.35	81.29	-19.70	0.10	50.92	-9.95	0.32	52.96	1.14
7220	-12.95	0.23	106.02	12.45	4.19	-2.14	-19.68	0.10	-17.83	-10.09	0.31	36.16	1.13
8000	-10.12	0.31	97.46	12.06	4.01	-54.58	-19.83	0.10	-60.30	-9.58	0.33	29.45	1.08

A-4SM

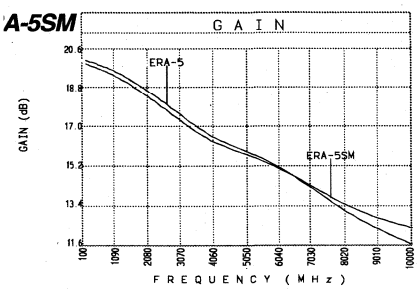


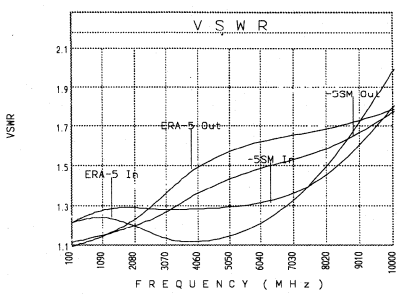


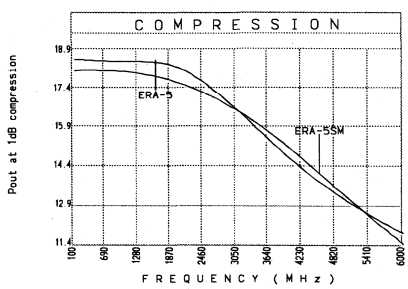


Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-12.64	0.23	177.59	13.67	4.83	170.61	-18.09	0.12	-5.31	-17.67	0.13	178.50	1.04
550	-12.36	0.24	158.88	13.56	4.76	136.16	-18.17	0.12	-29.89	-16.88	0.14	162.80	1.04
1000	-12.10	0.25	143.21	13.47	4.72	101.77	-18.16	0.12	-54.80	-16.29	0.15	149.98	1.04
2000	-11.54	0.26	111.96	13.16	4.55	23.71	-18.21	0.12	-109.29	-14.66	0.18	129.88	1.03
3000	-11.21	0.28	88.25	12.85	4.39	-53.45	-18.30	0.12	-165.76	-13.27	0.22	116.80	1.03
4000	-11.88	0.25	76.83	12.41	4.17	-130.95	-18.66	0.12	138.93	-12.24	0.24	103.89	1.08
5000	-13.04	0.22	79.31	11.63	3.82	152.70	-19.18	0.11	81.11	-12.25	0.24	86.11	1.22
6000	-13.34	0.22	93.52	11.03	3.56	77.52	-19.69	0.10	26.67	-12.46	0.24	76.84	1.35
7220	-10.27	0.31	108.89	10.63	3.40	-17.86	-20.58	0.09	-35.88	-13.29	0.22	80.82	1.45
8000	-7.77	0.41	98.82	9.81	3.09	-76.73	-20.76	0.09	-75.38	-11.39	0.27	82.14	1.39

A-5SM

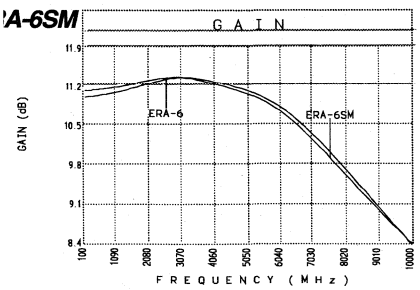


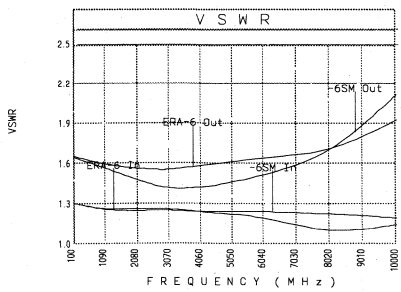


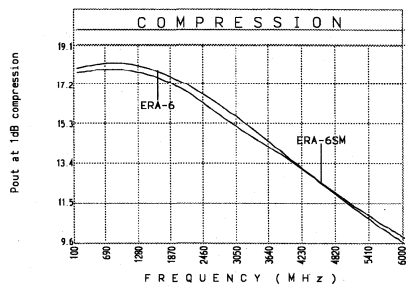


Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-14.91	0.18	172.80	20.08	10.09	169.05	-23.72	0.07	1.81	-17.76	0.13	173.95	1.03
550	-14.61	0.19	149.79	19.80	9.77	130.66	-22.47	0.08	-25.08	-17.80	0.13	158.90	0.99
1000	-14.54	0.19	127.39	19.43	9.36	92.07	-22.47	0.08	-46.48	-17.18	0.14	144.80	1.00
2000	-15.20	0.17	88.80	18.21	8.14	7.80	-21.96	0.08	-96.71	-15.98	0.16	126.69	1.02
3000	-16.90	0.14	72.32	16.81	6.93	-72.65	-21.39	0.09	-148.00	-14.68	0.18	119.64	1.07
4000	-18.41	0.12	90.96	15.31	5.83	-150.97	-20.92	0.09	160.47	-13.07	0.22	111.07	1.13
5000	-15.79	0.16	113.66	13.69	4.84	134.42	-20.88	0.09	106.02	-12.89	0.23	96.01	1.24
6000	-11.86	0.26	120.29	12.47	4.20	61.41	-20.42	0.10	52.41	-11.48	0.27	89.96	1.22
7220	-7.68	0.41	114.34	11.43	3.73	-31.64	-19.67	0.10	-10.06	-10.13	0.31	87.00	1.03
8000	-5.99	0.50	98.67	10.30	3.27	-87.65	-19.50	0.11	-53.25	-8.56	0.37	79.20	0.91

A-6SM







Freq. MHz	S_{11} (Input Return Loss) dB	Mag	Angle	S_{21} (Power Gain) dB	Mag	Angle	S_{12} (Isolation Out-In) dB	Mag	Angle	S_{22} (Output Return Loss) dB	Mag	Angle	K
100	-16.75	0.15	-2.94	11.09	3.59	170.58	-17.19	0.14	-4.79	-11.83	0.26	-1.41	1.13
550	-16.91	0.14	-0.03	11.01	3.55	135.73	-16.54	0.15	-32.00	-12.06	0.25	-14.25	1.10
1000	-17.32	0.14	2.75	11.04	3.56	100.28	-16.63	0.15	-57.70	-12.78	0.23	-25.84	1.12
2000	-18.03	0.13	12.27	11.04	3.56	19.44	-16.80	0.14	-116.46	-15.24	0.17	-62.30	1.16
3000	-17.99	0.13	26.56	10.92	3.52	-62.65	-17.17	0.14	-175.73	-16.71	0.15	-125.67	1.21
4000	-18.20	0.12	43.82	10.39	3.31	-145.69	-17.69	0.13	126.08	-14.15	0.20	173.19	1.29
5000	-17.56	0.13	64.89	9.28	2.91	132.93	-18.59	0.12	66.95	-12.24	0.24	137.21	1.49
6000	-16.31	0.15	80.31	8.14	2.55	53.42	-19.44	0.11	9.86	-9.70	0.33	111.65	1.69
7220	-13.36	0.21	94.70	6.60	2.14	-44.65	-20.58	0.09	-56.02	-7.21	0.44	90.13	1.94
8000	-10.91	0.28	86.50	5.10	1.80	-102.76	-21.17	0.09	-99.65	-5.94	0.50	75.87	2.11

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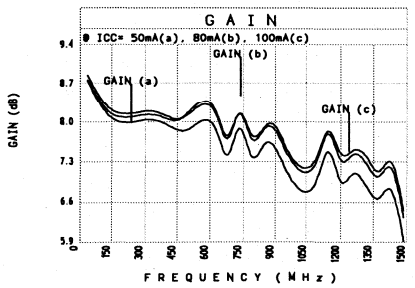
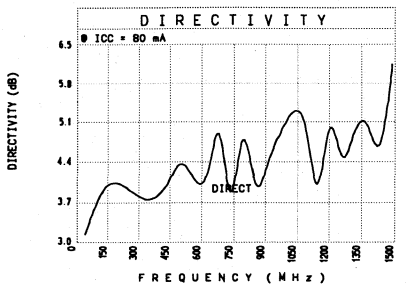
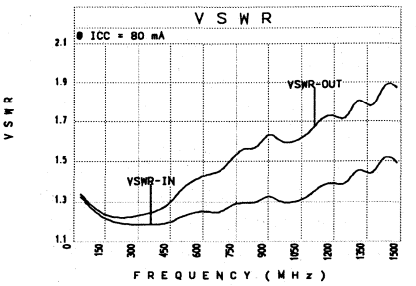
Amplifiers

MAV-5SM

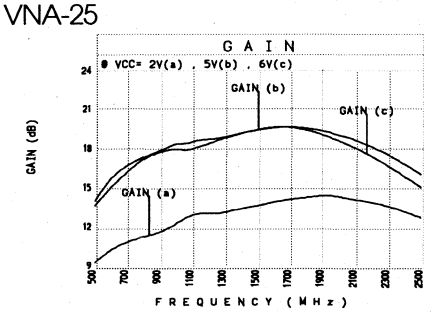


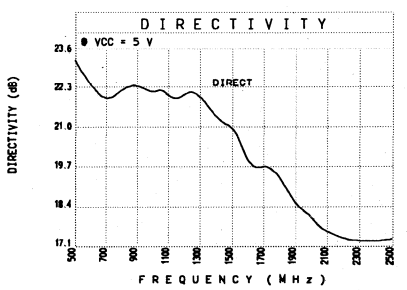


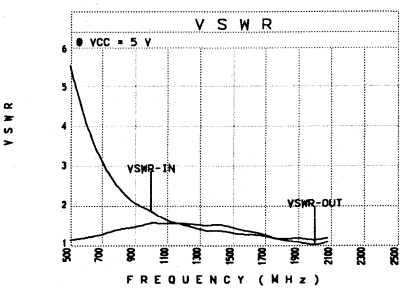


Freq.	S_{11} (Input Return Loss)			S_{21} (Gain)			S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)		
MHz		Mag	Angle	dB	Mag	Angle	dB	Mag	Angle		Mag	Angle
5.00		0.54	-43.00	14.70	5.43	160.00	-18.40	0.120	37.00		0.63	-39.00
50.00		0.18	-142.00	8.10	2.54	161.00	-13.70	0.206	3.00		0.16	-125.00
100.00		0.14	-156.00	7.80	2.45	166.00	-13.70	0.207	3.00		0.13	-137.00
200.00		0.14	-168.00	7.60	2.40	163.00	-13.70	0.206	1.00		0.13	-146.00
600.00		0.14	-175.00	7.40	2.34	137.00	-13.60	0.208	-1.00		0.20	-144.00
1000.00		0.17	-174.00	7.00	2.24	111.00	-13.60	0.209	-3.00		0.29	-154.00
1500.00		0.23	-179.00	6.40	2.09	80.00	-13.30	0.216	-4.00		0.37	-168.00
2000.00		0.33	171.00	5.50	1.88	51.00	-12.80	0.230	-10.00		0.48	178.00
2500.00		0.42	156.00	4.30	1.64	27.00	-13.00	0.224	-12.00		0.51	165.00
3000.00		0.49	146.00	3.20	1.44	6.00	-12.80	0.230	-11.00		0.55	157.00

VNA-25







Freq.	S_{11} (Input Return Loss)			S_{21} (Gain)			S_{12} (Isolation Out-In)			S_{22} (Output Return Loss)			
MHz	dB	Mag	Angle	dB	Mag	Angle	dB	Mag	Angle	dB	Mag	Angle	
500.00	-2.00	0.769	-110.00	14.00	5.20	22.00	-38.00	0.012	83.00	-16.00	0.157	12.00	3.3
700.00	-5.00	0.543	-144.00	16.00	6.50	-48.00	-39.00	0.011	-17.00	-15.00	0.185	-77.00	4.8
1000.00	-10.00	0.326	92.00	18.00	7.70	-132.00	-40.00	0.010	-72.00	-13.00	0.219	-150.00	5.6
1200.00	-12.00	0.247	157.00	18.00	8.20	152.00	-40.00	0.010	-98.00	-13.00	0.214	-164.00	5.4
1500.00	-15.00	0.177	126.00	19.00	8.60	102.00	-41.00	0.009	-130.00	-15.00	0.185	92.00	6.0
1800.00	-20.00	0.102	85.00	18.00	8.40	30.00	-40.00	0.010	-141.00	-16.00	0.165	7.00	5.7
2100.00	-26.00	0.050	-49.00	18.00	7.50	-39.00	-38.00	0.013	-127.00	-15.00	0.180	-82.00	4.9
2500.00	-16.00	0.153	149.00	16.00	6.00	-127.00	-34.00	0.019	134.00	-14.00	0.201	-107.00	4.1
2800.00	-13.00	0.234	117.00	14.00	5.00	135.00	-33.00	0.023	93.00	-14.00	0.196	145.00	3.9
3000.00	-11.00	0.285	86.00	13.00	4.40	131.00	-32.00	0.025	63.00	-15.00	0.178	112.00	4.0

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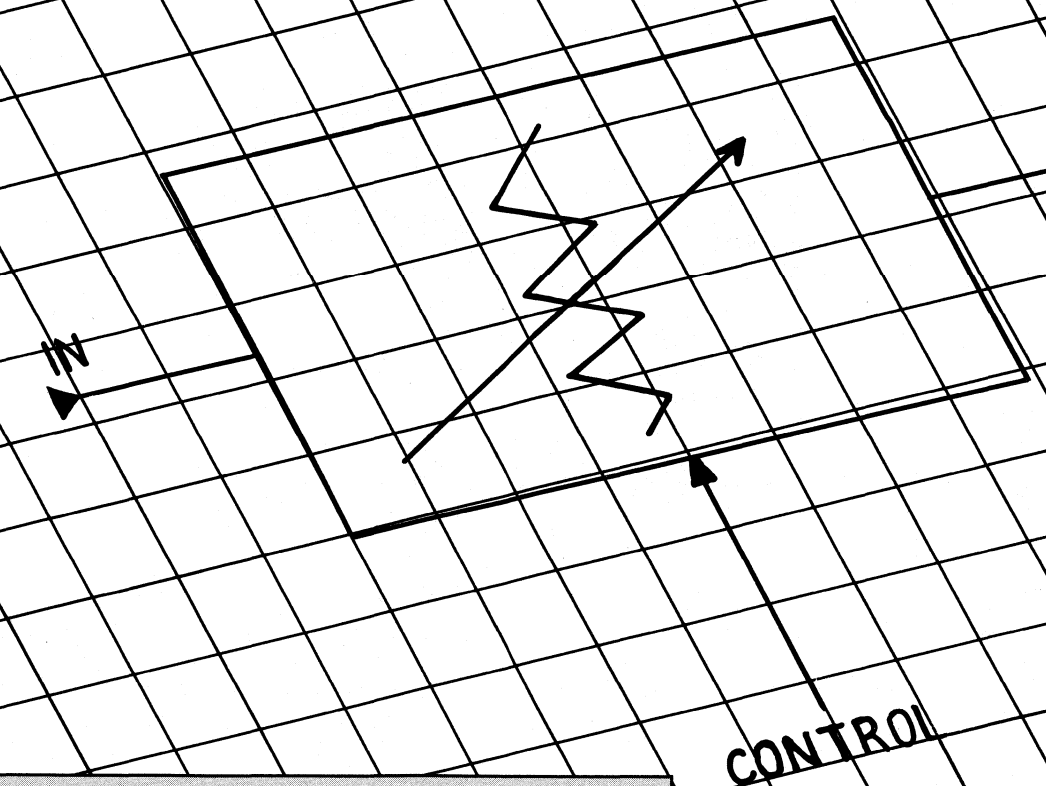
SECTION 4

BI-PHASE ELECTRONIC ATTENUATORS



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product specifications
coaxial 4-3
1 MHz to 2000 MHz, plug-in, surface mount 4-4, 4-5

computer data and curves . . . . . 4-10 thru 4-14

Electronic Attenuators

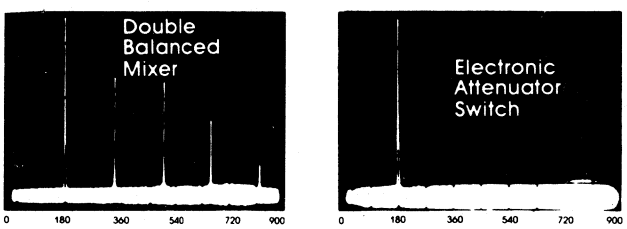
An electronic attenuator may be viewed as a variable resistor controlled by current through its control port. If a pure signal is applied at its input, harmonics will not be generated over most of the device's operating frequency range; however, some amount of harmonics will appear at the very low frequency end of the band with the amplitude determined by input power level and frequency. The minimum insertion loss of an electronic attenuator will occur at the highest value of control current, 20mA for Mini-Circuits' models. The minimum insertion loss value will increase as frequency rises so that, for example, the 1-200 MHz PAS model will have a 1.4dB insertion loss while the 100-2000 MHz PAS-2000 will have a 4dB spec. Generally speaking, the return loss is a function of control current. The higher the control current, the higher the return loss (closer to50 ohms); as current decreases, return loss drops, resulting in ahigher VSWR.

A useful feature of Mini-Circuits' electronic attenuators is the ability for either a positive or negative control current to provide the same amount of attenuation between input and output; this makes it usefu for biphase modulation applications. The computer-automated performance data (CAPD) included foi Mini-Circuits' electronic attenuators charts the phase difference between plus and minus modulation as a function of RF frequency.

The attenuator/switches are economically priced while covering the very broad frequency range from 1 to 2000 MHz. They offer low insertion loss (1.4 dB high isolation (65 dB), and exceptional unit-to-unit matched performance.

Applications include power leveling and bi-phase modulation as well as current-controlled attenuation

Double Balanced Mixer Vs. Electronic Attenuator



A comparison of the harmonics generated at a mixer's output is shown compared to the output of an electronic attenuator.

modern definition of terms

insertion loss:

must be defined at a particular value of control-current. The minimum insertion loss for Mini-Circuits' units is the difference in power from input to output with 20mA at thecontrol port.

in-out isolation:

insertion loss of the attenuator from input to output port when there is no current applied to the control port.

in-control isolation:

insertion loss of an electronic attenuator measurec from the RF input to control port. This insertion loss is independent of the amount of control current anc is dependent on the transformer used to provide coupling from RF input to the internal diodes.

return loss:

the amount of reflected power at the input relative tc the amount of incident power at the input for a specified control current. At very high control current, return loss is very high; at low control current levels, return loss is very small.

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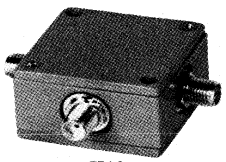
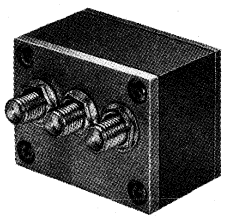
BI-PHASE 1 MHz to 2 GHz


ZFAS

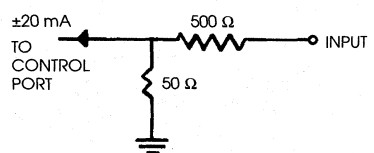

ZMAS

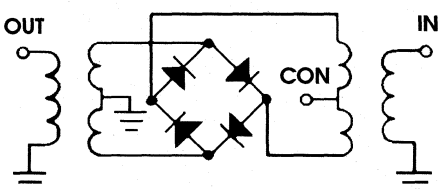
ZAS

MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) Mid-Band m Typ.	Mid-Band m Max.	Total Range Typ.	Total Range Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	BI-PHASE $\overline{X}$ (±20 mA) Typ. Δ AMP (dB) Total m	Total Range	Phase(deg) Deviation From 180° Total m	Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
ZMAS-1*	5-450	DC-0.05	3.5	4	3.5	4.7	20	30	65	50	55	45	35	25	0.10	0.1	0.5	1.2	4-10	M21	cp	66.95
ZMAS-3*	1-200	DC-0.05	1.4	2	1.6	2.5	15	30	65	50	50	40	50	35	0.10	0.1	0.5	1.0	4-11	M21	cp	67.95
ZAS-1*	5-450	DC-0.05	3.5	4	3.5	4.7	20	30	65	50	55	45	35	25	0.10	0.1	0.5	1.2	4-10	M22	cp	59.95
ZAS-3*	1-200	DC-0.05	1.4	2	1.6	2.5	15	30	65	50	50	40	50	35	0.10	0.1	0.5	1.0	4-11	M22	cp	59.95
△ ZFAS-2000**	100-2000	DC-0.5	4.2	6.5	5.4	7.5	19✲	25	30	22	—	—	26	20	0.3	0.4	5.0	8.0	4-11	K18	cn	64.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

suggested control port biasing configuration





NSN GUIDE

MCL NO.	NSN
ZAS-3B	5985-01-267-2832
ZMAS-1	5985-01-140-4291

NOTES:
- * Recommended for electronic attenuator
- ** Recommended for bi-phase modulator
- △ Available only with SMA connectors.
- ✲ +15 dBm from 100-800 MHz
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings: 1a. Control current, 30mA
- 2. Performance specifications apply for input power up to 10 dB below stated 1dB compression.

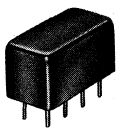
coaxial connections

see case style outline drawings

PORT	cn	cp
INPUT	2	3
OUTPUT	1	1
CONTROL	3	2
GND EXT.	—	—
CASE GND	—	—
NOT USED	—	—

BI-PHASE 1 MHz to 2 GHz

TFAS



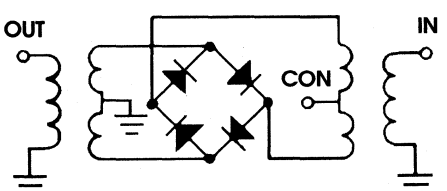
PAS
GAS

MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) Mid-Band m Typ.	Mid-Band m Max.	Total Range Typ.	Total Range Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	BI-PHASE X (±20 mA) Typ. Δ AMP (dB) m	Δ AMP (dB) Total Range	Phase(deg) Deviation From 180° m	Phase(deg) Deviation From 180° Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PAS-1*	5-450	DC-0.05	3.5	4.0	3.5	4.7	20	29	65	50	45	35	35	25	0.1	0.1	0.5	1.2	4-10	A01	cf	33.95
PAS-2*	10-1000	DC-0.05	4.0	6.0	6.5	8.5	20	29	50	40	40	30	35	25	0.1	0.3	0.5	1.0	4-10	A01	cg	47.95
PAS-3*	1-200	DC-0.05	1.4	2.0	1.6	2.5	15	29	65	50	50	40	50	35	0.1	0.1	0.5	1.0	4-11	A01	cf	34.95
PAS-2000**	100-2000	DC-0.5	4.2	6.5	5.4	7.5	19✲	25	30	22	—	—	26	20	0.3	0.4	5.0	8.0	4-11	A05	ch	24.95
❑ TFAS-1*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	B02	cm	13.95
❑ TFAS-2**	10-1000	DC-0.5	3.7	4.5	5.0	8.0	17★	25	50	30	42	20	31	20	0.1	0.2	2.0	3.0	4-12	B02	cm	17.95
❑ TFAS-860**	500-1000	DC-0.5	—	—	1.5	5.4	14	25	30	(typ.)		20	(min.)		—	0.3	—	4.0	4-13	B02	cm	19.95
❑ GAS-1**	5-450	DC-0.05	3.3	4	3.5	5.0	20	25	60	48	45	35	35	25	0.10	0.1	1.0	1.5	4-10	A05	cf	13.95
❑ GAS-2**	10-1000	DC-0.05	4.3	6	5.2	8.5	20	25	55	40	35	25	28	20	0.10	0.3	1.5	3.0	4-10	A05	cg	15.95
❑ GAS-3**	5-200	DC-0.05	1.2	2	1.4	2.5	20	25	50	45	45	35	40	30	0.10	0.1	0.5	1.0	4-11	A05	cf	14.95

L = low range (f_L to 10 f_L)

M = mid range (10f_L to f_U/2)
m = mid band (2f_L to f_U/2)

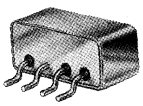
U = upper range (f_U/2 to f_U)



NOTES:

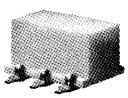
* Recommended for electronic attenuator
** Recommended for bi-phase modulator
✱ RAS-1 not available in tape & reel.
■ Denotes 75 Ohm model.
❑ Non-hermetic
✲ +15 dBm from 100-800 MHz
✣ +15 dBm from 2-10 MHz
★ +13 dBm from 10-500 MHz

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Control current, 30mA
1b. Max. Power at room temperature
2. Performance specifications apply for input power up to 10 dB below stated 1dB compression;
example: +5dBm in 2-10MHz range for TFAS-1, TFAS-1SM


TFAS-SM

SYAS

RAS

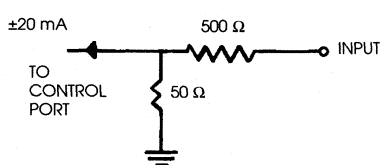

LRAS

MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) Mid-Band m Typ.	Mid-Band m Max.	Total Range Typ.	Total Range Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	BI-PHASE $\overline{X}$ (±20 mA) Typ. Δ AMP (dB) m	Δ AMP (dB) Total Range	Phase(deg) Deviation From 180° m	Phase(deg) Deviation From 180° Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
TFAS-1SM*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	NNN150	cm	13.95
TFAS-2SM**	10-1000	DC-0.5	3.7	4.5	5.0	8.0	17★	25	50	30	42	20	31	20	0.1	0.2	2.0	3.0	4-12	NNN150	cm	17.95
TFAS-860SM**	500-1000	DC-0.5	—	—	1.5	5.4	14	25	30	(typ.)		20	(min.)		—	0.3	—	4.0	4-13	NNN150	cm	19.95
SYAS-1*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	TTT167	ck	9.95
SYAS-2**	10-1000	DC-0.05	4.0	6.0	4.5	7.0	17★	25	59	40	42	28	28	20	0.1	0.3	2.0	3.0	4-12	TTT167	ck	13.95
SYAS-860**	600-1000	DC-0.5	—	—	2.7	5.7	14	25	25	(typ.)		18	(min.)		—	0.5	—	4.0	4-13	TTT166	ck	15.95
✱ RAS-1**	2-400	DC-0.05	1.4	2.0	1.6	3.2	20✱	25	65	45	45	28	32	22	0.10	0.1	1.0	2.0	4-12	TT146	ge	7.95
■ RAS-2-75**	10-1000	DC-0.05	4.1	6.0	4.5	7.5	20	25	58	40	42	28	39	20	0.15	0.3	1.5	3.0	4-12	TT100	cj	9.95
■ LRAS-2-75**	10-1000	DC-0.05	4.1	6.0	4.5	7.5	20	25	58	40	42	28	39	20	0.15	0.3	1.5	3.0	4-14	QQQ130	cj	9.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

suggested control port biasing configuration



pin and coaxial connections

see case style outline drawings for pin locations

PORT	cf	cg	ch	cj	ck	cm	ge
INPUT	1	1	1	4	1	1	4
OUTPUT	8	8	8	1	2	4	1
CONTROL	3,4 ^	3,4 ^	3	5	3	2	5
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,3,6	4,5,6	3	2,3,6
CASE GND	2	2,5,6,7	2,5,6,7	—	—	3	—
NOT USED	—	—	4	—	—	—	—

^ Pins must be connected together externally.

NSN GUIDE

MCL NO.	NSN
PAS-1	5985-01-282-2105
PAS-2	5985-01-192-0100
PAS-3	5895-01-067-3035

In Stock... Immediate Delivery

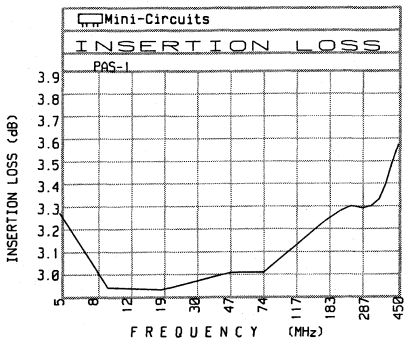
For Custom Versions Of Standard Models Consult Our Applications Dept.

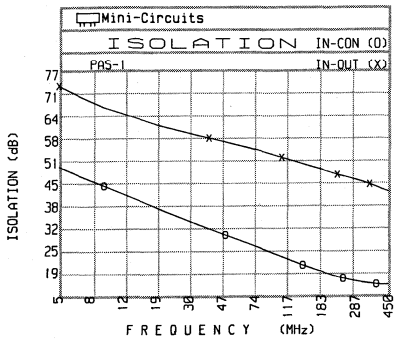
low current, bi-phase

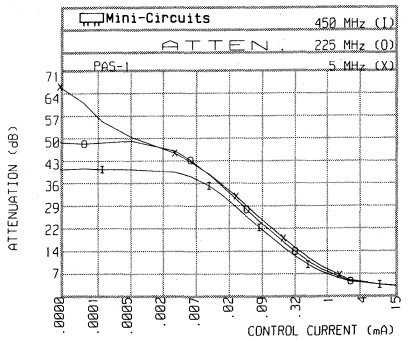
Electronic Attenuators/Switches

PAS-1, ZAS-1, ZMAS-1, GAS-1

5 to 450 MHz





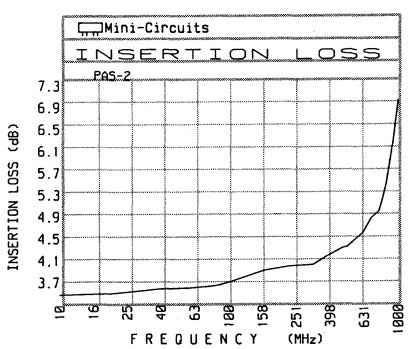


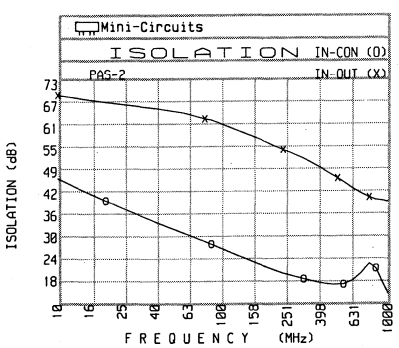
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
5.0	3.27	.025	.02	179.9	74	50	11.8
9.5	2.93	.019	.02	179.9	68	44	13.4
19.5	2.92	.017	.02	179.9	62	38	14.3
35.0	2.97	.017	.02	179.9	59	33	14.5
39.5	2.98	.017	.03	179.9	59	32	14.5
49.5	3.00	.017	.03	179.9	57	30	14.4
74.0	3.00	.019	.04	179.8	55	27	14.1
75.1	3.00	.018	.03	179.8	55	26	14.1
107.4	3.10	.019	.04	179.7	53	23	14.3
141.8	3.18	.019	.04	179.7	51	21	14.6
176.3	3.24	.021	.04	179.6	49	19	14.5
210.8	3.28	.021	.04	179.5	48	18	14.6
225.3	3.29	.023	.04	179.5	48	18	14.7
244.2	3.30	.024	.04	179.4	47	17	14.8
278.7	3.29	.024	.04	179.3	46	16	15.1
313.2	3.30	.026	.05	179.2	46	16	15.1
347.7	3.33	.029	.05	179.1	45	16	14.8
381.0	3.40	.034	.05	179.1	44	15	15.0
415.5	3.50	.041	.06	179.0	43	15	14.7
450.0	3.58	.044	.06	178.9	43	15	13.7

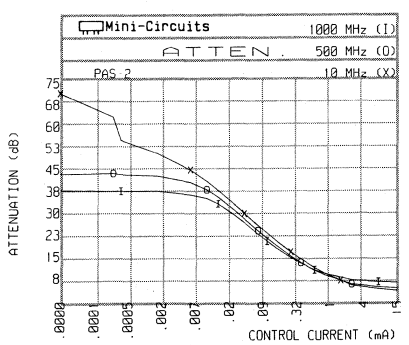
CONTROL CURRENT (mA)	ATTENUATION (dB) 5 MHz	225 MHz	450 MHz	PHASEΔ, REF AT 15mA CTRL 5 MHz (deg)	225 MHz (deg)	450 MHz (deg)	INPUT VSWR 5 MHz	225 MHz	450 MHz
0.0000	68.1	50.0	41.3	-52.4	124.7	108.2	2.9	2.9	2.6
0.0001	62.8	49.6	41.6	-9.9	119.7	103.2	2.9	2.9	2.6
0.0002	56.7	49.9	41.3	-18.0	114.6	102.4	2.9	2.9	2.6
0.0006	51.7	50.5	41.3	-20.7	101.4	95.5	2.9	2.9	2.6
0.0032	46.6	47.3	40.4	-10.7	58.4	76.3	2.9	2.9	2.6
0.0058	43.8	44.3	39.0	-6.4	45.6	60.3	2.9	2.9	2.6
0.0116	39.8	39.6	36.0	-0.4	29.9	43.3	2.8	2.9	2.6
0.0184	36.6	36.1	33.2	3.3	24.8	33.3	2.8	2.8	2.5
0.0327	32.6	31.6	29.1	5.9	18.3	23.7	2.8	2.7	2.4
0.0486	29.5	28.4	26.2	6.9	15.6	19.4	2.7	2.7	2.4
0.0787	25.9	24.6	22.6	7.6	13.3	14.8	2.6	2.5	2.2
0.1081	23.5	22.2	20.3	7.9	12.2	12.8	2.5	2.4	2.1
0.1975	19.1	17.8	16.1	7.8	10.0	9.7	2.2	2.2	1.9
0.3085	16.0	14.8	13.3	7.4	8.7	7.9	2.0	1.9	1.7
0.5100	12.9	11.7	10.6	6.5	7.3	6.0	1.7	1.7	1.4
0.8548	10.1	9.2	8.4	5.3	5.5	4.4	1.5	1.4	1.2
1.7555	7.2	6.6	6.1	3.3	3.4	2.5	1.3	1.2	1.1
2.6670	5.4	5.1	4.9	2.0	2.0	1.3	1.3	1.2	1.2
8.1232	4.0	4.0	4.0	0.5	0.5	0.4	1.5	1.4	1.4
15.1218	3.5	3.6	3.6	-0.1	-0.0	0.0	1.6	1.5	1.4

PAS-2, GAS-2

10 to 1000 MHz







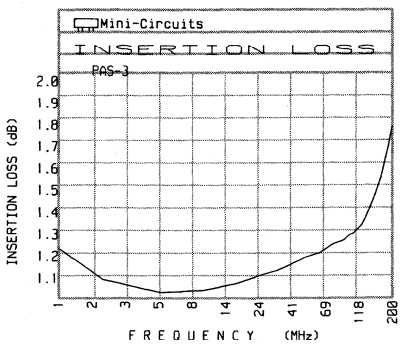
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
10.0	3.50	.025	.01	180.0	70	47	12.3
19.9	3.52	.015	.01	180.0	68	40	12.7
39.7	3.61	.008	.01	179.9	67	35	12.6
59.5	3.63	.006	.01	179.9	65	31	12.5
79.3	3.66	.006	.01	179.9	64	29	12.5
86.7	3.68	.006	.01	179.9	63	28	12.5
99.1	3.73	.006	.01	179.9	62	27	12.4
163.5	3.95	.006	.01	179.8	58	23	12.3
237.7	4.03	.007	.01	179.7	55	20	12.1
314.4	4.05	.008	.01	179.7	52	18	12.0
391.2	4.23	.012	.02	179.6	50	17	12.1
467.9	4.36	.017	.04	179.6	48	17	12.3
500.1	4.38	.021	.04	179.6	47	17	12.4
542.1	4.48	.027	.06	179.5	46	17	12.5
618.9	4.63	.040	.10	179.5	44	18	12.6
695.6	4.90	.053	.13	179.6	43	20	12.1
772.3	5.02	.064	.16	179.8	41	23	10.8
846.6	5.51	.073	.16	179.7	41	21	9.1
923.3	6.21	.087	.21	179.8	40	17	7.5
1000.0	7.06	.093	.36	180.4	40	14	6.3

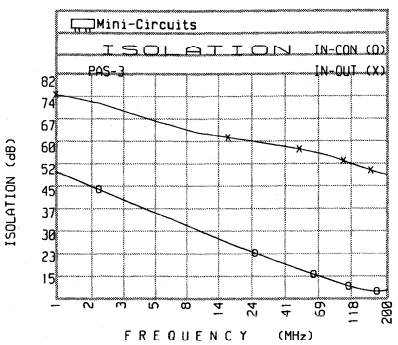
CONTROL CURRENT (mA)	ATTENUATION (dB) 10 MHz	500 MHz	1000 MHz	PHASEΔ, REF AT 15mA CTRL 10 MHz (deg)	500 MHz (deg)	1000 MHz (deg)	INPUT VSWR 10 MHz	500 MHz	100 MH
0.0000	71.8	43.8	38.2	-37.1	96.0	63.6	3.6	2.9	7.5
0.0003	63.7	44.2	38.1	-34.3	93.2	62.4	3.6	2.9	7.5
0.0004	55.7	43.8	38.1	-12.5	86.0	57.8	3.6	2.9	7.5
0.0016	51.2	43.3	38.1	-8.5	80.1	52.8	3.6	2.8	7.4
0.0057	45.4	41.1	36.8	-4.6	55.5	35.7	3.6	2.8	7.3
0.0105	41.5	38.6	35.6	-1.2	42.6	23.4	3.5	2.8	7.1
0.0161	38.3	36.0	33.7	1.5	34.4	12.9	3.5	2.8	6.9
0.0286	33.9	31.8	30.1	3.6	24.5	0.6	3.4	2.7	6.6
0.0437	30.3	28.4	27.1	4.3	20.7	-5.6	3.3	2.6	6.2
0.0734	26.2	24.4	23.2	5.1	16.3	-9.9	3.1	2.4	5.6
0.1029	23.6	21.8	20.8	5.0	14.4	-11.4	2.9	2.3	5.2
0.1510	20.7	19.1	18.2	5.0	12.8	-11.9	2.7	2.1	4.7
0.2540	17.1	15.6	15.1	4.6	10.4	-11.1	2.4	1.8	4.0
0.3743	14.6	13.3	13.1	4.3	9.0	-9.9	2.1	1.6	3.6
0.6438	11.5	10.6	10.8	3.5	6.9	-7.5	1.7	1.3	3.1
0.9350	9.7	9.1	9.6	3.0	5.4	-6.0	1.5	1.2	2.9
1.7496	7.2	7.2	8.2	2.0	3.6	-3.6	1.2	1.1	2.7
2.6537	5.5	5.9	7.3	1.3	1.9	-1.8	1.2	1.3	2.7
7.3043	4.3	4.9	6.7	0.5	0.6	-0.7	1.4	1.5	2.6
15.1437	3.6	4.5	6.4	0.1	0.1	-0.1	1.5	1.6	2.6

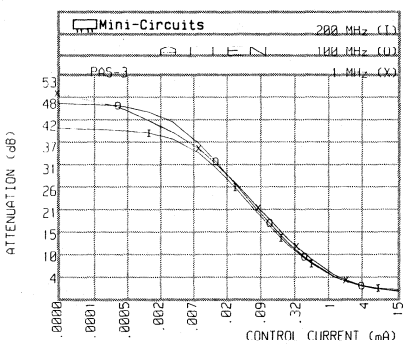
Mini-Circuits

PAS-3, ZAS-3, ZMAS-3, GAS-3

1 to 200 MHz





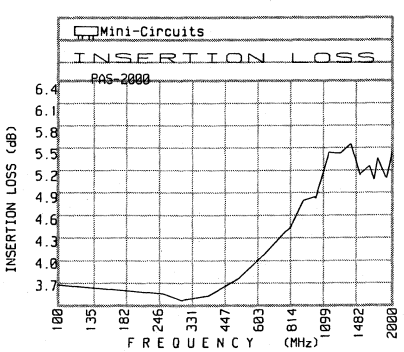


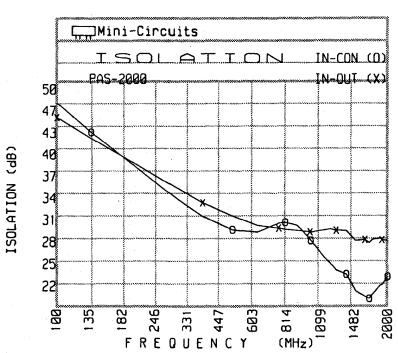
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
1.0	1.28	.002	.01	180.0	78	52	23.5
2.0	1.14	.002	.01	180.0	75	45	28.1
5.0	1.08	.002	.01	180.0	69	38	35.4
10.0	1.09	.002	.01	180.0	65	32	43.0
16.4	1.12	.002	.01	179.9	63	28	42.7
24.9	1.16	.002	.01	179.9	62	24	37.5
31.8	1.18	.002	.01	179.9	61	22	35.2
46.8	1.23	.001	.02	179.8	59	19	31.6
49.8	1.24	.001	.02	179.8	59	19	31.0
62.2	1.26	.002	.02	179.8	58	17	28.7
77.6	1.30	.001	.02	179.7	57	15	26.4
93.0	1.32	.001	.02	179.6	56	14	24.4
100.0	1.34	.001	.02	179.6	55	13	23.5
108.0	1.35	.001	.02	179.6	55	13	22.6
123.4	1.39	.001	.02	179.5	54	12	21.0
138.8	1.46	.001	.02	179.5	53	12	19.5
154.2	1.54	.001	.02	179.4	52	11	18.2
169.2	1.62	.001	.02	179.5	51	11	17.0
184.6	1.73	.001	.02	179.5	51	11	15.9
200.0	1.84	.002	.03	179.6	50	11	14.8

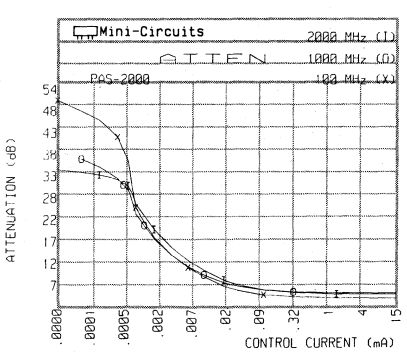
CONTROL CURRENT (mA)	ATTENUATION (dB) 1 MHz	100 MHz	200 MHz	PHASE Δ, REF AT 15mA CTRL 1 MHz (deg)	100 MHz (deg)	200 MHz (deg)	INPUT VSWR 1 MHz	100 MHz	200 MHz
0.0000	50.3	47.8	41.7	26.3	69.1	69.7	13.6	11.6	8.1
0.0004	47.0	47.3	41.2	19.0	65.6	65.4	13.5	11.6	8.1
0.0013	43.6	45.7	40.5	10.3	50.0	58.2	13.3	11.5	8.0
0.0032	40.7	43.3	39.0	5.7	36.8	46.4	12.9	11.3	7.9
0.0085	36.7	38.0	35.6	6.3	20.9	29.7	12.5	10.9	7.7
0.0162	33.0	33.5	32.0	6.6	12.3	19.1	11.7	10.3	7.4
0.0336	28.2	27.9	27.0	7.2	7.0	10.3	10.5	9.2	6.8
0.0567	24.5	23.9	23.1	7.5	4.7	6.0	9.3	8.1	6.1
0.0807	22.0	21.2	20.5	7.7	3.9	4.3	8.3	7.3	5.6
0.1215	19.1	18.2	17.5	7.5	3.0	2.9	7.1	6.2	4.9
0.1860	16.1	15.2	14.6	7.1	2.4	1.8	5.8	5.1	4.2
0.2459	14.2	13.3	12.8	6.5	2.1	1.4	5.0	4.5	3.7
0.3285	12.5	11.5	11.1	6.3	1.8	1.1	4.3	3.8	3.2
0.4365	10.8	9.9	9.6	5.7	1.6	0.9	3.6	3.3	2.8
0.5714	9.3	8.5	8.2	5.1	1.4	0.7	3.1	2.8	2.5
1.3114	5.6	5.2	5.1	3.3	0.8	0.3	2.0	1.9	1.7
2.0989	4.2	3.9	3.9	2.3	0.6	0.3	1.6	1.6	1.5
3.7220	2.9	2.8	2.9	1.3	0.3	0.1	1.3	1.3	1.3
7.0357	2.0	2.0	2.2	0.5	0.2	0.0	1.2	1.2	1.2
15.1415	1.4	1.5	1.8	-0.0	-0.0	-0.0	1.1	1.1	1.1

PAS-2000, ZFAS-2000

100 to 2000 MHz







FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
100.0	3.76	0.006	0.02	179.4	46	48	9.5
137.1	3.72	0.003	0.01	179.0	43	44	10.2
301.5	3.55	0.001	0.03	178.2	36	34	11.0
383.8	3.61	0.001	0.04	177.7	34	32	10.5
503.4	3.85	0.010	0.08	177.1	32	30	9.3
630.4	4.17	0.027	0.18	176.4	30	29	7.9
757.5	4.47	0.059	0.21	176.3	30	31	6.9
802.4	4.54	0.061	0.22	176.4	30	31	6.7
899.5	4.91	0.107	0.27	176.1	30	30	6.3
996.7	4.96	0.114	0.28	175.9	29	28	6.2
1004.2	4.94	0.118	0.28	175.8	29	28	6.2
1131.3	5.57	0.162	0.36	175.7	30	26	6.4
1258.3	5.56	0.105	0.36	175.5	30	24	7.0
1377.9	5.69	0.045	0.37	175.5	30	24	7.7
1497.5	5.26	0.053	0.33	175.2	28	21	8.7
1632.1	5.38	0.045	0.27	174.7	28	20	10.0
1699.4	5.2	0.068	0.29	174.2	28	20	10.8
1751.7	5.49	0.068	0.27	174.2	28	21	11.3
1901.2	5.22	0.090	0.23	173.0	28	22	12.4
2000.0	5.57	0.156	0.25	172.7	28	23	12.5

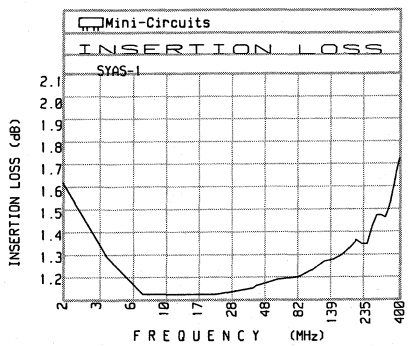
CONTROL CURRENT (mA)	ATTENUATION (dB) 100 MHz	1000 MHz	2000 MHz	PHASE Δ, REF AT 15mA CTRL 100 MHz (deg)	1000 MHz (deg)	2000 MHz (deg)	INPUT VSWR 100 MHz	1000 MHz	2000 MHz
0.0000	51.0	38.9	34.4	89.6	18.6	46.6	1.6	4.7	2.9
0.0001	48.5	37.0	33.9	91.3	12.9	42.2	1.6	4.7	2.9
0.0002	46.3	35.1	33.2	89.8	8.7	35.1	1.6	4.6	2.9
0.0003	44.1	33.6	32.7	85.5	5.8	31.0	1.5	4.6	2.9
0.0004	42.3	32.4	32.1	84.8	2.4	27.0	1.5	4.6	2.9
0.0005	39.1	30.8	31.2	78.5	-1.4	21.2	1.5	4.6	2.9
0.0006	36.5	29.7	30.6	71.5	-4.8	16.8	1.5	4.5	2.9
0.0007	30.2	26.8	28.7	53.5	-12.0	6.9	1.5	4.4	2.8
0.0008	25.5	24.0	26.3	43.0	-15.6	-0.9	1.4	4.2	2.7
0.0011	22.0	21.2	23.6	36.6	-16.4	-5.9	1.4	4.0	2.6
0.0016	18.4	18.1	20.3	31.0	-16.0	-8.8	1.3	3.7	2.4
0.0032	14.1	14.1	15.9	24.3	-13.7	-9.8	1.2	3.3	2.0
0.0058	11.3	11.5	13.0	19.5	-11.1	-8.9	1.2	3.1	1.8
0.0106	9.1	9.5	10.6	14.8	-8.6	-7.5	1.3	3.0	1.6
0.0226	6.9	7.7	8.3	9.5	-5.5	-5.4	1.5	2.9	1.4
0.0381	5.9	6.9	7.2	6.7	-4.0	-4.0	1.6	2.9	1.4
0.1031	4.8	6.0	6.0	3.2	-2.0	-2.1	1.8	3.0	1.5
0.3098	4.3	5.5	5.4	1.3	-0.9	-1.0	1.9	3.0	1.6
1.5487	4.0	5.3	5.0	0.4	-0.4	-0.4	2.0	3.0	1.7
15.1120	3.9	5.2	4.9	-0.1	-0.1	-0.0	2.0	3.1	1.7

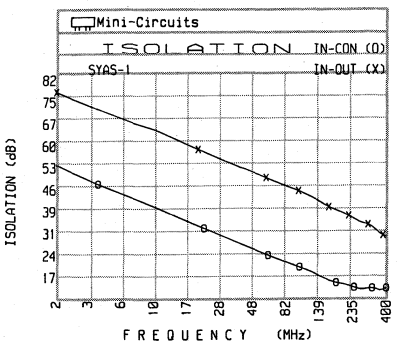
low current, bi-phase

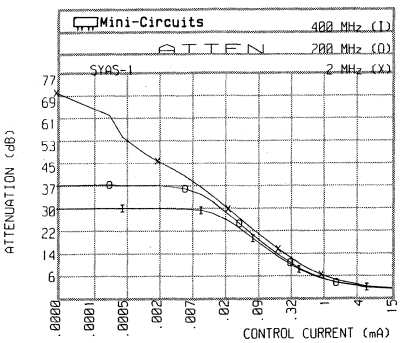
Electronic Attenuators/Switches

SYAS-1, TFAS-1, TFAS-1SM

2 to 400 MHz



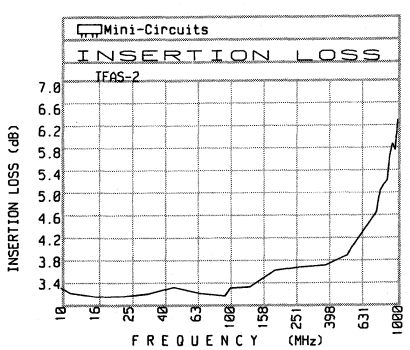


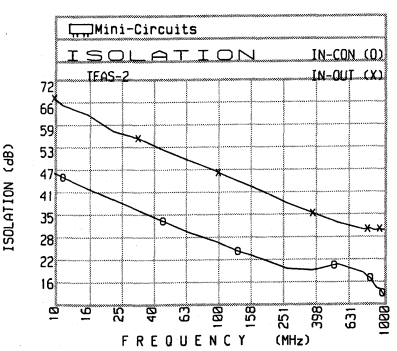


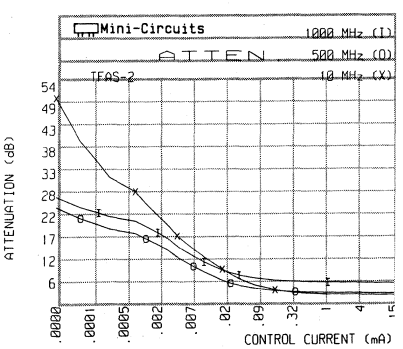
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄	CONTROL CURRENT (mA)	ATTENUATION (dB) 2 MHz	200 MHz	400 MHz	PHASEΔ, REF AT 15mA CTRL 2 MHz (deg)	200 MHz (deg)	400 MHz (deg)	INPUT VSWR 2 MHz	200 MHz	400 MHz
2.0	1.67	0.000	0.01	179.9	78	54	18.1	0.0000	72.7	39.0	30.6	27.2	-87.7	-95.3	7.7	7.2	4.4
7.0	1.16	0.001	0.00	180.0	68	43	25.4	0.0003	64.4	39.2	30.7	22.2	-86.0	-94.6	7.7	7.2	4.4
10.0	1.16	0.001	0.00	180.0	66	40	27.6	0.0005	56.5	39.0	30.8	28.6	-84.3	-93.7	7.6	7.2	4.4
21.9	1.16	0.001	0.00	180.0	58	33	31.0	0.0012	50.4	39.0	30.7	17.4	-80.5	-92.0	7.6	7.2	4.4
39.8	1.19	0.001	0.00	180.1	53	28	31.9	0.0019	47.8	39.0	30.7	14.1	-77.4	-90.3	7.5	7.2	4.4
59.7	1.23	0.001	0.00	180.1	50	25	32.1	0.0054	42.5	37.9	30.6	8.2	-56.2	-79.9	7.4	7.0	4.3
61.7	1.23	0.001	0.00	180.1	50	25	32.1	0.0100	38.4	35.8	30.1	7.6	-37.3	-67.6	7.2	6.9	4.3
81.6	1.24	0.001	0.00	180.2	47	22	32.2	0.0157	35.1	33.1	29.0	8.8	-25.3	-55.1	7.1	6.7	4.2
99.5	1.27	0.001	0.00	180.2	46	21	32.3	0.0284	30.6	28.7	26.3	8.8	-12.8	-37.6	6.7	6.3	4.0
121.4	1.31	0.001	0.01	180.3	44	19	32.4	0.0433	27.3	25.3	23.7	9.2	-7.2	-26.9	6.3	5.9	3.8
141.3	1.32	0.001	0.01	180.4	42	18	32.4	0.0722	23.2	21.2	20.0	9.3	-3.1	-17.7	5.6	5.3	3.5
181.1	1.37	0.001	0.01	180.6	39	16	32.2	0.1012	20.7	18.6	17.6	9.0	-1.4	-13.2	5.2	4.9	3.3
200.0	1.40	0.001	0.01	180.6	39	15	32.0	0.1898	16.1	14.1	13.3	8.2	0.4	-8.0	4.1	3.9	2.8
220.9	1.39	0.001	0.01	180.8	38	15	31.6	0.3008	13.1	11.2	10.6	7.4	0.9	-5.5	3.4	3.2	2.4
240.8	1.39	0.001	0.01	180.9	36	14	30.3	0.4259	10.9	9.2	8.8	6.7	1.1	-4.2	2.9	2.7	2.1
280.6	1.52	0.001	0.05	181.1	35	13	26.6	0.7017	8.3	6.9	6.6	5.4	1.1	-2.8	2.2	2.1	1.7
300.5	1.52	0.001	0.04	181.1	35	14	24.8	0.9968	6.8	5.6	5.4	4.4	0.9	-2.1	1.9	1.8	1.5
340.3	1.56	0.001	0.03	181.4	33	13	21.4	1.7486	4.8	3.9	4.0	3.0	0.7	-1.3	1.5	1.5	1.3
360.2	1.64	0.002	0.06	181.6	32	13	19.8	5.6920	2.5	2.1	2.3	0.9	0.2	-0.3	1.2	1.1	1.2
400.0	1.78	0.003	0.09	181.7	31	14	17.1	15.1258	1.8	1.5	1.8	0.0	0.0	0.1	1.3	1.1	1.3

TFAS-2, TFAS-2SM, SYAS-2

10 to 1000 MHz





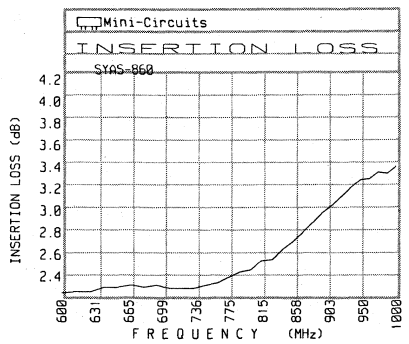


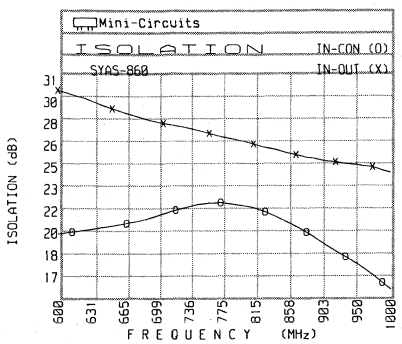
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄	CONTROL CURRENT (mA)	ATTENUATION (dB) 10 MHz	500 MHz	1000 MHz	PHASEΔ, REF AT 15mA CTRL 10 MHz (deg)	500 MHz (deg)	1000 MHz (deg)	INPUT VSWR 10 MHz	500 MHz	100 MH
10.0	3.34	0.009	0.00	180.0	69	47	11.4	0.0000	51.3	24.7	27.2	76.7	40.6	0.5	3.3	2.3	4.2
11.4	3.24	0.006	0.01	180.0	67	46	11.6	0.0001	40.8	22.0	24.7	67.8	31.3	-6.7	3.2	2.2	4.0
16.1	3.17	0.004	0.01	180.1	64	43	12.2	0.0002	35.5	20.5	23.4	61.3	25.4	-10.4	3.2	2.2	3.8
23.2	3.18	0.003	0.00	180.1	59	40	12.5	0.0003	32.1	19.5	22.5	59.5	21.4	-12.8	3.1	2.1	3.7
46.5	3.35	0.002	0.01	180.3	54	34	12.5	0.0008	28.6	18.4	21.4	55.8	17.3	-14.7	3.0	2.0	3.6
65.8	3.24	0.002	0.01	180.5	51	31	12.4	0.0012	25.7	17.1	20.1	53.7	14.1	-15.8	2.9	1.9	3.4
93.1	3.19	0.003	0.01	180.7	48	28	12.4	0.0019	22.8	15.7	18.6	51.0	10.9	-16.0	2.7	1.9	3.2
100.2	3.34	0.003	0.01	180.7	47	28	12.4	0.0029	20.2	14.2	17.0	47.8	8.6	-15.1	2.6	1.7	3.1
131.8	3.36	0.004	0.01	180.9	45	25	12.4	0.0040	17.8	12.7	15.3	45.1	6.8	-13.6	2.4	1.6	2.9
186.6	3.66	0.005	0.02	181.3	42	23	12.3	0.0074	14.6	10.4	12.9	40.1	4.7	-10.7	2.1	1.5	2.7
373.8	3.75	0.008	0.02	182.1	36	20	11.4	0.0110	12.7	9.1	11.5	36.8	3.7	-8.7	1.9	1.4	2.6
500.8	3.93	0.015	0.03	182.5	34	21	11.3	0.0159	11.1	8.0	10.4	33.2	2.8	-7.2	1.7	1.4	2.6
529.1	4.06	0.018	0.04	182.5	33	21	11.2	0.0221	9.7	7.0	9.5	29.5	2.2	-5.3	1.5	1.4	2.5
748.8	4.72	0.055	0.10	182.6	31	19	10.7	0.0301	8.5	6.3	8.8	25.9	1.7	-4.3	1.3	1.4	2.6
791.0	5.13	0.050	0.15	182.8	31	18	10.3	0.0416	7.4	5.8	8.3	22.4	1.0	-3.4	1.2	1.5	2.6
820.5	5.21	0.052	0.15	182.4	32	18	10.1	0.0753	5.9	5.1	7.6	16.2	0.7	-2.1	1.2	1.6	2.6
899.0	5.75	0.063	0.20	182.4	31	15	9.5	0.1640	4.7	4.5	7.0	9.2	0.2	-1.4	1.4	1.8	2.7
932.5	5.97	0.089	0.27	182.0	31	15	9.3	0.3543	4.0	4.2	6.7	5.0	0.0	-0.8	1.6	1.9	2.7
967.2	5.85	0.077	0.24	181.8	31	13	9.1	1.2309	3.6	4.0	6.5	1.7	-0.1	-0.5	1.8	2.0	2.7
1000.0	6.41	0.111	0.38	181.4	31	13	8.8	15.1064	3.4	3.8	6.3	0.0	-0.0	-0.1	1.9	2.0	2.7

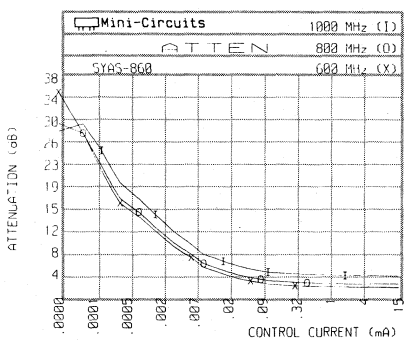
Mini-Circuits

SYAS-860

600 to 1000 MHz





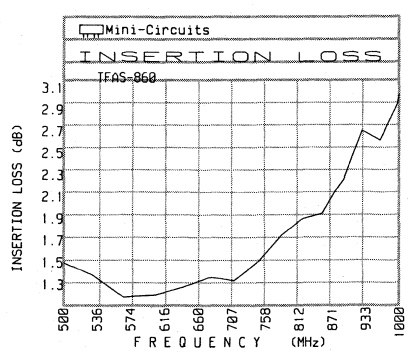


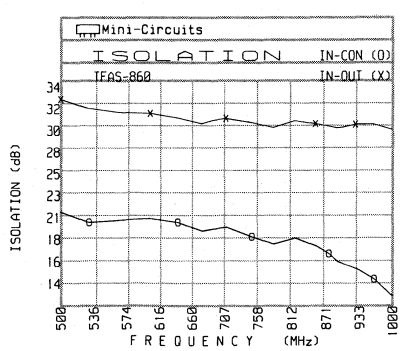
FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
600.0	2.30	0.015	0.07	182.1	30	20	10.8
627.0	2.31	0.013	0.06	182.4	30	20	11.2
640.0	2.35	0.011	0.06	182.4	29	20	11.3
667.0	2.37	0.007	0.06	182.6	29	21	11.4
680.0	2.35	0.005	0.07	182.8	29	21	11.4
707.0	2.34	0.005	0.08	182.7	28	21	11.2
720.0	2.34	0.007	0.10	182.9	28	22	11.1
747.0	2.37	0.008	0.13	183.0	28	22	10.7
773.0	2.44	0.009	0.16	183.2	27	22	10.2
787.0	2.49	0.011	0.19	183.2	27	22	10.0
813.0	2.59	0.014	0.20	183.3	26	22	9.5
827.0	2.60	0.018	0.24	183.6	26	22	9.2
853.0	2.76	0.021	0.26	183.7	26	21	8.6
880.0	2.94	0.032	0.33	183.8	26	20	8.1
893.0	3.03	0.037	0.35	183.8	25	20	7.9
920.0	3.18	0.040	0.40	183.9	25	19	7.4
933.0	3.26	0.047	0.43	183.9	25	18	7.2
960.0	3.34	0.049	0.48	183.8	25	17	6.7
973.0	3.40	0.051	0.49	183.8	25	17	6.6
1000.0	3.45	0.050	0.49	183.9	24	16	6.2

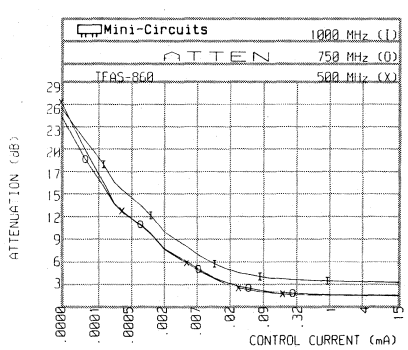
CONTROL CURRENT (mA)	ATTENUATION (dB) 600 MHz	800 MHz	1000 MHz	PHASE Δ, REF AT 15mA CTRL 600 MHz (deg)	800 MHz (deg)	1000 MHz (deg)	INPUT VSWR 600 MHz	800 MHz	1000 MHz
0.0000	35.3	29.9	28.6	-60.9	-101.2	-133.3	2.9	2.3	3.1
0.0001	28.3	28.3	29.9	11.7	-36.3	-80.9	2.9	2.3	3.0
0.0002	21.8	22.6	25.3	14.5	-18.8	-51.0	2.7	2.2	2.9
0.0003	18.4	19.2	21.9	11.1	-16.0	-41.8	2.5	2.1	2.7
0.0004	16.4	17.2	19.8	9.9	-13.7	-36.0	2.4	2.0	2.6
0.0008	14.1	14.9	17.2	9.4	-10.4	-28.8	2.2	1.8	2.4
0.0015	11.7	12.3	14.5	8.8	-7.2	-21.8	1.9	1.7	2.3
0.0029	9.3	9.9	11.8	7.8	-4.8	-15.9	1.7	1.5	2.2
0.0059	7.2	7.8	9.5	6.1	-3.3	-11.3	1.4	1.4	2.2
0.0095	5.6	6.2	7.8	4.4	-2.3	-7.9	1.2	1.4	2.3
0.0200	4.5	5.1	6.6	3.1	-1.7	-5.4	1.2	1.5	2.6
0.0344	3.7	4.3	5.8	2.0	-1.2	-3.8	1.3	1.7	2.9
0.0556	3.3	3.9	5.3	1.3	-1.0	-2.7	1.4	1.8	3.2
0.0814	3.0	3.6	5.0	0.8	-0.9	-2.0	1.5	1.9	3.4
0.1072	2.8	3.4	4.8	0.7	-0.9	-1.7	1.5	1.9	3.6
0.1926	2.6	3.2	4.6	0.3	-0.7	-1.1	1.6	2.0	3.8
0.2956	2.5	3.1	4.5	0.1	-0.6	-0.8	1.6	2.1	3.9
0.4662	2.4	3.0	4.4	0.0	-0.5	-0.5	1.7	2.1	4.0
2.0106	2.3	2.8	4.2	-0.0	-0.3	-0.2	1.7	2.2	4.2
15.0980	2.2	2.8	4.1	0.0	-0.1	0.1	1.7	2.2	4.3

TFAS-860, TFAS-860SM

500 to 1000 MHz







FREQ (MHz)	INSERTION LOSS (AT 20mA) (dB) x̄	(dB) σ	± CONTROL, 20mA ΔAMP (dB) x̄	ΔPHASE (deg) x̄	ISOLATION (IN-OUT) (dB) x̄	(IN-CON) (dB) x̄	INPUT R.LOSS (dB) x̄
500.0	1.46	0.009	0.09	182.1	33	21	9.5
530.5	1.35	0.008	0.08	182.2	32	20	10.8
565.5	1.15	0.006	0.06	182.4	32	20	12.4
580.0	1.16	0.007	0.05	182.4	32	21	13.3
604.0	1.17	0.010	0.04	182.4	32	21	14.0
639.0	1.24	0.012	0.04	182.6	31	20	15.0
674.0	1.33	0.022	0.03	182.8	31	19	15.2
690.0	1.32	0.023	0.03	182.7	31	20	14.9
709.0	1.30	0.024	0.04	182.6	31	20	14.6
747.5	1.48	0.054	0.05	182.8	31	19	13.4
782.5	1.71	0.082	0.10	183.0	30	18	12.2
817.5	1.86	0.103	0.15	182.8	31	19	11.0
852.5	1.91	0.152	0.13	182.9	31	18	9.9
875.0	2.11	0.202	0.17	183.0	30	17	9.4
891.0	2.22	0.244	0.20	183.0	30	16	8.8
901.5	2.36	0.291	0.22	183.1	30	16	8.5
926.0	2.67	0.380	0.26	183.0	31	15	8.0
961.0	2.58	0.341	0.26	182.8	31	14	7.3
996.0	2.91	0.658	0.33	183.2	30	13	6.7
1000.0	3.00	0.685	0.35	183.2	30	13	6.6

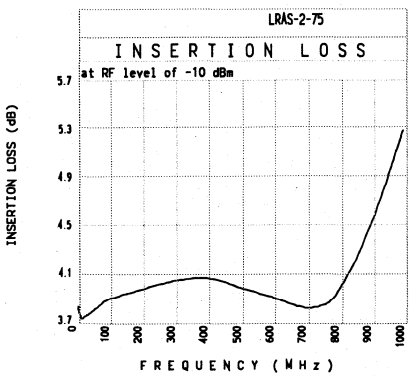
CONTROL CURRENT (mA)	ATTENUATION (dB) 500 MHz	750 MHz	1000 MHz	PHASE Δ, REF AT 15mA CTRL 500 MHz (deg)	750 MHz (deg)	1000 MHz (deg)	INPUT VSWR 500 MHz	750 MHz	1000 MHz
0.0000	27.1	25.3	26.4	83.7	62.3	54.7	5.1	2.8	4.7
0.0001	20.7	19.5	22.0	69.7	41.4	26.0	4.8	2.7	4.4
0.0002	16.3	15.8	18.8	51.4	25.7	9.2	4.1	2.5	3.8
0.0003	13.6	13.5	16.4	38.4	15.8	-0.3	3.6	2.3	3.3
0.0004	12.6	12.5	15.4	33.9	12.7	-3.1	3.4	2.2	3.1
0.0008	10.7	10.8	13.4	27.5	8.7	-6.0	3.0	2.0	2.8
0.0012	9.5	9.6	12.0	23.4	6.5	-6.8	2.7	1.8	2.6
0.0020	7.5	7.6	9.8	18.0	4.0	-6.9	2.3	1.6	2.3
0.0047	5.7	5.9	7.9	13.0	2.4	-5.9	2.0	1.4	2.2
0.0073	4.7	4.9	6.8	10.2	1.7	-4.9	1.8	1.3	2.2
0.0136	3.6	3.7	5.6	6.8	0.8	-3.6	1.7	1.2	2.4
0.0202	3.0	3.2	5.0	5.2	0.5	-2.8	1.7	1.2	2.5
0.0336	2.4	2.6	4.4	3.5	0.2	-2.0	1.7	1.3	2.7
0.0486	2.2	2.4	4.2	2.6	-0.0	-1.7	1.8	1.4	2.8
0.0752	1.9	2.1	3.9	1.8	-0.1	-1.3	1.8	1.4	3.0
0.1089	1.8	1.9	3.7	1.3	-0.1	-1.0	1.8	1.5	3.1
0.1787	1.6	1.8	3.6	0.8	-0.3	-0.7	1.9	1.5	3.2
0.2608	1.5	1.7	3.5	0.5	-0.2	-0.6	1.9	1.5	3.2
0.9689	1.4	1.5	3.3	0.1	-0.2	-0.2	1.9	1.6	3.3
14.8842	1.3	1.4	3.1	0.0	-0.1	-0.0	2.0	1.6	3.4

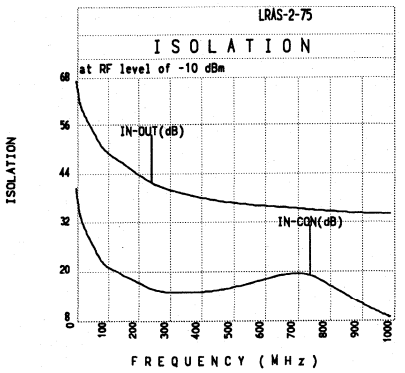
low current, bi-phase

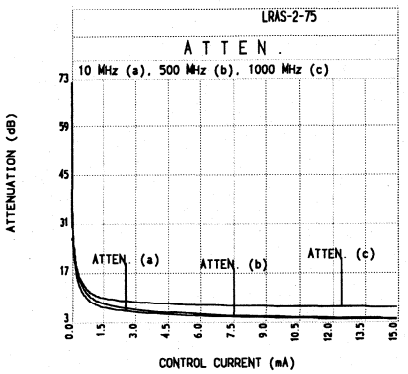
Electronic Attenuators/Switches

LRAS-2-75

10-1000 MHz







FREQ. (MHz)	INSERTION LOSS (AT 20mA) (dB) $\bar{X}$	INSERTION LOSS (AT 20mA) (dB) σ	±CONTROL, 20mA ΔAMP (dB) $\bar{X}$	±CONTROL, 20mA ΔPHASE (deg) $\bar{X}$	ISOLATION (IN-OUT) (dB) $\bar{X}$	ISOLATION (IN-CON) (dB) $\bar{X}$	INPUT R.LOSS (dB) $\bar{X}$	CONTROL CURRENT (mA)	ATTENUATION (dB) 10 MHz	ATTENUATION (dB) 500 MHz	ATTENUATION (dB) 1000 MHz	PHASEΔ, REF AT 15mA CTRL 10 MHz (deg)	PHASEΔ, REF AT 15mA CTRL 500 MHz (deg)	PHASEΔ, REF AT 15mA CTRL 1000 MHz (deg)	INPUT VSWR 10 MHz	INPUT VSWR 500 MHz	INPUT VSWR 10 M
10.00	3.85	0.03	0.02	179.90	67.88	41.14	10.10	0.0000	72.90	42.39	27.39	77.04	123.67	-103.48	2.08	3.13	3.(
11.05	3.82	0.03	0.02	179.90	67.79	40.28	10.23	0.0003	55.21	42.67	27.44	11.33	120.00	-102.87	2.08	3.12	3.(
18.88	3.74	0.03	0.02	179.90	63.46	35.60	10.64	0.0005	53.16	42.90	27.46	7.79	118.89	-102.59	2.08	3.12	3.(
20.04	3.74	0.03	0.02	180.00	62.60	35.08	10.66	0.0012	51.41	42.97	27.48	3.85	117.49	-102.39	2.07	3.12	3.(
31.63	3.76	0.02	0.02	180.00	59.62	31.14	10.66	0.0020	48.64	43.48	27.48	-0.16	112.28	-101.50	2.07	3.12	3.(
88.76	3.89	0.03	0.02	179.90	51.37	22.58	10.25	0.0057	43.09	45.33	27.53	1.31	89.97	-98.08	2.06	3.10	3.(
99.98	3.92	0.03	0.02	179.90	50.33	21.61	10.17	0.0100	39.50	44.93	27.53	3.65	57.70	-94.25	2.04	3.08	3.(
249.09	4.03	0.04	0.03	179.80	42.22	15.70	8.91	0.0159	36.40	42.36	27.53	5.11	30.17	-89.71	2.02	3.05	2.9
297.80	4.07	0.05	0.03	179.80	40.68	15.03	8.52	0.0285	31.75	36.38	27.24	6.51	7.06	-79.20	1.97	2.99	2.9
417.28	4.11	0.07	0.05	179.60	38.35	15.08	7.90	0.0446	28.17	31.97	26.78	7.17	-1.12	-68.54	1.91	2.91	2.7
498.88	4.00	0.08	0.06	179.20	37.36	15.99	7.87	0.0715	24.55	27.67	25.39	7.44	-5.78	-54.17	1.83	2.81	2.(
596.42	3.94	0.09	0.08	178.50	36.58	18.04	8.46	0.1020	21.81	24.54	23.59	7.48	-7.72	-43.64	1.74	2.71	2.5
699.03	3.81	0.10	0.11	177.78	36.03	20.13	10.04	0.1879	17.39	19.65	19.97	7.02	-9.03	-27.24	1.54	2.48	2.3
756.78	3.86	0.12	0.11	177.50	35.57	19.20	11.05	0.3050	14.19	16.15	16.91	6.28	-8.93	-17.65	1.36	2.27	2.1
787.42	3.89	0.14	0.15	177.38	35.34	17.98	11.95	0.4255	12.22	14.01	14.93	5.67	-8.50	-12.50	1.24	2.13	2.(
886.98	4.40	0.24	0.24	176.36	34.78	13.08	13.72	0.7057	9.67	11.18	12.34	4.51	-7.44	-6.55	1.12	1.95	1.7
941.39	4.82	0.31	0.39	175.63	34.59	10.71	15.64	0.9950	8.26	9.55	10.92	3.71	-6.60	-3.39	1.18	1.85	1.(
979.50	5.15	0.36	0.39	175.05	34.55	9.30	15.23	1.7446	6.45	7.41	9.22	2.46	-4.90	0.17	1.39	1.77	1.4
999.13	5.30	0.38	0.40	175.02	34.58	8.68	14.51	5.6985	4.37	4.79	7.63	0.63	-1.58	1.77	1.84	1.82	1.7
1019.15	5.47	0.41	0.45	175.10	34.64	8.11	13.84	15.0090	3.70	3.91	7.30	0.01	0.00	0.10	2.07	1.92	1.

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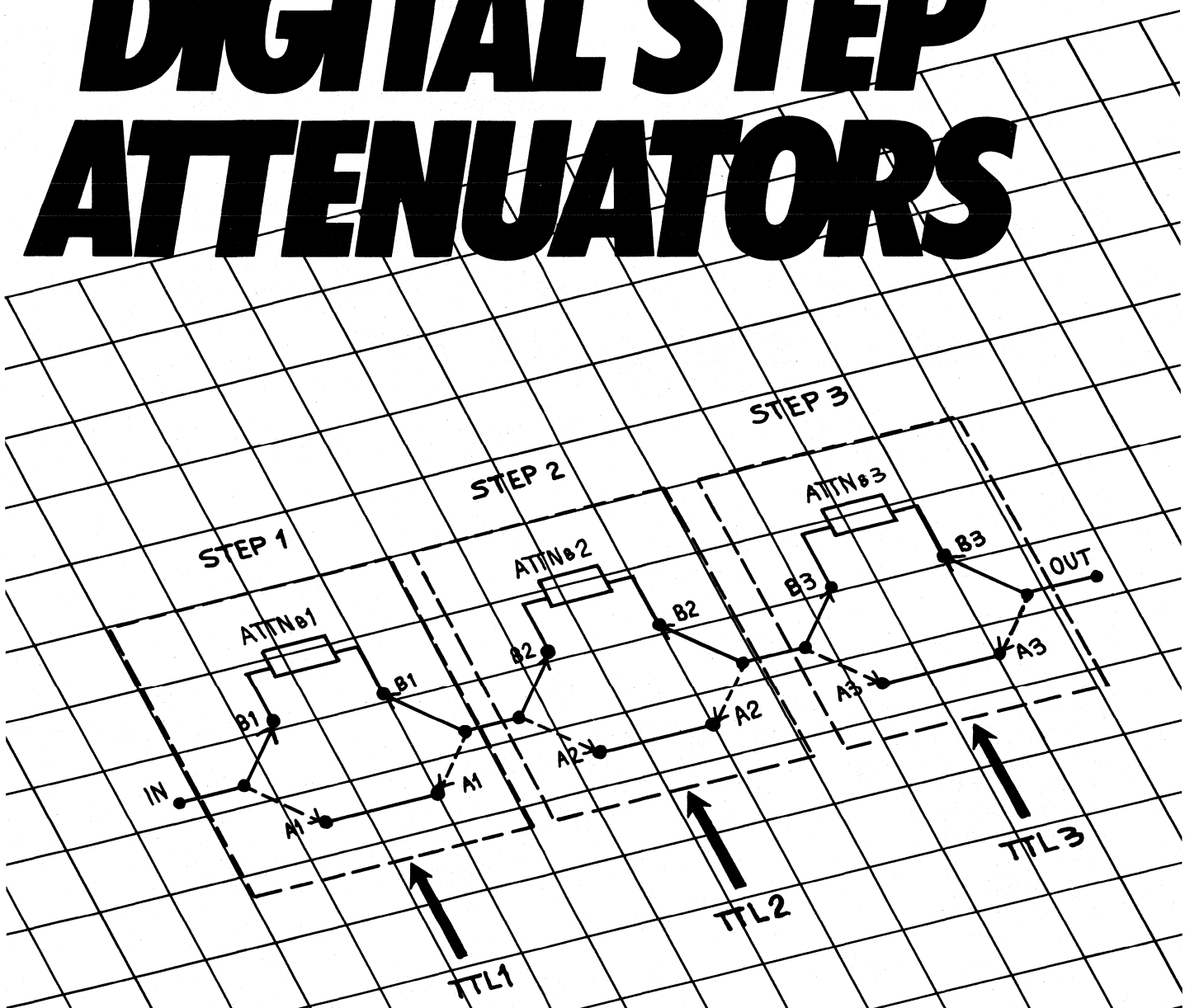
DIGITAL STEP ATTENUATORS



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Digital Step Attenuators

Precision TTL-controlled step attenuators, accurate over 10 to 1000 MHz and −55° to +100°C, are available from Mini-Circuits in hermetically-sealed TO-8 cases and SMA connectorized packages. In each package style, five models are offered, each with three internal discrete attenuators switchable to provide eight discrete and accurate levels up to 35 dB. Models can be cascaded to provide increased attenuation because of the excellent input/output return loss of each model; the final value of attenuation will equal the sum of the attenuations of the individual models. The accuracy of these step attenuators is comparable to precision fixed attenuators. Attenuation values are flat over the full frequency range and the full −55° to +100°C temperature range.

Three TTL lines are provided, one to correspond with each step of attenuation. To achieve 6-bit attenuation, merely cascade two models. Each step is switched on or off by a TTL signal, with the difference in insertion loss between the on and off state being the step attenuation. The 50 ohm TOAT- and ZFAT-series perform with 6 μsec switching speed and can handle power levels up to +10dBm above a few hundred MHz, and 0 dBm at 10 MHz.

modern definition of terms

digital attenuator/electronic step attenuator

an attenuator whose attenuation can be varied by digital control signals. As digital signals have finite states, a digitally controlled attenuator has a corresponding number of finite attenuation states.

thru loss

insertion loss of the step-attenuation in "000" state of the digital control signal.

primary attenuation step

Mini-Circuits' step attenuators have 3 digital control lines. When one of the signals is in the "high" state and the other two are in the "low" state, one step of the attenuator is activated, which is called a primary attenuation step.

step accuracy

is the deviation of the actual attenuation step from the specified value over the specified frequency range.

rise time

time required for the attenuator to change from 10% to 90% of its final value when one of the steps is switched on. The digital control signal should have a much lower rise time (approximately 1/10 of the attenuator) to make a good measurement.

delay time

is the time difference between 50% of the TTL signal to 90% of the final attenuation step value when the attenuator is turned "ON" or 10% of the step value when it is turned "OFF."

maximum attenuation

the sum total of the primary attenuation steps. It is the maximum achievable step attenuation.

most often asked questions about digital step attenuators

Q. *Suppose I don't work at less than the specified 1dB compression of a step attenuator, what are the consequences?*

A. Should you exceed the specified compression, typically given at 0dBm input, harmonics will be generated which may affect system operation. Also, when you measure the fundamental for attenuation, an error will appear because some of the fundamental's power has been transferred to the harmonic products.

Q. *What is meant by the "zero" value of a step attenuator?*

A. Step attenuators are referenced to the minimum

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most often asked questions cont.

ısertion loss of the switch. If the switch in its"zero" osition has an insertion loss of 3dB at 10MHz, it ıight be 3.5dB at 1GHz. All attenuation values are iven relative to this "zero" reference.

ı. *Why do Mini-Circuits' ads on TTL-controlled step attenuators emphasize the word "precision"?*

. Most step attenuators on the market have a rela-vely wide variation of attenuation over the specified equency band; for example, a 3dB step could be off y as much as 1dB so that attenuation is anywhere om 2 to 4dB. With Mini-Circuits' step attenuators, ıe difference would be 0.3dB or less. The same tuation occurs for temperature variation.

urther, when switching internal resistors to increase ttenuation from say 3dB to 6dB, the sum may be off y as much as 2dB if return loss within the unit is oor. With Mini-Circuits' precision step attenuators, esigned with 24dB return loss, the sum will be ithin 0.6dB of nominal.

ı. *What makes Mini-Circuits' step attenuators so precise?*

. Along with the 24dB return loss criterion, xtremely short lead lengths, resistors trimmed with gh accuracy, and switches with low parasitics yield recision performance.

ı. *What happens when step attenuators are cascaded?*

. Attenuation will be arithmetically additive pro-ded return loss of each unit is extremely good,)dB or better. Otherwise, the sum may be other ıan the total of the units. Mini-circuits' attenuators ın be cascaded without loss of accuracy.

. *How fast is attenuation switched from one value to another?*

. TTL switching from one value to another is speci-ed by delay time, and is 6 μs max. Delay is defined s the time to achieve 90% of the resulting RF ampli-de change.

Q. *If I exceed the maximum input level, will I burn out the step attenuator?*

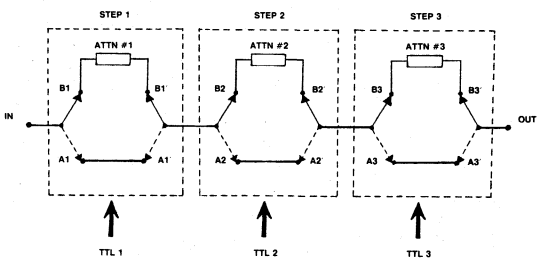
A. It's not recommended, but you can exceed the input power rating by 10dB without damage. The penalty would be the presence of distortion products and a decrease in attenuation accuracy.

Q. *What is the consequence of feeding pulses with excessive peak voltage into a step attenuator?*

A. Excessive voltage peaks will widen the pulse width.

Q. *Please sketch the configuration of a typical TTL-controlled step attenuator.*

A.



Each of the three steps is configured with two single-pole, double-throw switches and a fixed attenuator; see figure. Step 1 is shown with B1 and B1′ contacting Attn #1, Step 2 with B2 and B2′ contacting Atten #2, and Step 3 with B3 and B3′ contacting Atten #3. Thus, all steps are connected to their individual attenuators and are in cascade to provide maximum attenuation.

Q. *What are the TTL requirements for proper operation and how much latitude is allowable?*

A. For MCL attenuators, TTL"0" corresponds to 0 to 0.8V and TTL "1" corresponds to 2 to 5V.

Q. *Must the TTL input be 50-ohms? What if it is 75-ohms?*

A. TTL interfaces are defined in terms of voltages and currents, rather than impedance.

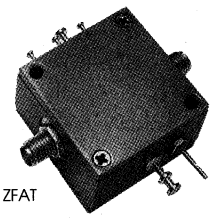
DIGITAL STEP ATTENUATORS

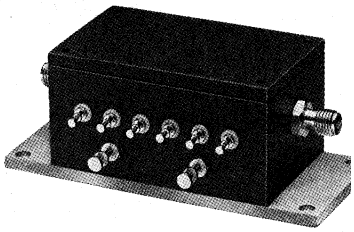
Mini-Circuits

50Ω Precision

TTL CONTROL, PIN DIODE 10 MHz to 1 GHz

TOAT


ZFAT


ZSAT

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	PRIMARY ATTENUATION STEPS (dB) @TTL CONTROL PORT #1	#2	#3	ATTENUATION (dB) LOGIC STATE* (1,1,1)** Nom.	(0,0,0) Max.	VSWR L	M	U	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
TOAT-R512	10	1000	0.5±0.18	1±0.25	2±0.25	3.5	4.0	1.6	1.4	1.5	5-6	QQ96	cq	59.95
TOAT-124	10	1000	1±0.25	2±0.25	4±0.3	7.0	4.0	1.6	1.4	1.5	5-7	QQ96	cq	59.95
TOAT-3610	10	1000	3±0.3	6±0.4	10±0.4	19.0	4.0	1.6	1.4	1.5	5-8	QQ96	cq	59.95
TOAT-4816	10	1000	4±0.4	8±0.4	16±0.5	28.0	4.0	1.6	1.4	1.5	5-9	QQ96	cq	59.95
TOAT-51020	10	1000	5±0.4	10±0.4	20±0.5	35.0	4.0	1.6	1.4	1.5	5-10	QQ96	cq	59.95
ZFAT-R512	10	1000	0.5±0.18	1±0.25	2±0.25	3.5	4.0	1.6	1.4	1.5	5-6	SSS173	-	89.95
ZFAT-124	10	1000	1±0.25	2±0.25	4±0.3	7.0	4.0	1.6	1.4	1.5	5-7	SSS173	-	89.95
ZFAT-3610	10	1000	3±0.3	6±0.4	10±0.4	19.0	4.0	1.6	1.4	1.5	5-8	SSS173	-	89.95
ZFAT-4816	10	1000	4±0.4	8±0.4	16±0.5	28.0	4.0	1.6	1.4	1.5	5-9	SSS173	-	89.95
ZFAT-51020	10	1000	5±0.4	10±0.4	20±0.5	35.0	4.0	1.6	1.4	1.5	5-10	SSS173	-	89.95
			SIX CONTROL PORTS											
ZSAT-31R5	10	1000	(1) 0.5±0.18 (4) 4±0.3	(2) 1±0.25 (5) 8±0.4	(3) 2±0.25 (6)16±0.5	31.5	7.0	1.7	1.5	1.6	5-5	AR214	-	119.00

L = 10 to 100 MHz M = 100 to 500 MHz U = 500 to 1000 MHz

features

- wide frequency band, 10-1000 MHz
- excellent step accuracy, 0.2 dB typ.
- excellent VSWR, 1.3 typ.
- low DC current, 6 mA typ.
- operates over -55° to 100 °C
- small case, 0.6" dia., TO-8

Additional Specifications

DC Voltage +5V
DC current 10mA max.
Switching Time (50% TTL to within specified accuracy of next-selected attenuation step, and to within 0.1 dB steady-state Thru-Loss) 10 µs typ., 15µs max.
TTL input High Threshold 2V min.
TTL input Low Threshold 0.8V max.
TTL Toggle Rate: 50 kHz typ.
1dB compression: 0 dBm (10-100MHz)
+10dBm (100-1000MHz)
For ZSAT-31R5:
1dB compression: +10 dBm (10-100 MHz)
+15 dBm (100-1000 MHz)

Logic function:

TTL High activates associated in-line attenuation
TTL Low bypasses this attenuation

NSN GUIDE

MCL NO.	NSN
TOAT-124	5985-01-416-9021
TOAT-51020	5985-01-416-9020

NOTES:

* For ZSAT-31R5: Total attenuation (1,1,1,1,1,1)
Thru-Loss (0,0,0,0,0,0)
** Total attenuation above thru-loss.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. Input power, 15 dBm
1b. DC voltage, 5.5 Volts
1c. TTL, 5.5 Volts
1d. Storage temperature -55°C to +125°C for TOAT models.
2. Step accuracy is specified for basic steps. For combination of steps accuracy is additive.
3. Thru-loss is minimum insertion loss with all attenuation elements bypassed (All TTL controls state are Low).
4. For optimum operation of TOAT models, ensure the device case is properly connected to the ground plane (of PC board).

pin connections

see case style outline drawing

PORT	cq
RF IN	4
RF OUT	11
TTL CONTROL #1	2
TTL CONTROL #2	3
TTL CONTROL #3	1
+5V DC	12
CASE GND	5,6,7,8,9,10

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)in diode

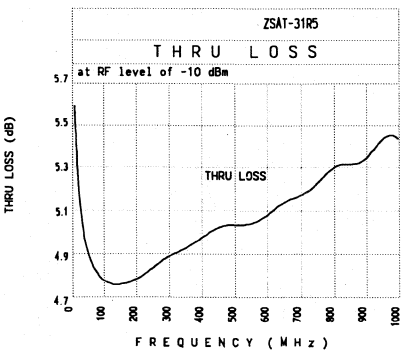
Step Attenuators

with TTL Control Inputs

50 ohms

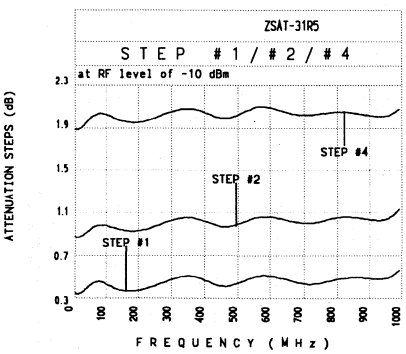
ZSAT-31R5

10 -1000 MHz



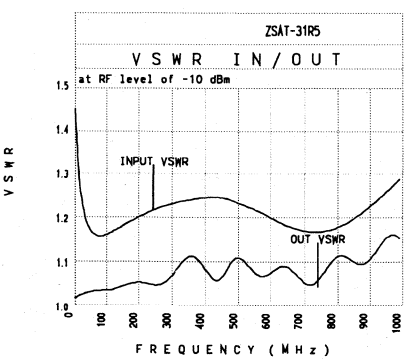
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000000 thru loss (dB)	000001 .5 (dB)	000010 1.0 (dB)	000100 2.0 (dB)	001000 4.0 (dB)	010000 8.0 (dB)	100000 16.0 (dB)	111111 31.5 (dB)
9.99	5.59	0.40	0.91	1.89	3.86	7.84	15.88	31.28
27.97	5.00	0.38	0.89	1.88	3.87	7.83	15.90	31.42
78.93	4.82	0.56	1.05	2.08	4.08	8.06	16.09	31.59
129.89	4.78	0.42	0.98	1.98	3.95	7.95	16.00	31.50
210.82	4.81	0.41	0.94	1.93	3.93	7.89	15.93	31.31
288.76	4.92	0.51	1.05	2.04	4.05	8.04	16.07	31.68
366.69	4.96	0.59	1.11	2.11	4.16	8.12	16.14	31.82
444.63	5.06	0.45	0.99	1.98	4.00	7.94	16.00	31.59
498.58	5.06	0.47	1.00	1.99	4.01	7.95	15.99	31.52
573.52	5.06	0.59	1.12	2.14	4.18	8.09	16.18	31.86
651.45	5.18	0.53	1.06	2.03	4.10	8.01	16.05	31.88
729.39	5.19	0.46	1.01	2.01	4.07	7.99	16.03	31.74
810.32	5.36	0.54	1.10	2.06	4.13	8.02	16.10	31.98
888.26	5.30	0.55	1.08	2.03	4.12	7.99	16.09	31.78
966.19	5.50	0.51	1.03	1.98	4.07	7.88	15.97	31.85
1017.15	5.42	0.65	1.22	2.12	4.21	8.03	16.17	31.82



INPUT VSWR

FREQ. (MHz)	000001 .5 (dB)	000010 1.0 (dB)	000100 2.0 (dB)	001000 4.0 (dB)	010000 8.0 (dB)	100000 16.0 (dB)	111111 31.5 (dB)
9.99	1.46	1.44	1.42	1.43	1.46	1.50	1.29
27.97	1.20	1.20	1.19	1.19	1.20	1.21	1.13
78.93	1.16	1.15	1.14	1.15	1.15	1.16	1.11
129.89	1.18	1.18	1.16	1.16	1.17	1.18	1.13
210.82	1.22	1.23	1.19	1.19	1.19	1.21	1.16
288.76	1.24	1.21	1.21	1.22	1.21	1.23	1.20
366.69	1.25	1.23	1.23	1.24	1.24	1.25	1.24
444.63	1.26	1.28	1.24	1.26	1.26	1.27	1.27
498.58	1.25	1.27	1.24	1.27	1.27	1.27	1.30
573.52	1.23	1.22	1.23	1.27	1.27	1.26	1.32
651.45	1.19	1.22	1.21	1.25	1.26	1.24	1.34
729.39	1.18	1.20	1.21	1.23	1.25	1.20	1.34
810.32	1.19	1.21	1.21	1.21	1.23	1.18	1.35
888.26	1.22	1.28	1.24	1.21	1.22	1.16	1.35
966.19	1.27	1.29	1.26	1.20	1.20	1.16	1.36
1017.15	1.31	1.34	1.29	1.20	1.20	1.17	1.36



OUTPUT VSWR

FREQ. (MHz)	000001 .5 (dB)	000010 1.0 (dB)	000100 2.0 (dB)	001000 4.0 (dB)	010000 8.0 (dB)	100000 16.0 (dB)	111111 31.5 (dB)
9.99	1.03	1.66	1.47	1.42	1.23	1.10	1.09
27.97	1.04	1.59	1.22	1.32	1.11	1.05	1.04
78.93	1.05	1.50	1.14	1.21	1.06	1.03	1.02
129.89	1.05	1.20	1.13	1.02	1.06	1.02	1.02
210.82	1.08	1.61	1.18	1.22	1.07	1.05	1.04
288.76	1.04	1.12	1.18	1.08	1.08	1.04	1.05
366.69	1.17	1.57	1.22	1.25	1.10	1.07	1.07
444.63	1.02	1.07	1.20	1.12	1.10	1.07	1.07
498.58	1.17	1.41	1.21	1.23	1.12	1.09	1.09
573.52	1.04	1.28	1.19	1.18	1.11	1.09	1.09
651.45	1.14	1.29	1.17	1.23	1.13	1.12	1.11
729.39	1.02	1.16	1.13	1.19	1.14	1.11	1.12
810.32	1.17	1.25	1.11	1.25	1.17	1.14	1.14
888.26	1.07	1.06	1.10	1.22	1.18	1.14	1.15
966.19	1.20	1.32	1.12	1.28	1.21	1.17	1.17
1017.15	1.15	1.16	1.15	1.31	1.24	1.17	1.17

* Step Attenuation above thru loss (TTL logic 000000)

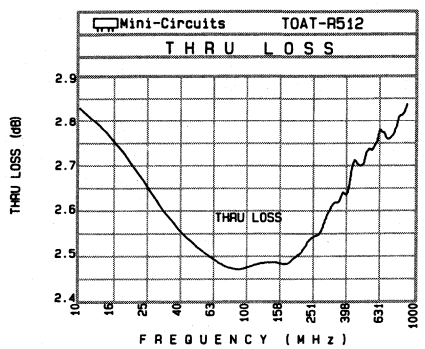
pin diode

Step Attenuators

with TTL Control Inputs

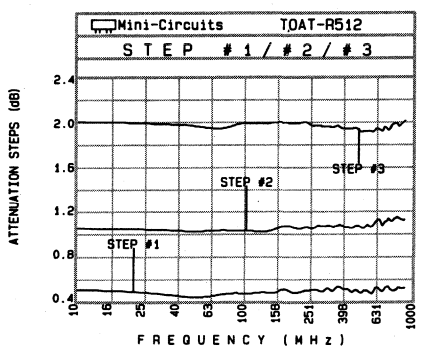
TOAT-R512, ZFAT-R512

10 - 1000 MHz



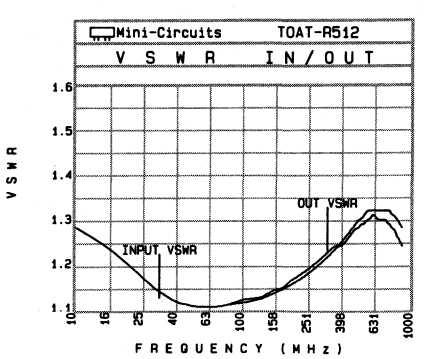
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000 thru loss (dB)	001 .5 (dB)	010 1.0 (dB)	011 1.5 (dB)	100 2.0 (dB)	101 2.5 (dB)	110 3.0 (dB)	111 3.5 (dB)
10.000	2.82	.48	1.01	1.49	2.01	2.49	3.01	3.51
49.600	2.51	.47	1.02	1.51	2.00	2.49	3.06	3.53
148.600	2.49	.48	1.03	1.49	2.01	2.51	3.05	3.50
208.000	2.52	.49	1.02	1.51	2.00	2.50	3.03	3.48
247.600	2.57	.49	1.02	1.51	1.98	2.48	3.02	3.50
346.600	2.60	.50	1.05	1.54	1.98	2.49	3.02	3.51
406.000	2.67	.52	1.08	1.57	1.98	2.47	3.04	3.53
445.600	2.70	.48	1.03	1.55	1.97	2.48	3.02	3.51
544.600	2.73	.50	1.08	1.57	1.96	2.49	3.04	3.54
604.000	2.74	.53	1.09	1.60	1.96	2.52	3.07	3.57
703.000	2.78	.53	1.12	1.66	1.98	2.54	3.08	3.61
762.400	2.77	.54	1.09	1.62	1.97	2.50	3.06	3.57
821.800	2.77	.52	1.14	1.68	2.01	2.55	3.10	3.66
881.200	2.82	.55	1.14	1.70	2.02	2.57	3.12	3.70
940.600	2.84	.57	1.14	1.70	1.99	2.59	3.14	3.73
1000.000	2.81	.56	1.18	1.71	2.07	2.62	3.18	3.76



INPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.26	1.26	1.24	1.27	1.25	1.25	1.23
49.600	1.11	1.11	1.10	1.10	1.10	1.10	1.09
148.600	1.14	1.14	1.14	1.13	1.13	1.13	1.13
208.000	1.17	1.17	1.17	1.15	1.16	1.16	1.16
247.600	1.19	1.20	1.20	1.17	1.18	1.18	1.19
346.600	1.24	1.25	1.25	1.22	1.23	1.23	1.24
406.000	1.27	1.28	1.28	1.24	1.25	1.27	1.27
445.600	1.29	1.30	1.30	1.26	1.27	1.29	1.29
544.600	1.31	1.33	1.33	1.29	1.30	1.32	1.33
604.000	1.32	1.34	1.34	1.30	1.31	1.34	1.34
703.000	1.31	1.34	1.33	1.30	1.31	1.35	1.35
762.400	1.30	1.33	1.33	1.30	1.31	1.34	1.35
821.800	1.28	1.32	1.31	1.29	1.30	1.34	1.34
881.200	1.26	1.30	1.30	1.28	1.28	1.33	1.32
940.600	1.24	1.28	1.27	1.26	1.26	1.31	1.31
1000.000	1.21	1.25	1.25	1.23	1.25	1.29	1.29



OUTPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.30	1.27	1.27	1.22	1.21	1.20	1.20
49.600	1.12	1.12	1.12	1.09	1.09	1.09	1.09
148.600	1.15	1.15	1.16	1.12	1.11	1.11	1.11
208.000	1.17	1.18	1.18	1.12	1.13	1.12	1.14
247.600	1.21	1.21	1.21	1.14	1.15	1.15	1.15
346.600	1.26	1.27	1.29	1.18	1.19	1.20	1.20
406.000	1.31	1.33	1.33	1.22	1.23	1.24	1.23
445.600	1.32	1.32	1.34	1.22	1.23	1.25	1.26
544.600	1.36	1.37	1.38	1.25	1.25	1.28	1.28
604.000	1.37	1.39	1.39	1.26	1.26	1.31	1.28
703.000	1.38	1.41	1.41	1.26	1.26	1.29	1.29
762.400	1.36	1.39	1.39	1.28	1.27	1.29	1.29
821.800	1.36	1.39	1.39	1.28	1.26	1.30	1.28
881.200	1.30	1.37	1.37	1.25	1.23	1.27	1.26
940.600	1.31	1.37	1.35	1.23	1.23	1.26	1.26
1000.000	1.28	1.33	1.32	1.22	1.22	1.24	1.26

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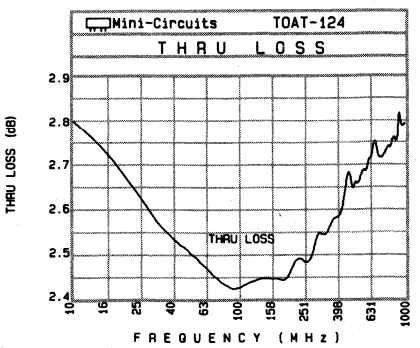
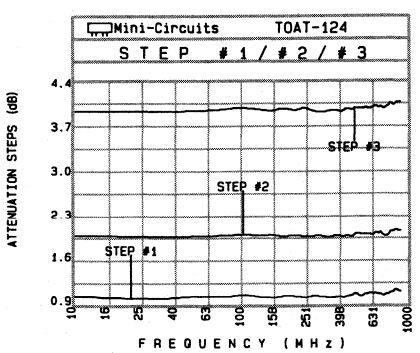
TOAT-124, ZFAT-124

10 - 1000 MHz



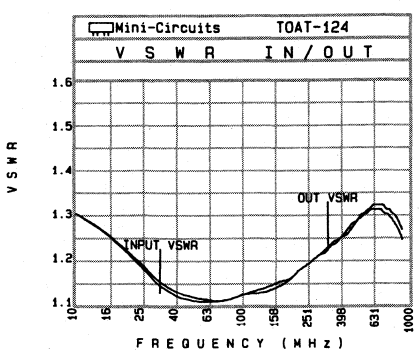
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000 thru loss (dB)	001 1 (dB)	010 2 (dB)	011 3 (dB)	100 4 (dB)	101 5 (dB)	110 6 (dB)	111 7 (dB)
10.000	2.80	1.01	1.99	3.01	4.02	5.03	6.03	7.03
49.600	2.52	1.02	2.02	3.05	4.05	5.06	6.05	7.09
148.600	2.46	.99	2.01	3.02	4.03	5.03	6.02	7.07
208.000	2.48	1.01	1.99	3.00	4.05	5.07	6.02	7.05
247.600	2.55	1.01	2.01	3.03	4.05	5.06	6.02	7.02
346.600	2.57	1.04	2.04	3.03	4.04	5.07	6.08	7.06
406.000	2.62	1.02	2.02	3.03	4.05	5.06	6.04	7.05
445.600	2.67	1.04	2.05	3.09	4.06	5.11	6.06	7.09
544.600	2.72	1.08	2.04	3.11	4.08	5.14	6.06	7.13
604.000	2.71	1.06	2.07	3.11	4.09	5.14	6.11	7.15
703.000	2.81	1.08	2.07	3.11	4.10	5.17	6.09	7.16
762.400	2.78	1.09	2.07	3.17	4.07	5.20	6.10	7.21
821.800	2.80	1.12	2.10	3.20	4.14	5.25	6.17	7.27
881.200	2.81	1.12	2.10	3.19	4.14	5.23	6.22	7.30
940.600	2.82	1.12	2.14	3.20	4.17	5.31	6.22	7.35
1000.000	2.81	1.14	2.14	3.28	4.19	5.37	6.28	7.42



INPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.25	1.26	1.22	1.27	1.23	1.24	1.20
49.600	1.10	1.10	1.09	1.10	1.09	1.09	1.08
148.600	1.14	1.12	1.12	1.13	1.12	1.11	1.11
208.000	1.17	1.15	1.15	1.16	1.16	1.14	1.14
247.600	1.19	1.17	1.17	1.17	1.18	1.16	1.16
346.600	1.24	1.21	1.22	1.22	1.23	1.20	1.22
406.000	1.27	1.24	1.25	1.24	1.26	1.22	1.24
445.600	1.29	1.25	1.27	1.26	1.27	1.24	1.26
544.600	1.32	1.28	1.30	1.29	1.31	1.27	1.30
604.000	1.33	1.29	1.31	1.31	1.33	1.29	1.32
703.000	1.32	1.28	1.32	1.31	1.33	1.29	1.34
762.400	1.31	1.28	1.32	1.31	1.34	1.29	1.34
821.800	1.30	1.26	1.31	1.30	1.33	1.29	1.35
881.200	1.28	1.25	1.31	1.29	1.33	1.29	1.35
940.600	1.26	1.23	1.30	1.27	1.32	1.27	1.34
1000.000	1.24	1.21	1.29	1.25	1.31	1.26	1.34



OUTPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.30	1.27	1.25	1.16	1.16	1.15	1.15
49.600	1.12	1.10	1.10	1.07	1.07	1.07	1.06
148.600	1.16	1.13	1.14	1.09	1.10	1.09	1.09
208.000	1.19	1.16	1.16	1.11	1.11	1.09	1.10
247.600	1.20	1.18	1.18	1.13	1.13	1.11	1.12
346.600	1.27	1.23	1.23	1.16	1.17	1.16	1.15
406.000	1.32	1.25	1.26	1.18	1.19	1.17	1.19
445.600	1.32	1.27	1.28	1.19	1.20	1.18	1.18
544.600	1.36	1.30	1.30	1.21	1.22	1.21	1.21
604.000	1.37	1.31	1.31	1.21	1.22	1.21	1.23
703.000	1.36	1.32	1.33	1.22	1.23	1.24	1.23
762.400	1.34	1.30	1.32	1.23	1.24	1.25	1.25
821.800	1.35	1.30	1.31	1.22	1.24	1.25	1.24
881.200	1.32	1.29	1.28	1.22	1.22	1.23	1.25
940.600	1.30	1.27	1.29	1.23	1.23	1.25	1.25
1000.000	1.27	1.26	1.27	1.23	1.23	1.27	1.24

* Step attenuation above thru loss (TTL logic 000)

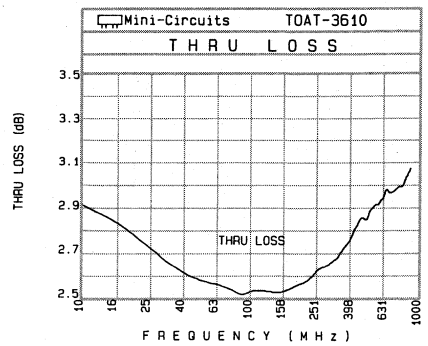
pin diode

Step Attenuators

with TTL Control Inputs

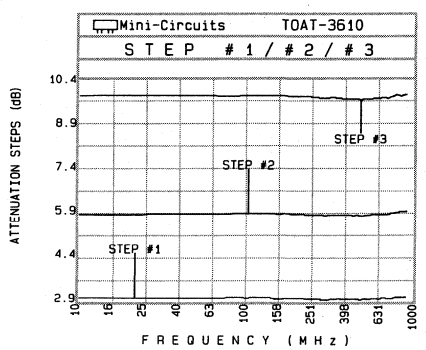
TOAT-3610, ZFAT-3610

10 - 1000 MHz



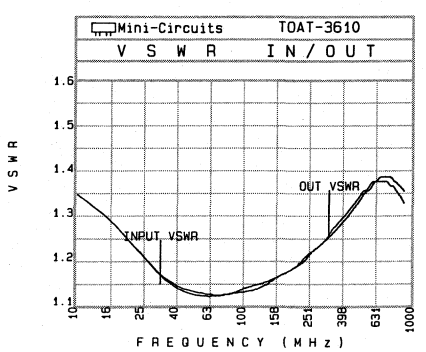
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000 thru loss (dB)	001 3 (dB)	010 6 (dB)	011 9 (dB)	100 10 (dB)	101 13 (dB)	110 16 (dB)	111 19 (dB)
10.000	2.60	3.03	6.03	9.12	9.91	13.02	16.00	19.02
49.600	2.33	3.08	6.10	9.15	9.95	13.03	15.97	19.03
148.600	2.30	3.06	6.09	9.12	9.97	12.98	16.03	19.03
208.000	2.35	3.02	6.06	9.06	9.94	12.97	16.03	19.01
247.600	2.39	2.97	6.04	9.04	9.94	12.99	15.93	19.04
346.600	2.46	3.00	6.07	9.05	9.95	12.95	16.02	19.00
406.000	2.52	3.01	6.07	9.04	9.93	12.94	15.99	18.96
445.600	2.55	3.02	6.06	9.00	9.95	12.95	15.98	18.82
544.600	2.62	3.06	6.04	9.01	9.95	12.98	16.02	18.98
604.000	2.65	3.04	6.04	8.94	9.93	13.00	15.96	18.94
703.000	2.74	2.97	6.00	8.94	9.99	12.94	15.91	18.89
762.400	2.70	3.03	6.01	8.97	10.01	12.96	16.00	18.91
821.800	2.74	3.08	6.06	9.05	10.07	13.08	16.07	18.97
881.200	2.80	3.05	6.07	9.01	10.02	13.11	15.98	19.00
940.600	2.84	3.07	6.03	9.04	10.09	13.15	16.13	19.01
1000.000	2.83	3.15	6.14	9.07	10.18	13.25	16.08	19.24



INPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.19	1.22	1.14	1.28	1.17	1.21	1.14
49.600	1.07	1.08	1.05	1.11	1.07	1.08	1.05
148.600	1.09	1.09	1.06	1.13	1.08	1.08	1.05
208.000	1.11	1.11	1.07	1.15	1.09	1.10	1.07
247.600	1.12	1.12	1.08	1.17	1.10	1.11	1.08
346.600	1.16	1.15	1.11	1.20	1.13	1.13	1.10
406.000	1.17	1.16	1.12	1.23	1.15	1.15	1.12
445.600	1.18	1.18	1.13	1.24	1.16	1.16	1.13
544.600	1.20	1.20	1.15	1.27	1.18	1.19	1.15
604.000	1.20	1.21	1.16	1.29	1.19	1.20	1.17
703.000	1.19	1.21	1.18	1.30	1.20	1.22	1.19
762.400	1.19	1.21	1.19	1.30	1.20	1.22	1.20
821.800	1.17	1.22	1.20	1.31	1.20	1.23	1.21
881.200	1.16	1.21	1.20	1.30	1.20	1.24	1.22
940.600	1.14	1.21	1.21	1.29	1.19	1.24	1.23
1000.000	1.13	1.21	1.22	1.28	1.19	1.25	1.24



OUTPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.31	1.24	1.22	1.12	1.11	1.11	1.10
49.600	1.11	1.09	1.08	1.05	1.05	1.04	1.05
148.600	1.15	1.11	1.10	1.07	1.07	1.06	1.06
208.000	1.17	1.11	1.11	1.07	1.07	1.07	1.06
247.600	1.19	1.13	1.13	1.09	1.09	1.09	1.08
346.600	1.24	1.17	1.17	1.13	1.12	1.12	1.12
406.000	1.27	1.21	1.21	1.15	1.15	1.14	1.14
445.600	1.29	1.21	1.19	1.14	1.15	1.15	1.14
544.600	1.32	1.25	1.24	1.19	1.19	1.18	1.19
604.000	1.34	1.26	1.26	1.20	1.19	1.20	1.20
703.000	1.36	1.28	1.28	1.22	1.24	1.23	1.23
762.400	1.37	1.29	1.31	1.24	1.25	1.26	1.27
821.800	1.36	1.31	1.33	1.25	1.26	1.26	1.28
881.200	1.35	1.30	1.31	1.26	1.26	1.26	1.27
940.600	1.34	1.32	1.35	1.29	1.30	1.30	1.30
1000.000	1.32	1.33	1.35	1.29	1.30	1.30	1.33

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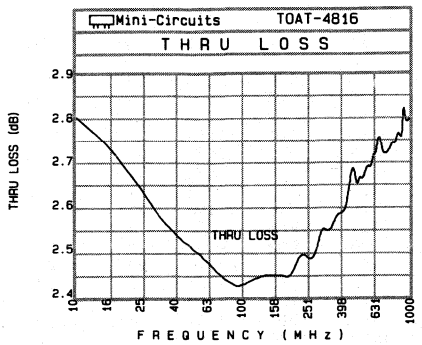
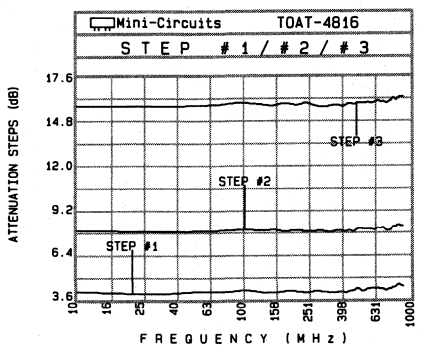
TOAT-4816, ZFAT-4816

10 - 1000 MHz



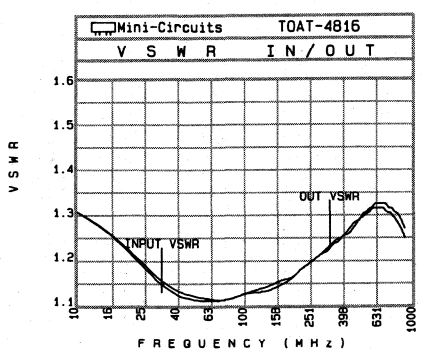
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000 thru loss (dB)	001 4 (dB)	010 8 (dB)	011 12 (dB)	100 16 (dB)	101 20 (dB)	110 24 (dB)	111 28 (dB)
10.000	2.58	4.08	7.97	12.05	16.09	20.15	23.88	28.02
49.600	2.19	4.07	8.01	12.07	16.20	20.22	24.12	28.16
148.600	2.20	4.05	8.05	12.12	16.14	20.12	24.07	28.26
208.000	2.23	4.08	8.02	12.13	16.19	20.34	24.10	28.37
247.600	2.28	4.06	8.05	12.08	16.14	20.20	24.19	28.31
346.600	2.36	4.05	7.99	12.06	16.17	20.14	23.99	28.29
406.000	2.41	4.02	8.00	12.08	16.14	20.21	23.98	27.93
445.600	2.45	4.07	8.00	11.99	16.09	20.16	24.21	28.32
544.600	2.48	4.02	7.99	11.97	16.16	20.26	24.46	28.32
604.000	2.55	4.03	8.03	12.01	16.13	20.17	24.10	28.34
703.000	2.55	4.01	8.02	12.00	16.17	20.15	24.22	27.91
762.400	2.58	4.02	8.08	12.12	16.20	20.30	24.12	28.39
821.800	2.56	4.06	8.14	12.09	16.24	20.26	24.15	27.99
881.200	2.61	4.07	8.15	12.11	16.28	20.25	24.17	28.06
940.600	2.64	4.09	8.13	12.16	16.24	20.36	24.33	28.22
1000.000	2.65	4.06	8.12	12.13	16.16	20.34	24.16	28.02



INPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.24	1.27	1.17	1.38	1.21	1.25	1.17
49.600	1.07	1.08	1.05	1.12	1.06	1.08	1.05
148.600	1.08	1.09	1.05	1.13	1.06	1.08	1.05
208.000	1.09	1.10	1.06	1.15	1.08	1.10	1.06
247.600	1.10	1.11	1.07	1.16	1.08	1.11	1.07
346.600	1.13	1.15	1.09	1.21	1.11	1.14	1.09
406.000	1.14	1.17	1.11	1.24	1.13	1.16	1.10
445.600	1.15	1.18	1.11	1.26	1.14	1.17	1.11
544.600	1.16	1.21	1.13	1.30	1.16	1.20	1.14
604.000	1.16	1.22	1.15	1.32	1.16	1.22	1.15
703.000	1.16	1.24	1.16	1.34	1.18	1.24	1.17
762.400	1.16	1.25	1.17	1.36	1.19	1.26	1.18
821.800	1.15	1.25	1.18	1.36	1.19	1.26	1.19
881.200	1.14	1.26	1.19	1.37	1.19	1.28	1.20
940.600	1.13	1.26	1.20	1.37	1.19	1.28	1.21
1000.000	1.12	1.26	1.21	1.37	1.19	1.30	1.23



OUTPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.42	1.29	1.29	1.11	1.11	1.10	1.11
49.600	1.14	1.09	1.10	1.05	1.05	1.05	1.06
148.600	1.11	1.07	1.06	1.05	1.04	1.04	1.04
208.000	1.12	1.06	1.05	1.02	1.02	1.02	1.01
247.600	1.15	1.08	1.07	1.05	1.04	1.04	1.04
346.600	1.22	1.12	1.12	1.09	1.07	1.07	1.08
406.000	1.29	1.19	1.18	1.12	1.13	1.11	1.12
445.600	1.29	1.19	1.18	1.13	1.13	1.13	1.12
544.600	1.35	1.26	1.26	1.19	1.20	1.19	1.20
604.000	1.31	1.24	1.23	1.19	1.19	1.18	1.20
703.000	1.31	1.25	1.26	1.21	1.23	1.23	1.21
762.400	1.28	1.25	1.26	1.23	1.23	1.23	1.24
821.800	1.26	1.22	1.23	1.20	1.19	1.20	1.19
881.200	1.26	1.22	1.23	1.20	1.21	1.21	1.21
940.600	1.29	1.23	1.25	1.19	1.19	1.21	1.22
1000.000	1.28	1.28	1.30	1.26	1.25	1.27	1.26

* Step attenuation above thru loss (TTL logic 000)

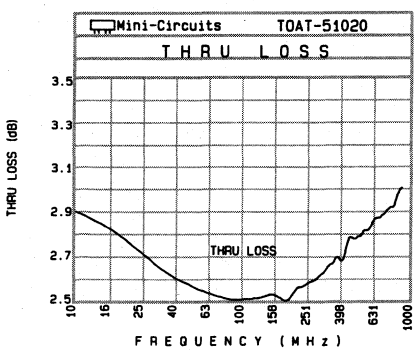
pin diode

Step Attenuators

with TTL Control Inputs

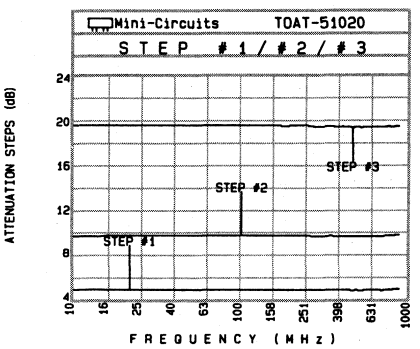
TOAT-51020, ZFAT-51020

10 - 1000 MHz



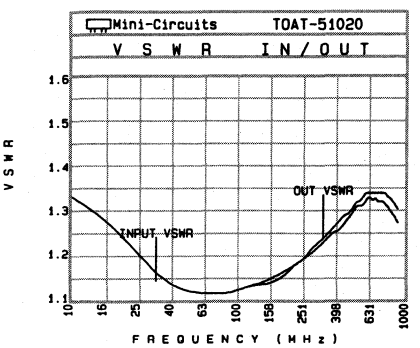
STEP ATTENUATION* AT TTL CONTROL STATE

FREQ. (MHz)	000 thru loss (dB)	001 5 (dB)	010 10 (dB)	011 15 (dB)	100 20 (dB)	101 25 (dB)	110 30 (dB)	111 35 (dB)
10.000	2.68	4.96	9.93	14.90	20.10	24.96	29.77	34.53
49.600	2.53	4.98	9.95	14.90	20.05	24.95	29.92	34.69
148.600	2.43	4.98	9.94	14.93	20.04	25.05	29.90	34.88
208.000	2.47	4.96	9.93	14.89	20.00	24.91	29.92	34.86
247.600	2.50	4.94	9.94	14.88	19.95	24.83	29.91	34.76
346.600	2.60	4.96	9.96	14.87	19.96	24.96	29.92	34.42
406.000	2.67	4.96	9.94	14.82	19.97	24.91	29.80	34.60
445.600	2.70	4.94	9.92	14.80	19.96	24.96	29.84	34.47
544.600	2.79	4.95	9.91	14.81	19.88	24.85	29.76	34.43
604.000	2.84	4.97	9.94	14.84	19.88	24.90	29.83	34.54
703.000	2.90	4.94	9.94	14.82	19.88	24.90	29.72	34.86
762.400	2.92	4.96	9.96	14.81	19.83	24.85	29.80	35.22
821.800	2.96	5.01	9.98	14.88	19.87	24.92	29.99	35.21
881.200	2.99	5.03	10.01	14.96	19.94	24.92	30.10	35.13
940.600	3.03	5.04	10.07	14.98	19.93	24.98	30.03	35.08
1000.000	3.06	5.09	10.16	15.08	20.00	25.28	29.95	35.55



INPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.11	1.15	1.09	1.20	1.10	1.14	1.09
49.600	1.08	1.10	1.06	1.13	1.07	1.10	1.06
148.600	1.08	1.10	1.06	1.12	1.07	1.10	1.06
208.000	1.10	1.12	1.08	1.15	1.09	1.12	1.08
247.600	1.12	1.14	1.09	1.17	1.10	1.13	1.09
346.600	1.15	1.18	1.12	1.21	1.13	1.18	1.12
406.000	1.17	1.21	1.14	1.24	1.16	1.20	1.14
445.600	1.18	1.22	1.16	1.26	1.17	1.22	1.16
544.600	1.21	1.26	1.19	1.30	1.20	1.25	1.19
604.000	1.22	1.28	1.21	1.32	1.22	1.27	1.21
703.000	1.22	1.30	1.23	1.35	1.24	1.30	1.23
762.400	1.22	1.31	1.25	1.36	1.25	1.31	1.25
821.800	1.22	1.32	1.26	1.36	1.26	1.32	1.27
881.200	1.22	1.32	1.27	1.37	1.27	1.33	1.28
940.600	1.22	1.32	1.28	1.36	1.27	1.33	1.29
1000.000	1.21	1.32	1.29	1.36	1.28	1.33	1.30



OUTPUT VSWR

FREQ. (MHz)	001	010	011	100	101	110	111
10.000	1.21	1.15	1.15	1.07	1.08	1.08	1.08
49.600	1.14	1.11	1.10	1.05	1.05	1.05	1.05
148.600	1.15	1.10	1.10	1.05	1.05	1.05	1.05
208.000	1.17	1.13	1.12	1.06	1.06	1.06	1.06
247.600	1.19	1.14	1.14	1.07	1.07	1.06	1.07
346.600	1.26	1.19	1.19	1.10	1.10	1.10	1.09
406.000	1.30	1.22	1.22	1.12	1.11	1.12	1.11
445.600	1.32	1.24	1.24	1.13	1.13	1.13	1.12
544.600	1.37	1.28	1.28	1.15	1.15	1.15	1.15
604.000	1.39	1.30	1.30	1.16	1.16	1.16	1.17
703.000	1.42	1.35	1.34	1.20	1.20	1.20	1.20
762.400	1.43	1.37	1.37	1.22	1.22	1.22	1.22
821.800	1.43	1.37	1.38	1.23	1.23	1.23	1.23
881.200	1.42	1.38	1.39	1.24	1.25	1.25	1.25
940.600	1.41	1.39	1.41	1.26	1.27	1.27	1.27
1000.000	1.40	1.40	1.42	1.27	1.27	1.28	1.28

* Step attenuation above thru loss (TTL logic 000)

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Mini-Circuits

SECTION 6

FIXED ATTENUATORS TERMINATIONS AND IMPEDANCE PADS

contents of this section

product specifications and data

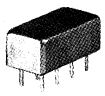
fixed attenuators, plug-in, surface mount 6-2, 6-3
fixed attenuators, coaxial 6-4, 6-5
surface mount attenuators 6-6
matching pads 6-7
terminations 6-7

computer data and curves

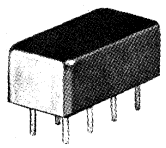
CAPD information . . . . . 6-8 thru 6-18

FIXED ATTENUATORS 50 & 75 Ω Plug-In

1/2W, 1W 1 to 40 dB, DC to 2000 MHz



MAT



AT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7		6-13	A11	cr	4.45
MAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	0.5	6-9	A11	cr	4.45
MAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-9	A11	cr	4.45
MAT-25	DC-1500	25±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-16	A11	cr	4.45
MAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	0.5	6-9	A11	cr	4.45
MAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	0.5	6-9	A11	cr	4.45
AT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	A04	cr	3.65
AT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6-12	A04	cr	3.65
AT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	A04	cr	3.65
■ AT-3-75	DC-500	3±0.2	0.9	—	—	2.0	—	—	1	6-12	A04	cr	3.65
AT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
■ AT-6-75	DC-500	6±0.3	1.0	—	—	2.0	—	—	1	6-13	A04	cr	3.65
AT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
■ AT-10-75	DC-500	10±0.4	1.0	—	—	2.0	—	—	1	6-8	A04	cr	3.65
AT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-9	A04	cr	3.65
■ AT-15-75	DC-500	15±0.4	0.8	—	—	1.5	—	—	1	6-9	A04	cr	3.65
AT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	A04	cr	3.65
■ AT-20-75	DC-500	20±0.5	1.1	—	—	2.0	—	—	1	6-9	A04	cr	3.65
AT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	1.8**	1	6-16	A04	cr	3.65
AT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	A04	cr	3.65
AT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	A04	cr	3.65

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

NOTES:

❑ Non-hermetic

■ Denotes 75 ohm models.

* Attenuation Flatness over DC-2000 MHz: 0.75 dB typ.

** VSWR over DC-2000 MHz: 1.45 (typ.)

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

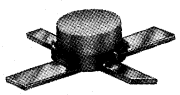
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.
For PAT models:
1. RF power at 25° C case temp.: 1 Watt.
2. Attenuation and VSWR at 25° C case temp.

NSN GUIDE

MCL NO.	NSN		
AT-6	5985-01-275-0339	MAT-3	5985-01-274-6609
MAT-1	5985-01-265-8138	MAT-4	5985-01-326-6977
MAT-10	5985-01-294-4719	MAT-5	5985-01-336-3720
MAT-15	5985-01-294-4720	MAT-6	5985-01-295-0261
MAT-2	5985-01-336-3058	MAT-7	5985-01-326-6978
MAT-20	5985-01-294-4721	MAT-9	5985-01-332-4595

1W MINIATURE CERAMIC 1 to 30 dB, DC to 7000 MHz

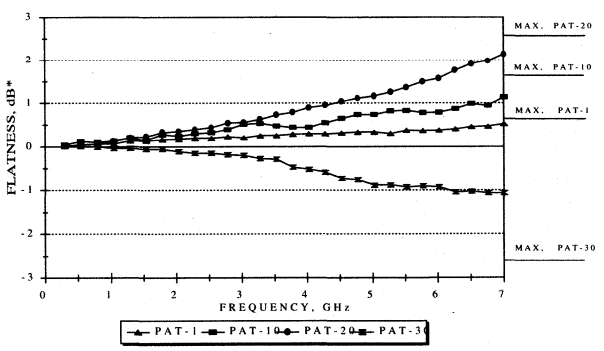


PAT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (10-49)
PAT-1	DC-7000	1±0.2	0.3	0.4	0.7	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-2	DC-7000	2±0.2	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-3	DC-7000	3±0.3	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-4	DC-7000	4±0.3	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-5	DC-7000	5±0.3	0.3	0.5	1.0	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-6	DC-7000	6±0.3	0.3	0.5	1.1	1.2	1.3	1.4	1	6-15	AF320	hl	2.95
PAT-7	DC-7000	7±0.3	0.4	0.6	1.3	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-8	DC-7000	8±0.4	0.4	0.6	1.5	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-9	DC-7000	9±0.4	0.4	0.6	1.7	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-10	DC-7000	10±0.4	0.4	0.6	1.7	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-12	DC-7000	12±0.6	0.5	0.6	1.8	1.3	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-15	DC-7000	15±0.6	0.5	0.7	2.4	1.3	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-20	DC-7000	20±1.3	0.5	0.7	2.6	1.4	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-30	DC-7000	30±1.7	0.4	0.7	2.6	1.4	1.4	1.5	1	6-16	AF320	hl	2.95

L = DC-1000 MHz M = DC-2500 MHz U = DC-f_U

TYPICAL FLATNESS vs. FREQUENCY



features

- low-cost ceramic package.
- wideband DC - 7 GHz frequency coverage.
- excellent VSWR throughout entire band.
- miniature size.

pin connections

see case style outline drawings

PORT	cr	hl
INPUT	1	1
OUTPUT	8	3
GND	2,3,4,5,6,7	2,4

* 0 dB on Flatness graph corresponds to actural low-frequency attenuation value.

marking code:

2 digits for nominal attenuation value.
examples: 03 for PAT-3, 20 for PAT-20

designers kits available

KIT NO.	MODEL TYPE	No. of Units in Kit	DESCRIPTION	PRICE $ per kit
K1-PAT	PAT	20	4 of each 3, 6, 10, 15, 20	49.95

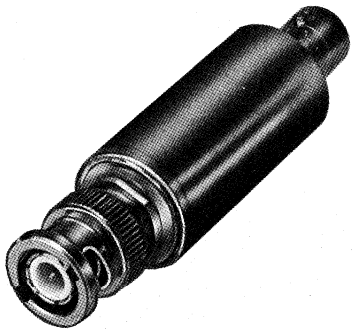
In Stock... Immediate Delivery

Available Tape & Reel

For Custom Versions Of Standard Models Consult Our Applications Dept.

1/2W, 1W, 2W 0.5 to 40 dB, DC to 2000 MHz

TAT (Consult factory)



CAT

	MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	CAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	FF55	-	16.95
	CAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6-12	FF55	-	16.95
	CAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF55	-	16.95
■	CAT-3-75	DC-500	3±0.2	0.9	—	—	2.0	—	—	1	6-12	FF55	-	16.95
	CAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF55	-	16.95
	CAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
	CAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
■	CAT-6-75	DC-500	6±0.3	1.0	—	—	2.0	—	—	1	6-13	FF55	-	16.95
	CAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
	CAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
	CAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
	CAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF55	-	16.95
■	CAT-10-75	DC-500	10±0.4	1.0	—	—	2.0	—	—	1	6-8	FF55	-	16.95
	CAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF55	-	16.95
	CAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-8	FF55	-	16.95
■	CAT-15-75	DC-500	15±0.4	0.8	—	—	1.5	—	—	1	6-9	FF55	-	16.95
	CAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	FF55	-	16.95
■	CAT-20-75	DC-500	20±0.5	1.1	—	—	2.0	—	—	1	6-9	FF55	-	16.95
NEW	CAT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	2.0**	1	6-16	FF55	-	16.95
	CAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	FF55	-	16.95
	CAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	FF55	-	16.95

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

NOTES:

■ Denotes 75 ohm models. For coax connector models 75 ohm BNC connectors are standard.

* Attenuation Flatness over DC-2000 MHz:
CAT-25, NAT-25, 0.75 dB typ.; NAT-1-2W, 0.20 dB typ.;
NAT-2-2W, 0.40 dB typ.; NAT-3-2W, 0.50 dB typ.

** VSWR over DC-2000 MHz:
CAT-25, NAT-25, 1.45 (typ.)
NAT-2W models, 1.25 (typ.)

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.

NSN GUIDE

MCL NO.	NSN		
CAT-10	5985-01-380-3801	NAT-10	5985-01-291-5548
CAT-15	5985-01-299-9257	NAT-30	5985-01-298-0746
CAT-20	5985-01-265-0338	SAT-3	5985-01-418-0247
CAT-30	5985-01-296-0943	SAT-6	5985-01-237-5343
CAT-5	5985-01-299-9258	SAT-10	5985-01-250-4812
CAT-6	5985-01-300-0481	SAT-15	5985-01-418-0250
NAT-3	5985-01-298-0747	SAT-30	5985-01-190-6838

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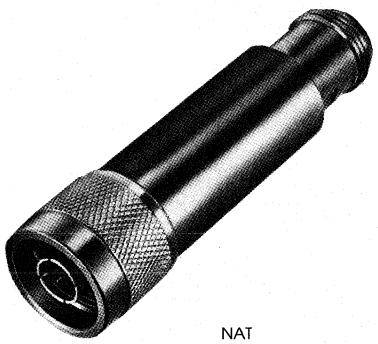

NAT

SAT

	MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	NAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	FF57	-	23.95
NEW	NAT-1-2W	DC-2000	1±0.2	0.2	0.3	0.5*	1.3	1.4	1.5**	2	6-17	FF57	–	26.95
	NAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6--12	FF57	-	23.95
NEW	NAT-2-2W	DC-2000	2±0.2	0.2	0.4	0.7*	1.3	1.4	1.5**	2	6-17	FF57	–	26.95
	NAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF57	-	23.95
NEW	NAT-3-2W	DC-2000	3±0.2	0.3	0.4	0.7*	1.3	1.4	1.5**	2	6-17	FF57	–	26.95
	NAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF57	-	23.95
	NAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
	NAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
	NAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
	NAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
	NAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
	NAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF57	-	23.95
	NAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF57	-	23.95
	NAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-8	FF57	-	23.95
	NAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	FF57	-	23.95
NEW	NAT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	1.8**	1	6-16	FF57	-	23.95
	NAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	FF57	-	23.95
	NAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	FF57	-	23.95
NEW	SAT-0.5	DC-1500	0.5±0.1	0.2	0.3	0.3	1.2	1.2	1.3	1	6-17	FF56	–	20.95
	SAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
	SAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
NEW	SAT-2.5	DC-1500	2.5±0.2	0.2	0.4	0.7	1.2	1.2	1.3	0.25	6-17	FF56	–	20.95
	SAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
	SAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
	SAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
	SAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
	SAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
	SAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
	SAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
	SAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
	SAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
	SAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
	SAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-9	FF56	-	20.95
	SAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	0.5	6-9	FF56	-	20.95
	SAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	0.5	6-9	FF56	-	20.95

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

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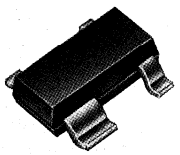
For Custom Versions Of Standard Models Consult Our Applications Dept.

1/2W MINIATURE 1 to 20 dB, DC to 2500 MHz



LAT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. :1 L	M	U	MAX. INPUT POWER, W 25°C	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (10-49)
LAT-1	DC-2500	1±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	—	MMM168	jk	1.95
LAT-2	DC-2500	2±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	—	MMM168	jk	1.95
LAT-3	DC-2500	3±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	—	MMM168	jk	1.95
LAT-4	DC-2500	4±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	—	MMM168	jk	1.95
LAT-5	DC-2500	5±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	—	MMM168	jk	1.95
LAT-6	DC-2500	6±0.3	0.3	0.4	0.7	1.3	1.4	1.5	0.50	—	MMM168	jk	1.95
LAT-7	DC-2500	7±0.3	0.3	0.4	0.7	1.3	1.4	1.5	0.50	—	MMM168	jk	1.95
LAT-8	DC-2500	8±0.4	0.3	0.5	0.8	1.3	1.4	1.5	0.50	—	MMM168	jk	1.95
LAT-9	DC-2500	9±0.4	0.3	0.5	0.8	1.3	1.4	1.5	0.50	—	MMM168	jk	1.95
LAT-10	DC-2500	10±0.5	0.3	0.5	0.8	1.3	1.4	1.5	0.50	—	MMM168	jk	1.95
LAT-12	DC-2500	12±0.8	0.3	0.5	0.8	1.3	1.4	1.6	0.50	—	MMM168	jk	1.95
LAT-15	DC-2500	15±0.8	0.3	0.5	0.8	1.3	1.4	1.6	0.50	—	MMM168	jk	1.95
LAT-20	DC-2500	20±1.5	0.3	0.5	0.8	1.3	1.4	1.6	0.50	—	MMM168	jk	1.95

L = DC-500 MHz M = DC-1000 MHz U = DC-2500

features

- wideband DC - 2500 MHz frequency coverage.
- excellent VSWR throughout entire band.
- miniature size SOT-143 package
- low cost

pin connections

see case style outline drawings

PORT	jk
INPUT	4
OUTPUT	2
GND	1,3

marking code:

2 digits for nominal attenuation value.
examples: 03 for LAT-3, 20 for LAT-20

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. RF power at 25°C case temp.: 1/2 Watt.
2. Attenuation and VSWR at 25°C case temp.

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MINIMUM LOSS *DC to 2000 MHz, 50 to 75Ω*

BMP

MODEL NO.	FREQUENCY RANGE, MHz		ATTENUATION dB				VSWR max.			CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTOR	PRICE $
				Flatness max.									Qty. (1-9)
	f_L	f_U	Nom.	L	M	U	L	M	U	Page	Note B		
BMP-5075	DC	2000	5.7±0.1	0.2	0.3	0.4	1.06:1	1.22:1	1.4:1	6-11	FF55	75ΩM-BNC 50ΩF-BNC	24.95
BMP-5075R	DC	2000	5.7±0.1	0.2	0.3	0.4	1.06:1	1.22:1	1.4:1	6-11	FF55	75ΩF-BNC 50ΩM-BNC	24.95

L=DC to 100MHz M=100MHz to 1000MHz U=1000MHz to 2000MHz

features

- minimum loss pad for resistive matching of 75 ohm impedance to 50 ohms and vice versa
- excellent VSWR 1.15:1 Typical

TERMINATIONS *50&75Ω Coaxial*

DC to 6000 MHz

NTRM

TTRM (Consult Factory)

BTRM

STRM

	MODEL NO.	IMPEDANCE OHMS	FREQUENCY RANGE MHz	RETURN LOSS, dB, MIN. DC-500 MHz	DC-1000 MHz	DC-2000 MHz	DC-4000 MHz	DC-6000 MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTOR	PRICE $ Qty. (1-9)
	BTRM-50	50	DC-2000	35	30	21	—	—	6-10	LL85	M-BNC	8.25
■	BTRM-75	75	DC-1000	30	20	—	—	—	6-10	LL85	M-BNC, 75Ω	9.95
	STRM-50	50	DC-2000	35	30	21	—	—	6-10	LL86	M-SMA	9.45
	NTRM-50	50	DC-2000	35	30	21	—	—	6-10	LL87	M-TYPE N	9.45
NEW	NTRM-50G	50	DC-6000	36	32	28	20	18	--	LL87	M-TYPE N	11.95

NOTES:

■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. RF input power, 0.25 Watt for matching pads and terminations (0.35 Watt for NTRM-50G).

NSN GUIDE

MCL NO.	NSN
BTRM-50	6625-01-325-7972
BTRM-75	5985-01-328-7420

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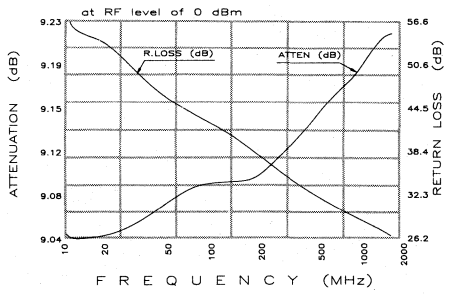
rugged, one-piece design

Fixed Attenuators

Attenuation and Return Loss

AT-9, MAT-9, SAT-9, CAT-9, NAT-9, TAT-9

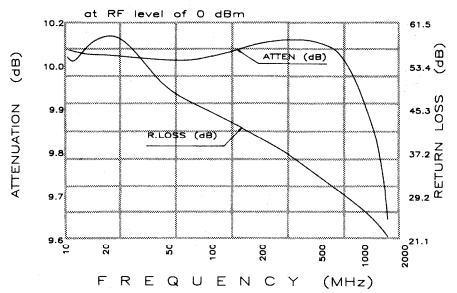
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	9.04	0.01	55.62	1.25
20.000	9.05	0.01	53.80	2.29
50.000	9.06	0.01	44.68	0.74
100.000	9.09	0.00	42.77	0.62
165.000	9.11	0.01	39.79	0.58
200.000	9.11	0.01	38.42	0.66
240.000	9.11	0.02	36.92	0.68
275.000	9.12	0.01	35.94	0.73
735.000	9.20	0.02	29.36	0.72
1500.000	9.24	0.01	27.08	1.22

AT-10, MAT-10, SAT-10, CAT-10, NAT-10, TAT-10

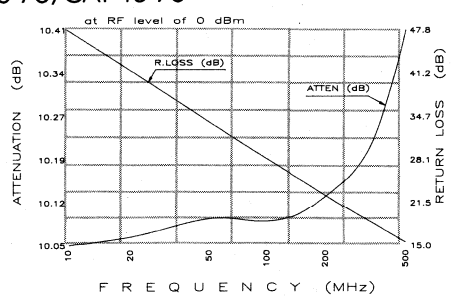
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	10.05	0.03	52.69	5.94
20.000	10.04	0.03	57.77	7.34
50.000	10.07	0.03	47.69	0.93
100.000	10.09	0.03	45.37	1.35
165.000	10.10	0.03	42.34	1.12
200.000	10.10	0.02	40.70	0.99
240.000	10.10	0.03	39.21	1.21
275.000	10.11	0.03	38.08	1.12
735.000	10.04	0.03	29.08	0.36
1500.000	9.63	0.02	20.75	0.88

AT-10-75, CAT-10-75

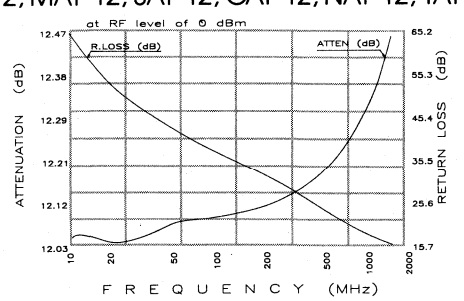
DC to 500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	10.04	0.01	47.74	0.57
20.000	10.04	0.02	41.70	0.33
50.000	10.07	0.01	34.12	0.12
100.000	10.09	0.01	28.14	0.21
110.000	10.09	0.01	27.30	0.17
122.500	10.10	0.01	26.42	0.22
135.000	10.09	0.02	25.72	0.24
147.500	10.08	0.02	24.81	0.21
250.000	10.15	0.02	20.72	0.20
500.000	10.39	0.03	15.11	0.20

AT-12, MAT-12, SAT-12, CAT-12, NAT-12, TAT-12

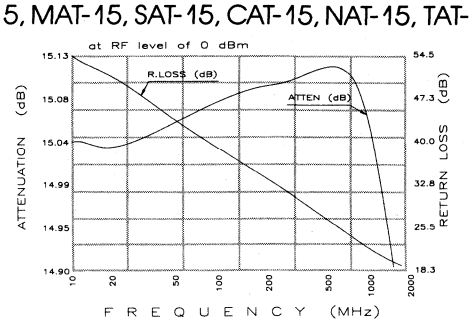
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	12.05	0.01	60.85	3.50
20.000	12.04	0.01	55.45	2.93
50.000	12.06	0.01	44.68	1.40
100.000	12.09	0.01	42.83	3.14
165.000	12.10	0.01	38.48	3.21
200.000	12.11	0.01	36.69	3.17
240.000	12.10	0.01	35.42	3.29
275.000	12.12	0.01	34.52	3.48
735.000	12.19	0.03	25.54	3.28
1500.000	12.29	0.11	19.34	3.06

AT-15, MAT-15, SAT-15, CAT-15, NAT-15, TAT-15

DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	15.04	0.01	51.49	4.85
20.000	15.04	0.01	49.53	2.75
50.000	15.06	0.01	43.06	1.06
100.000	15.09	0.02	38.62	0.80
165.000	15.09	0.02	34.91	0.79
200.000	15.09	0.02	33.39	0.80
240.000	15.09	0.02	31.73	0.78
275.000	15.11	0.02	30.52	0.74
735.000	15.11	0.04	22.45	0.61
1500.000	14.92	0.05	18.05	0.29

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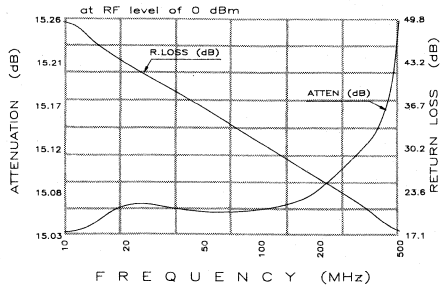
15-75, CAT-15-75

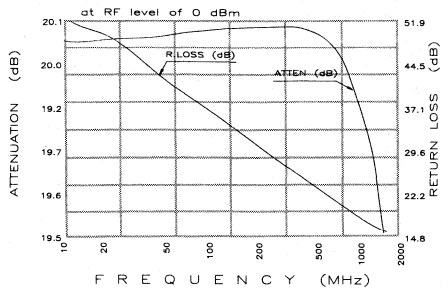
DC to 1000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	15.05	0.02	49.61	0.96
20.000	15.06	0.03	43.64	0.91
50.000	15.05	0.02	36.83	0.51
100.000	15.07	0.02	30.96	0.42
110.000	15.06	0.03	30.08	0.45
122.500	15.08	0.02	29.19	0.40
135.000	15.08	0.03	28.59	0.49
147.500	15.07	0.03	27.66	0.41
250.000	15.08	0.03	23.64	0.45
500.000	15.22	0.04	17.64	0.42

20, MAT-20, SAT-20, CAT-20, NAT-20, TAT-20

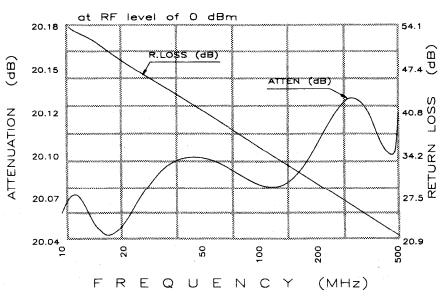
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	20.05	0.01	51.60	0.39
20.000	20.07	0.01	50.18	0.70
50.000	20.08	0.01	41.40	0.40
100.000	20.10	0.01	36.37	0.52
165.000	20.10	0.01	32.48	0.52
200.000	20.12	0.02	30.93	0.54
240.000	20.10	0.02	29.29	0.52
275.000	20.10	0.01	28.07	0.51
735.000	20.04	0.04	19.91	0.45
1500.000	19.49	0.06	14.73	0.31

20-75, CAT-20-75

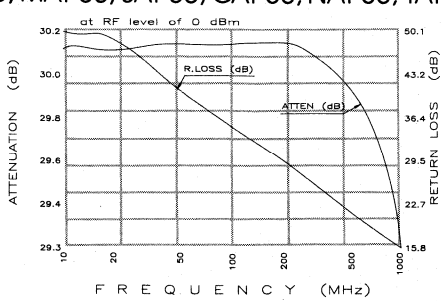
DC to 500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	20.05	0.02	53.02	1.07
20.000	20.02	0.04	47.46	1.17
50.000	20.07	0.05	40.39	0.96
100.000	20.10	0.02	34.04	0.67
110.000	20.09	0.05	33.05	0.62
122.500	20.11	0.04	32.12	0.64
135.000	20.11	0.05	31.44	0.66
147.500	20.11	0.03	30.41	0.72
250.000	20.12	0.04	26.30	0.65
500.000	20.12	0.04	19.99	0.63

30, MAT-30, SAT-30, CAT-30, NAT-30, TAT-30

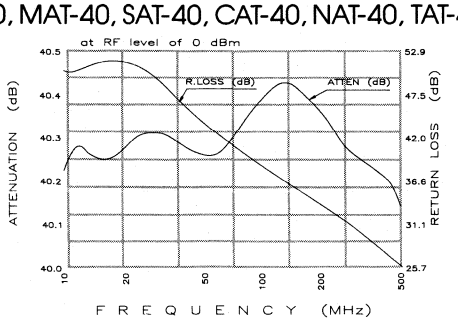
DC to 1000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	30.11	0.03	50.49	0.53
20.000	30.10	0.04	49.22	0.99
50.000	30.12	0.04	39.97	0.71
100.000	30.12	0.05	34.46	0.80
135.000	30.13	0.06	31.95	0.82
160.000	30.16	0.03	30.64	0.85
200.000	30.11	0.04	28.79	0.84
215.000	30.07	0.04	28.14	0.85
500.000	29.98	0.04	21.05	0.84
1000.000	29.30	0.06	15.14	0.73

40, MAT-40, SAT-40, CAT-40, NAT-40, TAT-40

DC to 500 MHz



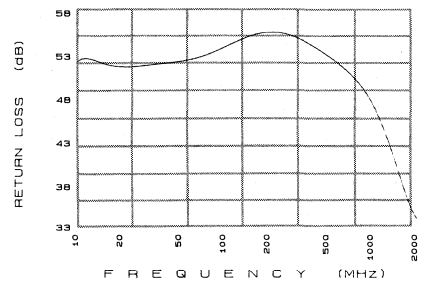
FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	40.29	0.08	50.94	1.47
20.000	40.29	0.06	54.52	1.60
50.000	40.30	0.11	44.68	0.98
100.000	40.35	0.07	40.27	1.30
110.000	40.29	0.12	39.41	1.17
125.000	40.34	0.13	38.45	1.31
135.000	40.34	0.09	37.90	1.33
150.000	40.40	0.08	37.12	1.36
250.000	40.22	0.08	32.62	1.21
500.000	40.06	0.12	27.37	1.23

Terminations

50 ohms and 75 ohms

BTRM-50

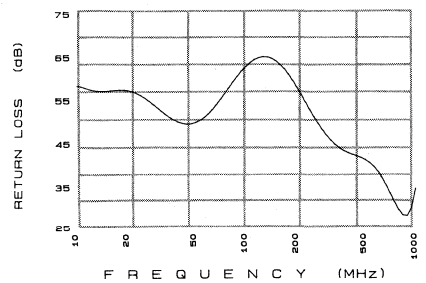
DC to 2000 MHz



FREQUENCY (MHz)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.00	51.94	4.30
20.00	52.19	5.03
50.00	53.25	6.41
100.00	52.85	4.54
165.00	51.64	4.49
200.00	50.86	5.09
270.00	49.06	4.77
500.00	46.12	7.36
1000.00	40.01	7.42
2000.00	29.03	4.82

BTRM-75

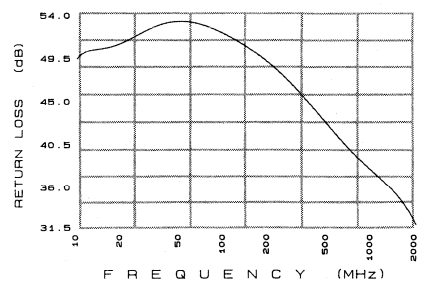
DC to 1000 MHz



FREQUENCY (MHz)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.00	48.53	5.67
20.00	49.89	4.47
50.00	49.33	1.12
100.00	50.66	6.80
135.00	52.98	12.08
160.00	54.94	5.23
200.00	48.52	3.34
215.00	46.65	3.71
500.00	37.95	2.61
1000.00	27.31	1.52

NTRM-50

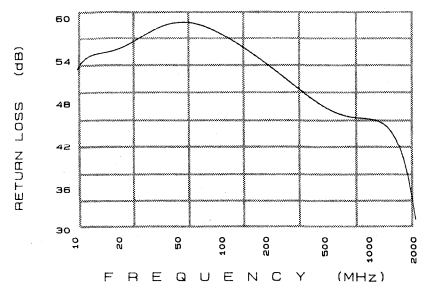
DC to 2000 MHz



FREQUENCY (MHz)	RETURN LOSS x (dB)	RETURN LOSS σ (dB)
10.00	46.13	2.12
20.00	46.99	2.43
50.00	49.09	2.73
100.00	48.19	2.33
165.00	47.65	1.78
200.00	47.75	1.47
270.00	47.18	2.04
500.00	44.96	3.45
1000.00	39.14	1.88
2000.00	29.80	2.77

STRM-50

DC to 2000 MHz



FREQUENCY (MHz)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.00	58.28	9.09
20.00	57.99	8.59
50.00	54.10	3.94
100.00	55.75	5.36
165.00	50.96	4.96
200.00	50.26	4.53
270.00	50.86	6.95
500.00	46.69	7.74
1000.00	42.87	5.47
2000.00	35.85	3.22

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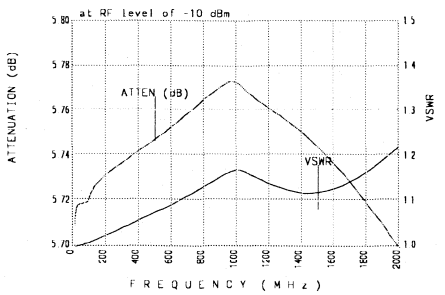
coaxial

Matching Pads

BMP-5075

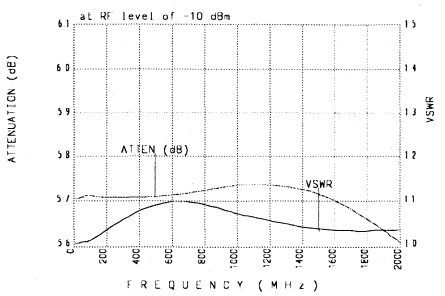
DC to 2000 MHz



FREQUENCY (MHz)	ATTENUATION		VSWR (:1) 50Ω		75Ω	
	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	σ (dB)
10.00	5.71	0.01	1.00	2.22	1.00	1.94
20.00	5.72	0.01	1.00	1.83	1.00	1.83
60.00	5.72	0.01	1.01	2.01	1.01	0.96
100.00	5.72	0.02	1.01	2.11	1.01	0.82
110.00	5.73	0.02	1.01	2.18	1.01	0.79
555.00	5.75	0.07	1.09	0.90	1.12	0.22
1000.00	5.78	0.05	1.18	0.76	1.22	0.20
1010.00	5.77	0.07	1.18	0.78	1.22	0.20
1505.00	5.75	0.10	1.08	1.41	1.19	0.36
2000.00	5.70	0.10	1.23	1.58	1.07	0.79

BMP-5075R

DC to 2000 MHz



FREQUENCY (MHz)	ATTENUATION		VSWR (:1) 50Ω		75Ω	
	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	σ (dB)
10.00	5.71	0.00	1.01	0.29	1.00	1.74
20.00	5.71	0.00	1.01	0.38	1.00	1.61
60.00	5.71	0.00	1.01	0.64	1.00	1.29
100.00	5.72	0.01	1.01	0.87	1.00	1.08
110.00	5.71	0.01	1.01	0.90	1.01	1.29
555.00	5.71	0.02	1.13	0.26	1.04	0.27
1000.00	5.74	0.03	1.07	0.34	1.12	0.21
1010.00	5.74	0.03	1.07	0.34	1.12	0.22
1505.00	5.74	0.06	1.03	1.19	1.09	0.62
2000.00	5.61	0.03	1.04	2.43	1.25	0.59

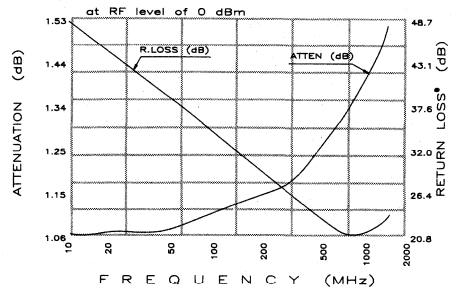
rugged, one–piece design

Fixed Attenuators

Attenuation and Return Loss

AT-1, MAT-1, SAT-1, CAT-1, NAT-1, TAT-1

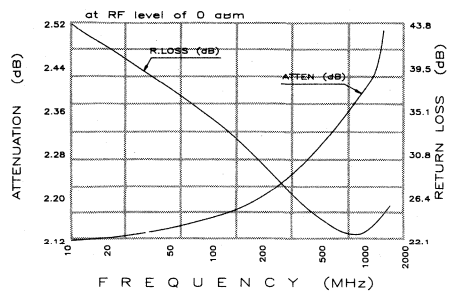
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	1.06	0.01	49.18	0.31
20.000	1.06	0.01	45.40	1.00
50.000	1.07	0.01	38.70	0.60
100.000	1.10	0.01	33.88	0.33
165.000	1.12	0.01	30.26	0.39
200.000	1.13	0.01	28.73	0.35
240.000	1.14	0.02	27.39	0.37
275.000	1.15	0.02	26.52	0.39
735.000	1.30	0.02	20.47	0.47
1500.000	1.50	0.03	22.91	1.17

AT-2, MAT-2, SAT-2, CAT-2, NAT-2, TAT-2

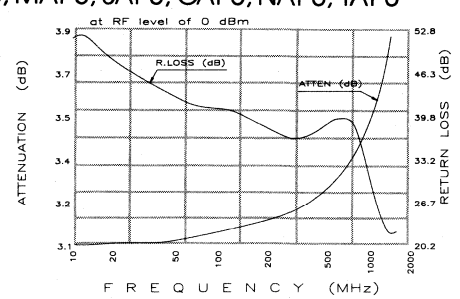
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	2.10	0.02	46.31	2.39
20.000	2.10	0.02	43.00	1.71
50.000	2.12	0.02	38.25	1.00
100.000	2.14	0.01	34.85	0.67
165.000	2.16	0.02	31.65	0.58
200.000	2.17	0.02	30.24	0.54
240.000	2.18	0.02	29.05	0.53
275.000	2.19	0.03	28.25	0.50
735.000	2.32	0.03	22.59	0.41
1500.000	2.51	0.04	26.17	1.39

AT-3, MAT-3, SAT-3, CAT-3, NAT-3, TAT-3

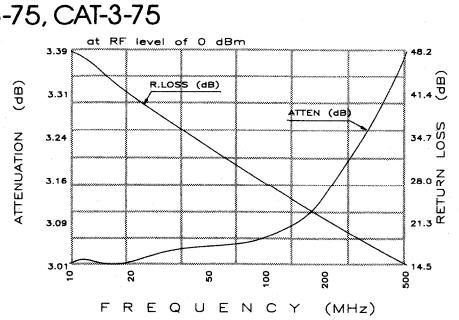
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	3.07	0.00	53.83	0.75
20.000	3.07	0.01	48.68	0.74
50.000	3.08	0.01	42.96	0.36
100.000	3.11	0.00	42.11	0.69
165.000	3.13	0.01	40.05	0.68
200.000	3.14	0.01	38.87	0.60
240.000	3.14	0.01	38.61	0.66
275.000	3.16	0.01	38.45	0.77
735.000	3.36	0.02	36.92	2.64
1500.000	3.82	0.04	20.70	1.03

AT-3-75, CAT-3-75

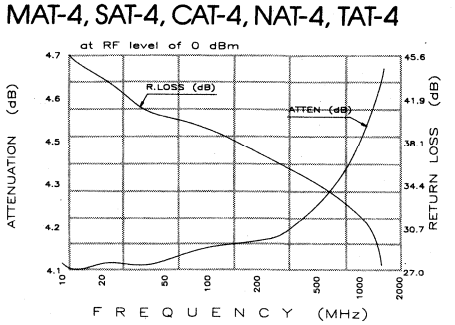
DC to 500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	3.01	0.01	47.80	0.93
20.000	3.01	0.00	40.47	0.70
50.000	3.03	0.01	32.73	0.20
100.000	3.07	0.00	26.43	0.23
110.000	3.07	0.01	25.77	0.29
122.500	3.07	0.01	25.11	0.30
135.000	3.07	0.01	24.49	0.28
147.500	3.08	0.01	23.50	0.24
250.000	3.14	0.01	19.49	0.23
500.000	3.41	0.02	14.30	0.24

AT-4, MAT-4, SAT-4, CAT-4, NAT-4, TAT-4

DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	4.09	0.01	46.24	1.38
20.000	4.09	0.01	43.70	1.12
50.000	4.10	0.01	40.47	0.89
100.000	4.15	0.01	39.80	0.60
165.000	4.15	0.01	38.15	0.59
200.000	4.16	0.01	37.18	0.54
240.000	4.17	0.00	36.69	0.62
275.000	4.18	0.01	36.37	0.58
735.000	4.34	0.01	32.91	1.26
1500.000	4.69	0.03	28.07	1.36

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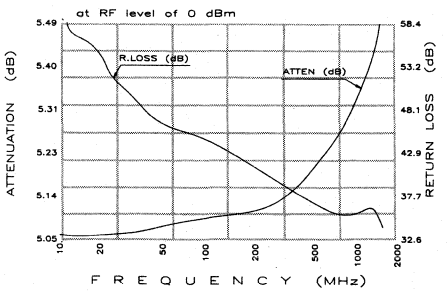
T-5, MAT-5, SAT-5, CAT-5, NAT-5, TAT-5

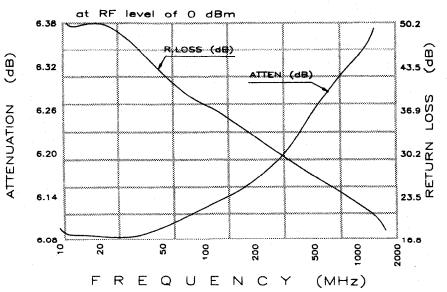
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	5.06	0.01	54.99	5.19
20.000	5.06	0.02	50.17	4.32
50.000	5.08	0.01	43.31	2.22
100.000	5.10	0.02	43.07	1.98
165.000	5.11	0.02	41.02	1.58
200.000	5.11	0.02	39.82	1.32
240.000	5.12	0.02	39.10	1.27
275.000	5.13	0.02	38.75	1.17
735.000	5.27	0.03	33.74	1.27
1500.000	5.52	0.02	30.49	2.16

T-6, MAT-6, SAT-6, CAT-6, NAT-6, TAT-6

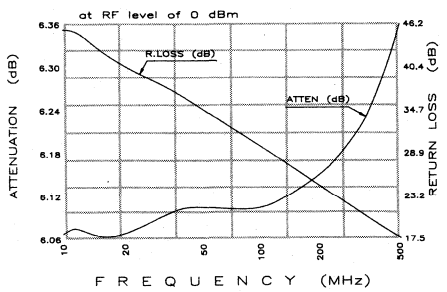
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	6.08	0.01	52.93	5.85
20.000	6.08	0.01	49.00	1.14
50.000	6.11	0.01	40.58	0.59
100.000	6.13	0.00	36.63	0.77
165.000	6.14	0.01	32.87	0.67
200.000	6.16	0.01	31.37	0.77
240.000	6.18	0.01	29.95	0.82
275.000	6.19	0.01	28.88	0.89
735.000	6.31	0.05	21.81	0.87
1500.000	6.42	0.05	16.52	0.42

T-6-75, CAT-6-75

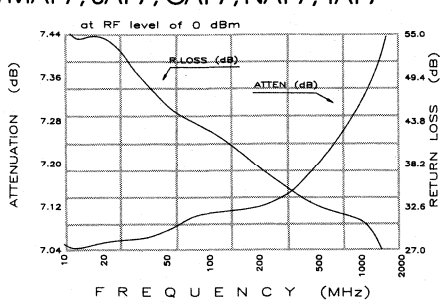
DC to 500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	6.10	0.03	46.04	1.63
20.000	6.08	0.03	40.48	0.78
50.000	6.11	0.04	35.15	0.35
100.000	6.12	0.03	29.59	0.55
110.000	6.13	0.03	28.95	0.49
122.500	6.13	0.03	28.21	0.43
135.000	6.14	0.03	27.52	0.38
147.500	6.13	0.03	26.54	0.34
250.000	6.18	0.04	22.74	0.45
500.000	6.37	0.04	17.49	0.41

T-7, MAT-7, SAT-7, CAT-7, NAT-7, TAT-7

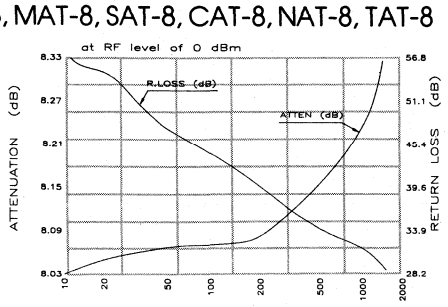
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	7.05	0.02	55.12	0.91
20.000	7.06	0.01	54.55	2.86
50.000	7.08	0.01	45.44	1.28
100.000	7.10	0.01	43.27	1.01
165.000	7.11	0.00	40.40	1.11
200.000	7.12	0.01	39.02	1.08
240.000	7.12	0.01	37.66	1.20
275.000	7.13	0.01	36.86	1.27
735.000	7.25	0.01	31.07	1.52
1500.000	7.43	0.02	30.03	3.29

T-8, MAT-8, SAT-8, CAT-8, NAT-8, TAT-8

DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{x}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{x}$ (dB)	RETURN LOSS σ (dB)
10.000	8.04	0.01	55.70	0.77
20.000	8.04	0.01	53.29	0.76
50.000	8.06	0.01	45.09	0.83
100.000	8.08	0.02	42.05	1.30
165.000	8.09	0.02	38.77	1.40
200.000	8.08	0.01	37.28	1.40
240.000	8.09	0.01	35.63	1.44
275.000	8.10	0.01	34.53	1.49
735.000	8.19	0.01	27.63	1.59
1500.000	8.34	0.01	24.82	2.11

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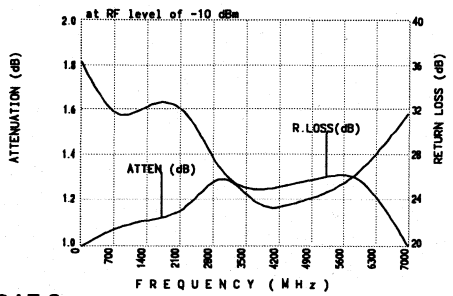
Fixed Attenuators

PAT-1

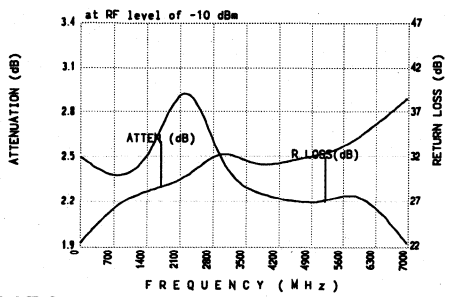
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	1.00	0.10	36.66	5.17
796.25	1.09	0.12	30.56	2.14
1542.50	1.12	0.10	33.38	3.03
2288.75	1.15	0.10	32.95	2.34
3035.00	1.38	0.09	25.75	1.58
3781.25	1.15	0.10	24.85	1.61
4527.50	1.19	0.09	25.61	1.70
5273.75	1.24	0.12	26.31	1.73
6020.00	1.33	0.09	26.91	1.97
7015.00	1.60	0.06	20.00	0.90

PAT-2

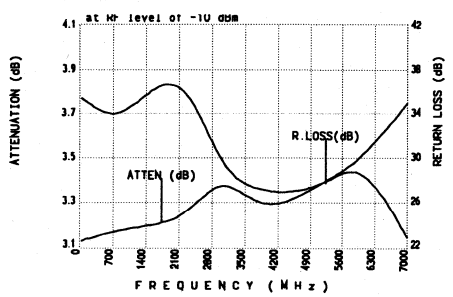
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	1.94	0.01	32.32	1.48
796.25	2.21	0.03	29.39	0.34
1542.50	2.30	0.01	31.62	0.83
2288.75	2.36	0.01	43.65	3.86
3035.00	2.60	0.02	30.14	1.40
3781.25	2.43	0.02	28.18	1.16
4527.50	2.50	0.03	27.21	1.82
5273.75	2.53	0.01	27.11	2.31
6020.00	2.65	0.02	28.95	1.33
7015.00	2.91	0.04	22.60	0.79

PAT-3

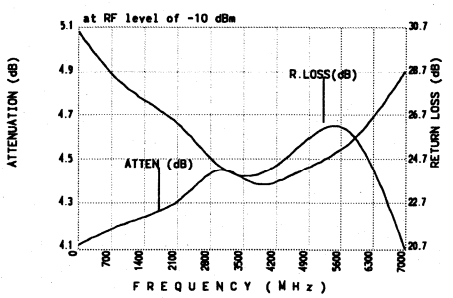
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	3.13	0.02	35.64	0.92
796.25	3.18	0.01	33.25	0.76
1542.50	3.20	0.01	36.74	2.39
2288.75	3.24	0.01	37.50	3.07
3035.00	3.44	0.01	28.76	1.32
3781.25	3.28	0.01	27.17	1.17
4527.50	3.31	0.03	26.95	1.58
5273.75	3.41	0.02	27.86	2.06
6020.00	3.50	0.02	30.20	1.30
7015.00	3.76	0.02	22.90	0.73

PAT-4

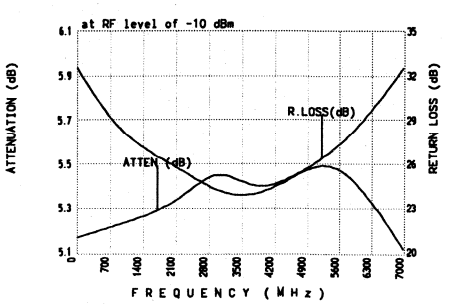
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	4.12	0.03	30.58	1.03
796.25	4.20	0.02	28.35	0.56
1542.50	4.25	0.03	27.37	0.71
2288.75	4.32	0.03	26.31	0.95
3035.00	4.52	0.03	24.21	0.88
3781.25	4.36	0.02	23.80	0.88
4527.50	4.43	0.05	24.93	0.93
5273.75	4.51	0.04	26.54	1.14
6020.00	4.60	0.04	26.31	1.31
7015.00	4.91	0.06	20.72	0.75

PAT-5

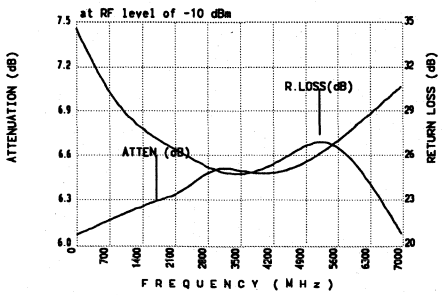
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	5.18	0.02	32.75	1.90
796.25	5.23	0.04	28.92	1.18
1542.50	5.28	0.03	27.06	1.01
2288.75	5.36	0.03	25.81	0.79
3035.00	5.51	0.03	24.21	0.57
3781.25	5.39	0.03	23.94	0.49
4527.50	5.44	0.04	25.09	0.58
5273.75	5.54	0.03	26.58	0.78
6020.00	5.67	0.04	25.22	0.94
7015.00	5.95	0.04	20.43	0.63

PAT-6

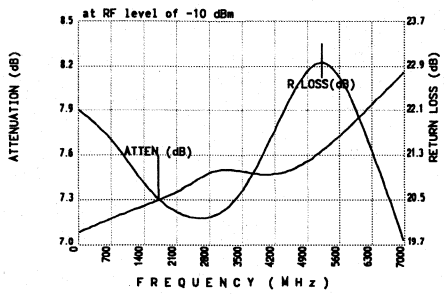
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	6.08	0.02	34.71	3.50
796.25	6.18	0.09	29.86	1.97
1542.50	6.29	0.12	27.56	1.85
2288.75	6.35	0.14	26.36	2.06
3035.00	6.57	0.16	24.93	1.89
3781.25	6.48	0.14	24.75	1.83
4527.50	6.50	0.17	26.00	1.96
5273.75	6.62	0.17	27.59	2.84
6020.00	6.81	0.18	25.97	4.14
7015.00	7.08	0.17	20.85	1.79

PAT-7

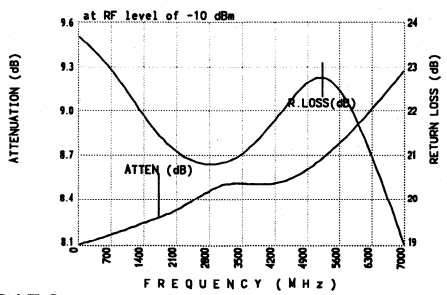
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	7.09	0.05	22.14	1.73
796.25	7.19	0.06	21.63	1.53
1542.50	7.28	0.05	20.61	1.33
2288.75	7.37	0.06	20.18	1.31
3035.00	7.55	0.06	20.15	1.22
3781.25	7.47	0.06	20.88	1.13
4527.50	7.48	0.08	22.35	1.29
5273.75	7.63	0.08	23.36	1.73
6020.00	7.85	0.09	22.19	1.81
7015.00	8.17	0.08	19.77	1.13

PAT-8

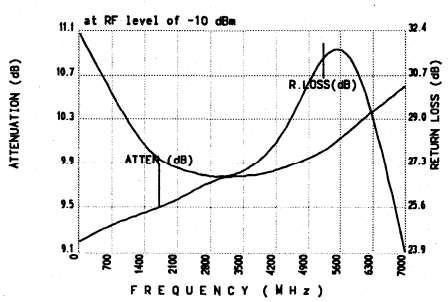
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	8.11	0.06	23.77	2.76
796.25	8.18	0.06	23.04	2.24
1542.50	8.27	0.05	21.70	1.94
2288.75	8.35	0.06	20.96	1.89
3035.00	8.55	0.05	20.77	1.79
3781.25	8.52	0.05	21.24	1.78
4527.50	8.53	0.04	22.29	2.05
5273.75	8.70	0.03	23.19	2.54
6020.00	8.92	0.05	21.98	2.30
7015.00	9.30	0.03	19.02	1.42

PAT-9

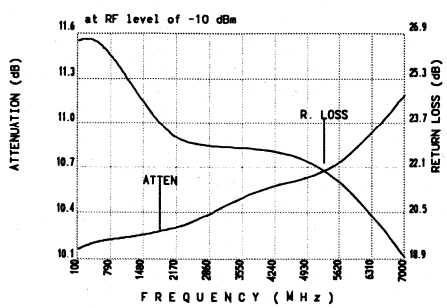
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	9.20	0.03	32.31	5.62
796.25	9.37	0.05	29.80	3.78
1542.50	9.47	0.06	27.56	4.86
2288.75	9.60	0.06	27.03	3.28
3035.00	9.81	0.05	26.71	1.74
3781.25	9.78	0.07	27.12	1.05
4527.50	9.89	0.08	28.71	1.04
5273.75	10.00	0.08	32.02	1.89
6020.00	10.29	0.06	31.80	2.65
7015.00	10.61	0.08	23.94	1.26

PAT-10

DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
100.00	10.16	0.09	26.53	2.37
399.70	10.20	0.09	26.67	2.32
699.40	10.22	0.09	26.22	1.94
1000.00	10.23	0.09	25.57	1.58
1500.40	10.25	0.08	24.29	0.98
2000.80	10.29	0.08	23.25	0.63
2500.00	10.32	0.08	22.77	0.52
4000.30	10.59	0.09	22.79	0.77
5500.60	10.62	0.09	22.10	0.92
7000.00	11.18	0.12	18.91	0.76

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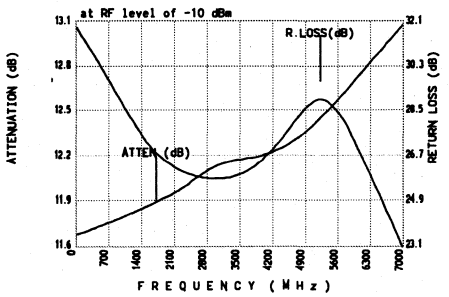
Fixed Attenuators

PAT-12

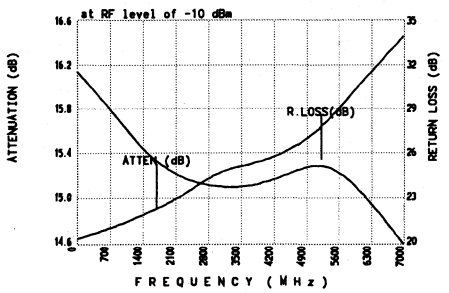
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	11.69	0.15	31.95	3.35
796.25	11.77	0.16	29.70	2.88
1542.50	11.88	0.15	27.06	2.48
2288.75	11.98	0.16	26.09	2.25
3035.00	12.18	0.17	25.75	1.98
3781.25	12.19	0.16	26.09	1.81
4527.50	12.26	0.18	27.58	2.02
5273.75	12.46	0.18	29.83	3.20
6020.00	12.73	0.18	27.35	3.69
7015.00	13.09	0.18	23.13	1.96

PAT-15

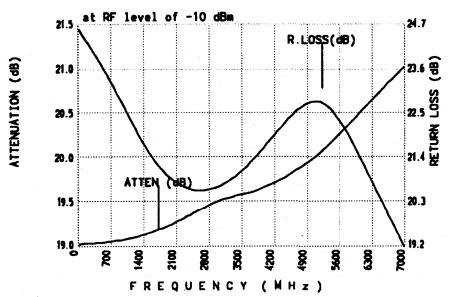
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	14.66	0.04	31.77	4.14
796.25	14.75	0.04	29.12	3.05
1542.50	14.88	0.07	25.94	2.25
2288.75	15.03	0.07	24.43	1.84
3035.00	15.27	0.08	23.85	1.51
3781.25	15.32	0.09	23.90	1.19
4527.50	15.43	0.08	24.72	1.03
5273.75	15.65	0.11	25.76	1.22
6020.00	16.03	0.13	24.05	1.43
7015.00	16.49	0.13	20.05	0.70

PAT-20

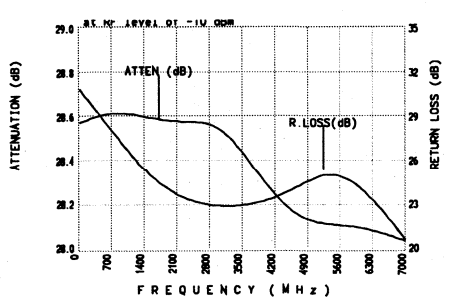
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	19.05	0.13	24.65	1.08
796.25	19.07	0.14	23.32	0.83
1542.50	19.16	0.13	21.44	0.63
2288.75	19.33	0.14	20.61	0.57
3035.00	19.58	0.14	20.66	0.57
3781.25	19.63	0.15	21.37	0.56
4527.50	19.83	0.15	22.52	0.59
5273.75	20.10	0.19	23.21	0.58
6020.00	20.53	0.19	21.61	0.41
7015.00	21.06	0.22	19.22	0.25

PAT-30

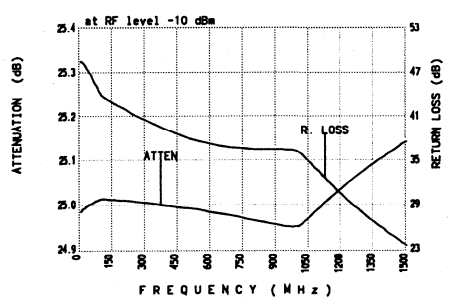
DC to 7000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
50.00	28.59	0.26	31.15	7.01
796.25	28.65	0.26	28.07	4.31
1542.50	28.61	0.22	25.06	6.12
2288.75	28.59	0.16	23.53	4.73
3035.00	28.60	0.13	23.05	2.25
3781.25	28.38	0.13	23.23	1.66
4527.50	28.17	0.15	24.04	1.65
5273.75	28.12	0.22	25.62	2.11
6020.00	28.12	0.31	24.85	2.60
7015.00	28.05	0.38	20.83	1.15

AT-25, MAT-25, CAT-25, NAT-25

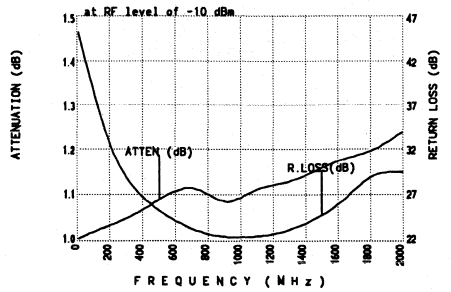
DC to 2000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
10.00	24.99	0.00	48.87	0.36
20.00	25.00	0.00	48.88	0.31
60.00	25.01	0.00	46.87	0.26
100.00	25.02	0.00	44.46	0.29
110.00	25.02	0.00	43.98	0.30
555.00	25.00	0.02	36.81	0.97
1000.00	24.95	0.04	36.94	2.07
1010.00	24.96	0.04	36.61	1.99
1255.00	25.07	0.04	28.95	0.94
1500.00	25.15	0.04	23.86	0.68

NAT-1-2W

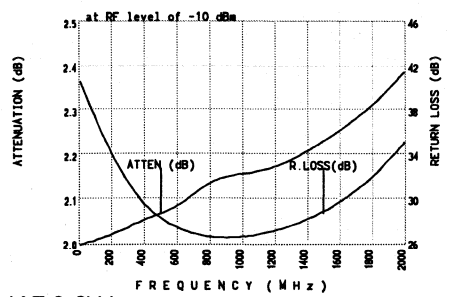
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
1.00	1.01	0.00	45.93	0.14
200.90	1.04	0.01	31.54	0.91
400.80	1.07	0.01	26.49	0.98
700.65	1.15	0.01	23.31	1.13
900.55	1.07	0.01	22.59	1.33
1100.45	1.13	0.01	22.61	1.67
1300.35	1.13	0.01	23.26	2.22
1600.20	1.19	0.02	25.78	3.93
1800.10	1.20	0.01	30.09	8.05
2000.00	1.25	0.00	29.93	4.34

NAT-2-2W

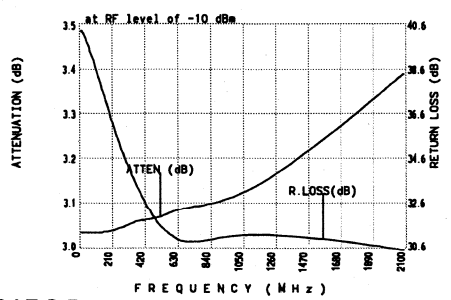
DC to 2000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
1.00	2.01	0.00	41.16	0.10
200.90	2.03	0.00	34.11	0.66
400.80	2.07	0.01	29.59	1.00
600.70	2.09	0.02	27.78	1.04
800.60	2.16	0.01	26.99	1.24
1000.50	2.17	0.01	27.02	1.52
1200.40	2.18	0.01	27.57	1.88
1500.25	2.24	0.01	29.14	2.70
1800.10	2.32	0.01	32.28	4.37
2000.00	2.40	0.02	35.63	5.89

NAT-3-2W

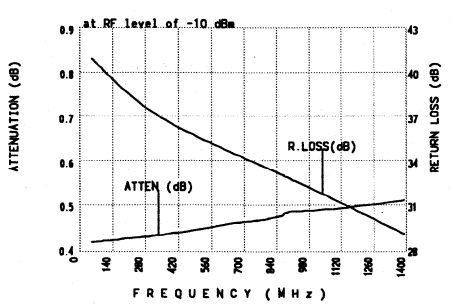
DC to 2000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
10.00	3.04	0.00	40.56	0.07
40.00	3.04	0.00	40.42	0.13
162.50	3.04	0.00	37.62	0.98
275.00	3.05	0.01	35.09	1.46
387.50	3.07	0.01	33.31	1.60
500.00	3.07	0.01	31.80	1.74
612.50	3.09	0.01	31.15	1.96
725.00	3.10	0.01	30.83	2.02
1125.00	3.12	0.02	31.59	2.76
2100.00	3.40	0.03	30.61	3.17

SAT-0.5

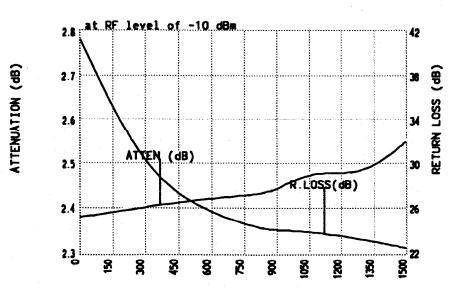
DC to 1500 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
62.35	0.43	0.00	41.39	0.51
248.50	0.44	0.00	38.44	0.59
434.65	0.45	0.00	36.65	0.55
620.80	0.47	0.00	35.32	0.55
806.95	0.48	0.01	33.98	0.54
874.00	0.49	0.01	33.49	0.55
881.50	0.49	0.01	33.43	0.55
889.00	0.50	0.01	33.37	0.55
1044.43	0.50	0.01	32.20	0.60
1495.71	0.53	0.01	28.73	0.64

SAT-2.5

DC to 15000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	RETURN LOSS $\bar{X}$ (dB)	RETURN LOSS σ (dB)
10.00	2.39	0.00	41.66	0.17
274.31	2.41	0.00	30.53	0.16
538.62	2.43	0.00	26.36	0.22
802.92	2.44	0.00	24.75	0.43
874.77	2.45	0.01	24.55	0.49
882.46	2.45	0.01	24.52	0.49
892.08	2.45	0.01	24.50	0.50
1096.00	2.50	0.01	24.28	0.56
1298.00	2.48	0.00	23.65	0.63
1500.00	2.56	0.01	22.87	1.03

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Mini-Circuits

SPECIFICATIONS CHECKLIST

Fixed Attenuators

If your particular requirements are not met with a Mini-Circuits catalog item, please complete the check list below and mail, phone, or fax it to Mini-Circuits, Applications Engineering.

Please indicate: Critical Parameter ✔✔ Important Parameter ✔

Application: ☐ Industrial/Commercial ☐ Military ☐ Space

Electrical:

Frequency range _____ MHz
Attenuation _____ dB, tol. ± _____ dB
Attenuation flatness ± _____ dB
Over frequency _____ MHz
Max. iinput power _____ W
VSWR or return loss (dB) ☐ 50 ohms ☐ 75 ohms
Input _____ Output _____
Operating temperature _____ °C

Environmental requirements:

_____
_____
_____
_____
_____
_____
_____

Diagram of application:

Mechanical:

Standard case style _____ *(for outline drawings see Table of Contents. Non-standard case, complete list below).*

PC Board Mounting
☐ Plug-in ☐ Flat pack
☐ Surface-mount

Coaxial Connector
☐ BNC ☐ TNC
☐ SMA ☐ Type N

Special Requirements: _____

_____

Name _____ Title _____
Company _____ Dept. _____
Company address _____
Phone _____ Fax _____

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SECTION 7

DIRECTIONAL COUPLERS

contents of this section

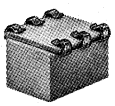
product specifications

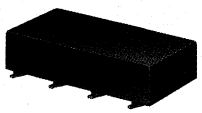
surface mount 7-2
high power couplers plug-in & coaxial 7-3
6 to 30 dB coupling models 7-4, 7-5

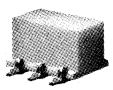
computer data and curves

CAPD information . . . . . 7-8 thru 7-28

6 to 20 dB COUPLING 5 MHz to 1200 MHz


JDC


SCDC


LRDC

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRI($) Qt (1-
NEW	JDC-6-1	5-400	6.5±0.5	±0.5	1.6	2.0	1.7	2.4	2.0	2.4	35	30	25	20	20	15	1.25	.5	.5	7-23	BH292	hz	14.
NEW	JDC-10-2	5-750	10.0±0.5	±0.6	1.0	1.5	1.0	1.5	1.0	1.5	20	15	20	17	20	16	1.13	1	1	7-23	BH292	hz	14.
NEW	JDC-20-2	400-900	20.5±1.0	±1.0			0.2	0.6					19	13			1.15	2	2	7-23	BH292	hz	14.
NEW ■	JDC20-1W-75	50-750	19.5±0.5	±0.5	0.5	0.9	0.5	0.7	0.5	0.9	25	18	23	15	20	15	1.2	.5	.5	7-28	BH292	hz	14.
	SCDC-11-2	500-1100	11.3±0.5	±0.6			1.1	1.8					20	10			1.4	2	2	7-18	YY161	cx	11.
	SCDC-25-2	500-1100	25.5±0.75	±0.8			0.5	1.0					22	10			1.4	2	2	7-18	YY161	cx	13.
	LRDC-10-1	5-500	10.7±0.5	±0.5	0.9	1.4	0.9	1.4	1.2	1.9	31	25	30	20	25	16	1.2	1	1	7-24	QQQ130	cz	15.
	LRDC-20-2	300-1100	20.5±1.0	±1.3			0.25	0.6					22	10			1.2	2	2	7-20	QQQ130	cz	15.
■	LRDC-10-1-75	5-600	10.7±0.5	±0.5	1.1	1.5	1.0	1.4	1.2	1.8	19	15	21	17	21	16	1.3	1	1	7-28	QQQ130	cz	11.
■	LRDC-10-2-75	30-1000	10.0±0.5	±0.6	1.0	1.5	1.1	1.5	1.3	1.8	21	17	22	17	19	15	1.3	1	1	7-27	QQQ130	cz	13.
■	LRDC-10-2W-75	30-1200	10.0±0.5	±0.8	1.0	1.5	1.1	1.6	1.3	2.0	21	17	22	17	18	15	1.3	1	1	7-27	QQQ130	cz	15.
■	LRDC-12-1-75	5-600	12.2±0.5	±0.6	0.4	0.8	0.5	1.0	0.8	1.5	20	17	21	18	20	12	1.3	1	1	7-27	QQQ130	cz	11.

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

NOTES:

- ❑ Non-hermetic
- * L = 30-100 MHz, M = 100-200 MHz, Operating Temperature +50° C Max.
- ** L = 40-100 MHz, M = 100-200 MHz
- ✦ Bi-directional
- △ Available only with SMA connectors.
- ■ Denotes 75 ohm models.
- ✪ When only specification for M range given, specification applies to entire frequency range.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 2. Mainline Loss includes theorical power loss at coupled port.
- 3. For PDC models, external heat sinking is recommended to reduce case temperature.

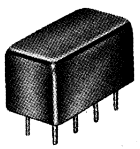
pin and coaxial connections

See case style outline drawing for pin locations

PORT	cu	cx	cz	gh	de	gj	hz
INPUT	1	1	6	1	S	2	1
OUTPUT	4	2	1	2	1	3	6
COUPLED (forward)	3	5	4	5	3	1	3
COUPLED (reverse)	—	—	—	—	2	S	—
NOT USED	6	3,6	3**	—	—	—	4
CASE GND	2,5,7,8	—	—	3,4,6,7,8	—	—	—
GND	—	4,7,8	2,5	—	—	—	2,5

**isolate

20 dB COUPLING up to 25W 30 to 970 MHz



PDC

ZFDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PDC20-400HP**	40-400	21.5±0.5	±0.6	0.1	0.3	0.2	0.4	0.2	0.5	30	20	30	20	27	18	1.1	10	10	7-25	A01	gh	49.95
PDC20-900HP	800-900	20.2±0.6	±0.5			0.25	0.5					24	20			1.1	5	5	7-25	A01	cu	39.95
PDC20-970HP	860-970	20.2±0.6	±0.5			0.25	0.5					24	20			1.1	5	5	7-25	A01	cu	39.95
✦ ZFDC-20-1H*	30-400	20.5±0.5	±0.4	0.15	0.4	0.15	0.4	0.3	0.4	30	25	30	25	30	23	1.2	25	25	7-13	J17	de	58.95
△✦ ZFBDC20-900HP	800-900	20.7±0.6	±0.6			0.1	0.4					28	20			1.1	10	10	7-26	J17	gj	79.95
△✦ ZFBDC20-970HP	860-970	20.4±0.6	±0.6			0.1	0.4					28	20			1.1	10	10	7-26	J17	gj	79.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

features

- high power operation
- very low insertion loss
- excellent directivity
- excellent VSWR, 1.1:1 typical
- wide bandwidth, 30-400 MHz model ZFDC-20-1H and 40-400 MHz model PDC20-400HP
- cellular application, models PDC-HP ZFDC-HP

NSN GUIDE (see the following pages for model specifications)

MCL NO.	NSN	MIL-C 15370/18*
PDC-10-1	5985-01-178-4406	002
PDC-10-1-75	5985-01-294-3796	
PDC-10-2		008
PDC-10-5	5895-01-389-9497	
PDC-10-21	5985-01-130-0177	003
PDC-10-22	5985-01-190-7738	
PDC-10-54	5895-01-394-6080	
PDC-15-6	5985-01-147-0160	009
PDC-20-3	5985-01-076-8477	001
TDC-10-1	5905-01-226-3428	
ZDC-10-1B	5985-01-391-5675	
ZDC-10-1(BNC)	5985-01-125 3467	
ZDC-20-1	5985-01-178-4405	
ZDC-20-3(BNC)	5985-01-096-5007	
ZDC-20-3B	5985-01-264-9105	
ZEDC-10-2	5985-01-251-2669	
ZEDC-15-2B	5985-01-337-9981	
ZFDC-10-1	5985-01-230-6676	

NSN GUIDE (see the following pages for model specifications)

MCL NO.	NSN
ZFDC-10-1(SMA)	5985-01-179-5122
ZFDC-10-1B	5985-01-135-9780
ZFDC-10-2	5985-01-208-5694
ZFDC-10-21	5985-01-253-0600
ZFDC-10-5(SMA)	5985-01-417-0065
ZFDC-10-6B	5985-01-314-4176
ZFDC-15-5	5985-01-298 0144
ZFDC-15-6	5985-01-330-6792
ZFDC-20-2	5985-01-230-6676
ZFDC-20-3(BNC)	5985-01-146-0478
ZFDC-20-3(TNC)	5985-01-226-7882
ZFDC-20-3(SMA)	6130-01-383-9709
ZFDC-20 4	5985-01-266-9992
ZFDC-20-5(BNC)	5985-01-097-2192
ZMDC-10-1	4935-01-227-6945
ZMDC-10-1B	4935-01-227-6945
ZMDC-20-3	5985-01-193-8515

* units are not QPL listed.

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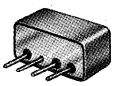
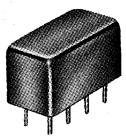
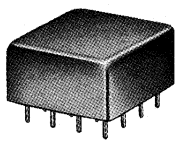
DIRECTIONAL COUPLERS 50 & 75Ω

6 to 30 dB COUPLING 5 kHz to 2000 MHz


TDC


PDC

TODC


P4DC
PDC-20A-5

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M⊙ Typ.	M⊙ Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M⊙ Typ.	M⊙ Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
TDC-6-1	10-400	6.3±0.4	±0.4	2.0	2.4	2.0	2.4	2.0	2.5	36	30	30	25	20	15	1.5	1	2	7-8	B02	cw	23.95
TDC-10-1	1-400	10.0±0.5	±0.5	1.2	1.5	1.0	1.3	1.2	1.5	35	25	30	20	20	15	1.5	1	2	7-8	B02	cw	17.95
TDC-10-2	5-1000	11±0.5	±0.6	1.4	1.8	1.5	1.8	1.6	2.0	50	35	25	20	20	15	1.5	0.5	0.5	7-8	B02	cw	25.95
PDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	A01	cu	13.45
✦ PDC-10-1BD	1-400	11.5±0.5	±0.5	0.6	0.9	0.8	1.1	0.9	1.3	55	35	35	20	22	15	1.2	2.0	4	7-19	A01	cv	11.45
✣ PDC-10-2	250-1000	10.5±0.5	±0.6	1.4	1.6	—	—	1.6	2.0	30	23	—	—	25	15	1.5	—	5	7-9	A01	cu	34.45
PDC-10-5	1-2000	10.5±0.5	±1.0	1.2	1.9	1.3	1.9	2.0	2.5	38	25	30	18	22	18	1.3	0.5	0.5	7-9	A01	cu	40.95
PDC-10-6	0.005-20	11±0.5	±0.5	0.4	1.2	0.4	0.8	0.4	1.0	40	30	40	30	35	25	1.3	1.5	3	7-10	A01	cu	23.95
PDC-10-21**	1-1000	11±0.5	±0.5	1.2	1.7	1.2	1.7	1.6	2	40	30	25	20	25	20	1.3	1	2	7-10	A01	cu	32.95
PDC-10-22	5-750	11±0.5	±0.5	1.1	1.6	1.2	1.7	1.6	1.9	35	30	25	20	25	20	1.25	1	2	7-10	A01	cu	23.95
PDC-10-54	10-1500	10.5±0.5	±0.7	1.2	1.8	1.3	1.9	1.6	2.3	35	25	28	23	28	23	1.3	0.5	0.5	7-11	A01	cu	35.95
PDC-15-6	0.01-35	15±0.5	±0.5	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	A01	cu	23.95
PDC-15-21	1-500	14.7±0.5	±0.6	0.7	1.1	0.7	1.1	0.8	1.2	35	30	35	30	30	23	1.4	1	2	7-11	A01	cu	23.95
PDC-20-1*	25-400	21±0.75	±0.5	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	A01	cu	23.95
✦ PDC-20-1BD	0.5-200	19.2±0.5	±0.5	0.3	0.5	0.3	0.5	0.4	0.6	40	30	35	20	22	18	1.1	3	5	7-19	A01	cv	16.95
PDC-20-1W	10-700	19.2±0.5	±0.5	0.25	0.5	0.4	0.7	0.7	1.1	34	30	27	23	23	20	1.4	1	2	7-12	A01	cu	23.95
PDC-20-3	0.2-250	19.5±0.5	±0.5	0.35	0.6	0.25	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	A01	cu	15.95
✦ PDC-20-3BD	0.2-250	19.5±0.5	±0.5	0.3	0.6	0.25	0.5	0.35	0.6	47	25	40	25	30	20	1.1	1.5	4	7-19	A01	cv	17.95
PDC-20A-5	0.1-2000	20.0±0.5	±1.0	0.6	1.5	0.6	1.5	1.9	2.9	34	20	25	15	20	10	1.5	0.5	2	7-15	C145	cy	44.95
■ PDC-10-1-75	1-250	10.5±0.5	±0.75	1.1	1.5	1.1	1.5	1.1	1.5	30	20	30	20	30	20	2.0	2	4	7-16	A01	cu	14.95
■ PDC-10-6-75	0.2-100	10.0±0.5	±0.2	1.2	1.6	0.9	1.2	0.9	1.3	50	30	40	25	37	25	1.5	1	2	7-16	A01	cu	23.95
■ PDC-15-6-75	0.02-35	14.5±0.5	±0.5	0.3	0.7	0.3	0.7	0.3	0.7	35	20	35	20	35	20	1.3	1.5	4	7-16	A01	cu	25.95
■ PDC-20-3-75	1-150	19.5±0.5	±0.75	0.35	0.8	0.35	0.8	0.35	0.8	25	20	25	20	25	20	2.0	2	4	7-17	A01	cu	14.95
■ PDC-20-6-75	0.05-40	20.4±0.3	±0.25	0.1	0.25	0.1	0.2	0.1	0.3	45	35	35	20	25	18	1.2	1.5	3	7-17	A01	cu	23.95
TODC-10-1	10-400	11.3±0.5	±0.5	1.2	1.5	1.0	1.3	1.2	1.5	35	25	30	20	25	20	1.5	0.5	1	7-13	QQ96	ct	17.95
✷ P4DC-30A-2	5-1000	30.5±0.5	±1	0.7	1.2	0.7	1.2	0.8	1.5	30	15	32	20	20	10	1.15	1	2	7-22	C07	da	34.95

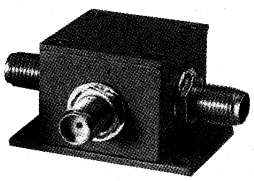
L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

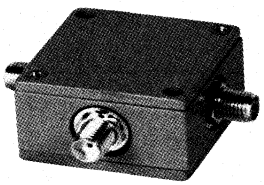
• NSN Guide - see previous page

NOTES:

* L = 25-50 MHz, M = 50-300 MHz, U = 300-400 MHz
** Upper range coupling ±0.75 dB
*** Above 1000 MHz, coupling flatness ±1 dB.
✦ Bi-directional
✣ L = f_L-$2f_L$
✷ 4-coupled ports, Isolation between coupled ports, 25 dB minimum.
✪ When only specification for M range given, specification applies to entire frequency range.
△ Available only with SMA connectors
■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
2. Mainline Loss includes theorical power loss at coupled port.

Plug-In & Coaxial


ZEDC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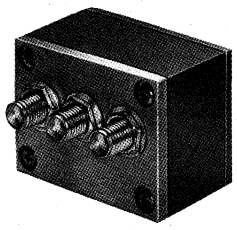
ZMDC

ZDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZEDC-10-2B	1-1000	11±0.5	±0.75	1.3	1.8	1.5	1.8	1.5	1.8	35	30	30	20	18	13	1.3	1.5	3	7-15	V37	db	64.95
ZEDC-15-2B	1-1000	15±0.5	±0.5	0.5	1.4	0.8	1.2	1.0	1.4	35	30	30	25	25	15	1.15	1.5	3	7-15	V37	db	64.95
ZFDC-10-1	1-500	10.5±0.25	±0.6	1.0	1.3	0.8	1.1	1.0	1.3	32	25	33	25	22	15	1.2	1.5	3	7-9	K18	db	44.95
ZFDC-10-2	10-1000	10.75±0.5	±0.5	1.5	2.0	1.2	1.8	1.5	2.0	35	28	30	25	27	20	1.5	1.5	3	7-14	K18	db	51.95
ZFDC-10-5	1-2000	10.8±0.5	±1.0	1.2	1.9	1.2	1.8	1.8	2.5	38	25	30	18	22	18	1.3	0.5	0.5	7-9	K18	db	84.95
ZFDC-10-6	0.005-20	11±0.5	±0.5	0.4	1.2	0.4	0.8	0.4	1.0	40	30	40	30	35	25	1.3	1.5	3	7-10	K18	db	52.95
ZFDC-10-21**	1-1000	11±0.5	±0.5	1.2	1.7	1.2	1.7	1.6	2.0	40	30	25	20	25	20	1.2	1	2	7-10	K18	db	54.95
■ ZFDC-10-1-75	1-400	10.5±0.5	±0.5	1.0	1.4	1.1	1.5	1.1	1.6	46	30	44	28	34	20	1.3	2	4	7-21	K18	db	45.95
■ ZFDC-10-21-75	10-750	11±0.5	±0.75	1.5	1.8	1.5	1.9	1.7	2.1	36	30	30	20	26	20	1.4	1	2	7-21	K18	db	54.95
ZFDC-10-22	1-750	11±0.5	±0.5	1.1	1.9	1.2	1.7	1.4	1.9	35	30	25	20	25	20	1.25	1	2	7-10	K18	db	49.95
ZFDC-15-5	1-2000	15.5±0.5	±1.0	1.2	1.8	1.2	1.8	1.3	2.3	30	20	25	20	18	11	1.3	0.5	2	7-14	K18	dc	71.95
ZFDC-15-6	0.03-35	15±0.5	±0.5	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	K18	db	49.95
■ ZFDC-15-6-75	0.02-35	14.5±0.5	±0.5	0.3	0.7	0.3	0.7	0.3	0.7	35	20	35	20	35	20	1.3	1.5	4	7-16	K18	db	49.95
ZFDC-20-3	0.2-250	19.5±0.5	±0.25	0.35	0.6	0.25	0.5	0.35	0.6	36	25	33	25	25	20	1.2	1.5	4	7-12	K18	db	44.95
■ ZFDC-20-3-75	10-250	19.3±0.5	±0.3	0.25	0.4	0.3	0.5	0.4	0.6	29	25	29	25	28	24	1.2	1	2	7-21	K18	db	49.95
ZFDC-20-4	1-1000	19.5±0.5	±0.5	1.2	1.5	0.6	0.8	1.2	1.5	36	28	27	20	23	18	1.1	.5	2	7-14	K18	dc	64.95
△ ZFDC-20-4L	10-1000	20.2±0.5	±0.5	0.2	0.5	0.3	0.7	0.7	1.2	40	20	30	16	20	14	1.1	1	1	7-26	K18	db	64.95
ZFDC-20-5***	0.1-2000	19.5±0.5	±0.5	0.3	1	0.7	1.4	1.5	2.3	30	20	27	20	22	10	1.2	.5	2	7-20	K18	dc	84.95
△ ZFDC-20-50***	20-2000	19.5±0.5	±0.8	0.8	1.3	0.7	1.3	1.0	1.6	30	20	25	20	22	10	1.25	1	1	7-24	K18	dc	64.95
■ ZFDC-3375	0.2-200	30.5±0.5	±0.6	0.5	0.8	0.6	0.9	0.7	1.0	30	25	25	20	19	15	1.6	.5	2	7-12	K18	db	45.95
ZMDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	M21	dd	49.95
✣ ZMDC-10-2	250-1000	10.5±0.5	±0.5	1.1	1.4	—	—	1.6	1.9	40	30	—	—	20	15	1.5	—	5	7-9	M21	dd	59.95
ZMDC-15-6	0.1-35	15±0.5	±0.5	0.4	0.6	0.2	0.4	0.4	0.6	38	30	35	25	28	20	1.15	2	4	7-11	M21	dd	59.95
ZMDC-20-1*	25-400	21±0.75	±0.5	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	M21	dd	59.95
ZMDC-20-3	0.2-250	19.5±0.5	±0.5	0.35	0.5	0.35	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	M21	dd	49.95
ZMDC-30-1	0.1-250	30±0.5	±0.5	0.4	0.6	0.5	0.8	0.55	0.85	23	18	20	15	17	10	1.5	1.0	3	7-13	M21	dd	49.95
ZDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	M22	dd	44.95
✣ ZDC-10-2	250-1000	10.5±0.5	±0.5	1.1	1.4	—	—	1.6	1.9	40	25	—	—	20	15	1.5	—	4	7-9	M22	dd	51.95
ZDC-15-2	0.5-250	15±0.5	±0.5	0.8	1.2	0.7	1.0	0.9	1.2	32	28	32	28	32	28	1.4	1.5	3	7-20	M22	dd	51.95
ZDC-15-6	.01-35	15±0.5	±0.5	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	M22	dd	51.95
ZDC-20-1*	25-400	20±0.5	±0.5	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	M22	dd	51.95
ZDC-20-3	0.2-250	19±0.5	±0.5	0.35	0.6	0.25	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	M22	dd	44.95
■ ZDC-10-1-75	1-250	10.5±0.5	±0.75	1.1	1.5	1.1	1.5	1.1	1.5	30	20	30	20	30	20	2	2	4	7-16	M22	dd	44.95
■ ZDC-15-6-75	.02-35	14.5±0.5	±0.6	0.3	0.6	0.2	0.4	0.4	0.6	35	30	35	25	28	20	1.5	2	4	7-16	M22	dd	52.95
■ ZDC-20-3-75	1-150	19.5±0.5	±0.75	0.35	0.8	0.35	0.8	0.35	0.8	25	20	25	20	25	20	2	2	4	7-17	M22	dd	45.95
■ ZDC-2375	50-100	10.5±0.3	±0.2	—	—	—	—	1.1	1.3	—	—	—	—	35	30	1.3	—	4	7-17	M22	dd	52.95
■ ZDC-20-3-75-1	55-90	18.6±0.5	±0.3	0.4	0.6	0.4	0.6	0.4	0.6	35	30	35	30	35	30	1.2	—	4	7-22	M22	dd	52.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

pin and coax connections

see case style outline drawing

Port	ct	cu	cv	cw	cy	da	db	dc	dd	de
Input	5	1	1	1	14	8	1	3	3	S
Output	8	4	4	2	8	12	2	1	2	1
Coupled (forward)	2	3	3	4	5	2,1,13,14*	3	2	1	3
Coupled (reverse)	—	—	6	—	—	—	—	—	—	2
Not Used	11	6	—	—	—	—	—	—	—	—
Case GND	All other pins	2,5,7,8	2,5,7,8	3	All other pins	All other pins	—	—	—	—

* 4-coupled ports #1, #2, #3, #4 consecutively

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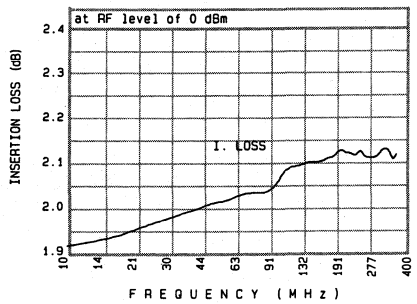
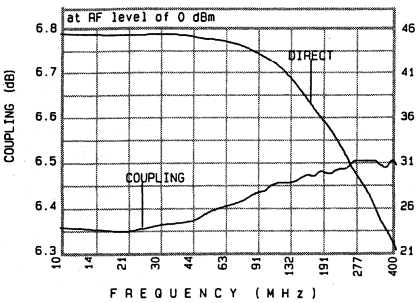
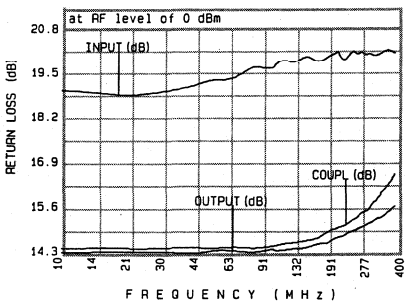
very broadband
Directional Couplers

TDC-6-1

10 to 400 MHz



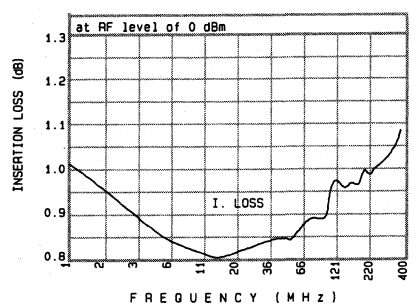


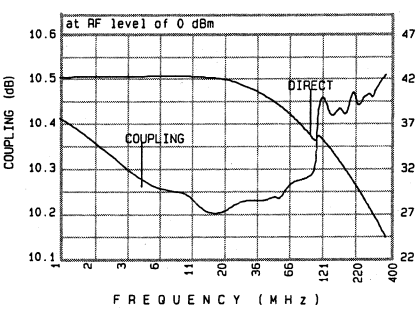


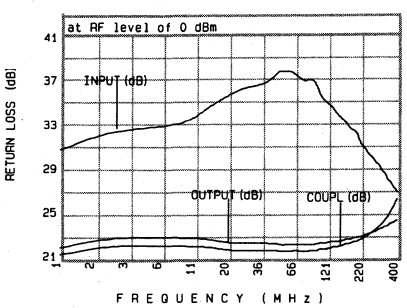
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
10.00	1.92	6.36	45.76	19.09	14.37	14.49
19.75	1.95	6.35	45.59	18.93	14.42	14.53
77.28	2.04	6.42	44.33	19.84	14.39	14.51
99.70	2.08	6.45	42.98	19.88	14.44	14.59
155.28	2.11	6.48	38.20	19.95	14.63	14.79
200.13	2.13	6.48	34.76	20.15	14.85	15.13
233.28	2.14	6.49	32.09	20.33	15.02	15.37
311.28	2.14	6.51	26.84	20.21	15.39	16.11
389.28	2.14	6.51	22.28	20.33	15.87	16.92
400.00	2.13	6.50	21.59	20.33	16.01	17.00

TDC-10-1

1 to 400 MHz



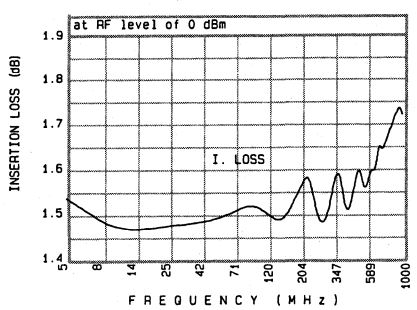


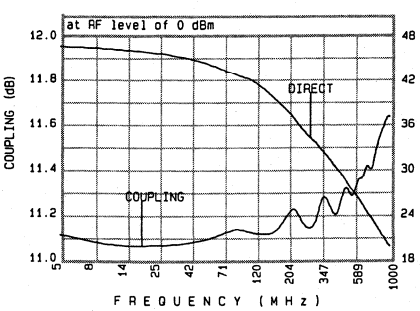


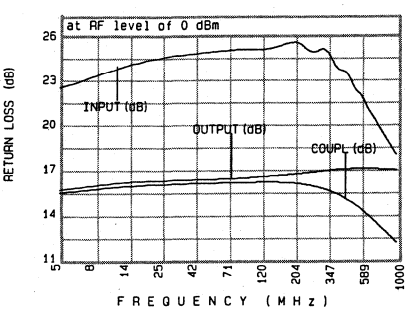
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	1.02	10.42	42.50	31.09	22.15	21.49
2.00	0.94	10.35	42.57	32.84	23.07	22.37
5.00	0.84	10.25	42.61	33.16	23.14	22.36
10.00	0.82	10.26	42.65	33.63	23.03	22.30
20.00	0.82	10.21	42.34	36.08	22.58	21.92
50.00	0.85	10.25	39.59	38.32	22.54	21.92
100.00	0.90	10.30	35.13	36.59	22.51	21.93
200.00	1.00	10.46	30.37	32.59	23.10	22.74
387.53	1.11	10.52	22.60	27.56	24.68	26.36
400.00	1.12	10.53	22.17	27.26	24.68	26.63

TDC-10-2

5 to 1000 MHz







Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
5.00	1.54	11.12	46.98	22.70	15.85	15.65
10.00	1.46	11.07	46.73	23.89	16.30	16.03
20.00	1.48	11.07	46.28	24.86	16.48	16.22
50.00	1.49	11.09	44.93	25.17	16.57	16.32
100.00	1.52	11.13	42.76	25.29	16.72	16.38
200.00	1.59	11.25	37.70	25.93	16.98	16.31
500.00	1.56	11.29	27.82	22.47	17.33	14.79
557.11	1.61	11.38	26.63	21.79	17.30	14.37
972.94	1.72	11.67	18.90	17.81	17.20	12.01
1000.00	1.76	11.75	18.62	17.57	17.20	11.89

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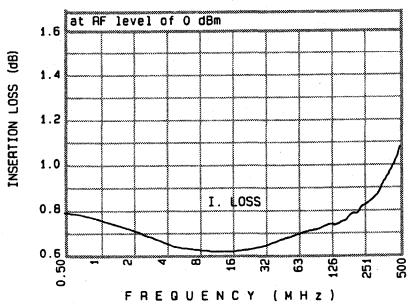
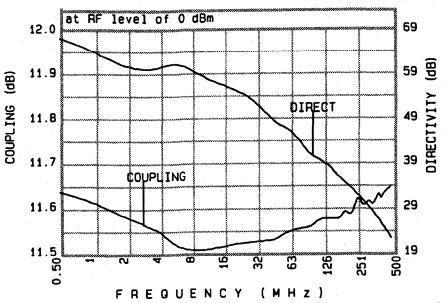
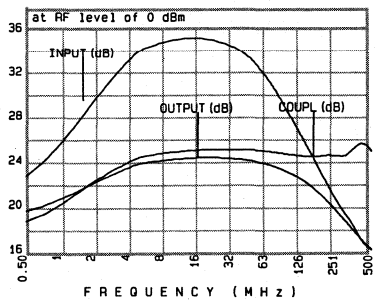
Mini-Circuits

PDC-10-1, ZFDC-10-1, ZDC-10-1, ZMDC-10-1

0.5 to 500 MHz







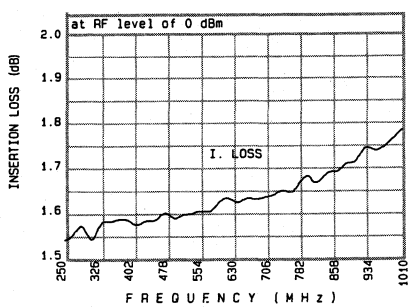
Freq. (MHz)	I. Loss (dB) In-Out
0.50	0.80
1.75	0.72
5.49	0.64
84.17	0.72
180.32	0.80
250.25	0.85
291.46	0.88
388.86	0.98
486.26	1.11
500.00	1.13

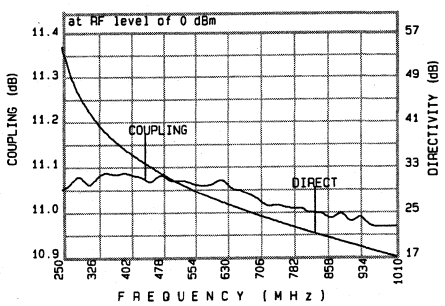
Coupling (dB) In-CPL	Directivity (dB)
11.64	67.65
11.58	59.85
11.51	62.42
11.56	41.10
11.59	34.41
11.61	30.61
11.61	28.87
11.65	24.21
11.68	20.17
11.70	19.54

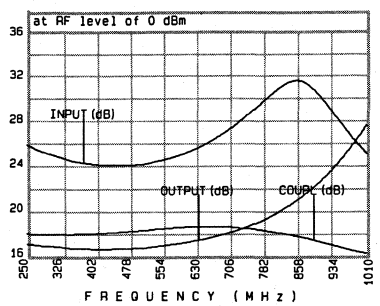
Return Loss (dB) In	Out	CPL
22.87	19.76	18.76
30.24	22.43	22.75
34.63	24.16	24.78
29.64	23.57	25.00
23.43	21.33	24.75
20.71	19.77	24.77
19.66	19.00	24.80
17.56	17.51	25.80
16.49	16.42	25.43
16.35	16.29	25.22

PDC-10-2, ZMDC-10-2, ZDC-10-2

250 to 1000 MHz







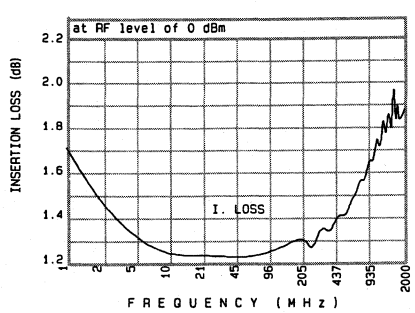
Freq. (MHz)	I. Loss (dB) In-Out
250.00	1.54
371.62	1.59
493.24	1.59
500.00	1.59
513.51	1.60
635.13	1.62
756.75	1.64
858.10	1.69
979.72	1.77
1000.00	1.79

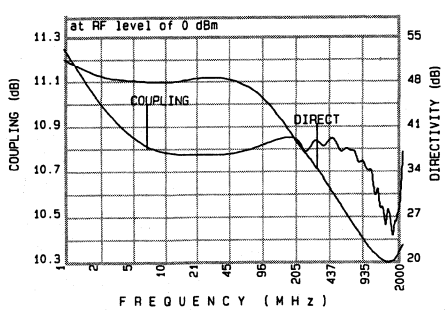
Coupling (dB) In-CPL	Directivity (dB)
11.05	54.80
11.08	37.67
11.07	31.15
11.07	30.80
11.07	30.26
11.05	26.24
11.01	22.89
10.98	20.37
10.97	17.60
10.97	17.12

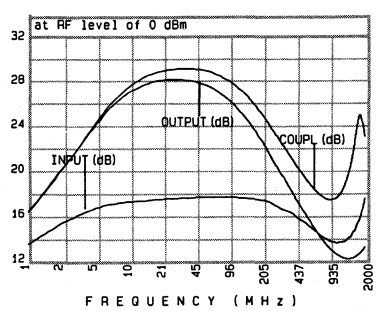
Return Loss (dB) In	Out	CPL
26.03	17.11	18.01
24.40	16.72	18.06
24.21	16.77	18.34
24.23	16.78	18.35
24.28	16.81	18.38
25.84	17.54	18.73
29.35	19.03	18.50
31.80	21.42	17.77
26.08	26.67	16.50
25.26	27.86	16.35

PDC-10-5, ZFDC-10-5

1 to 2000 MHz







Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.72
2.00	1.44
5.00	1.29
10.00	1.23
20.00	1.24
50.00	1.22
100.00	1.26
200.00	1.34
1000.00	1.79
2000.00	1.95

Coupling (dB) In-CPL	Directivity (dB)
11.26	51.91
10.99	48.59
10.82	48.39
10.78	47.89
10.78	49.11
10.78	48.83
10.84	44.88
10.88	38.04
10.73	21.92
10.79	22.74

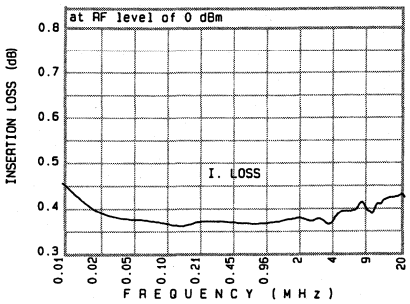
Return Loss (dB) In	Out	CPL
13.62	16.54	16.42
15.74	20.60	20.51
17.27	25.50	25.75
17.43	27.76	28.35
17.70	28.51	29.38
17.86	28.03	29.30
17.82	25.88	27.79
17.53	21.96	24.56
13.85	12.50	18.15
20.63	14.32	18.05

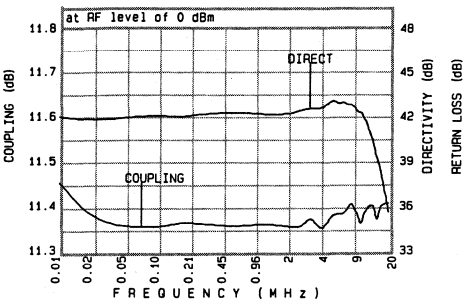
very broadband

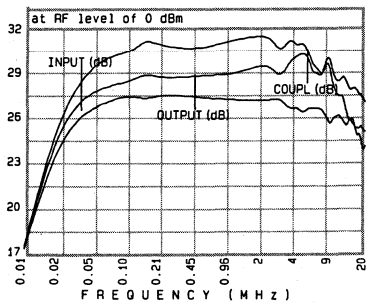
Directional Couplers

PDC-10-6, ZFDC-10-6

0.005 to 20 MHz







Freq. (MHz)	I. Loss (dB) In-Out
0.005	0.46
0.020	0.38
0.050	0.38
0.100	0.37
0.200	0.38
0.500	0.37
9.930	0.39
10.540	0.41
19.250	0.44
20.000	0.43

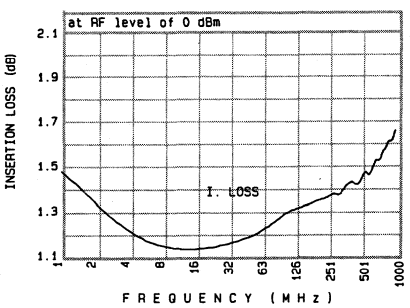
Coupling (dB) In-CPL	Directivity (dB)
11.46	42.21
11.37	41.97
11.36	42.22
11.36	42.32
11.37	42.36
11.36	42.58
11.39	42.12
11.40	41.92
11.40	34.07
11.40	33.28

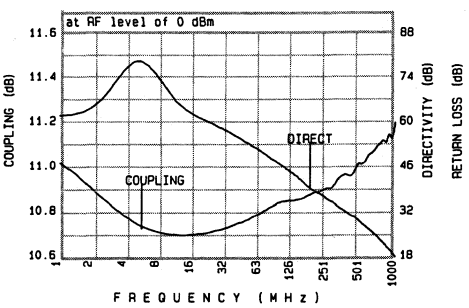
Return Loss (dB)

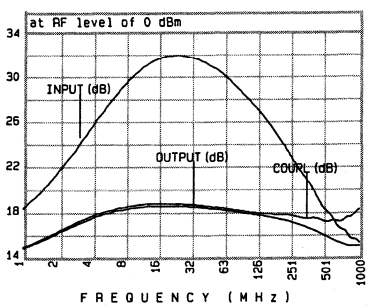
In	Out	CPL
17.45	17.48	17.63
25.66	26.73	27.36
27.20	28.32	30.42
27.80	28.59	30.46
27.84	28.82	30.99
27.58	29.12	30.88
26.27	29.24	28.38
26.30	28.82	28.06
25.36	27.52	24.05
25.30	27.33	24.31

PDC-10-21, ZFDC-10-21

1 to 1000 MHz







Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.49
2.25	1.30
9.74	1.14
167.08	1.36
361.89	1.45
500.50	1.47
584.17	1.55
777.72	1.63
972.53	1.72
1000.00	1.75

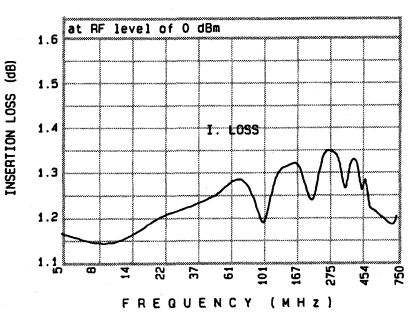
Coupling (dB) In-CPL	Directivity (dB)
11.03	62.75
10.87	64.39
10.70	66.04
10.88	40.75
10.98	33.06
11.02	29.44
11.07	27.42
11.13	23.07
11.17	19.15
11.21	18.72

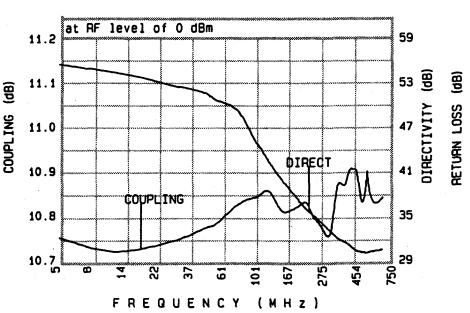
Return Loss (dB)

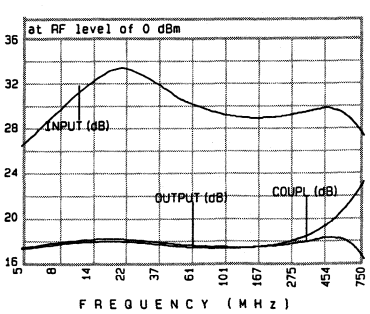
In	Out	CPL
18.51	14.90	14.98
22.67	16.76	16.95
31.25	18.72	18.93
25.31	17.63	17.99
20.15	16.56	17.67
18.08	15.85	17.37
16.97	15.51	17.40
15.77	15.13	17.78
15.32	15.25	18.59
15.44	15.35	18.78

PDC-10-22, ZFDC-10-22

5 to 750 MHz







Freq. (MHz)	I. Loss (dB) In-Out
5.00	1.17
10.00	1.13
20.00	1.21
50.00	1.26
100.00	1.20
200.00	1.24
366.22	1.34
500.00	1.22
727.43	1.28
750.00	1.27

Coupling (dB) In-CPL	Directivity (dB)
10.76	56.00
10.72	55.00
10.74	54.00
10.79	52.00
10.85	45.27
10.84	36.71
10.87	31.90
10.90	30.51
10.96	30.19
10.94	29.66

Return Loss (dB)

In	Out	CPL
26.72	17.45	17.54
31.54	18.12	18.32
34.28	18.19	18.42
30.97	17.69	17.87
29.52	17.58	17.66
29.28	17.84	17.74
29.98	19.03	18.34
29.97	20.33	18.48
27.90	23.20	16.88
27.62	23.46	16.58

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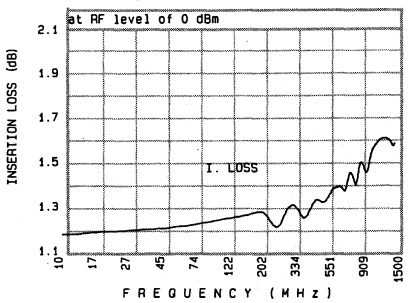
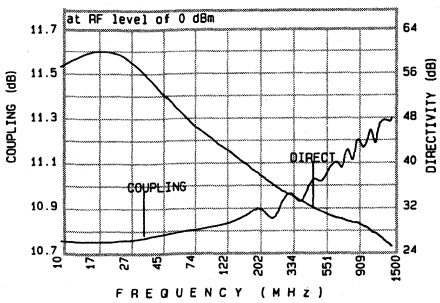
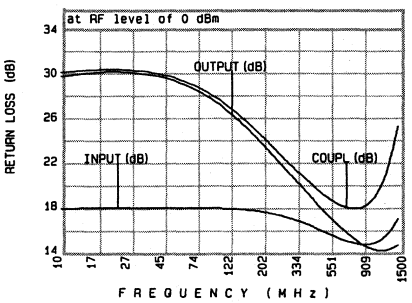
Mini-Circuits

PDC-10-54

10 to 1500 MHz



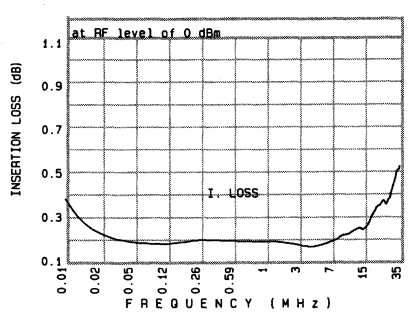


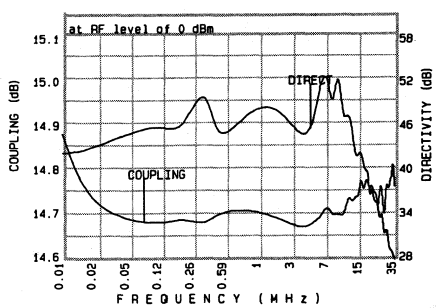


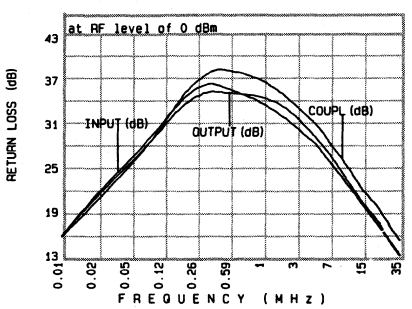
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
10.00	1.19	10.76	57.69	18.12	30.01	30.38
20.00	1.21	10.75	63.30	18.18	30.68	30.84
50.00	1.22	10.80	49.75	18.21	29.84	30.10
100.00	1.26	10.82	43.92	18.17	27.52	27.95
200.00	1.31	10.93	37.99	17.77	23.54	24.25
500.00	1.34	11.03	31.49	15.86	17.46	19.07
750.00	1.42	11.13	29.86	14.99	15.27	18.14
1000.00	1.58	11.28	28.13	15.12	14.41	19.41
1460.00	1.60	11.34	24.78	18.36	15.24	27.48
1500.00	1.56	11.30	24.58	18.83	15.42	27.35

PDC-15-6, ZFDC-15-6, ZMDC-15-6, ZDC-15-6

0.01 to 35 MHz



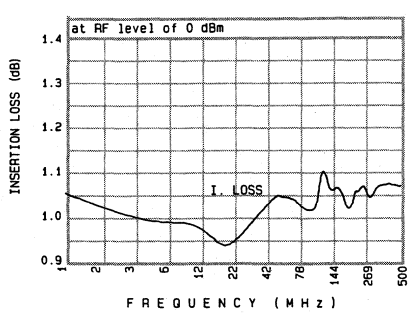


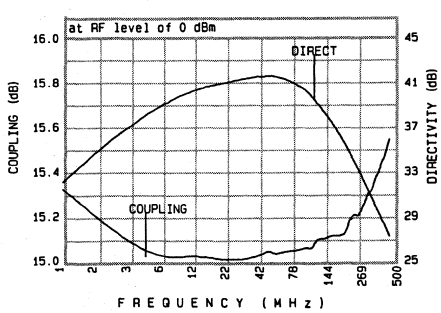


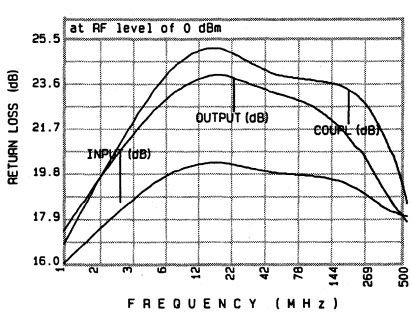
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.01	0.40	14.89	42.70	16.22	16.21	16.11
0.02	0.22	14.71	43.09	21.21	20.87	20.13
0.11	0.19	14.68	47.43	30.96	30.40	30.27
5.00	0.19	14.69	47.31	28.81	29.56	31.39
7.80	0.22	14.70	47.82	25.23	26.10	27.86
16.55	0.29	14.75	40.87	19.67	19.99	21.95
17.51	0.32	14.79	40.28	19.17	19.66	21.42
26.25	0.40	14.73	33.38	16.05	16.18	18.31
34.04	0.53	14.80	28.46	13.80	13.98	15.90
35.00	0.55	14.77	28.18	13.68	13.81	15.76

PDC-15-21

1 to 500 MHz







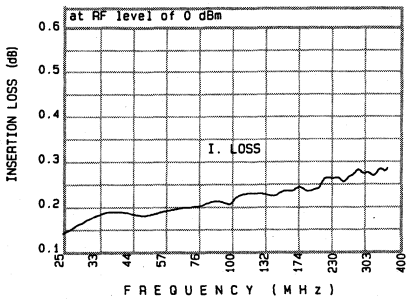
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	1.06	15.34	32.42	16.05	17.46	16.90
2.00	1.02	15.17	36.04	17.98	20.35	20.48
5.00	0.99	15.02	38.99	19.71	22.88	23.85
10.00	1.00	15.04	40.49	20.29	23.93	25.18
20.00	0.94	15.02	41.24	20.35	24.08	25.14
50.00	1.05	15.04	41.93	19.93	23.29	24.09
100.00	1.04	15.06	40.11	19.78	22.64	23.85
200.00	1.07	15.20	35.05	19.30	21.06	23.28
250.50	1.05	15.25	32.88	18.98	20.43	22.73
500.00	1.10	15.74	25.54	18.12	17.89	18.66

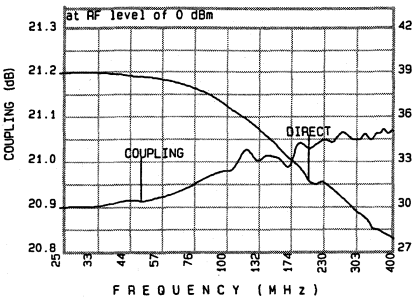
very broadband

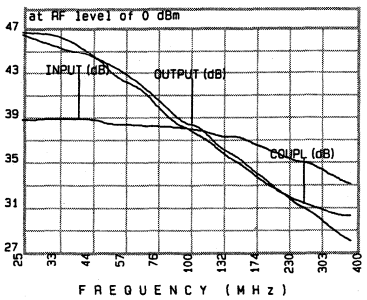
Directional Couplers

PDC-20-1, ZMDC-20-1, ZDC-20-1

25 to 400 MHz



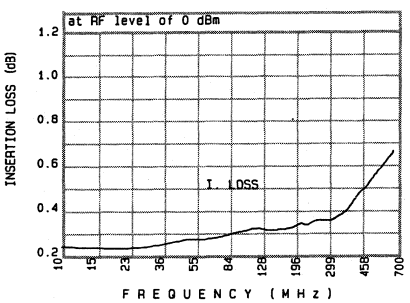


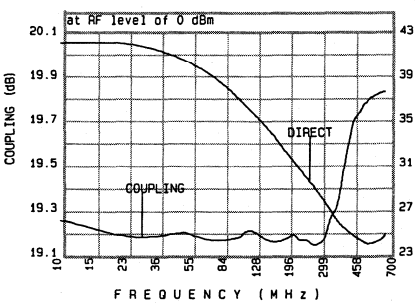


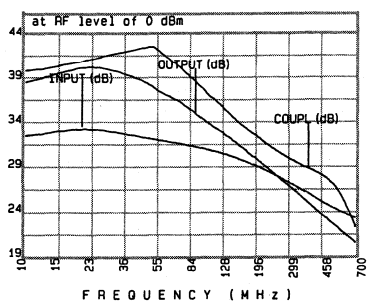
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
25.00	0.14	20.90	39.03	38.82	46.83	46.62
50.00	0.18	20.91	38.76	38.41	43.91	43.34
100.00	0.22	20.98	36.87	37.98	38.48	37.78
118.75	0.23	21.05	35.93	37.56	36.95	36.63
200.00	0.24	21.03	31.74	35.84	32.57	32.64
212.51	0.27	21.04	31.42	35.51	32.18	32.20
254.17	0.27	21.06	30.87	34.98	30.91	31.28
316.68	0.27	21.07	29.28	33.88	29.06	30.42
389.60	0.31	21.07	28.01	32.78	27.58	30.10
400.00	0.32	21.07	27.86	32.68	27.39	30.03

PDC-20-1W

10 to 700 MHz



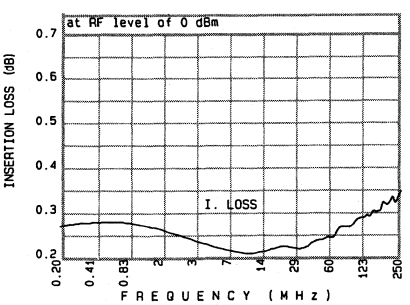


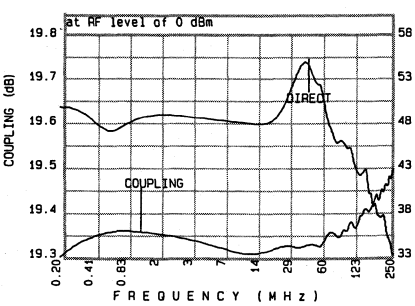


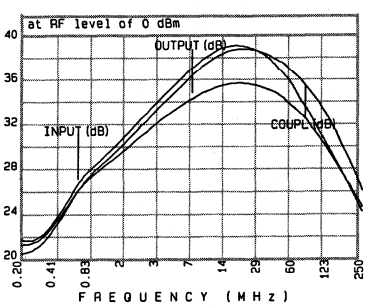
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
10.00	0.24	19.26	42.27	32.56	38.59	39.87
20.00	0.23	19.19	42.35	33.59	40.69	41.00
50.00	0.28	19.21	40.65	32.19	38.16	42.91
100.00	0.31	19.18	36.99	30.96	33.93	37.04
200.00	0.35	19.20	31.34	28.72	29.15	31.77
334.71	0.39	19.29	26.31	26.26	25.25	29.01
355.00	0.41	19.40	25.76	25.95	24.79	28.80
500.00	0.57	19.81	24.06	24.22	22.25	26.42
679.71	0.75	19.83	26.55	23.17	19.88	20.13
700.00	0.77	19.82	27.18	23.07	19.62	19.39

PDC-20-3, ZFDC-20-3, ZDC-20-3, ZMDC-20-3

0.2 to 250 MHz







Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.20	0.27	19.30	50.00	21.66	21.23	20.44
0.30	0.28	19.34	49.89	21.42	21.34	20.83
0.92	0.28	19.36	49.51	28.84	28.04	28.38
49.93	0.24	19.33	51.88	36.50	34.32	37.55
101.43	0.29	19.39	45.73	31.41	30.95	34.11
125.15	0.30	19.40	42.05	29.83	29.57	32.57
162.29	0.30	19.42	38.02	27.88	27.75	30.24
216.29	0.33	19.46	35.65	25.38	25.70	27.77
243.13	0.34	19.49	33.18	24.43	24.88	26.47
250.00	0.35	19.50	33.42	24.21	24.67	26.09

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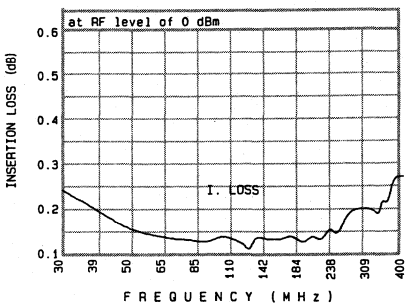
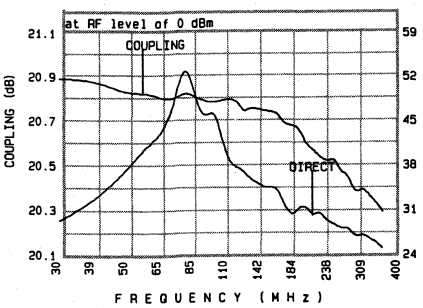
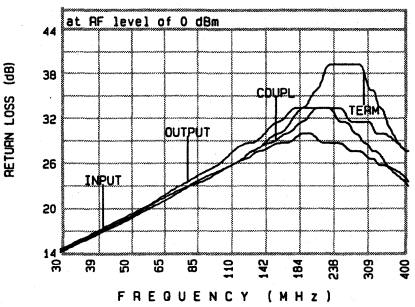
Mini-Circuits

ZFDC-20-1H

30 to 400 MHz



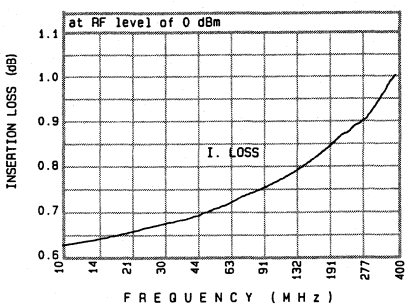


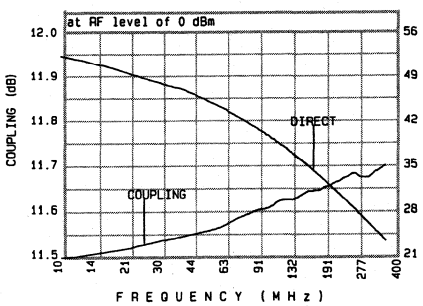


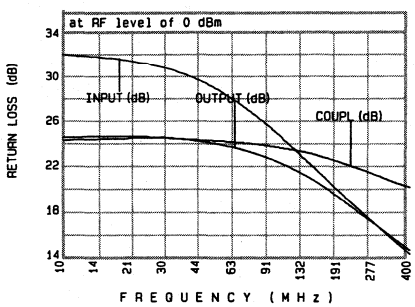
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Coupling (dB) Out-Term	Directivity (dB) Out-CPL	Directivity (dB) In-Term	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL	Return Loss (dB) Term
30.00	0.25	20.91	21.06	29.98	30.09	15.04	15.04	14.88	14.72
50.00	0.16	20.84	20.94	37.79	38.11	19.40	19.73	19.40	19.08
60.00	0.15	20.85	20.91	42.22	42.34	21.23	21.23	20.83	20.83
100.00	0.15	20.80	20.89	49.13	40.37	25.66	26.44	25.66	25.66
160.00	0.14	20.76	20.77	35.50	33.21	29.42	32.26	30.71	30.71
200.00	0.15	20.61	20.67	32.23	30.16	30.71	34.15	34.15	36.61
280.00	0.21	20.44	20.54	28.30	27.87	28.30	30.71	32.26	40.09
300.00	0.19	20.40	20.47	27.58	26.41	27.32	29.42	32.26	36.61
391.00	0.28	20.21	20.32	24.19	24.06	24.94	24.29	28.30	28.30
400.00	0.28	20.15	20.25	24.06	24.50	24.29	23.69	28.30	28.30

TODC-10-1

10 to 400 MHz



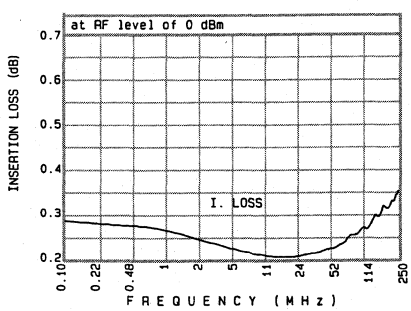


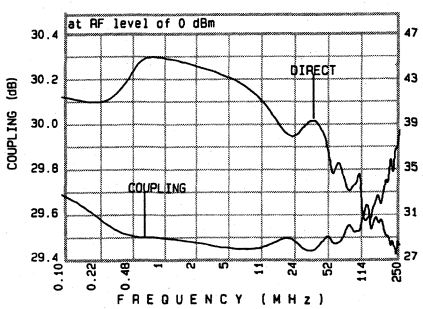


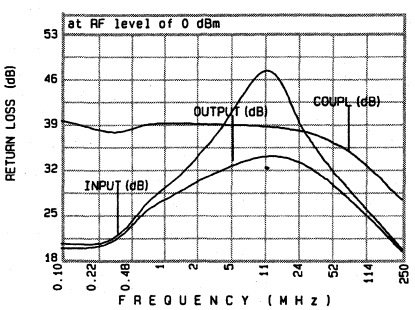
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL
10.00	0.63	11.50	52.78	32.35	24.87	24.61
20.00	0.66	11.52	50.12	31.88	24.97	24.78
50.00	0.71	11.56	45.69	29.41	24.34	24.55
100.00	0.77	11.61	39.88	25.13	22.64	23.95
130.00	0.80	11.63	37.04	23.08	21.55	23.57
200.00	0.87	11.67	31.63	19.67	19.21	22.51
230.00	0.89	11.68	29.69	18.62	18.34	22.10
320.00	0.99	11.71	24.82	16.10	16.23	21.03
390.00	1.03	11.70	21.73	14.62	14.91	20.44
400.00	1.04	11.70	21.32	14.44	14.76	20.40

ZMDC-30-1

0.1 to 250 MHz







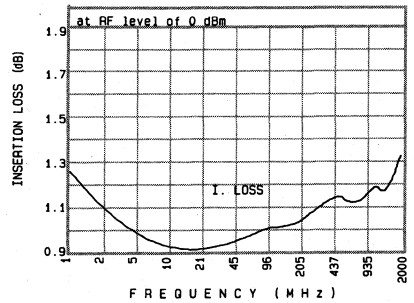
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL
0.10	0.29	29.70	41.70	20.80	20.07	40.08
0.30	0.28	29.53	40.54	20.41	20.23	37.53
0.92	0.27	29.51	45.28	29.21	27.62	39.72
49.93	0.23	29.53	37.06	31.75	29.83	36.47
101.43	0.27	29.52	35.82	26.21	25.27	33.07
125.15	0.31	29.62	31.94	24.55	23.83	31.69
162.29	0.32	29.64	30.86	22.50	21.90	29.80
216.29	0.36	29.78	28.15	20.26	19.82	27.86
243.13	0.39	29.94	28.36	19.32	18.96	27.14
250.00	0.40	29.98	28.40	19.10	18.72	26.90

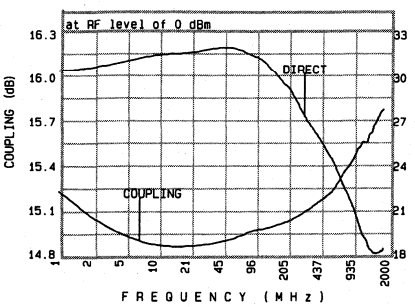
very broadband

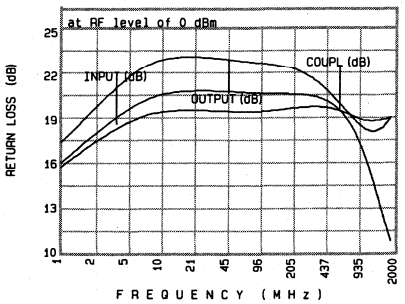
Directional Couplers

ZFDC-15-5

1 to 2000 MHz







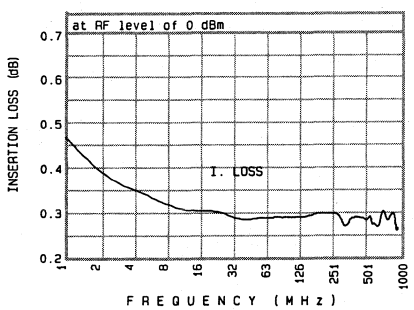
Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.28
1.98	1.09
9.97	0.93
200.66	1.07
758.84	1.15
1009.10	1.21
1243.70	1.19
1592.20	1.28
1889.20	1.37
2000.00	1.38

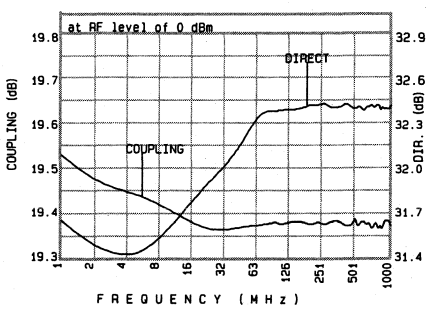
Coupling (dB) In-CPL	Directivity (dB)
15.26	30.81
15.06	30.99
14.88	31.98
15.05	29.96
15.41	22.67
15.56	20.52
15.58	19.09
15.74	18.30
15.84	19.26
15.88	20.19

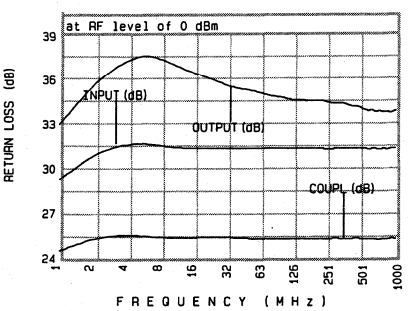
Return Loss (dB) In	Out	CPL
16.05	17.71	16.35
17.95	20.28	18.50
19.94	23.59	21.17
20.12	22.78	21.05
19.57	19.42	18.68
19.28	18.65	16.68
19.27	18.53	14.73
19.35	19.01	12.18
19.63	19.81	10.59
19.72	20.25	10.14

ZFDC-20-4

1 to 1000 MHz







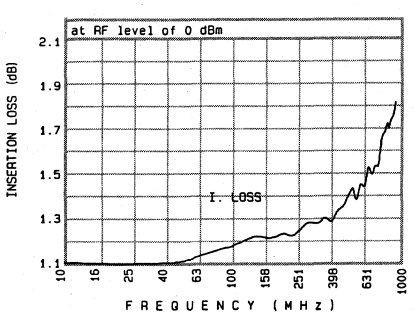
Freq. (MHz)	I. Loss (dB) In-Out
1.00	0.48
2.00	0.38
5.00	0.35
10.00	0.31
20.00	0.32
50.00	0.30
100.00	0.30
500.00	0.28
966.81	0.29
1000.00	0.31

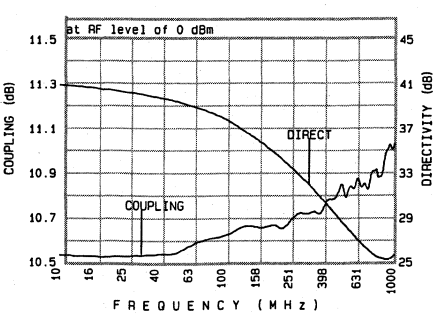
Coupling (dB) In-CPL	Directivity (dB)
19.54	31.67
19.47	31.46
19.45	31.41
19.41	31.65
19.37	31.91
19.38	32.26
19.38	32.43
19.38	32.44
19.39	32.44
19.38	32.46

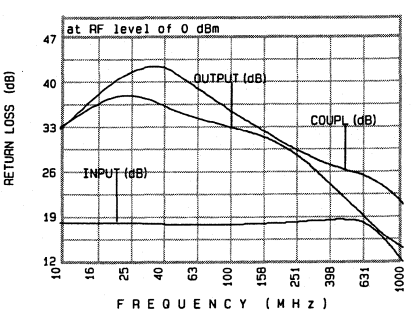
Return Loss (dB) In	Out	CPL
29.54	33.27	24.80
31.70	36.63	25.89
32.14	38.42	25.82
31.62	37.18	25.62
31.73	36.40	25.77
31.69	35.62	25.63
31.67	34.96	25.64
31.65	34.28	25.66
31.70	34.17	25.69
31.69	34.12	25.63

ZFDC-10-2

10 to 1000 MHz







Freq. (MHz)	I. Loss (dB) In-Out
10.00	1.12
20.00	1.11
50.00	1.12
100.00	1.19
200.00	1.25
370.00	1.28
500.00	1.46
700.00	1.52
970.00	1.92
1000.00	1.96

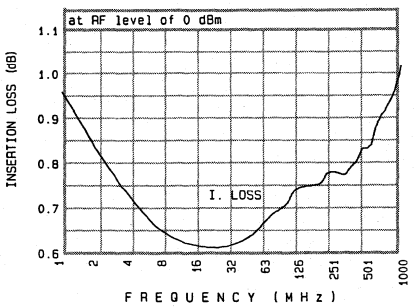
Coupling (dB) In-CPL	Directivity (dB)
10.55	41.31
10.54	40.86
10.55	39.90
10.63	38.28
10.69	35.14
10.72	31.24
10.87	28.92
10.81	26.56
11.01	25.88
11.05	26.03

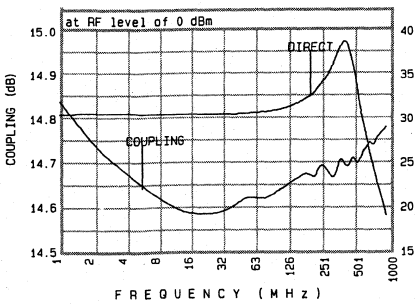
Return Loss (dB) In	Out	CPL
18.67	33.83	33.53
18.79	40.11	42.53
18.39	35.97	41.56
18.40	33.63	36.05
18.70	30.74	31.33
19.21	25.13	27.97
19.13	21.59	26.74
17.47	17.93	25.28
13.05	15.04	22.16
12.53	14.74	21.65

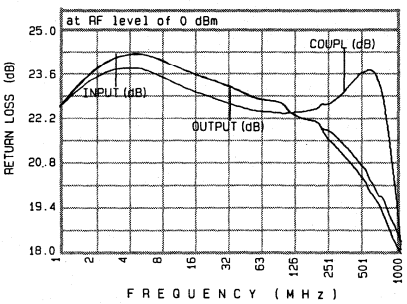
Mini-Circuits

ZEDC-15-2B

1 to 1000 MHz



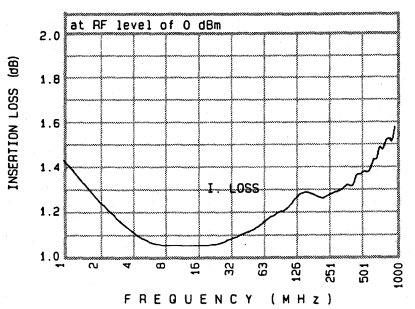


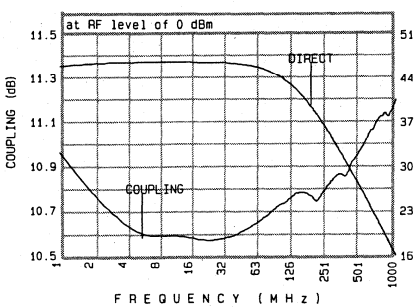


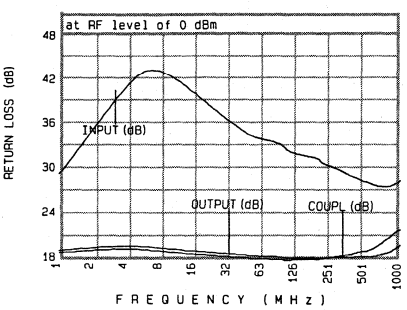
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	0.97	14.85	30.94	22.72	22.68	22.69
2.00	0.81	14.73	31.19	24.23	24.19	23.90
5.00	0.68	14.66	31.01	24.54	24.55	24.02
10.00	0.63	14.60	30.97	23.94	23.94	23.38
20.00	0.62	14.59	30.99	23.58	23.56	23.01
50.00	0.66	14.64	31.10	22.98	22.97	22.58
100.00	0.75	14.65	31.59	22.58	22.60	22.52
200.00	0.79	14.69	33.80	22.04	22.01	22.84
500.00	0.85	14.72	30.81	20.30	20.65	23.89
1000.00	1.04	14.79	15.83	18.09	18.46	18.21

ZEDC-10-2B

1 to 1000 MHz



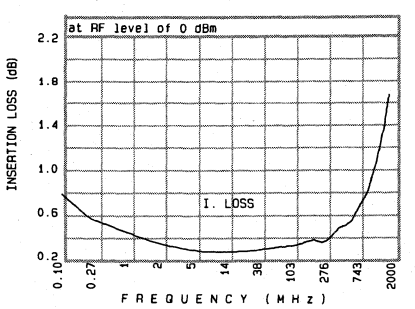


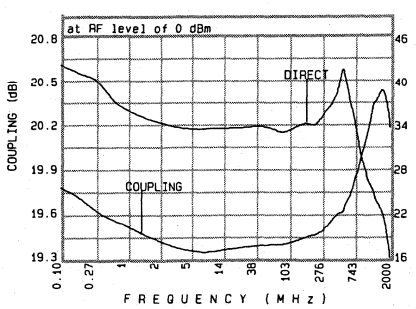


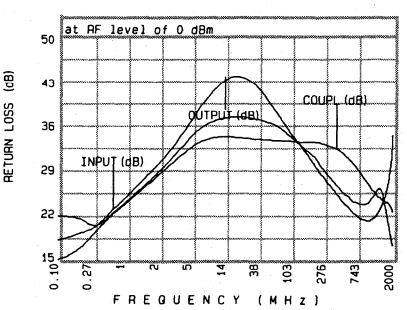
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	1.45	10.98	46.64	29.59	19.38	19.07
2.00	1.23	10.75	47.13	36.69	19.94	19.55
5.00	1.06	10.59	47.31	45.10	20.07	19.64
10.00	1.07	10.62	47.30	42.74	19.52	19.10
20.00	1.06	10.58	47.22	38.88	19.22	18.79
50.00	1.14	10.64	46.80	34.53	18.71	18.37
100.00	1.23	10.76	44.74	33.47	18.53	18.20
200.00	1.28	10.76	38.91	31.74	18.49	18.32
500.00	1.39	11.00	26.99	28.71	18.63	19.35
1000.00	1.67	11.22	16.77	28.81	20.20	22.33

PDC-20A-5

0.1 to 2000 MHz







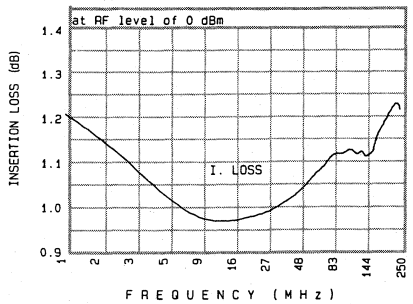
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.10	0.80	19.80	42.90	22.32	18.40	15.30
0.20	0.60	19.71	41.29	22.12	19.73	17.14
0.50	0.49	19.57	37.18	23.02	23.62	22.88
1.00	0.41	19.50	35.94	26.29	27.31	26.01
2.00	0.34	19.42	34.63	29.91	31.22	29.52
5.00	0.29	19.36	33.94	35.77	38.05	33.98
10.00	0.28	19.36	34.20	38.00	43.40	35.28
20.00	0.29	19.39	34.18	38.45	46.13	34.97
1000.00	0.95	20.15	28.28	24.62	21.67	27.44
2000.00	2.12	20.22	16.58	17.72	35.28	23.10

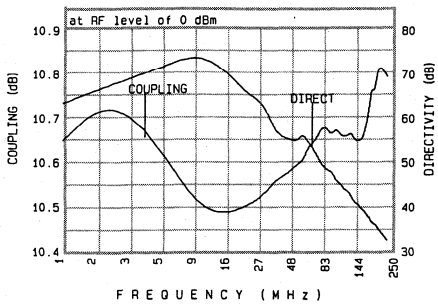
very broadband

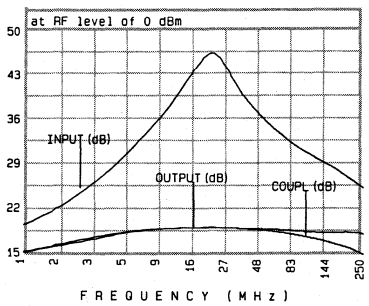
Directional Couplers

PDC-10-1-75, ZDC-10-1-75

1 to 250 MHz







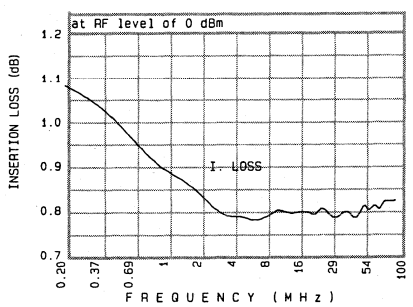
Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.22
2.00	1.14
5.00	1.02
10.00	0.97
20.00	0.99
50.00	1.06
100.00	1.14
125.00	1.14
200.00	1.26
250.00	1.18

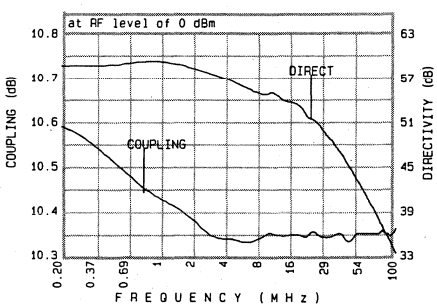
Coupling (dB) In-CPL	Directivity (dB)
10.66	64.46
10.77	68.62
10.63	72.79
10.48	76.67
10.51	66.34
10.61	55.63
10.67	46.20
10.66	41.93
10.80	34.67
10.76	30.79

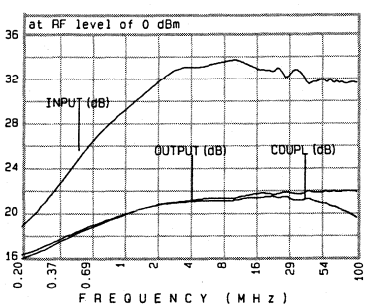
Return Loss (dB) In	Out	CPL
19.98	15.74	15.69
23.91	17.52	17.17
31.09	19.14	18.96
38.21	19.58	19.60
49.72	19.67	19.75
36.71	19.46	19.26
31.50	19.08	18.28
30.23	18.94	17.79
27.42	18.97	16.52
25.90	18.73	15.50

PDC-10-6-75

0.2 to 100 MHz







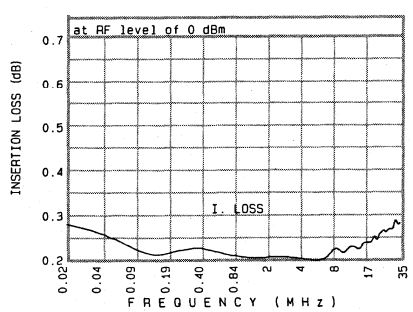
Freq. (MHz)	I. Loss (dB) In-Out
0.20	1.09
0.50	1.01
1.99	0.87
12.67	0.80
31.19	0.80
49.70	0.82
52.89	0.81
75.60	0.83
96.94	0.84
100.00	0.85

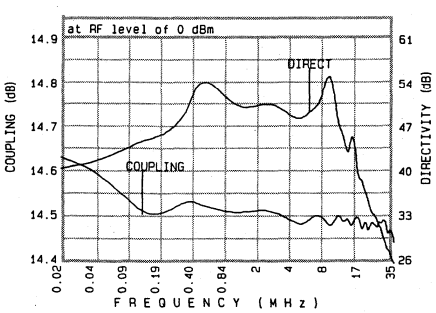
Coupling (dB) In-CPL	Directivity (dB)
10.60	59.21
10.52	59.15
10.41	59.22
10.35	54.18
10.35	49.12
10.36	43.60
10.36	42.89
10.36	37.98
10.36	34.35
10.37	33.88

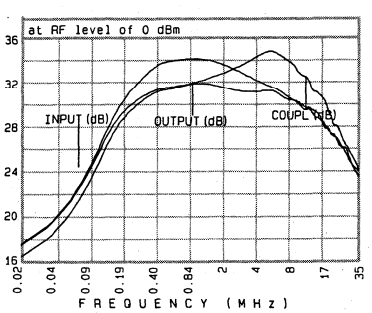
Return Loss (dB) In	Out	CPL
19.03	16.12	16.44
25.12	18.50	18.70
31.41	20.99	20.95
33.63	21.86	21.66
33.22	21.99	21.39
32.31	22.15	21.08
31.97	22.22	21.12
31.95	22.27	20.40
32.13	22.09	19.55
32.26	22.13	19.41

PDC-15-6-75, ZFDC-15-6-75, ZDC-15-6-75

0.02 to 35 MHz







Freq. (MHz)	I. Loss (dB) In-Out
0.02	0.29
0.11	0.21
0.19	0.23
5.00	0.21
8.76	0.22
17.51	0.27
18.47	0.25
27.22	0.30
34.04	0.32
35.00	0.32

Coupling (dB) In-CPL	Directivity (dB)
14.64	41.06
14.51	45.49
14.51	46.04
14.49	49.49
14.48	56.79
14.47	39.43
14.50	37.32
14.50	30.61
14.47	26.41
14.45	26.24

Return Loss (dB) In	Out	CPL
17.84	17.76	16.69
27.28	27.01	26.01
31.77	30.62	30.08
32.03	31.88	35.38
30.52	30.72	33.26
27.49	27.88	29.50
27.92	27.54	28.43
25.08	25.19	25.91
24.15	23.56	23.91
23.72	23.38	23.52

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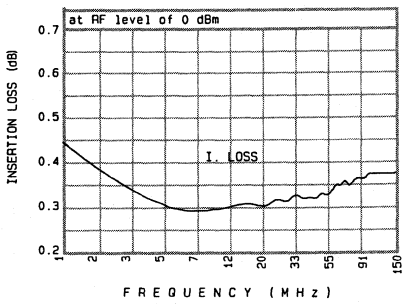
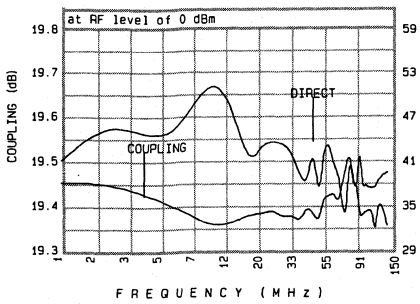
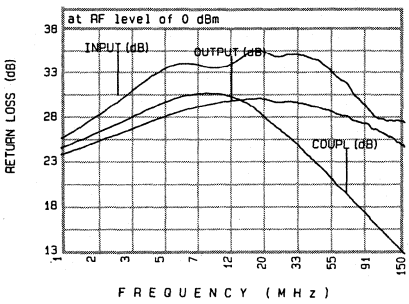
Mini-Circuits

PDC-20-3-75, ZDC-20-3-75

1 to 150 MHz



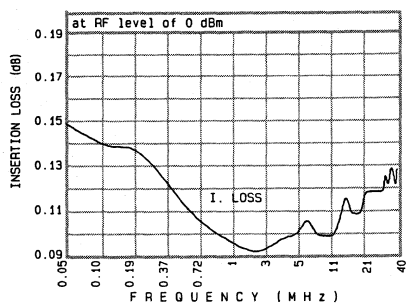


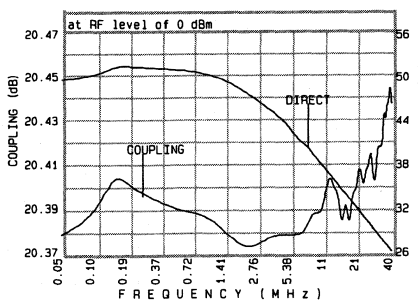


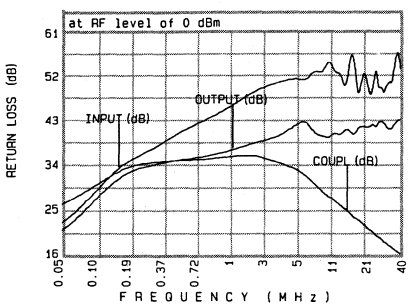
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	0.45	19.46	41.58	25.97	24.04	24.88
1.93	0.36	19.46	47.84	29.62	26.37	27.44
9.94	0.30	19.35	56.88	32.94	30.18	31.33
20.00	0.30	19.39	43.82	35.94	30.58	28.32
46.82	0.34	19.37	35.25	34.29	29.28	22.54
73.64	0.36	19.53	43.57	30.78	28.04	18.80
85.00	0.37	19.56	33.76	29.93	27.73	17.77
119.45	0.38	19.51	31.82	28.10	26.21	14.96
146.09	0.39	19.52	30.86	28.08	25.47	13.35
150.00	0.39	19.54	29.43	27.90	25.09	13.11

PDC-20-6-75

0.05 to 40 MHz



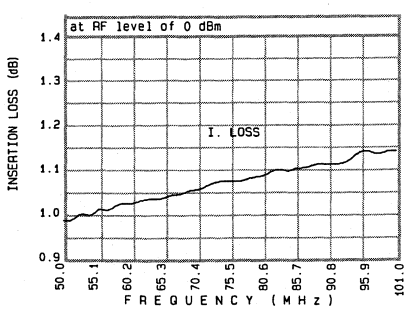


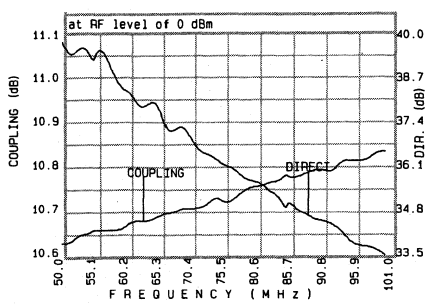


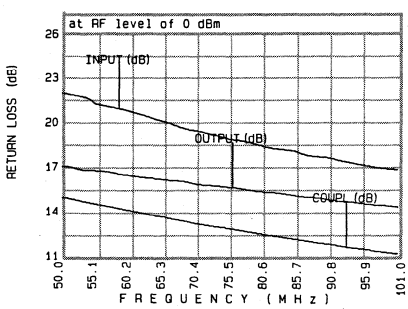
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.05	0.15	20.38	50.11	23.07	21.50	26.75
0.10	0.14	20.39	50.77	30.25	28.78	31.25
0.20	0.14	20.40	51.93	36.45	34.32	35.14
0.50	0.11	20.39	51.56	42.08	36.01	35.76
1.00	0.10	20.39	51.07	45.08	36.92	36.15
12.64	0.12	20.40	36.48	48.65	42.37	25.92
19.87	0.12	20.40	32.72	49.54	42.49	21.88
26.43	0.12	20.42	30.27	49.04	43.45	19.45
38.77	0.13	20.45	27.05	51.37	43.29	16.37
40.00	0.12	20.44	26.75	49.82	44.94	16.03

ZDC-2375

50 to 100 MHz





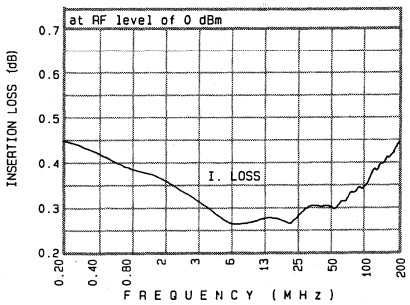


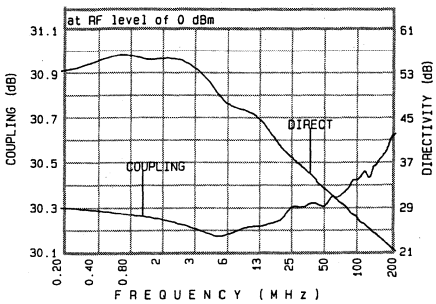
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
50.00	0.99	10.63	39.89	22.24	17.31	15.20
55.38	1.02	10.66	39.71	21.48	16.98	14.72
62.13	1.04	10.68	37.84	20.75	16.54	14.13
68.88	1.06	10.71	37.45	19.77	16.24	13.57
75.63	1.08	10.72	36.18	19.10	15.90	13.09
82.38	1.11	10.77	35.42	18.49	15.53	12.62
87.88	1.12	10.79	34.78	17.99	15.24	12.21
94.63	1.15	10.82	33.96	17.46	14.84	11.81
98.63	1.15	10.84	33.75	17.20	14.72	11.55
100.00	1.15	10.84	33.55	17.13	14.62	11.48

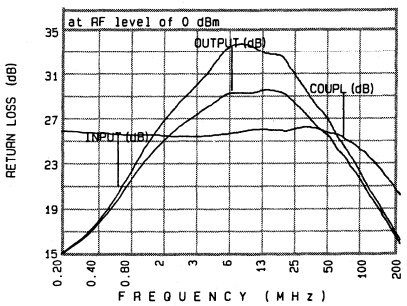
very broadband

Directional Couplers

ZFDC-3375 — 75 ohms — 0.2 to 200 MHz





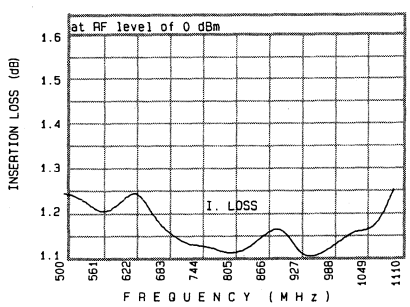


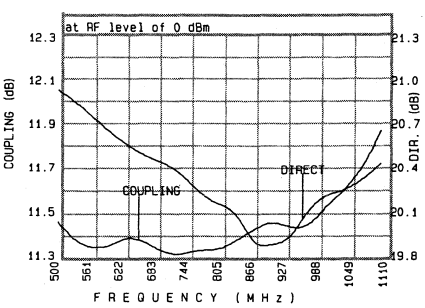
Freq. (MHz)	I. Loss (dB) In-Out
0.20	0.46
0.70	0.39
2.20	0.34
20.18	0.27
60.64	0.32
97.10	0.37
109.09	0.40
151.55	0.43
194.01	0.47
200.00	0.47

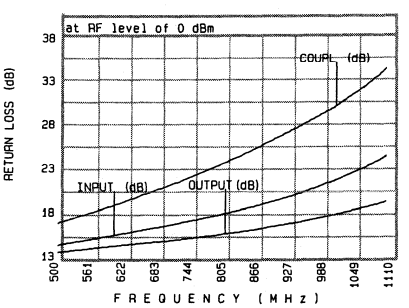
Coupling (dB) In-CPL	Directivity (dB)
30.32	54.26
30.29	58.24
30.25	57.71
30.26	40.30
30.36	31.26
30.45	27.21
30.49	26.73
30.56	24.19
30.67	22.14
30.65	21.85

Return Loss (dB) In	Out	CPL
15.40	15.32	26.38
21.96	21.46	26.02
29.51	27.30	25.81
32.35	29.59	26.40
25.43	24.39	25.99
21.96	21.46	24.64
21.07	20.54	23.95
18.69	18.36	22.27
16.90	16.57	20.93
16.65	16.31	20.69

SCDC-11-2 — 50 ohms — 500 to 1100 MHz





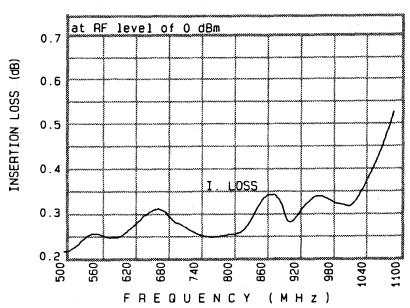


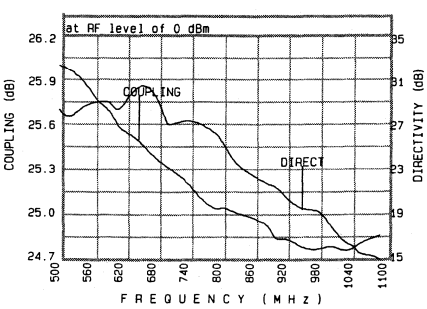
Freq. (MHz)	I. Loss (dB) In-Out
500.000	1.25
532.250	1.24
633.000	1.27
733.750	1.13
834.500	1.12
932.000	1.10
1000.250	1.14
1032.750	1.17
1065.250	1.16
1100.000	1.26

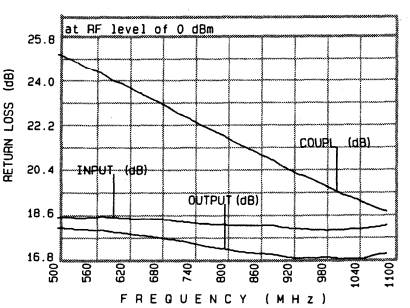
Coupling (dB) In-CPL	Directivity (dB)
11.47	20.96
11.38	20.88
11.41	20.58
11.32	20.38
11.39	20.14
11.45	19.92
11.55	20.25
11.61	20.27
11.71	20.34
11.89	20.46

Return Loss (dB) In	Out	CPL
14.72	13.88	17.20
15.08	14.12	17.87
16.22	14.85	19.99
17.40	15.48	22.25
18.82	16.30	24.98
20.52	17.31	28.03
22.04	18.19	30.29
22.82	18.69	31.74
23.74	19.18	33.03
24.94	19.77	34.94

SCDC-25-2 — 50 ohms — 500 to 1090 MHz







Freq. (MHz)	I. Loss (dB) In-Out
500.000	0.22
547.500	0.27
610.500	0.26
702.750	0.29
799.500	0.26
900.750	0.27
999.750	0.33
1013.250	0.32
1076.250	0.48
1090.000	0.54

Coupling (dB) In-CPL	Directivity (dB)
26.04	28.84
25.93	29.36
25.60	28.13
25.34	27.27
25.08	26.19
24.83	21.97
24.81	18.24
24.79	17.52
24.86	15.59
24.88	15.20

Return Loss (dB) In	Out	CPL
18.57	18.16	25.35
18.54	18.07	24.81
18.58	17.97	24.16
18.47	17.70	23.02
18.29	17.31	21.93
18.18	17.03	20.73
18.09	16.93	19.68
18.07	16.88	19.50
18.21	17.11	18.93
18.27	17.10	18.84

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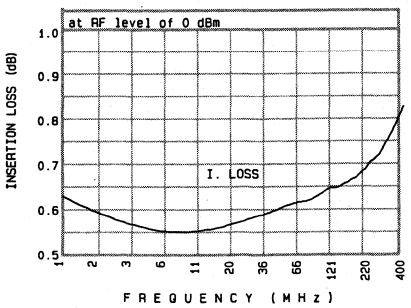
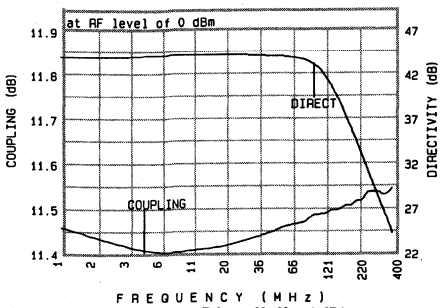
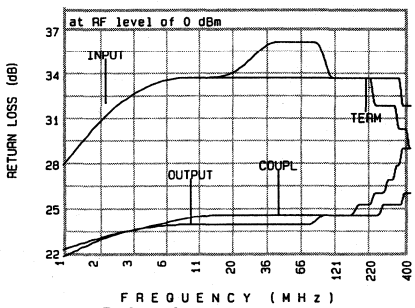
PDC-10-1BD

50 ohms

1 to 400 MHz





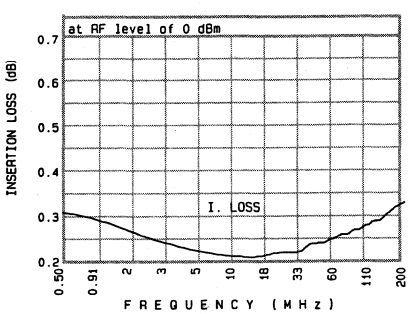


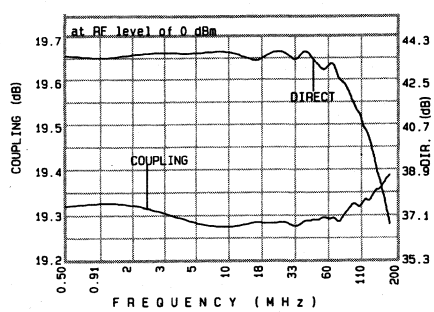
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Coupling (dB) Out-Term	Directivity (dB) Out-CPL	Directivity (dB) In-Term	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL	Return Loss (dB) Term
1.00	0.64	11.47	11.48	44.64	42.04	28.30	22.12	22.61	28.30
2.00	0.59	11.44	11.43	44.54	43.04	32.26	23.69	23.69	32.26
5.00	0.56	11.41	11.41	44.84	43.05	34.15	24.29	24.29	34.15
10.00	0.56	11.42	11.42	44.89	42.69	34.15	24.29	24.94	34.15
20.00	0.58	11.43	11.43	44.89	40.54	34.15	24.29	24.94	34.15
50.00	0.62	11.47	11.47	44.74	34.72	36.61	24.29	24.94	34.15
100.00	0.65	11.50	11.50	43.24	29.06	34.15	24.94	24.94	34.15
200.00	0.70	11.53	11.56	34.09	23.05	34.15	25.66	24.94	34.15
389.00	0.83	11.56	11.72	22.88	17.08	29.42	29.42	26.44	32.26
400.00	0.84	11.56	11.74	22.42	16.81	29.42	29.42	26.44	32.26

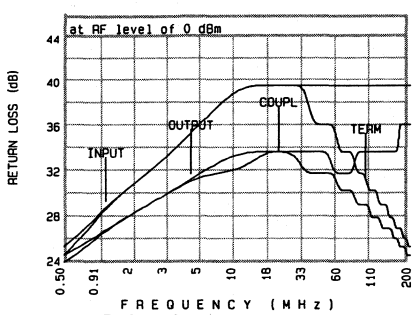
PDC-20-1BD

50 ohms

0.5 to 200 MHz





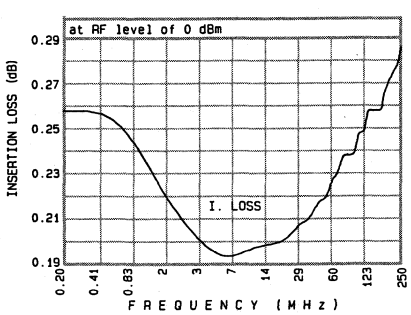


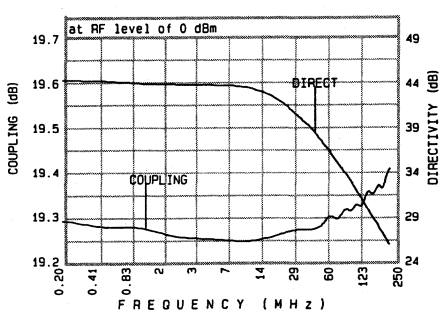
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Coupling (dB) Out-Term	Directivity (dB) Out-CPL	Directivity (dB) In-Term	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL	Return Loss (dB) Term
0.50	0.32	19.33	19.36	43.86	41.25	24.94	24.29	24.94	25.66
1.00	0.30	19.34	19.34	43.68	43.14	29.42	27.32	27.32	29.42
2.00	0.26	19.33	19.32	44.04	43.67	32.26	29.42	29.42	32.26
5.00	0.23	19.29	19.28	43.89	43.43	36.61	32.26	32.26	36.61
10.00	0.22	19.28	19.28	44.16	43.69	40.09	32.26	34.15	40.09
20.00	0.23	19.29	19.28	44.05	42.57	40.09	34.15	34.15	40.09
50.00	0.25	19.30	19.30	43.36	40.26	40.09	34.15	32.26	36.61
100.00	0.29	19.33	19.35	41.46	34.99	40.09	34.15	29.42	30.71
194.50	0.34	19.42	19.55	35.52	29.13	40.09	36.61	24.94	25.66
200.00	0.34	19.44	19.57	35.35	29.00	40.09	36.61	24.94	25.66

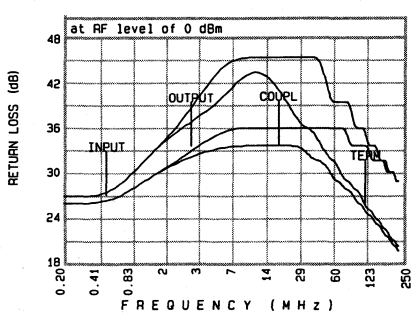
PDC-20-3BD

50 ohms

0.2 to 250 MHz







Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Coupling (dB) Out-Term	Directivity (dB) Out-CPL	Directivity (dB) In-Term	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) CPL	Return Loss (dB) Term
0.20	0.26	19.30	19.32	44.80	51.00	27.32	26.44	26.44	27.32
0.50	0.26	19.28	19.30	44.72	49.34	27.32	26.44	26.44	27.32
1.00	0.24	19.29	19.29	44.37	46.60	32.26	29.42	29.42	32.26
2.00	0.21	19.26	19.25	44.36	46.58	36.61	32.26	32.26	36.61
5.00	0.19	19.26	19.24	44.25	46.04	46.06	36.61	34.15	40.09
10.00	0.20	19.25	19.24	44.19	44.88	46.06	36.61	34.15	46.06
20.00	0.20	19.27	19.26	42.56	42.41	46.06	36.61	34.15	40.09
50.00	0.22	19.29	19.28	37.55	37.31	40.09	36.61	30.71	32.26
122.00	0.26	19.36	19.36	30.62	30.53	34.15	32.26	24.29	24.94
250.00	0.29	19.47	19.61	24.07	24.01	27.32	27.32	18.49	18.78

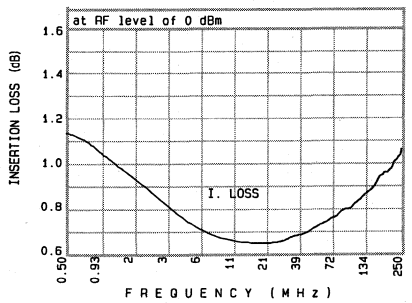
very broadband

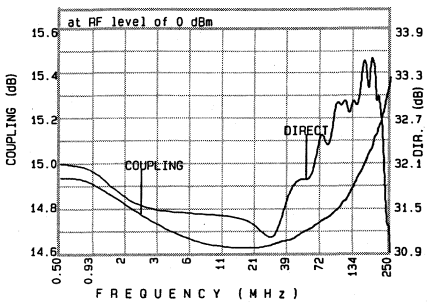
Directional Couplers

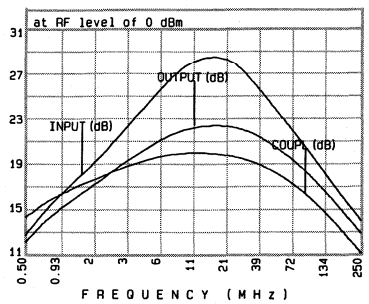
50 ohms

ZDC-15-2

0.5 to 250 MHz



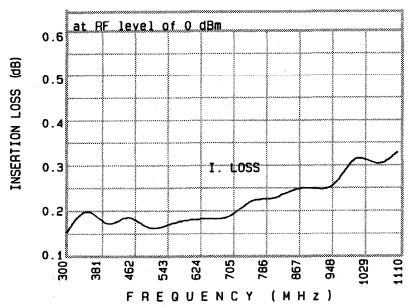


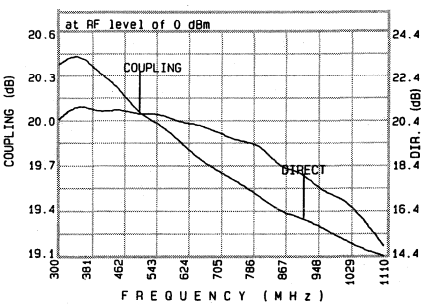


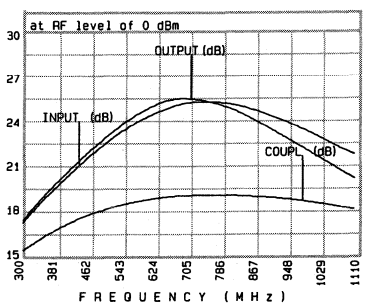
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.50	1.15	14.95	32.15	12.86	12.22	14.49
1.00	1.05	14.92	32.05	16.79	15.50	16.72
2.00	0.93	14.81	31.55	19.94	17.88	18.21
5.00	0.73	14.68	31.49	25.12	21.17	19.99
10.00	0.66	14.64	31.46	28.97	22.79	20.50
20.00	0.65	14.63	31.41	29.44	22.96	20.33
50.00	0.72	14.71	31.96	24.47	21.02	18.68
100.00	0.81	14.82	32.92	20.17	18.17	16.20
125.00	0.87	14.91	33.09	18.71	17.07	15.17
250.00	1.08	15.41	30.95	14.30	13.12	11.31

LRDC-20-2

300 to 1100 MHz



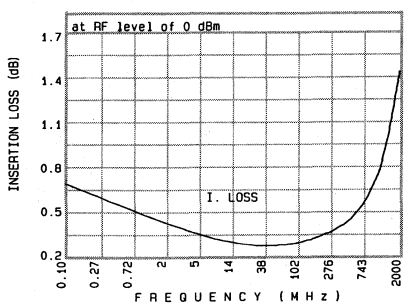


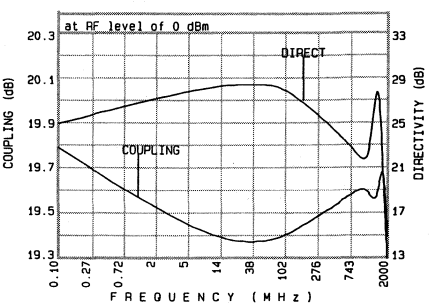


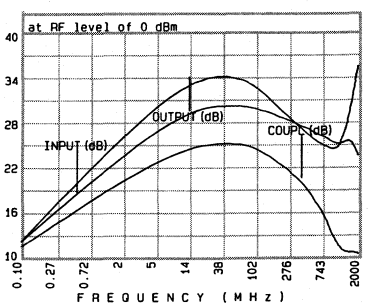
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
300.000	0.16	20.04	23.22	17.43	17.56	15.52
448.750	0.21	20.12	22.19	21.71	22.04	17.87
550.250	0.18	20.09	20.53	23.93	24.41	18.73
601.000	0.19	20.02	19.71	24.72	25.28	19.01
698.875	0.19	19.95	18.31	25.69	25.96	19.30
749.625	0.24	19.89	17.77	25.71	25.73	19.31
851.125	0.26	19.70	16.47	25.24	24.60	19.24
999.750	0.35	19.51	15.24	23.57	22.19	18.85
1050.500	0.30	19.37	14.79	22.79	21.31	18.61
1100.000	0.34	19.18	14.49	22.13	20.48	18.37

ZFDC-20-5

0.1 to 2000 MHz







Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
0.10	0.72	19.81	25.36	12.50	12.52	11.77
10.00	0.29	19.38	28.99	30.81	34.92	25.86
50.00	0.29	19.38	29.03	31.14	35.30	25.90
100.00	0.30	19.40	28.78	30.96	34.11	25.64
500.00	0.42	19.56	24.55	27.86	26.44	20.15
1000.00	0.73	19.64	21.67	25.90	24.74	12.73
1200.00	0.87	19.59	22.52	25.76	25.81	11.26
1500.00	1.10	19.55	31.53	26.52	29.13	11.01
1750.00	1.32	19.80	21.12	25.75	33.02	10.96
2000.00	1.48	19.41	13.08	24.25	36.48	10.81

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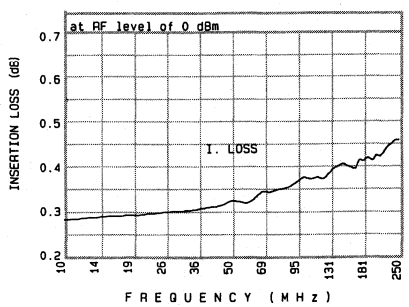
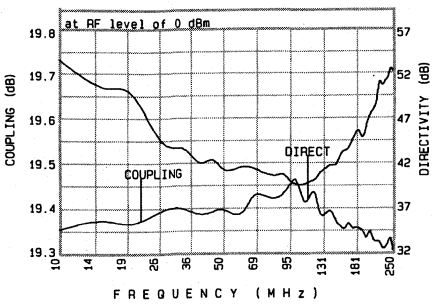
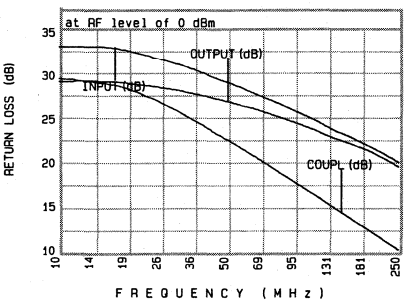
ZFDC-20-3-75

10 to 250 MHz



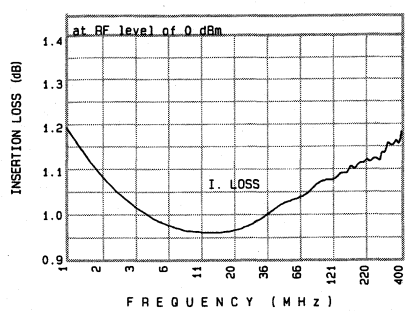


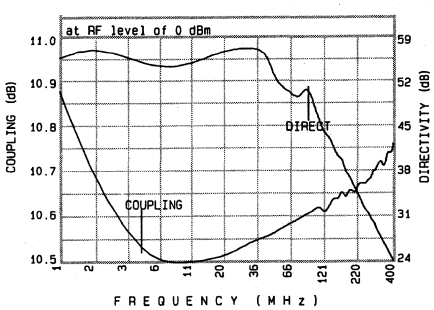


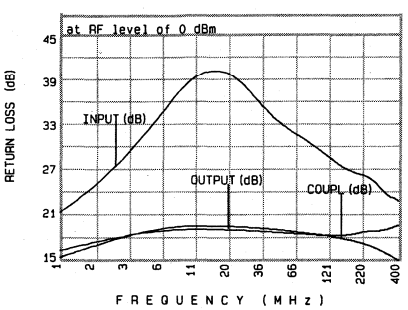
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
10.00	0.29	19.36	54.40	33.81	29.81	30.17
20.00	0.30	19.36	52.31	33.26	29.61	28.99
50.00	0.34	19.41	41.16	29.77	27.51	23.16
90.00	0.37	19.44	41.57	26.71	25.32	18.69
100.00	0.39	19.46	41.41	26.15	24.89	17.85
125.00	0.39	19.49	35.96	24.78	23.76	16.01
170.00	0.43	19.56	34.87	23.12	22.40	13.64
200.00	0.44	19.62	35.28	22.09	21.57	12.33
244.00	0.47	19.73	34.47	20.73	20.21	10.76
250.00	0.47	19.72	32.56	20.58	20.04	10.55

ZFDC-10-1-75

1 to 400 MHz



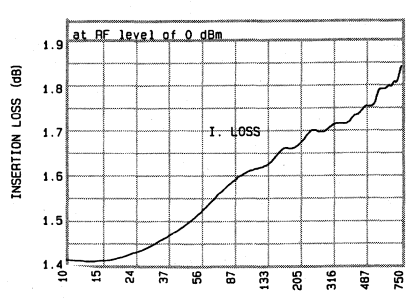


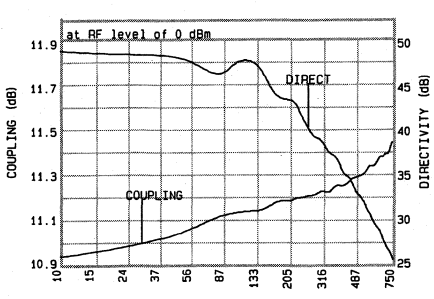


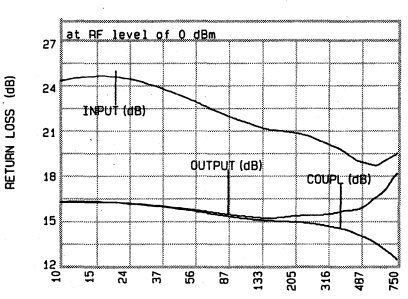
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
1.00	1.21	10.89	56.79	21.67	16.53	15.54
2.00	1.08	10.67	58.96	25.46	17.86	17.44
5.00	0.99	10.50	55.42	32.76	19.19	19.44
10.00	0.97	10.50	55.25	40.71	19.52	20.00
20.00	0.97	10.51	58.11	41.89	19.47	19.95
50.00	1.04	10.57	52.66	33.97	19.07	19.42
100.00	1.09	10.62	48.80	30.31	18.69	18.77
200.00	1.13	10.66	36.21	26.98	19.00	17.73
389.00	1.18	10.75	24.90	23.51	19.97	15.38
400.00	1.20	10.77	24.30	23.32	20.01	15.22

ZFDC-10-21-75

10 to 750 MHz







Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
10.00	1.42	10.95	49.73	24.79	16.51	16.55
20.00	1.41	10.98	49.26	25.50	16.61	16.60
50.00	1.50	11.05	49.31	23.76	16.14	16.07
100.00	1.62	11.15	48.54	22.17	15.66	15.52
200.00	1.68	11.20	44.12	21.33	15.64	15.24
375.00	1.73	11.28	37.21	20.10	15.96	14.77
408.00	1.75	11.28	35.48	19.75	16.01	14.64
500.00	1.77	11.32	33.01	19.25	16.34	14.19
732.00	1.86	11.47	26.42	19.79	18.41	12.79
750.00	1.86	11.47	25.92	19.96	18.56	12.65

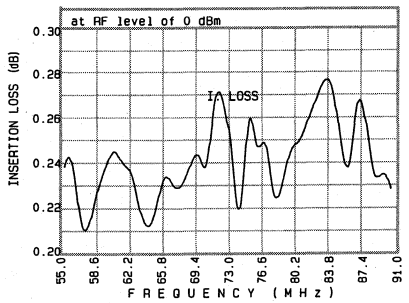
very broadband

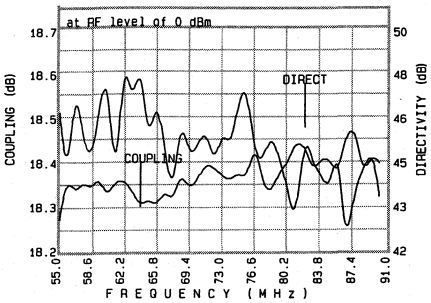
Directional Couplers

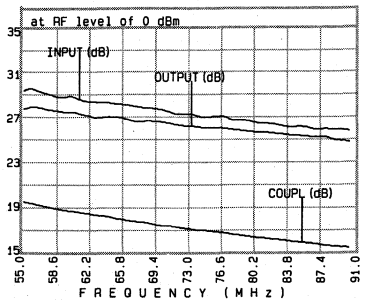
ZDC-20-3-75-1

75 ohms

55 to 90 MHz







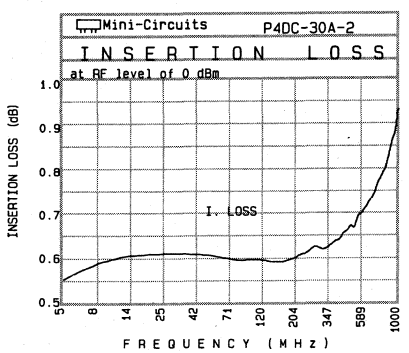
Freq. (MHz)	I. Loss (dB) In-Out	Coupling (dB) In-CPL	Directivity (dB)	Return Loss (dB) In	Out	CPL
55.00	0.24	18.28	46.80	29.85	28.20	19.78
59.40	0.24	18.38	46.83	29.29	27.90	19.03
64.00	0.21	18.31	48.79	28.85	27.60	18.52
68.40	0.24	18.39	46.77	28.36	27.17	17.93
73.00	0.25	18.38	46.18	27.89	26.71	17.37
77.40	0.22	18.36	45.09	27.16	26.40	16.87
82.00	0.27	18.45	46.22	26.91	26.01	16.40
86.40	0.28	18.48	41.62	26.34	25.72	16.02
89.20	0.24	18.43	45.53	26.41	25.42	15.75
90.00	0.23	18.41	43.75	26.29	25.27	15.66

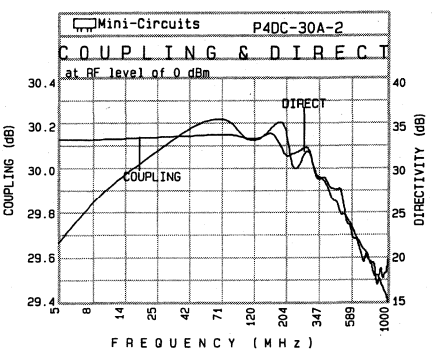
4-COUPLED PORT

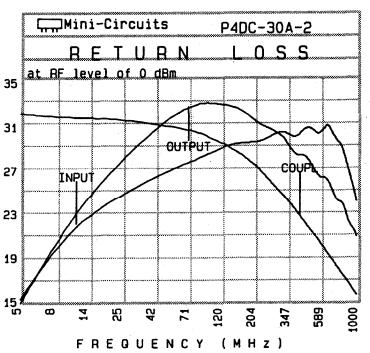
P4DC-30A-2

50 ohms

5 to 1000 MHz







Freq. (MHz)	I. Loss (dB) In-Out x̄	I. Loss (dB) In-Out σ	Coupling (dB) In-Cpl x̄	Coupling (dB) In-Cpl σ	Directivity (dB) x̄	Isolation (dB) Cpl-Cpl x̄	Isolation (dB) Cpl-Cpl σ	Return Loss (dB) In x̄	Return Loss (dB) Out x̄	Return Loss (dB) Cpl x̄
5.000	0.56	0.02	30.13	0.03	22.16	31.60	0.04	15.65	15.24	32.74
10.000	0.60	0.03	30.17	0.03	28.64	31.55	0.03	21.44	22.13	32.53
20.000	0.61	0.03	30.19	0.03	32.72	31.52	0.05	24.43	27.16	32.47
50.000	0.60	0.04	30.17	0.04	36.46	31.50	0.05	27.29	32.44	32.03
100.000	0.59	0.03	30.16	0.04	35.97	31.47	0.06	29.01	33.97	31.27
200.000	0.60	0.02	30.16	0.04	35.13	31.41	0.13	29.62	32.11	29.23
500.000	0.69	0.05	30.03	0.15	29.15	31.10	0.46	28.73	26.88	23.82
555.000	0.72	0.04	30.02	0.16	28.28	31.05	0.52	28.18	25.84	23.00
975.000	1.00	0.19	30.16	0.37	19.73	30.43	1.06	24.48	21.08	18.51
1000.000	1.00	0.17	30.18	0.39	19.09	30.37	1.07	24.04	20.62	18.24

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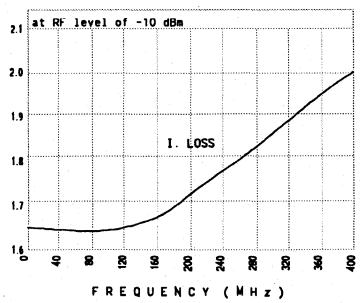
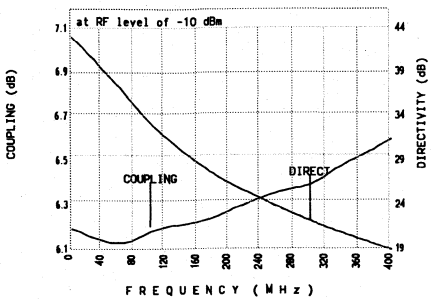
JDC-6-1

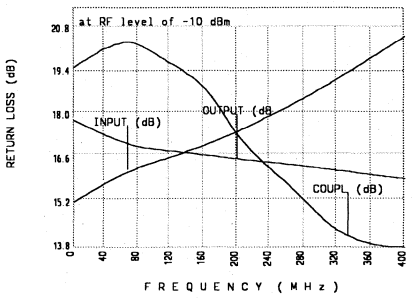
5 to 400 MHz



Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.66
67.60	1.65
100.90	1.65
167.50	1.68
200.80	1.74
267.40	1.82
300.70	1.87
334.00	1.92
367.30	1.97
400.60	2.01



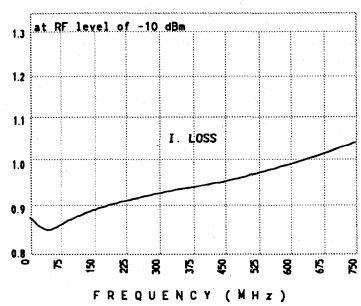
Coupling (dB) In-CPL	Directivity (dB)
6.21	43.46
6.11	37.14
6.22	33.22
6.23	28.49
6.29	26.76
6.39	23.81
6.39	22.52
6.49	21.35
6.54	20.32
6.61	19.26



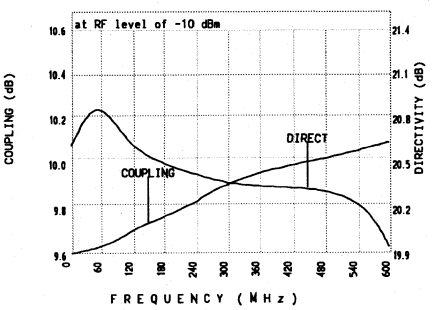
Return Loss (dB) In	Out	CPL
15.33	17.94	18.61
16.35	17.11	17.83
16.59	17.01	18.00
17.18	16.81	18.64
17.56	16.70	19.12
18.44	16.51	20.49
18.94	16.40	21.41
19.49	16.29	22.49
20.07	16.17	23.72
20.67	16.06	25.00

JDC-10-2

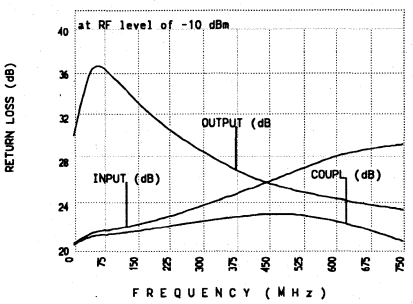
5 to 750 MHz



Freq. (MHz)	I. Loss (dB) In-Out
5.00	0.89
42.25	0.85
79.50	0.88
154.00	0.91
228.50	0.93
377.50	0.96
452.00	0.97
526.50	0.99
638.25	1.02
750.00	1.06



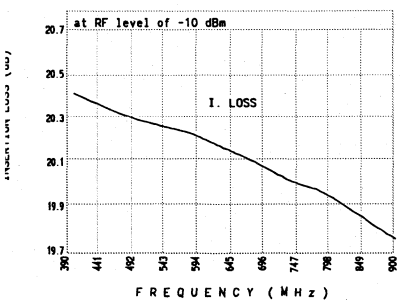
Coupling (dB) In-CPL	Directivity (dB)
9.63	20.66
9.65	20.97
9.68	20.80
9.75	20.60
9.82	20.49
9.94	20.40
10.00	20.38
10.04	20.37
10.09	20.28
10.12	19.99



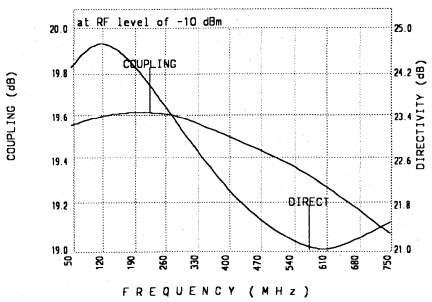
Return Loss (dB) In	Out	CPL
21.06	30.79	20.96
22.05	37.85	21.74
22.21	36.82	21.83
22.75	33.62	22.18
23.50	30.98	22.63
25.50	27.50	23.51
26.66	26.41	23.75
27.83	25.63	23.70
29.45	24.79	22.78
30.01	24.10	21.26

JDC-20-2

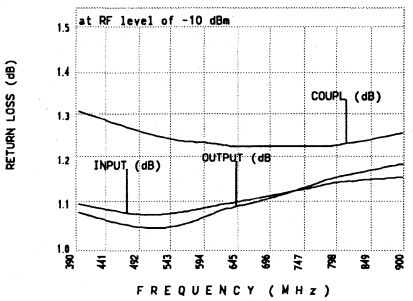
400 to 900 MHz



Freq. (MHz)	I. Loss (dB) In-Out
399.50	20.43
499.00	20.30
560.00	20.27
596.00	20.23
632.00	20.18
668.00	20.14
740.00	20.02
776.00	20.00
800.00	19.96
900.00	19.77



Coupling (dB) In-CPL	Directivity (dB)
0.19	19.02
0.20	19.98
0.18	20.02
0.21	20.02
0.23	19.69
0.23	19.79
0.24	18.94
0.24	18.59
0.26	18.23
0.28	16.93



Return Loss (dB) In	Out	CPL
1.11	1.09	1.32
1.08	1.05	1.27
1.09	1.06	1.25
1.10	1.08	1.25
1.11	1.10	1.24
1.12	1.11	1.24
1.14	1.14	1.24
1.15	1.16	1.24
1.16	1.17	1.24
1.17	1.20	1.27

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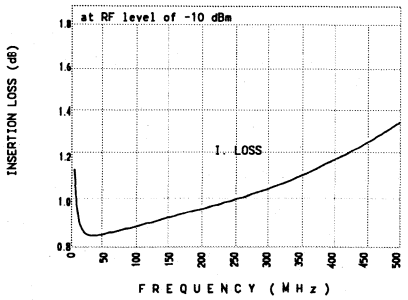
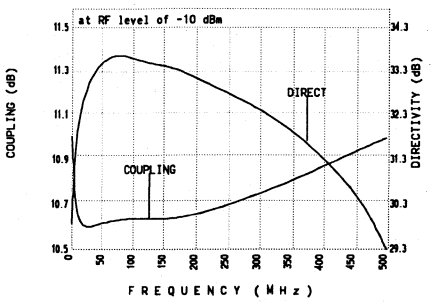
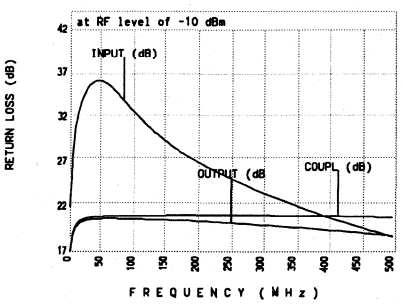
very broadband
Directional Couplers

LRDC-10-1

5 to 500 MHz







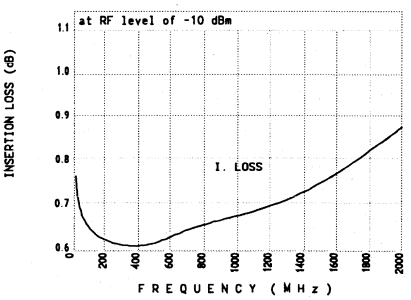
Freq. (MHz)	I. Loss (dB) In-Out
1.00	1.16
5.99	0.85
40.96	0.87
83.41	0.90
125.87	0.93
160.84	0.96
208.29	0.99
333.16	1.10
458.04	1.29
500.50	1.37

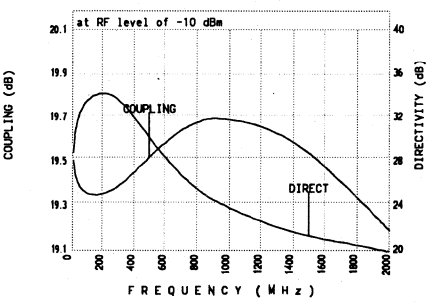
Coupling (dB) In-CPL	Directivity (dB)
11.02	29.94
10.58	32.37
10.63	33.64
10.65	33.76
10.65	33.50
10.65	33.47
10.67	33.12
10.79	32.33
10.96	30.68
11.01	29.36

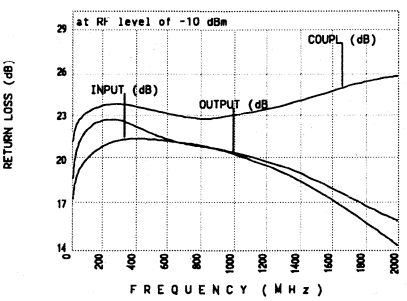
Return Loss (dB)		
In	Out	CPL
22.28	17.31	17.39
32.94	20.67	20.92
37.94	21.00	21.25
34.08	20.96	21.25
30.92	20.85	21.29
28.91	20.78	21.32
26.74	20.68	21.35
22.67	20.11	21.31
19.78	19.35	21.20
18.97	19.02	21.07

ZFDC-20-50

20 to 2000 MHz







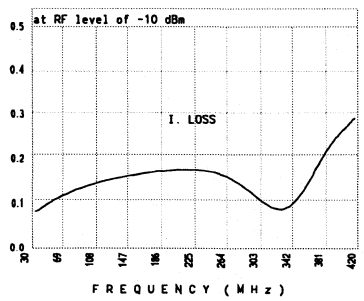
Freq. (MHz)	I. Loss (dB) In-Out
20.00	0.77
50.00	0.65
264.28	0.61
478.57	0.61
692.85	0.65
810.00	0.66
880.00	0.67
1340.00	0.71
1780.00	0.82
2000.00	0.88

Coupling (dB) In-CPL	Directivity (dB)
19.52	29.07
19.35	33.89
19.36	35.18
19.52	30.70
19.66	27.01
19.69	25.65
19.72	24.85
19.67	21.82
19.37	20.77
19.20	20.07

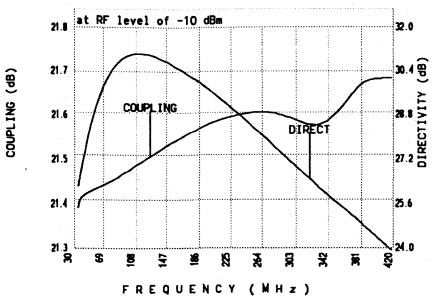
Return Loss (dB)		
In	Out	CPL
17.62	18.98	21.52
20.12	22.27	23.41
21.72	23.41	24.30
21.70	22.04	23.67
21.38	21.30	23.15
21.20	21.12	23.00
21.09	21.07	23.01
19.45	19.88	23.93
16.27	17.24	25.61
14.42	16.12	25.93

PDC20-400HP

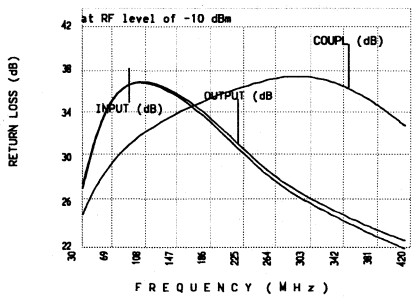
40 to 400 MHz



Freq. (MHz)	I. Loss (dB) In-Out
39.62	0.09
41.60	0.09
79.12	0.14
168.00	0.18
250.95	0.19
294.40	0.14
339.82	0.06
379.32	0.21
399.07	0.26
420.80	0.30



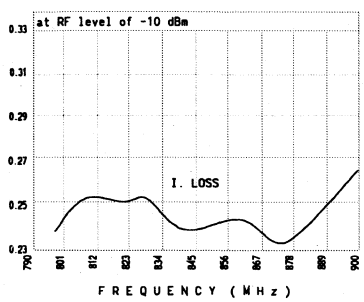
Coupling (dB) In-CPL	Directivity (dB)
21.40	26.35
21.43	26.80
21.45	31.85
21.57	30.66
21.62	28.62
21.61	27.37
21.56	26.12
21.68	25.15
21.69	24.58
21.69	24.03



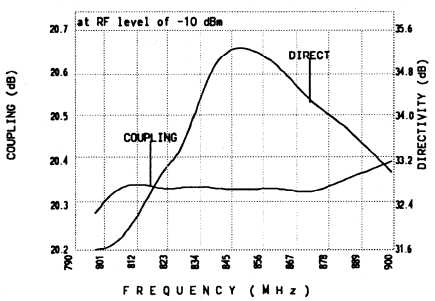
Return Loss (dB) In	Out	CPL
27.48	27.89	25.14
28.14	28.49	25.55
38.88	38.75	31.23
35.61	35.96	35.10
29.03	29.46	37.21
26.83	27.27	37.87
24.93	25.42	37.21
23.44	24.04	35.51
22.79	23.43	34.42
22.07	22.81	33.15

PDC20-900HP

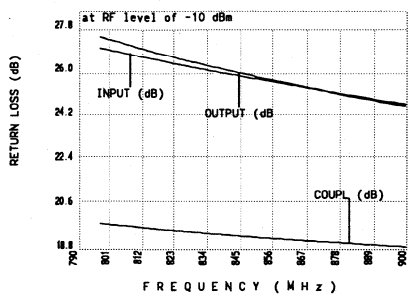
800 to 900 MHz



Freq. (MHz)	I. Loss (dB) In-Out
798.30	0.24
808.15	0.26
822.92	0.25
827.85	0.26
837.70	0.24
847.55	0.24
862.32	0.25
872.17	0.23
882.02	0.24
901.72	0.27



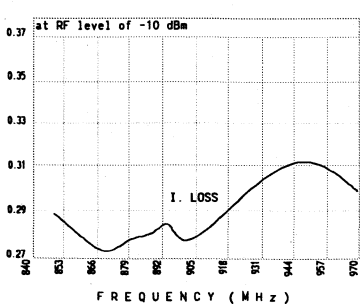
Coupling (dB) In-CPL	Directivity (dB)
20.29	31.66
20.37	31.73
20.34	33.28
20.35	33.28
20.35	34.93
20.34	35.48
20.35	35.03
20.33	34.30
20.36	34.02
20.41	32.97



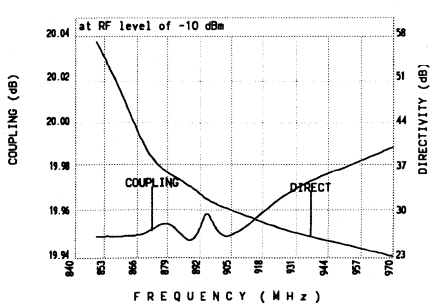
Return Loss (dB) In	Out	CPL
26.98	27.43	19.83
26.72	27.09	19.72
26.34	26.60	19.54
26.22	26.44	19.50
25.98	26.16	19.40
25.76	25.86	19.30
25.45	25.49	19.18
25.22	25.24	19.10
25.01	24.96	19.02
24.62	24.54	18.87

PDC20-970HP

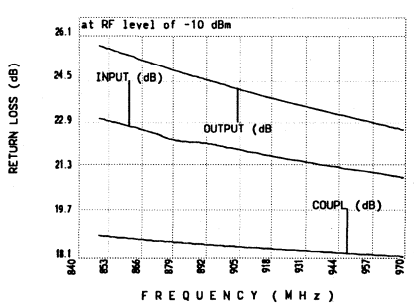
860 to 970 MHz



Freq. (MHz)	I. Loss (dB) In-Out
849.75	0.29
860.25	0.28
870.75	0.27
879.50	0.28
890.00	0.28
895.25	0.29
900.50	0.27
925.00	0.30
949.50	0.32
970.50	0.30



Coupling (dB) In-CPL	Directivity (dB)
19.95	57.27
19.95	48.96
19.95	38.63
19.96	36.22
19.94	33.98
19.97	32.11
19.94	31.38
19.97	27.48
19.98	25.33
19.99	23.29



Return Loss (dB) In	Out	CPL
23.08	25.72	18.88
22.83	25.40	18.79
22.61	25.07	18.71
22.24	24.82	18.65
22.23	24.54	18.58
22.15	24.42	18.54
22.05	24.26	18.51
21.62	23.64	18.36
21.25	23.12	18.23
20.95	22.65	18.12

In Stock... Immediate Delivery

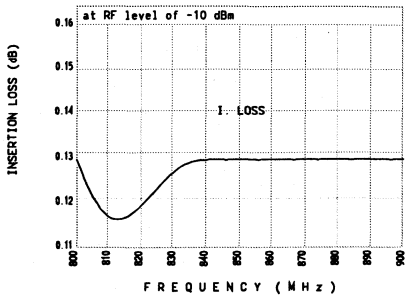
For Custom Versions Of Standard Models Consult Our Applications Dept.

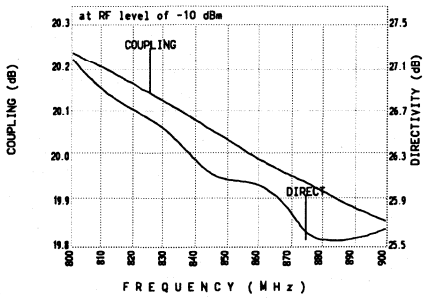
bi-directional

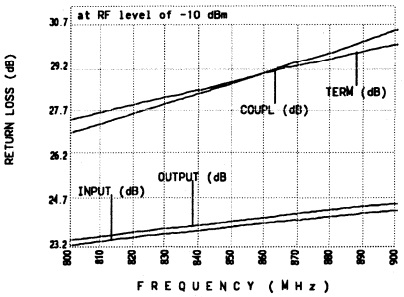
Directional Couplers

ZFBDC20-900HP

800 to 900 MHz







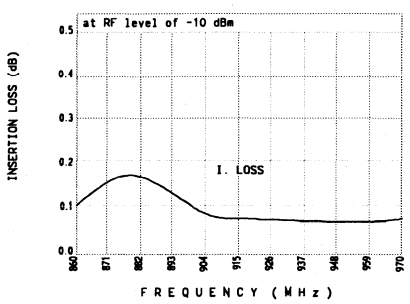
Freq. (MHz)	I. Loss (dB) In-Out
800.00	0.13
811.25	0.11
830.00	0.13
841.25	0.13
848.75	0.13
860.00	0.13
871.25	0.13
875.00	0.13
890.00	0.13
901.25	0.13

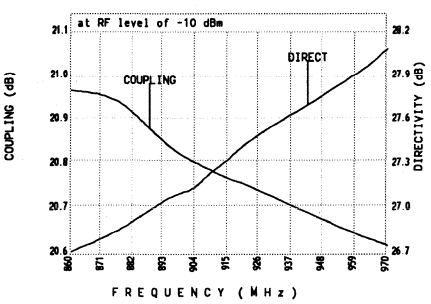
Coupling (dB)		Directivity (dB)	
In-CPL	Out-Term	Out-CPL	In-Term
20.24	20.31	27.20	24.84
20.20	20.24	26.84	25.58
20.13	20.19	26.62	25.41
20.08	20.15	26.22	25.63
20.05	20.11	26.10	25.73
20.00	20.07	26.12	26.00
19.96	20.03	25.83	26.34
19.95	20.00	25.57	26.37
19.89	19.96	25.56	26.84
19.86	19.91	25.69	26.80

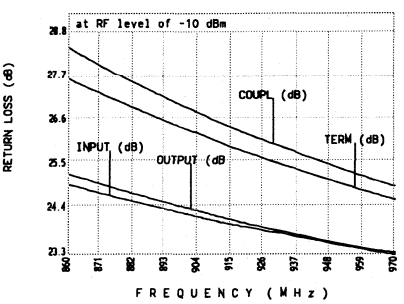
Return Loss (dB)			
In	Out	CPL	Term
23.29	23.46	27.07	27.50
23.46	23.61	27.44	27.82
23.69	23.88	28.08	28.28
23.80	23.97	28.43	28.53
23.91	24.10	28.69	28.74
24.05	24.22	29.09	29.10
24.16	24.39	29.54	29.37
24.20	24.44	29.58	29.44
24.38	24.62	30.18	29.85
24.47	24.70	30.59	30.08

ZFBDC20-970HP

860 to 970 MHz







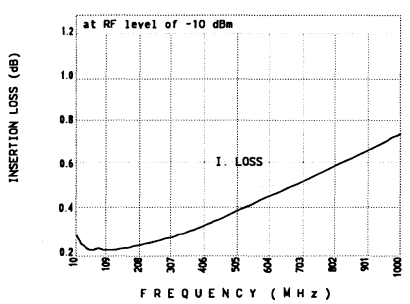
Freq. (MHz)	I. Loss (dB) In-Out
860.00	0.11
875.00	0.19
885.00	0.17
896.25	0.12
902.50	0.09
908.75	0.08
915.00	0.08
920.00	0.08
957.00	0.07
970.00	0.08

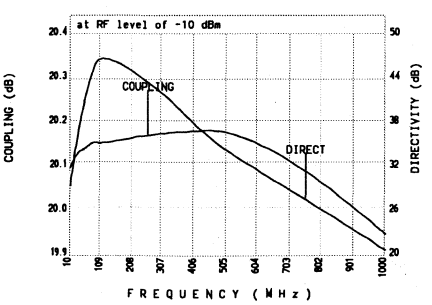
Coupling (dB)		Directivity (dB)	
In-CPL	Out-Term	Out-CPL	In-Term
20.97	21.06	26.72	22.08
20.96	21.06	26.84	21.99
20.90	21.01	26.96	21.92
20.83	20.95	27.11	21.92
20.81	20.93	27.12	21.84
20.79	20.90	27.26	21.83
20.77	20.89	27.33	21.78
20.76	20.87	27.46	21.77
20.65	20.76	27.87	21.87
20.62	20.73	28.10	21.55

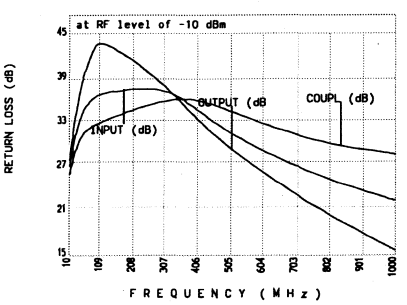
Return Loss (dB)			
In	Out	CPL	Term
25.04	25.31	28.46	27.67
24.74	24.96	27.84	27.16
24.57	24.75	27.46	26.85
24.37	24.52	27.06	26.50
24.27	24.42	26.87	26.34
24.15	24.29	26.65	26.15
24.06	24.17	26.44	25.96
24.00	24.08	26.29	25.83
23.46	23.47	25.28	24.93
23.30	23.36	24.99	24.66

ZFDC-20-4L

10 to 1000 MHz







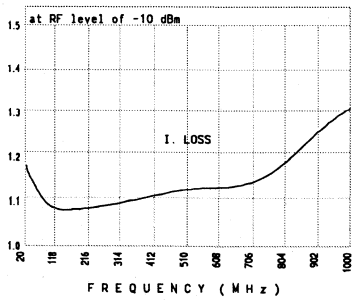
Freq. (MHz)	I. Loss (dB) In-Out
10.00	0.29
36.25	0.23
57.50	0.22
78.75	0.24
100.00	0.21
300.00	0.28
400.00	0.33
510.00	0.41
755.00	0.57
1000.00	0.75

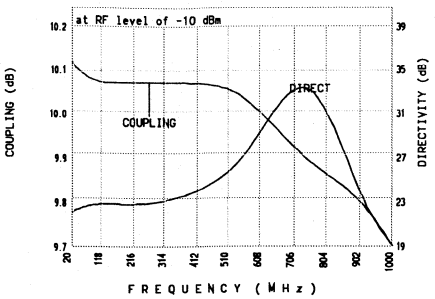
Coupling (dB)	Directivity (dB)
In-CPL	
20.10	29.43
20.14	37.68
20.14	41.50
20.16	45.20
20.15	48.10
20.18	42.62
20.18	37.85
20.19	33.87
20.10	27.72
19.95	20.73

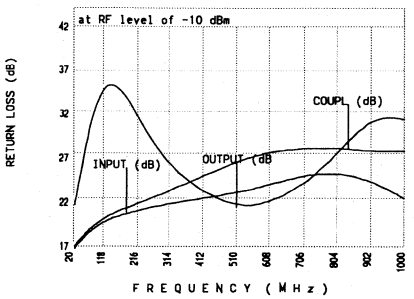
Return Loss (dB)		
In	Out	CPL
27.17	28.03	26.13
33.32	36.61	30.75
35.15	40.10	31.86
36.27	42.72	32.55
37.08	44.99	33.08
38.26	38.39	36.38
34.77	33.39	36.38
31.16	29.03	34.47
25.77	21.47	30.25
22.46	15.67	28.74

LRDC-10-2-75

30 to 1000 MHz







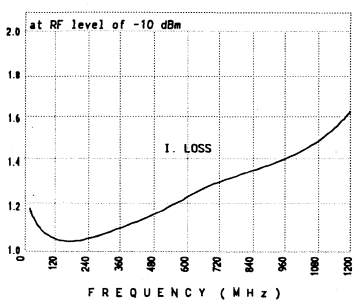
Freq. (MHz)	I. Loss (dB) In-Out
28.88	1.19
30.16	1.18
91.46	1.09
161.00	1.09
289.64	1.10
498.87	1.14
593.68	1.14
754.14	1.15
897.47	1.27
1000.56	1.32

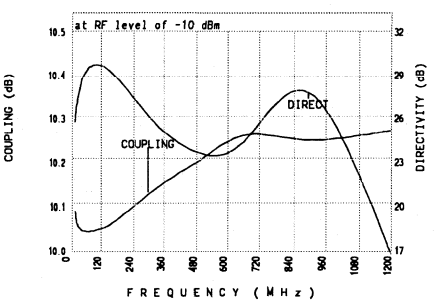
Coupling (dB) In-CPL	Directivity (dB)
10.13	22.47
10.12	22.61
10.08	23.28
10.08	23.22
10.08	23.11
10.08	25.17
10.03	28.72
9.89	37.29
9.83	23.63
9.71	19.42

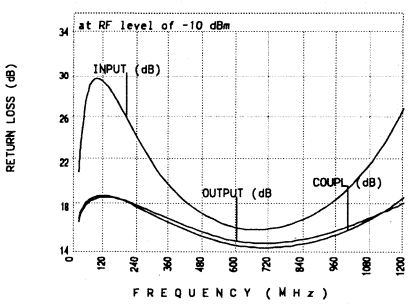
Return Loss (dB)		
In	Out	CPL
17.24	22.09	17.46
17.35	22.42	17.57
19.85	35.09	20.23
20.96	37.04	21.47
22.21	26.01	23.37
23.34	21.75	26.81
24.21	21.99	28.05
26.06	25.35	28.78
25.07	32.45	28.13
22.80	31.75	28.13

LRDC-10-2W-75

30 to 1200 MHz







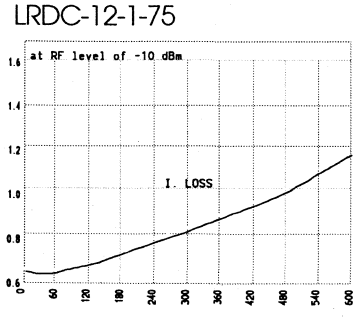
Freq. (MHz)	I. Loss (dB) In-Out
23.68	1.21
31.16	1.18
61.06	1.10
158.23	1.04
315.21	1.10
520.77	1.20
674.01	1.32
879.57	1.39
1088.87	1.50
1201.00	1.65

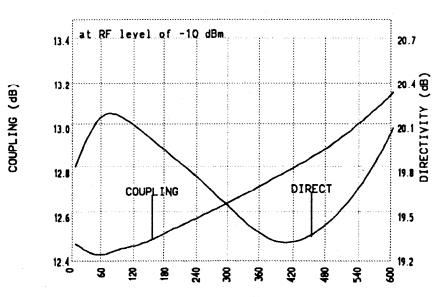
Coupling (dB) In-CPL	Directivity (dB)
10.10	26.05
10.06	27.31
10.05	30.20
10.06	30.12
10.15	25.69
10.22	23.25
10.29	23.99
10.25	30.70
10.27	22.42
10.28	17.05

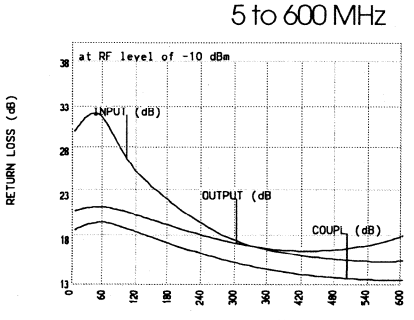
Return Loss (dB)		
In	Out	CPL
21.46	17.01	17.25
23.65	17.77	17.99
31.44	19.11	19.37
28.87	19.46	19.51
20.41	17.63	17.24
16.78	15.56	15.15
15.97	14.88	14.50
17.10	15.37	14.92
21.86	17.37	17.06
27.27	18.70	19.19

LRDC-12-1-75

5 to 600 MHz







Freq. (MHz)	I. Loss (dB) In-Out
5.00	0.67
47.14	0.65
89.28	0.69
131.42	0.70
215.71	0.79
300.00	0.85
385.71	0.94
471.42	1.01
557.14	1.14
600.00	1.20

Coupling (dB) In-CPL	Directivity (dB)
12.50	19.87
12.43	20.25
12.48	20.23
12.49	20.11
12.60	19.86
12.68	19.60
12.80	19.29
12.91	19.42
13.08	19.81
13.18	20.13

Return Loss (dB)		
In	Out	CPL
30.72	21.77	19.63
34.25	22.38	20.75
28.28	21.81	20.01
25.05	21.05	19.08
20.96	19.31	17.23
18.05	17.95	15.81
16.92	17.15	14.76
16.21	17.17	14.18
15.93	17.96	13.89
16.05	18.88.	13.87

In Stock... Immediate Delivery

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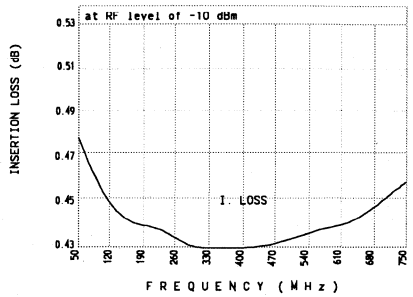
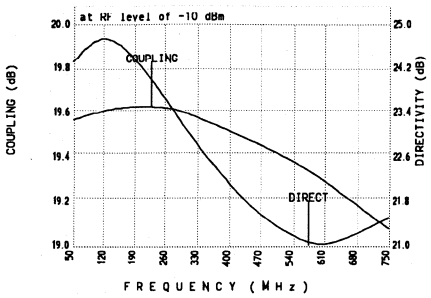
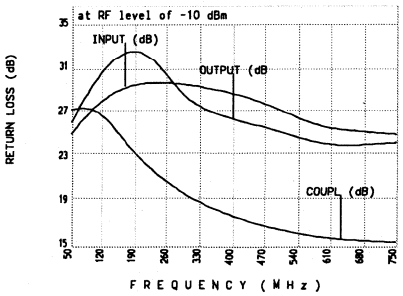
very broadband
Directional Couplers

JDC20-1W-75

50 to 750 MHz







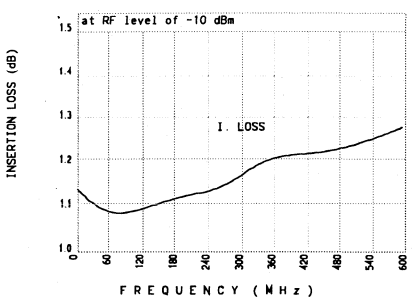
Freq. (MHz)	I. Loss (dB) In-Out
50.00	0.48
108.33	0.45
166.66	0.44
225.00	0.44
283.33	0.43
341.66	0.43
458.33	0.43
575.00	0.44
633.33	0.44
750.00	0.46

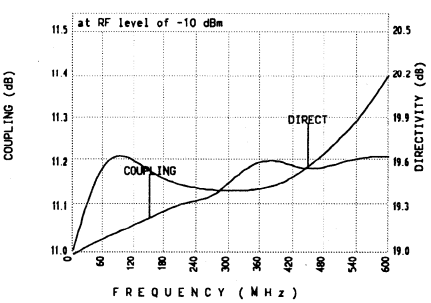
Coupling (dB) In-CPL	Directivity (dB)
19.58	24.37
19.62	24.92
19.64	24.65
19.64	24.06
19.63	23.38
19.58	22.71
19.48	21.60
19.36	21.05
19.27	21.06
19.09	21.56

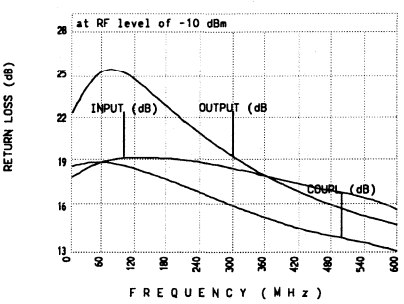
Return Loss (dB)		
In	Out	CPL
25.24	26.25	27.37
28.13	30.65	27.75
29.48	32.97	24.47
29.91	32.60	21.93
29.72	28.79	20.07
29.40	27.19	18.71
28.25	25.93	16.90
25.97	24.48	15.96
25.57	24.08	15.67
25.20	24.45	15.43

LRDC-10-1-75

5 to 600 MHz







Freq. (MHz)	I. Loss (dB) In-Out
5.00	1.14
64.00	1.07
152.50	1.11
211.50	1.13
270.50	1.14
330.00	1.20
390.00	1.22
450.00	1.22
540.00	1.25
600.00	1.28

Coupling (dB) In-CPL	Directivity (dB)
11.00	19.03
11.04	19.80
11.08	19.54
11.12	19.46
11.12	19.43
11.20	19.43
11.22	19.45
11.18	19.58
11.22	19.87
11.22	20.21

Return Loss (dB)		
In	Out	CPL
18.23	22.57	18.98
19.58	26.69	19.48
19.57	23.91	18.46
19.41	21.93	17.61
19.08	20.37	16.75
18.60	18.91	15.89
18.05	17.76	15.12
17.49	16.75	14.44
16.96	15.58	13.85
16.07	15.03	13.24

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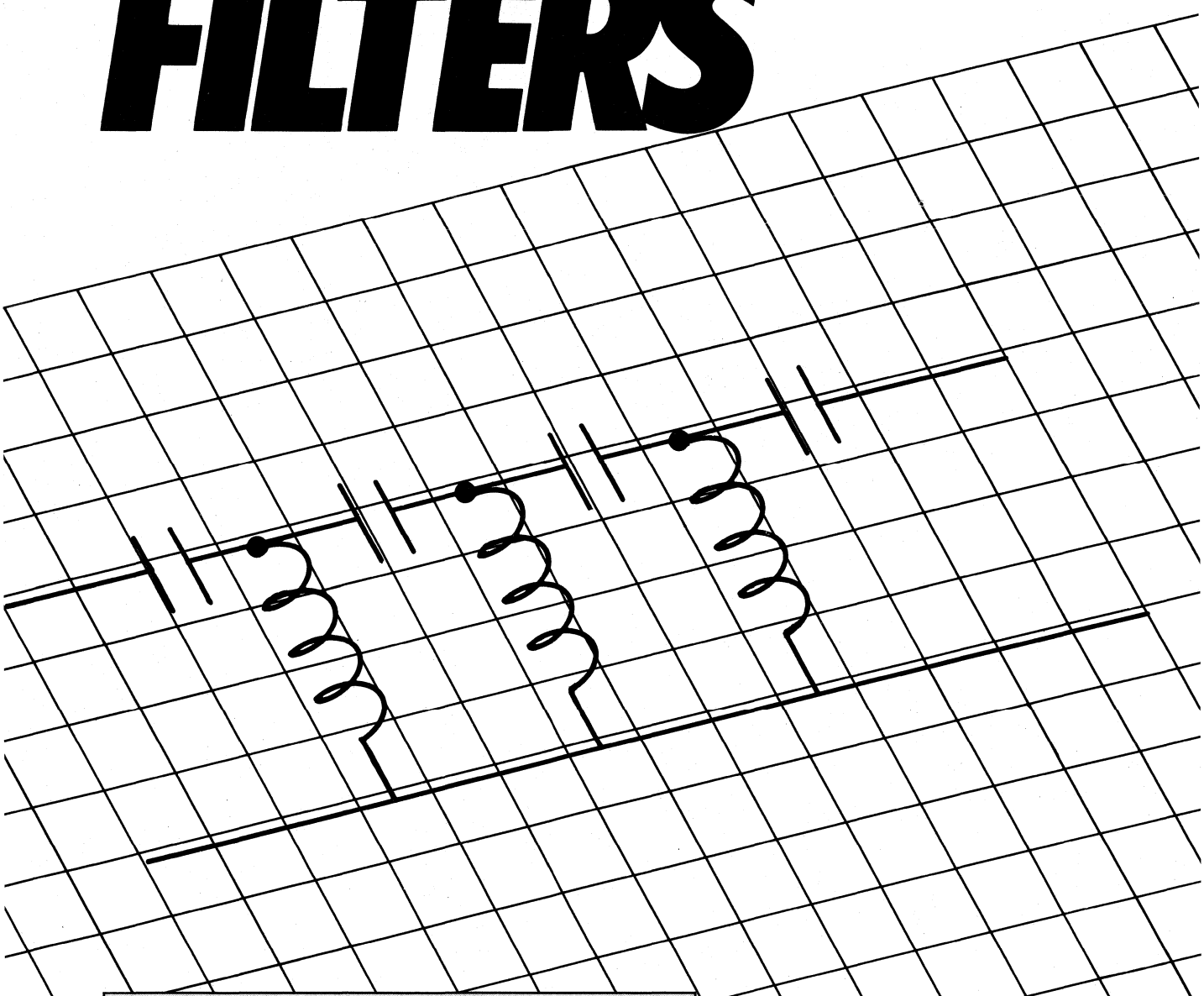
FILTERS



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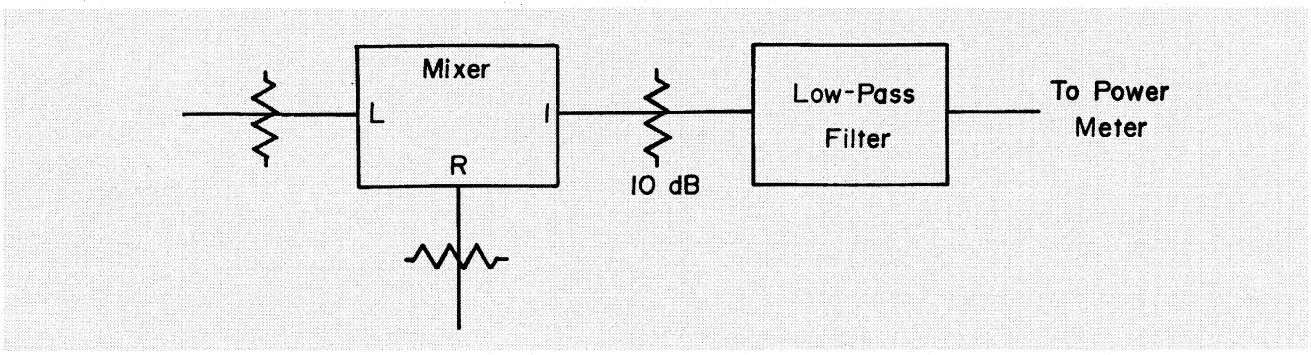
Constant-Impedance IF Bandpass Filters Improve Circuits Performance



1. The mixer conversionloss measurement setup is diagrammed.

The effect of constant-impedance bandpass filters on conversion loss and intermodulation of mixers is described.

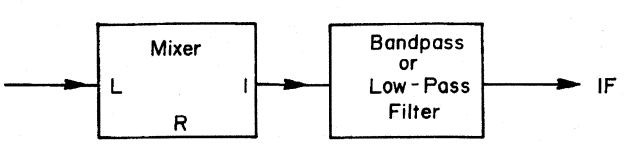
Radhakrishnaiah P. N. Setty
Director of Engineering
Mini-Circuits Laboratory, Brooklyn, New York

Double-balanced mixers are normally very wideband. When used as downconverters, the sum and difference fequencies are of equal amplitude. Filtering is essential to remove the sum frequency.

Conversion loss is usually measured with a 10-dB attenuator at the I-port, followed by a low-pass or bandpass filter to reject the sum frequency (Fig. 1). In this setup, the sum frequency is rejected by the low-pass filter and reflected back into the mixer.

Because of the 10-dB pad, the level of the sum frequency reflected back into the mixer is at least 20-dB below that leaving the I-port. The purpose of the 10-dB pad at the I-port is to provide a 50-Ohm termination at the I-port over a wide frequency range and to prevent the reflected sum frequency from generating secondary IF signals.

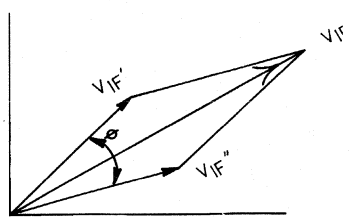
In practical systems, attenuation at the IF port is not tolerable, since it decreases the signal level and increases the noise figure. Instead, a filter is added directly at the I-port to prevent the sum and intermodulation products from entering the IF amplifier (fig. 2).



2. A practical mixer termination is shown.

The output at the I-port consists of fl = ± (fL - fR), the difference frequency, and fS = fL + fR, the sum frequency. The sum frequency is reflected back into the mixer, recombines with the second harmonic of the LO signal, and produces fl' = ±[2fL - (fL + fR)], a secondary IF signal that is at the same frequency as the IF.

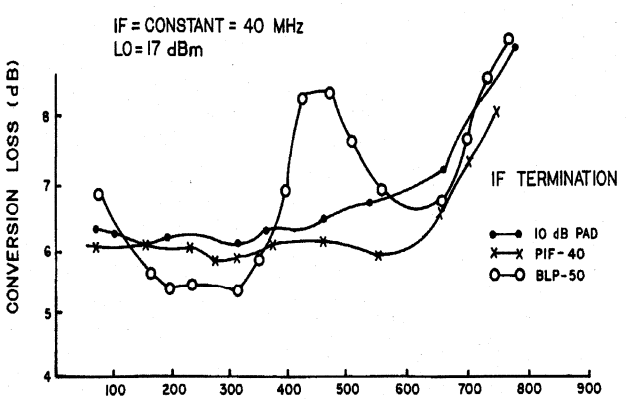
If V_{IF}' and V_{IF}'' are the voltage levels caused by IF and secondary IF and ø the phase angle between them, then VIF is the resultant IF voltage output, which is the vectorial sum of the two IF voltages (Fig. 3).



3. A vector diagram of IF voltage is presented.

When the IF frequency is held constant, and RF and LO frequencies are swept, then VIF', VIF", and ø all vary with frequency. The resultant IF voltage will vary not only because of conversion-loss variation with frequency, but also because of variation of ø. This could result in undesirable ripples in the conversion-loss response. Figure 4 shows the effect when a commercial mixer such as Mini-Circuits' ZFM-1H is followed by a low-pass filter, MCL BLP-50. As much as 3dB ripple in conversion-loss response can be seen.

If the impedance at the I-port is held constant over a wide frequency range and the sum frequency is prevented from reentering the mixer, flat conversion loss can be realized.

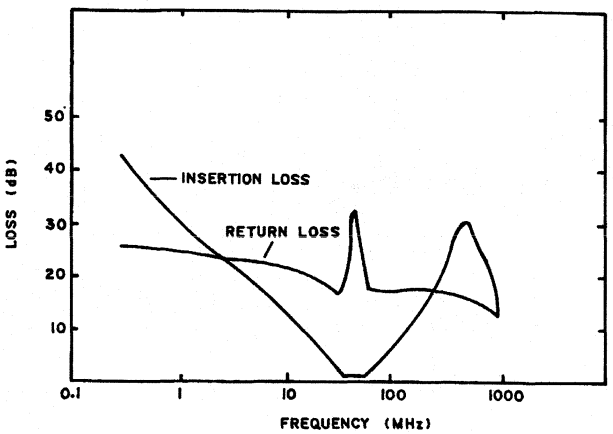


4. Conversion loss is shown as a function of the IF filter.

In Stock ... Immediate Delivery

Constant-Impedance Filters

Mini-Circuits has introduced a series of constant-impedance filters for different IF frequency ranges. These filters are a bandpass design with typically 1dB bandwidths of 30 percent. Stop-band return loss is 18-dB (typical), up to 10 times the IF center frequency. Insertion loss and return loss of a model PIF-40 IF filter with 40-MHz center frequency is shown in Figure 5.

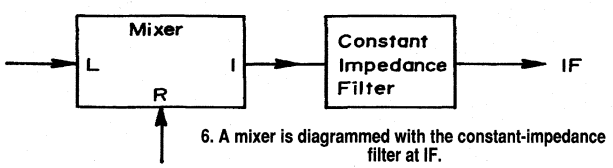


5. Insertion loss and return loss of a model PIF-40 IF filter are plotted.

If the I-port of a mixer is terminated with a constant-impedance filter (Fig. 6) such as the PIF-40, the filter attenuates the sum frequency by absorption. In Figure 4, the frequencies are:

RF = 80 to 500 MHz
LO = 120 to 540 MHz
If = 40 MHz
Sum = 200 to 1040 MHz

When the PIF-40 is used at the IF output, the sum frequency is attenuated by at least 14 dB. Also, the return



6. A mixer is diagrammed with the constant-impedance filter at IF.

loss is 13 dB up to 1040 MHz. The level of sum signal reflected into the mixer is determined by the return loss of the filter. Figure 4 shows how flat the conversion loss is as a function of frequency, which is within 0.3 dB p-p up to 500 MHz, a substantial improvement form 3dB p-p when the BLP-50 is used at the output.

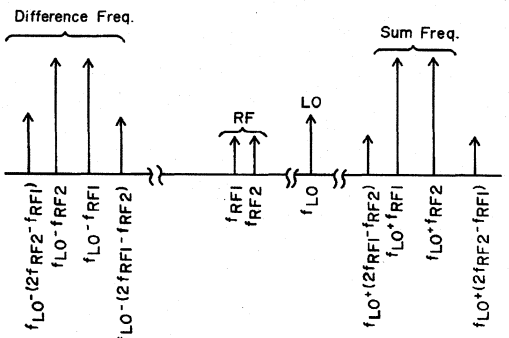
Constant-impedance filters are bandpass in nature; hence, signals outside the passband are attenuated. The LO and RF signals (which fall outside the passband) are attenuated, and isolation is improved.

Effect of IF Termination on Intermodulation

When the IF is terminated with conventional low-pass or bandpass filters, the sum frequency is reflected and reenters the mixer. This influences conversion loss. When more than one carrier is present at the input, the most serious intermodulation of concern is the two-tone, third-order intermodulation. This is because intermodulation frequencies are separated from the IF frequency by the same spacing as that of the RF carriers. Mathematically, the intermodulation frequencies are

$$f_{LO} \pm (2f_{RF1} - f_{RF2})$$

and $$f_{LO} \pm (2f_{RF2} - f_{RF1})$$

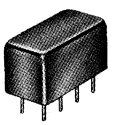


7. The mixer out put spectrum is presented.

Figure 7 shows the frequency spectrum at the IF with two IF signals. If the sum-frequency components are reflected back into the mixer, they combine with the second harmonic of the LO and produce the desired IF frequencies and associated intermodulations. The primary and secondary IF products add vectorially and affect the intermodulation level with reference to the IF output. With a constant-impedance filter at the IF, the sum products are absorbed and the intermodulations are not affected.

Besides the two-tone, third-order problem, the reflected signals mix with LO signals and generate secondary intermodulation products. Constant-impedance filters will minimize these effects and provide the ideal termination.

LOW PASS DC to 1000 MHz



PLP

	MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	A01	cr	13.95
	PLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	A01	cr	14.95
	PLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	A01	cr	11.45
■	PLP-7-75	DC-7	8	11-15	15-200	1.7:1	18:1	8-35	A01	cr	12.95
	PLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	A01	cr	11.45
■	PLP-10.7-75	DC-11	14	19-24	24-200	1.7:1	18:1	8-35	A01	cr	12.95
	PLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	A01	cr	11.45
■	PLP-15-75	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	A01	cr	12.95
	PLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	A01	cr	11.45
■	PLP-21.4-75	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-36	A01	cr	12.95
	PLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	A01	cr	11.45
■	PLP-30-75	DC-32	35	47-61	61-200	1.7:1	18:1	8-36	A01	cr	12.95
	PLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	A01	cr	11.45
■	PLP-50-75	DC-48	55	70-90	90-200	1.7:1	18:1	8-36	A01	cr	12.95
	PLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	A01	cr	11.45
	PLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	A01	cr	11.45
	PLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	A01	cr	11.45
■	PLP-100-75	DC-98	108	146-189	189-400	1.7:1	18:1	8-37	A01	cr	12.95
	PLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	A01	cr	11.45
	PLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	A01	cr	11.45
	PLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	A01	cr	11.45
	PLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	A01	cr	11.45
	PLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	A01	cr	11.45
	PLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	A01	cr	11.45
	PLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	A01	cr	11.45
■	PLP-600-75	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-37	A01	cr	12.95
	PLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	A01	cr	11.45
	PLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	A01	cr	11.45
	PLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	A01	cr	11.45
■	PLP-850-75	DC-750	850	1150-1490	1490-2000	1.7:1	18:1	8-37	A01	cr	12.95
	PLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	A01	cr	11.45
	PLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	A01	cr	11.45

NOTES:

* 35 dB for SCLF-380, SCLF-420 and SCLF-550 models

** 1db compression at +13dbm input power

■ Denotes 75 ohm model.

❑ Non-hermetic

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current rating:
   1a. RF power, 0.5 Watt

NSN GUIDE

MCL NO.	NSN
PLP-30	5915-01-355-9433
PLP-100	5915-01-332-1091
PLP-150	5915-01-389-3575
PLP-450	5915-01-389-8302

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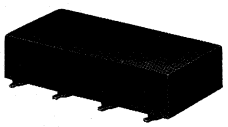
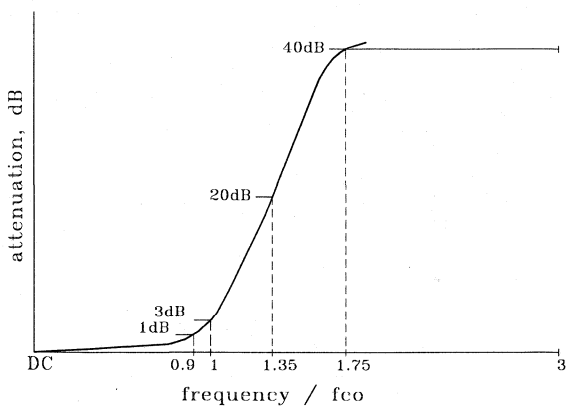
Low Pass DC to 1000 MHz



SCLF

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	(loss > 40dB)	VSWR, Passband Typ.	Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
SCLF-5	DC-5.0	5.8	8-10	10-200	1.7:1	18:1	8-38	YY161	cr	14.95
SCLF-8	DC-8.0	9.2	12.5-16.5	16.5-200	1.7:1	18:1	8-38	YY161	cr	12.95
SCLF-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-38	YY161	cr	12.95
SCLF-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-25	DC-25	28	36-47	47-200	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-30	DC-30	35	47-61	61-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-45	DC-45	55	70-90	90-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-95	DC-95	108	146-189	189-400	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-135	DC-135	155	210-300	300-600	1.7:1	18:1	8-20	YY161	cr	11.45
SCLF-190	DC-190	210	290-390	390-800	1.7:1	18:1	8-20	YY161	cr	11.45
SCLF-225	DC-225	250	340-440	440-1200	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-380	DC-380	440	580-750	750-1800*	1.7:1	18:1	8-21	YY161	cr	11.45
SCLF-420	DC-420	570	750-920	920-2000*	1.7:1	18:1	8-21	YY161	cr	11.45
SCLF-550	DC-550	605	800-1050	1050-2000*	1.7:1	18:1	8-40	YY161	cr	12.95
SCLF-700	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-40	YY161	cr	12.95
SCLF-1000	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-40	YY161	cr	12.95

LOW PASS
TYPICAL FREQUENCY RESPONSE



pin connections

see case style outline drawings

PORT	cr
INPUT	1
OUTPUT	8
GND	2,3,4,5,6,7

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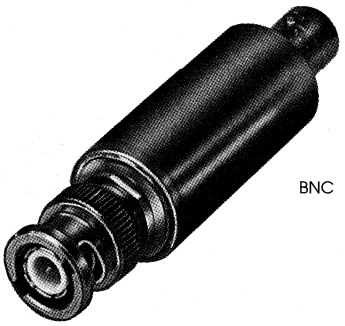
LOW PASS DC to 1000 MHz



MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
BLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF55	—	34.95
BLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF55	—	35.95
BLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-7-75	DC-7	8	11-15	15-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-10.7-75	DC-11	14	19-24	24-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF55	—	32.95
■ BLP-15-75	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-21.4-75	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF55	—	32.95
■ BLP-30-75	DC-32	35	47-61	61-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF55	—	32.95
■ BLP-50-75	DC-48	55	70-90	90-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF55	—	32.95
BLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF55	—	32.95
BLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF55	—	32.95
■ BLP-100-75	DC-98	108	146-189	189-400	1.7:1	18:1	8-37	FF55	—	33.95
BLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF55	—	32.95
BLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF55	—	32.95
BLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF55	—	32.95
BLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF55	—	32.95
BLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF55	—	32.95
BLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF55	—	32.95
BLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF55	—	32.95
■ BLP-600-75	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-37	FF55	—	33.95
BLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF55	—	32.95
BLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF55	—	32.95
BLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF55	—	32.95
■ BLP-850-75	DC-750	850	1150-1490	1490-2000	1.7:1	18:1	8-37	FF55	—	33.95
BLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF55	—	32.95
BLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF55	—	32.95

NOTES:

** 1dB compression at +13 dBm input power

■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

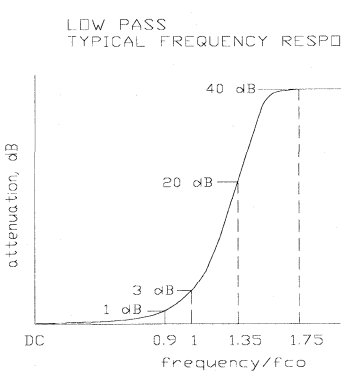
C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current rating:
   1a. RF power, 0.5 Watt

2. Models are available with male/female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.

NSN GUIDE

MCL NO.	NSN
SLP-30	5915-01-327-4692
SLP-21.4	5915-01-414-9165



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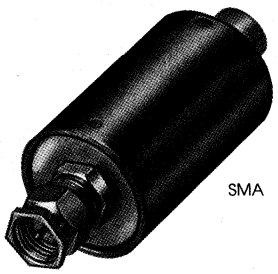
TYPE N

NLP

SMA



SLP

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
NLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF57	—	37.95
NLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF57	—	38.95
NLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF57	—	35.95
NLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF57	—	35.95
NLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF57	—	35.95
NLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF57	—	35.95
NLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF57	—	35.95
NLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF57	—	35.95
NLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF57	—	35.95
NLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF57	—	35.95
NLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF57	—	35.95
NLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF57	—	35.95
NLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF57	—	35.95
NLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF57	—	35.95
NLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF57	—	35.95
NLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF57	—	35.95
NLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF57	—	35.95
SLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF99	—	36.95
SLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF99	—	37.95
SLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF99	—	34.95
SLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF99	—	34.95
SLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF99	—	34.95
SLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF99	—	34.95
SLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF99	—	34.95
SLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF99	—	34.95
SLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF99	—	34.95
SLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF99	—	34.95
SLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF99	—	34.95
SLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF99	—	34.95
SLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF99	—	34.95
SLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF99	—	34.95
SLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF99	—	34.95
SLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF99	—	34.95
SLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF99	—	34.95

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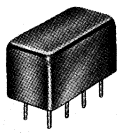
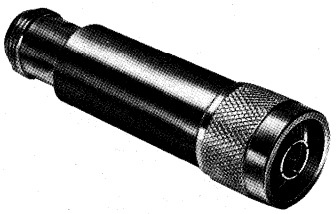
BANDPASS 10.7 to 70 MHz



PIF
PBP
PBLP



NIF
NBP
NBLP

constant impedance

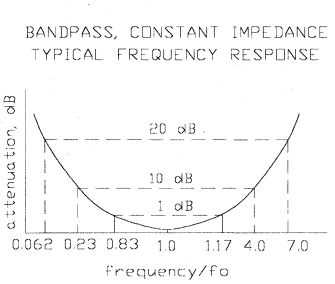
MODEL NO.	CENTER FREQ. MHz	PASSBAND, MHz (loss < 1dB)	STOP BANDS (loss > 10dB) at MHz	STOP BANDS (loss > 20dB) at MHz	VSWR, 1.3:1, Typ. TOTAL BAND, MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection*	PRICE $ (note 2a) Qty. (1-9)
_IF-21.4	21.4	18-25	4.9 & 85	1.3 & 150	DC-220	8-22	▽	cs	14.95
_IF-30	30	25-35	7 & 120	1.9 & 210	DC-330	8-22	▽	cs	14.95
_IF-40	42	35-49	10 & 168	2.6 & 300	DC-400	8-22	▽	cs	14.95
_IF-50	50	41-58	11.5 & 200	3.1 & 350	DC-440	8-23	▽	cs	14.95
_IF-60	60	50-70	14 & 240	3.8 & 400	DC-500	8-23	▽	cs	14.95
_IF-70	70	58-82	16 & 280	4.4 & 490	DC-550	8-23	▽	cs	14.95

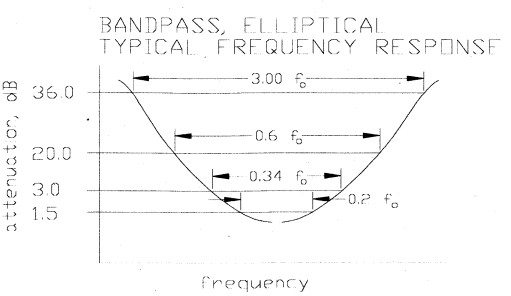
For connector selection, add prefix letter P, B, N or S to _IF where applicable (see note 2)

elliptic response

MODEL NO.	CENTER FREQ. MHz	PASSBAND I.L. 1.5 dB MAX. (MHz)	3 dB BANDWIDTH TYPICAL (MHz)	STOP BANDS I.L. > 20 dB at MHz	STOP BANDS I.L. > 35 dB at MHz	PASSBAND VSWR MAX.	STOP BAND VSWR TYPICAL	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection*	PRIC $ (note 2 Qty (1-9
_BP-10.7	10.7	9.5-11.5	8.9-12.7	7.5 & 15	0.6 & 50-1000	1.7:1	16:1	8-24	▽	cr	18.9
_BP-21.4	21.4	19.2-23.6	17.9-25.3	15.5 & 29	3.0 & 80-1000	1.7:1	16:1	8-24	▽	cr	18.9
_BP-30	30	27.0-33.0	25-35	22 & 40	3.2 & 99-1000	1.7:1	16:1	8-24	▽	cr	18.9
_BP-60	60	55.0-67.0	49.8-70.5	44 & 79	4.6 & 190-1000	1.7:1	16:1	8-25	▽	cr	18.9
_BP-70	70	63.0-77.0	58.0-82.0	51 & 94	6.0 & 193-1000	1.7:1	16:1	8-25	▽	cr	18.9

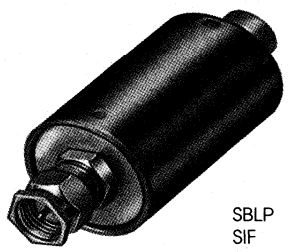
For connector selection, add prefix letter P, B, N or S to _BP where applicable (see note 2)





LOW PASS, FLAT TIME DELAY DC to 1.87 GHz

BBLP
BIF
BBP



SBLP
SIF
SBP

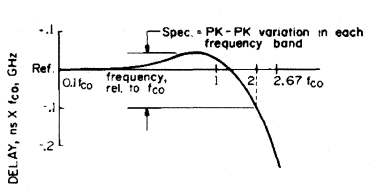
MODEL NO.	PASSBAND, MHz (loss < 1.2 dB) Min.	fco, MHz (loss 3dB) Nom.	STOP BAND, MHz loss > 10dB	STOP BAND, MHz loss > 20dB	VSWR DC-0.2fco X	VSWR DC-0.6fco X	GROUP DELAY VARIATION, ns DC-fco X	GROUP DELAY VARIATION, ns DC-2fco X	GROUP DELAY VARIATION, ns DC-2.67fco X	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2c) Qty. (1-9)
_BLP-39	DC-23	39	78-117	117	1.3:1	2.3:1	0.70	4.0	5.00	8-31	▽	cr	19.95
_BLP-117	DC-65	117	234-312	312	1.3:1	2.4:1	0.35	1.4	1.90	8-31	▽	cr	19.95
_BLP-156	DC-94	156	312-416	416	1.3:1	1.1:1	0.30	1.1	1.50	8-31	▽	cr	19.95
_BLP-200	DC-120	200	400-534	534	1.6:1	1.9:1	0.40	1.3	1.60	8-32	▽	cr	19.95
_BLP-300	DC-180	300	600-801	801	1.25:1	2.2:1	0.20	0.6	0.80	8-32	▽	cr	19.95
_BLP-467	DC-280	467	934-1246	1246	1.25:1	2.2:1	0.15	0.4	0.55	8-32	▽	cr	19.95
▼ _BLP-933	DC-560	933	1866-2490	2490	1.3:1	2.2:1	0.09	0.2	0.28	8-33	▽	—	38.95
▼ _BLP-1870	DC-850	1870	3740-5000	5000	1.45:1	2.9:1	0.05	0.1	0.15	8-33	▽	—	38.95

For connector selection, add prefix letter P, B, N, or S to _BLP where applicable (see note 2)

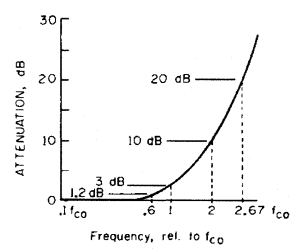
features

- Flat group delay for low pulse distortion.
- Delay and selectivity are both controlled by design.
- Wide selection of cutoff frequencies, 48-to-1 range. Custom Fco values are available.
- Choice of pin package or connectorized models.

TYPICAL GROUP DELAY



TYPICAL FREQUENCY RESPONSE
Insertion Loss



NOTES:

* Connection for plug-in models (PIF, PBP, PBLP)
▼ _BLP-933 AND _BLP-1870 available only with N and SMA connectors.
▽ Four different case styles available:
For plug-in models, case style A01
SMA connector models, case style FF99
BNC connector models, case style FF55
N-type connector models, case style FF57
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF power, 0.5 Watt
2. 2a. Price for PIF-series only, SIF $38.95, BIF $36.95, NIF $39.95
2b Price for PBP-series only, SBP $42.95, BBP $40.95, NBP $43.95
2c. Price for PBLP-series only, SBLP $38.95, BBLP $36.95, NBLP $39.95
3. Models are available with male/ female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.
4. All filters, except pin units (PIF, PBP and PBLP), are non-hermetic.

pin connections

see case style outline drawings

PORT	cr	cs
INPUT	1	1
OUTPUT	8	6
GND	2,3,4,5,6,7	2,3,4,5,7,8

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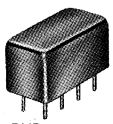
HIGH PASS 25 MHz to 2.2 GHz

SURFACE MOUNT

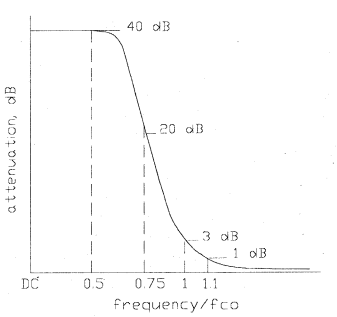
SCHF



PHP

	MODEL NO.	STOP BAND, MHz (loss > 40dB)	STOP BAND, MHz (loss > 20dB)	fco, MHz Nom. (loss 3dB)	PASSBAND, MHz (loss < 1dB)	VSWR, Stopband Typ.	VSWR, Passband Typ.	CAPD DATA (see RF/IF Designer hand-book) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
NEW	SCHF-25	DC-13	13-19	25	27.5-200	18:1	1.3:1	8-41	YY161	cr	14.95
NEW	SCHF-300	DC-145	145-190	245	290-1200	18:1	1.5:1	8-41	YY161	cr	14.95
	PHP-25	DC-13	13-19	25	27.5-200	18:1	1.7:1	8-26	A01	cr	16.95
	PHP-50	DC-20	20-26	37	41-200	17:1	1.5:1	8-26	A01	cr	14.95
	PHP-100	DC-40	40-55	82	90-400	17:1	1.5:1	8-26	A01	cr	14.95
	PHP-150	DC-70	70-95	120	133-600	17:1	1.8:1	8-27	A01	cr	14.95
	PHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	A01	cr	14.95
	PHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	A01	cr	14.95
	PHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	A01	cr	14.95
	PHP-300	DC-145	145-170	245	*290-1200	17:1	1.7:1	8-28	A01	cr	14.95
	PHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	A01	cr	14.95
	PHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	A01	cr	14.95
	PHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	A01	cr	14.95
	PHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	A01	cr	14.95
	PHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	A01	cr	14.95
	PHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	A01	cr	14.95
	PHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	A01	cr	14.95

HIGH PASS
TYPICAL FREQUENCY RESPONSE



NOTES:

* Insertion loss 1.5 dB maximum
❑ Non-hermetic
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF power, 0.5 Watt
2. Models are available with male/female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.

pin connections

see case style outline drawings

PORT	cr
INPUT	1
OUTPUT	8
GND	2,3,4,5,6,7

NSN GUIDE

MCL NO.	NSN
BHP-25	5915-01-425-7519
SHP-200	5915-01-360-0677

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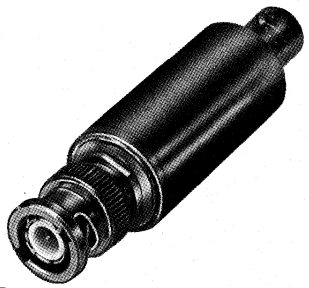
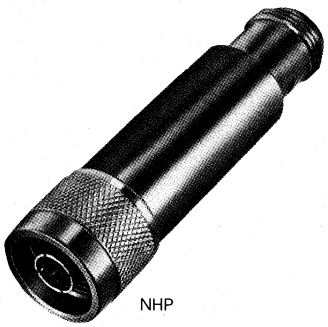
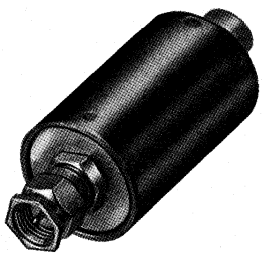
Plug-In & Coaxial



BHP



NHP



SHP

MODEL NO.	STOP BAND, MHz (loss > 40dB)	STOP BAND, MHz (loss > 20dB)	fco, MHz Nom. (loss 3dB)	PASSBAND, MHz (loss < 1dB)	VSWR, Stopband Typ.	VSWR, Passband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
BHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF55	-	38.95
BHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF55	-	36.95
BHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF55	-	36.95
BHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF55	-	36.95
BHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF55	-	36.95
BHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF55	-	36.95
BHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF55	-	36.95
BHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF55	-	36.95
BHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF55	-	36.95
BHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF55	-	36.95
BHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF55	-	36.95
BHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF55	-	36.95
BHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF55	-	36.95
BHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF55	-	36.95
BHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF55	-	36.95
NHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF57	-	39.95
NHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF57	-	39.95
NHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF57	-	39.95
NHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF57	-	39.95
NHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF57	-	39.95
NHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF57	-	39.95
NHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF57	-	39.95
NHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF57	-	39.95
NHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF57	-	39.95
NHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF57	-	39.95
NHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF57	-	39.95
NHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF57	-	39.95
NHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF57	-	39.95
NHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF57	-	39.95
NHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF57	-	39.95
SHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF99	-	38.95
SHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF99	-	38.95
SHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF99	-	38.95
SHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF99	-	38.95
SHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF99	-	38.95
SHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF99	-	38.95
SHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF99	-	38.95
SHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF99	-	38.95
SHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF99	-	38.95
SHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF99	-	38.95
SHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF99	-	38.95
SHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF99	-	38.95
SHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF99	-	38.95
SHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF99	-	38.95
SHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF99	-	38.95

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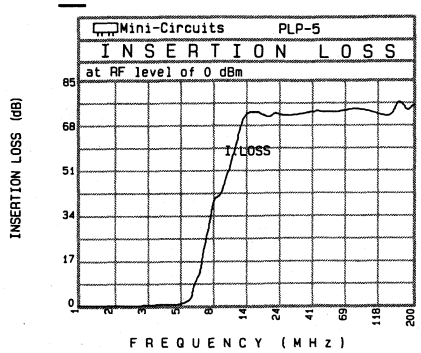
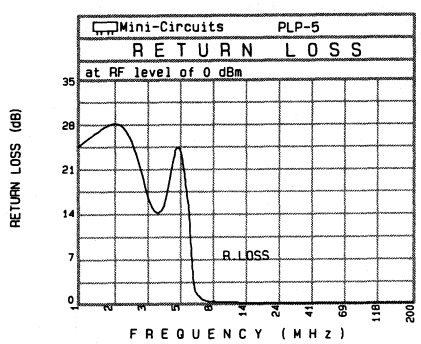
MODEL SELECTION

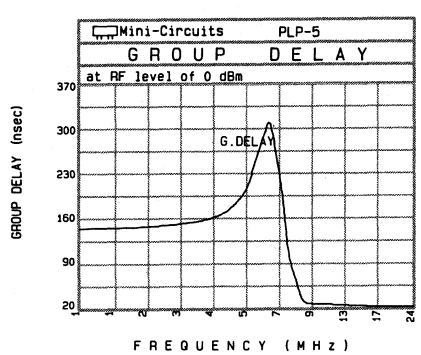
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

LP-5 DC-5 MHz

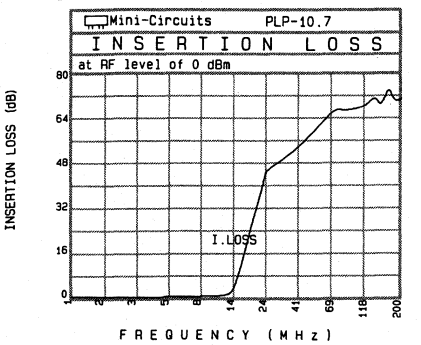


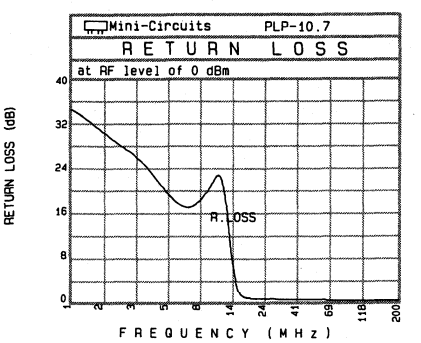


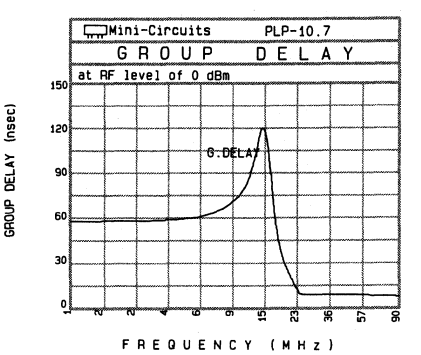


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.08	0.1	25.1	1.0	147.473
2.0	0.13	0.1	32.4	2.0	150.986
3.0	0.34	0.1	15.6	3.0	158.958
3.5	0.69	0.1	14.2	3.5	164.573
4.0	0.71	0.1	15.8	4.0	173.418
4.5	0.73	0.1	25.1	4.5	192.059
5.0	0.91	0.1	25.5	5.0	215.975
5.8	2.41	0.7	15.8	5.3	253.980
6.0	3.35	0.8	7.2	5.8	294.321
6.3	9.49	1.3	2.0	6.0	326.824
6.8	11.67	1.1	1.2	6.3	305.701
7.0	16.87	1.2	0.9	6.8	223.890
7.3	23.49	1.1	0.5	7.0	180.770
7.8	29.30	1.0	0.4	7.3	106.737
8.0	34.55	1.0	0.3	7.8	73.246
8.3	39.27	1.0	0.3	8.0	54.493
8.5	41.68	1.1	0.3	8.3	38.639
8.8	42.05	1.1	0.2	8.5	31.119
9.0	42.44	1.1	0.2	8.8	29.126
9.5	43.73	1.1	0.2	9.0	28.459
10.0	47.90	1.1	0.2	9.5	27.231
12.0	63.04	1.6	0.1	10.0	26.911
16.0	75.52	4.1	0.1	12.0	26.682
22.0	75.62	9.9	0.1	13.0	25.945
35.0	74.63	3.9	0.1	14.0	25.338
80.0	77.85	6.6	0.1	16.0	24.483
156.0	81.35	8.6	0.1	18.0	24.079
178.0	75.08	2.3	0.1	20.0	23.998
189.0	77.64	6.8	0.1	22.0	23.815
200.0	78.15	5.2	0.1	24.0	23.723

LP-10.7 DC-11 MHz

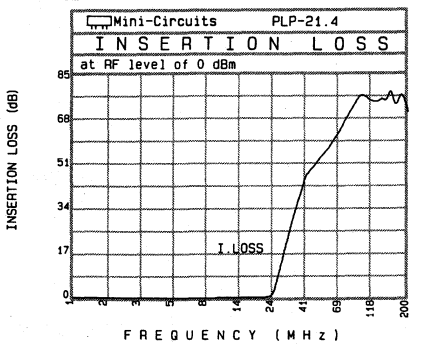


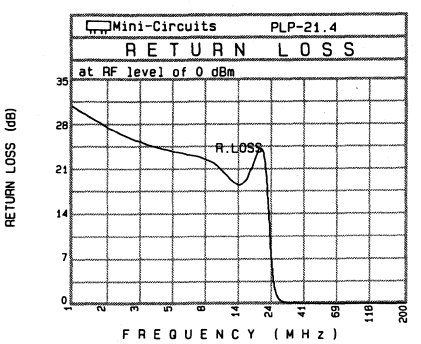


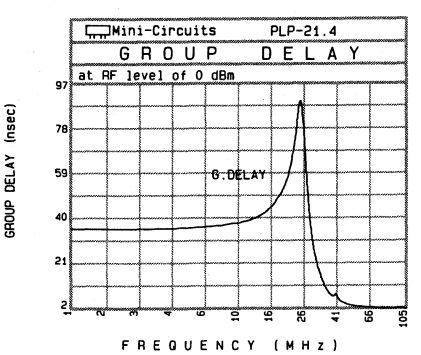


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.07	0.1	35.4	1.0	58.799
2.0	0.09	0.1	29.3	2.0	59.100
3.0	0.12	0.1	26.7	3.0	59.274
5.0	0.32	0.1	18.8	5.0	60.968
7.0	0.47	0.1	16.4	7.0	63.357
10.0	0.65	0.1	21.3	10.0	74.878
11.0	0.75	0.1	24.0	11.0	81.219
13.0	1.40	0.2	15.6	12.0	91.066
14.0	2.93	0.6	7.4	13.0	107.182
15.0	6.69	1.2	3.1	13.5	117.873
16.0	11.80	1.5	1.5	14.0	126.316
17.0	17.23	1.5	1.1	15.0	118.462
17.5	19.81	1.6	1.0	15.5	101.874
18.0	22.31	1.6	0.9	16.0	88.384
19.0	27.01	1.7	0.8	16.5	69.668
20.0	31.35	1.7	0.8	17.0	58.263
21.5	37.46	1.8	0.7	17.5	48.582
22.5	41.58	2.0	0.7	18.0	41.979
23.0	43.42	2.0	0.7	19.0	32.499
23.5	45.39	2.3	0.7	20.0	26.260
24.0	47.26	2.3	0.7	21.0	22.782
67.5	69.85	8.9	0.5	21.5	15.910
89.5	68.74	2.9	0.5	22.0	16.353
111.5	69.81	2.2	0.5	22.5	13.868
133.5	73.98	3.2	0.5	23.0	13.792
156.0	74.31	4.9	0.5	23.5	9.849
167.0	77.32	6.1	0.5	24.0	9.527
178.0	71.38	2.8	0.5	67.5	9.305
189.0	75.13	2.8	0.5	78.5	8.983
200.0	72.96	2.1	0.5	89.5	8.696

LP-21.4 DC-22 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.10	0.1	31.7	1.0	36.156
2.0	0.12	0.0	26.4	2.0	36.114
5.0	0.21	0.1	24.0	5.0	36.803
10.0	0.29	0.1	23.3	10.0	38.686
15.0	0.45	0.1	16.1	15.0	42.252
20.0	0.45	0.1	27.7	20.0	55.732
22.0	0.60	0.1	21.6	22.0	69.397
23.5	1.46	0.4	9.6	23.0	81.704
24.5	3.45	1.0	4.4	23.5	88.289
25.0	4.95	1.2	3.0	24.0	92.344
27.0	12.37	1.5	0.7	24.5	91.461
29.0	19.53	1.4	0.3	25.0	85.660
30.0	22.77	1.4	0.3	26.0	66.763
31.0	25.77	1.3	0.2	27.0	48.882
32.0	28.62	1.3	0.2	28.0	36.298
33.0	31.31	1.3	0.2	29.0	28.750
35.0	36.30	1.2	0.1	30.0	24.488
38.0	42.86	1.3	0.1	31.0	19.404
39.0	45.08	1.1	0.1	32.0	17.880
40.0	46.77	1.0	0.1	33.0	13.725
41.0	48.73	1.0	0.1	34.0	13.701
86.5	76.16	2.0	0.1	35.0	14.628
105.0	77.54	4.3	0.1	36.0	8.862
124.0	75.42	0.6	0.1	38.0	7.643
143.0	75.51	1.8	0.0	39.0	7.393
162.0	74.57	3.5	0.1	40.0	9.968
171.5	75.79	4.4	0.1	41.0	2.673
181.0	81.15	8.2	0.1	86.5	2.561
190.5	76.97	3.2	0.1	96.0	2.444
200.0	72.23	2.4	0.1	105.0	2.281

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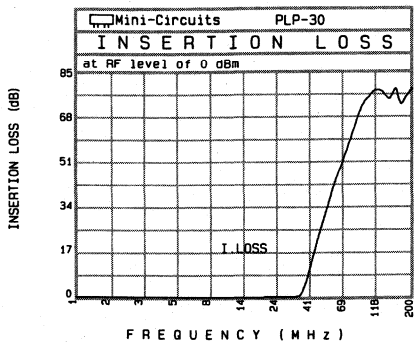
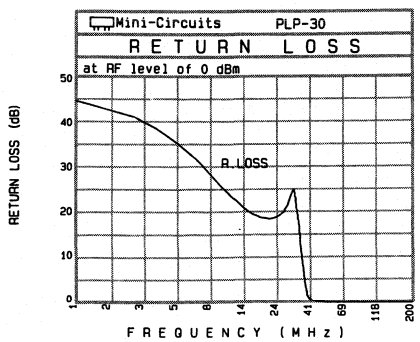
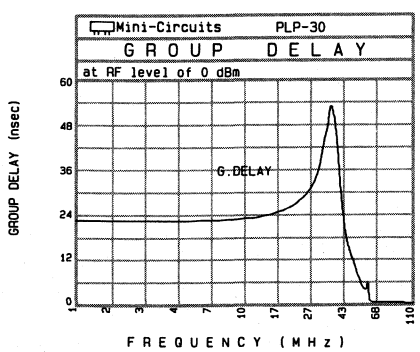
LP-30 DC-32 MHz

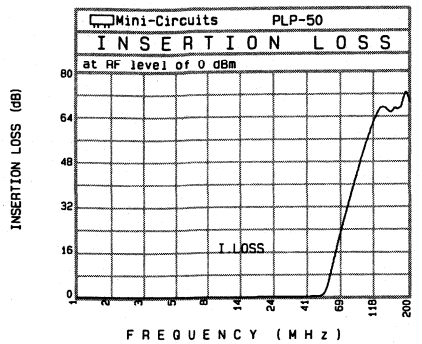


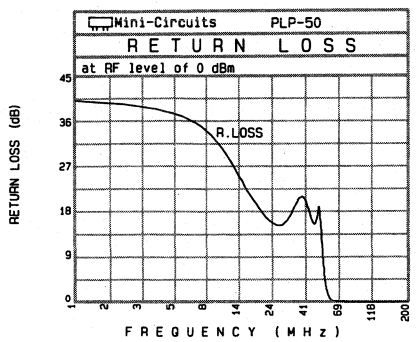


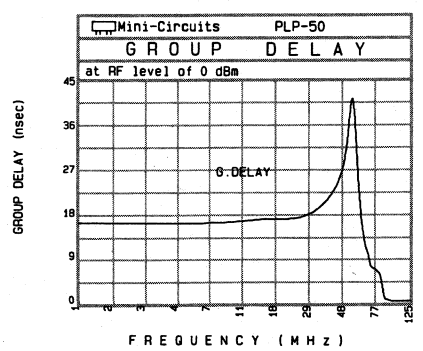


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.07	0.1	45.8	1.0	23.199
10.0	0.21	0.1	23.5	10.0	23.469
19.0	0.29	0.1	18.2	19.0	26.059
28.0	0.37	0.1	20.4	28.0	32.447
31.0	0.48	0.1	28.1	31.0	41.587
32.0	0.55	0.1	21.8	32.0	45.564
33.5	0.62	0.1	18.8	33.5	48.791
34.0	0.76	0.1	16.1	34.0	51.333
35.0	1.30	0.3	9.9	35.0	56.959
38.0	6.09	0.9	2.1	38.0	47.730
40.0	10.78	0.9	0.9	39.0	39.870
43.0	17.56	0.8	0.4	40.0	32.354
45.0	21.65	0.7	0.3	42.0	23.788
46.0	23.56	0.7	0.3	43.0	19.717
47.0	25.39	0.7	0.2	44.0	17.974
48.0	27.19	0.7	0.2	45.0	15.872
50.0	30.58	0.6	0.2	46.0	14.294
55.0	38.32	0.6	0.1	47.0	12.983
59.0	43.69	0.7	0.2	48.0	12.683
60.0	45.01	0.7	0.1	49.0	10.484
61.0	46.27	0.5	0.1	50.0	11.503
91.5	76.88	4.1	0.1	52.0	7.622
109.5	80.77	5.3	0.1	55.0	4.408
127.5	79.89	2.8	0.1	58.0	4.043
145.5	77.20	3.0	0.1	59.0	7.931
164.0	74.52	3.4	0.1	60.0	1.036
173.0	74.92	3.8	0.1	61.0	0.989
182.0	78.05	5.9	0.1	91.5	0.881
191.0	79.62	6.8	0.1	100.5	0.791
200.0	80.65	6.9	0.1	109.5	0.750

LP-50 DC-48 MHz

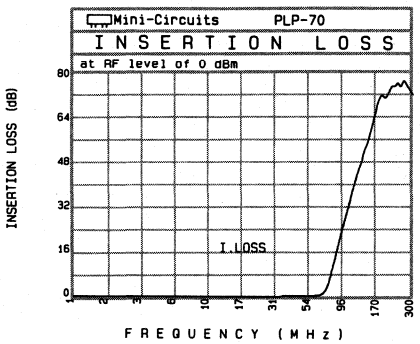


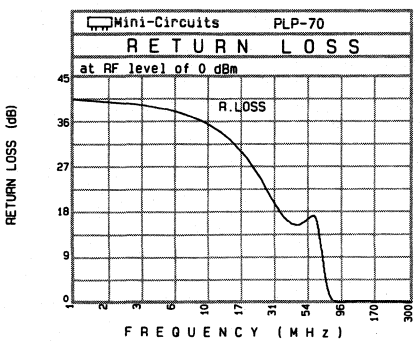


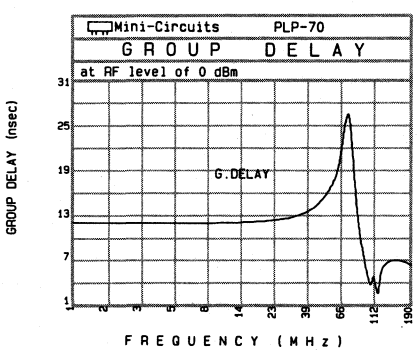


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.05	0.0	41.2	1.0	16.618
15.5	0.23	0.1	22.7	8.5	16.728
23.0	0.37	0.1	15.7	15.5	17.871
30.5	0.43	0.1	15.4	23.0	17.451
38.0	0.40	0.1	25.1	30.5	18.789
45.0	0.65	0.1	14.8	38.0	21.888
48.0	0.70	0.1	17.1	45.0	25.865
52.0	1.46	0.2	9.9	48.0	30.556
55.0	4.65	0.3	3.0	49.5	33.922
57.0	7.96	0.4	1.5	52.0	42.092
61.0	14.84	0.5	0.5	53.5	42.832
65.0	20.96	0.6	0.3	55.0	38.774
67.0	23.73	0.6	0.2	57.0	29.196
69.0	26.33	0.7	0.2	59.0	22.033
70.0	27.59	0.7	0.2	61.0	16.656
72.5	30.55	0.8	0.2	63.0	14.036
80.0	38.67	1.2	0.1	65.0	11.169
82.5	41.07	1.4	0.1	67.0	10.620
85.0	43.54	1.6	0.1	69.0	8.062
87.5	45.78	1.8	0.1	70.0	7.565
90.0	47.97	2.2	0.1	72.5	7.701
100.0	56.91	4.1	0.1	75.0	7.136
133.5	68.38	5.2	0.1	80.0	6.566
150.0	67.23	4.2	0.1	81.0	4.925
163.0	68.62	4.6	0.1	82.5	3.609
170.5	69.35	3.3	0.1	85.0	0.835
175.0	69.36	5.8	0.1	87.5	1.233
185.5	77.07	8.8	0.1	90.0	0.728
192.5	69.51	5.2	0.1	100.0	0.697
200.0	71.27	9.7	0.1	125.0	0.692

LP-70 DC-60 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.02	0.1	41.6	1.0	12.184
12.0	0.09	0.1	35.7	12.0	12.269
23.0	0.14	0.1	25.9	23.0	12.703
34.0	0.30	0.1	17.1	34.0	13.240
45.5	0.38	0.1	15.3	45.5	14.839
56.5	0.48	0.1	18.3	56.5	17.752
60.0	0.57	0.1	17.8	60.0	19.128
64.0	0.81	0.1	13.9	62.0	20.776
67.0	1.27	0.2	9.8	64.0	22.108
70.0	2.40	0.5	5.9	66.0	24.563
75.0	6.44	0.7	1.9	67.0	25.578
82.0	14.32	0.6	0.3	70.0	27.327
85.0	17.61	0.6	0.1	72.0	27.288
88.0	20.73	0.5	0.1	75.0	23.248
90.0	22.72	0.5	0.1	80.0	16.050
92.0	24.63	0.4	0.1	82.0	13.757
100.0	31.63	0.3	0.2	85.0	10.853
105.0	35.63	0.3	0.2	88.0	9.196
110.0	39.22	0.3	0.3	90.0	8.000
115.0	42.79	0.3	0.3	92.0	7.139
117.0	44.09	0.3	0.3	95.0	7.245
167.0	71.03	2.8	0.3	100.0	4.977
189.5	71.25	4.9	0.3	102.0	2.548
211.5	78.21	8.2	0.2	105.0	5.780
233.5	79.29	6.9	0.2	110.0	3.413
255.5	79.68	7.6	0.2	115.0	1.564
267.0	78.34	9.9	0.2	117.0	7.503
278.0	76.60	3.1	0.1	167.0	7.041
289.0	75.01	2.8	0.1	178.0	6.825
300.0	74.09	4.1	0.1	189.5	6.540

rugged, high selectivity

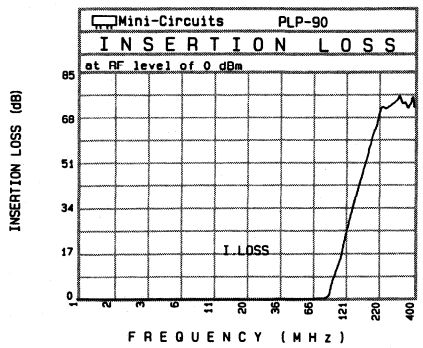
Low Pass Filters

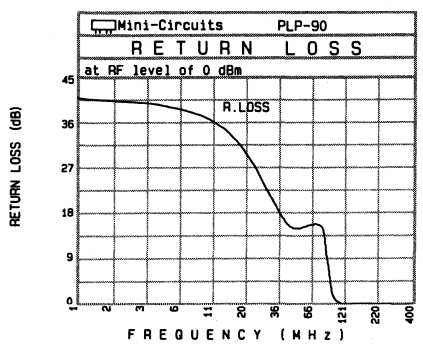
MODEL SELECTION

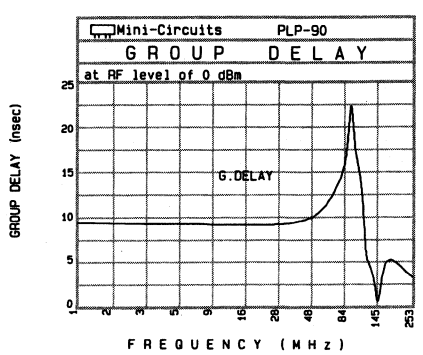
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

LP-90 DC-81 MHz

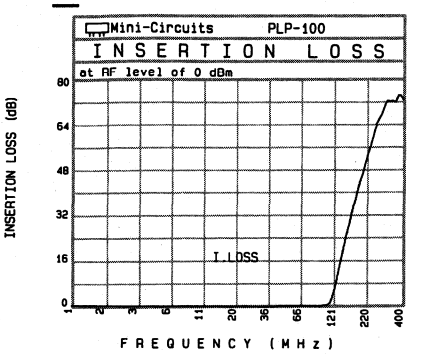


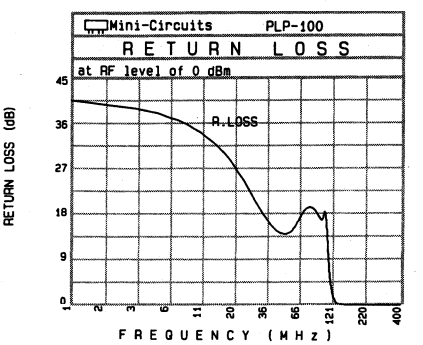


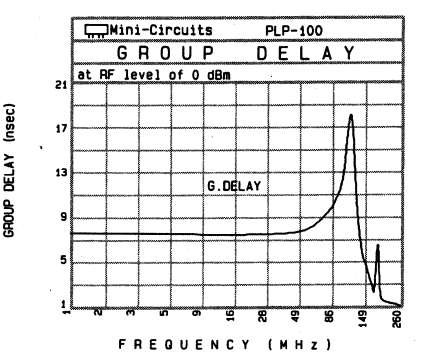


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.05	0.1	42.0	1.0	9.672
12.5	0.14	0.1	37.5	12.5	9.503
24.0	0.18	0.1	27.7	24.0	9.491
35.5	0.31	0.1	18.7	35.5	9.776
46.5	0.42	0.1	14.9	46.5	10.240
58.0	0.43	0.1	16.1	58.0	11.244
81.0	0.69	0.1	17.0	81.0	15.573
87.0	1.28	0.4	9.7	84.0	17.894
90.0	2.01	0.5	7.6	87.0	19.997
93.0	6.43	0.9	3.8	90.0	24.263
97.0	8.74	1.0	1.7	93.0	21.734
104.0	12.94	1.1	0.8	97.0	17.532
111.0	16.72	1.2	0.5	104.0	15.893
115.5	21.91	1.2	0.1	111.0	12.218
121.0	26.16	1.2	0.2	115.5	5.804
130.0	32.40	1.3	0.3	121.0	5.229
140.0	38.50	1.4	0.3	130.0	3.892
145.0	41.31	1.4	0.3	135.0	2.740
150.0	43.98	1.5	0.3	140.0	0.487
155.0	46.76	1.7	0.3	145.0	0.841
157.0	47.69	1.8	0.3	150.0	2.060
184.0	60.11	2.9	0.3	155.0	7.687
206.5	66.87	1.4	0.3	157.0	5.680
229.5	75.03	5.6	0.2	184.0	5.380
252.5	74.83	7.6	0.2	195.5	5.060
298.0	76.96	7.1	0.1	206.5	4.740
321.0	75.07	4.9	0.1	218.0	4.320
355.5	73.10	4.4	0.1	229.5	4.010
378.0	75.50	4.8	0.1	241.0	3.760
400.0	74.56	6.3	0.1	252.5	3.450

LP-100 DC-98 MHz

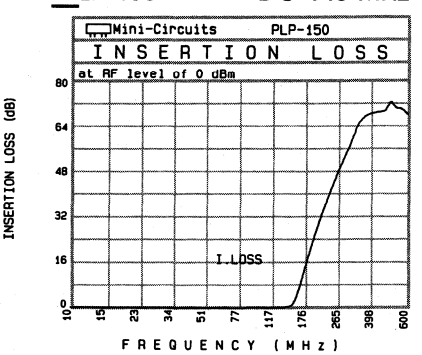


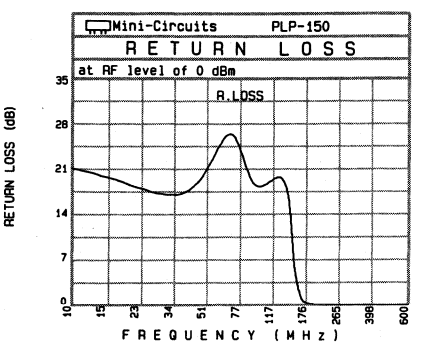


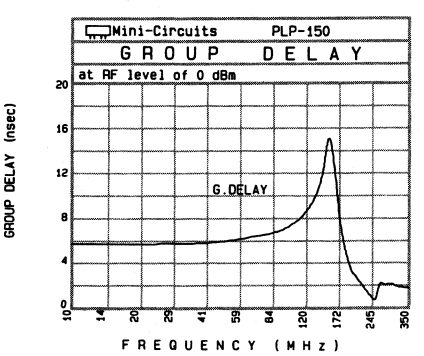


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.02	0.1	41.6	1.0	7.802
29.5	0.16	0.1	20.2	15.0	7.718
58.0	0.34	0.1	14.4	29.5	7.812
72.0	0.31	0.1	20.3	43.5	7.901
86.5	0.41	0.1	20.2	58.0	8.226
98.0	0.58	0.1	16.8	72.0	9.283
102.0	0.62	0.1	18.4	86.5	10.402
106.0	0.75	0.1	18.3	98.0	12.091
108.0	0.93	0.2	15.0	102.0	13.505
112.0	1.72	0.5	9.3	104.0	14.551
120.0	5.98	1.3	2.5	106.0	15.904
130.0	13.62	1.3	0.6	108.0	16.952
138.0	19.37	1.2	0.3	112.0	18.647
140.0	20.73	1.2	0.3	115.0	18.923
146.0	24.55	1.2	0.2	120.0	16.027
150.0	26.95	1.1	0.1	125.0	11.256
160.0	32.54	1.2	0.1	130.0	8.381
170.0	37.64	1.2	0.1	138.0	6.335
180.0	42.35	1.2	0.1	140.0	5.440
185.0	44.43	1.3	0.0	146.0	5.302
189.0	46.24	1.4	0.0	150.0	4.068
250.0	67.20	3.6	0.1	155.0	3.545
271.5	76.41	8.4	0.1	160.0	3.249
300.0	75.73	6.4	0.1	165.0	3.192
330.0	75.45	3.9	0.1	170.0	1.495
343.0	73.72	2.6	0.1	180.0	9.308
360.0	75.87	4.3	0.1	185.0	2.440
371.5	77.51	9.8	0.1	189.0	1.634
390.0	79.32	7.8	0.1	250.0	1.412
400.0	75.26	2.4	0.1	260.0	1.228

LP-150 DC-140 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
10.0	0.12	0.1	21.7	10.0	5.875
50.0	0.20	0.0	18.9	30.0	5.932
70.0	0.19	0.1	31.6	50.0	6.124
87.5	0.30	0.1	18.1	70.0	6.723
107.5	0.34	0.1	19.0	87.5	6.973
127.5	0.43	0.1	21.2	107.5	7.940
140.0	0.59	0.1	18.5	127.5	9.564
147.5	1.11	0.1	11.0	140.0	11.710
155.0	3.27	0.2	4.3	145.0	13.582
165.0	9.15	0.4	1.2	147.5	14.703
180.0	18.50	0.6	0.4	150.0	15.571
195.0	26.35	0.7	0.2	155.0	15.775
200.0	28.70	0.7	0.2	165.0	10.701
205.0	30.89	0.7	0.2	170.0	8.263
210.0	33.01	0.8	0.2	180.0	5.337
220.0	36.90	0.8	0.1	190.0	3.934
240.0	43.83	0.9	0.1	195.0	3.242
260.0	49.92	1.3	0.1	200.0	3.185
270.0	52.20	1.9	0.1	205.0	2.751
290.0	57.13	1.7	0.1	210.0	2.474
300.0	59.12	2.5	0.1	220.0	2.061
320.0	64.42	3.7	0.1	230.0	1.548
360.0	69.97	6.8	0.1	240.0	0.945
462.5	71.43	5.2	0.1	250.0	0.617
502.5	74.26	2.1	0.1	260.0	2.736
522.5	72.73	2.6	0.1	270.0	2.100
540.0	72.69	4.1	0.1	290.0	2.428
560.0	72.65	5.6	0.0	300.0	2.217
590.0	76.20	9.3	0.1	320.0	2.006
600.0	70.55	3.8	0.1	350.0	1.977

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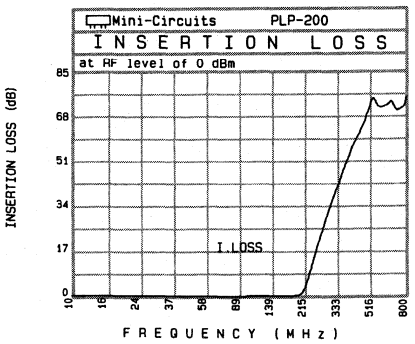
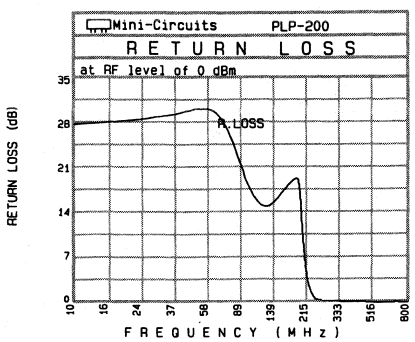
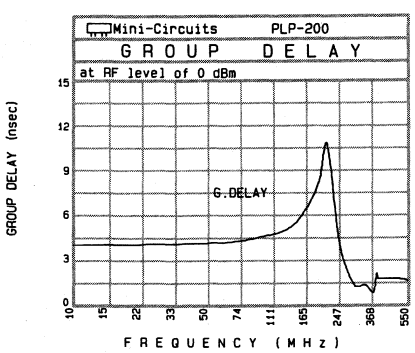
LP-200 DC-190 MHz

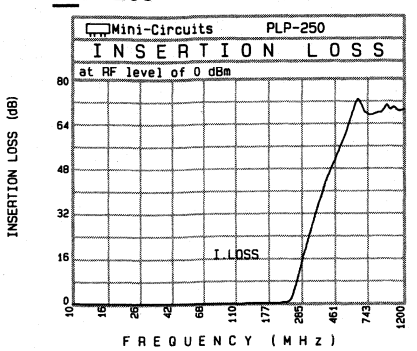


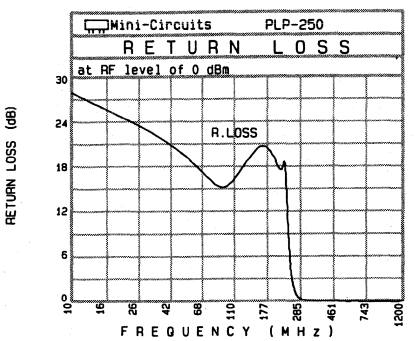


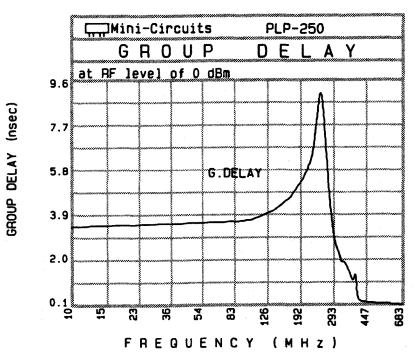


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
10.0	0.08	0.1	28.6	10.0	4.181
37.5	0.12	0.1	30.1	37.5	4.307
67.5	0.15	0.1	32.8	67.5	4.375
95.0	0.26	0.1	18.5	95.0	4.777
122.5	0.43	0.1	14.3	122.5	5.092
150.0	0.39	0.1	17.4	150.0	5.752
190.0	0.58	0.1	21.0	190.0	8.298
200.0	0.96	0.2	13.6	195.0	9.067
210.0	2.52	0.7	5.9	200.0	10.178
220.0	6.01	1.1	2.4	205.0	11.129
240.0	15.07	1.3	0.7	210.0	11.423
250.0	19.34	1.3	0.6	220.0	9.611
260.0	23.25	1.4	0.5	235.0	5.782
280.0	30.20	1.5	0.4	240.0	4.995
290.0	33.33	1.5	0.4	245.0	4.341
300.0	36.17	1.5	0.3	250.0	3.626
320.0	41.60	1.8	0.3	260.0	2.947
370.0	53.41	2.3	0.2	280.0	1.790
380.0	55.00	2.8	0.2	290.0	1.539
385.0	56.23	2.7	0.2	300.0	1.210
390.0	57.87	4.0	0.2	310.0	0.877
490.0	71.86	7.9	0.1	320.0	0.152
550.0	72.71	1.6	0.1	340.0	1.772
602.5	74.42	2.5	0.1	370.0	0.312
660.0	77.14	4.3	0.0	380.0	2.764
715.0	72.38	5.7	0.1	385.0	1.862
750.0	73.49	3.5	0.1	390.0	1.941
780.0	73.91	4.7	0.1	490.0	1.922
790.0	80.33	5.3	0.1	517.5	1.909
800.0	77.51	9.6	0.1	550.0	1.810

LP-250 DC-225 MHz

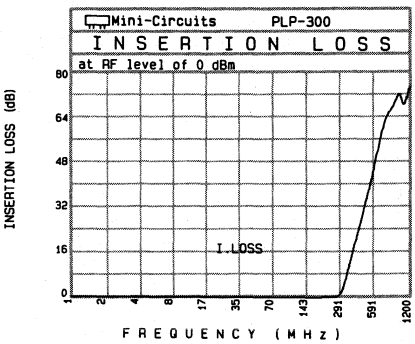


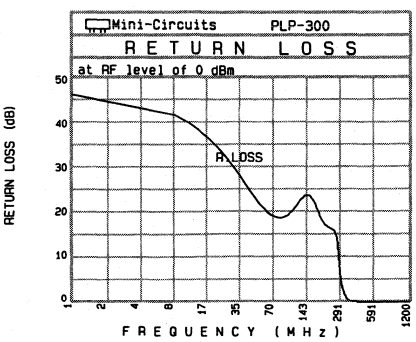


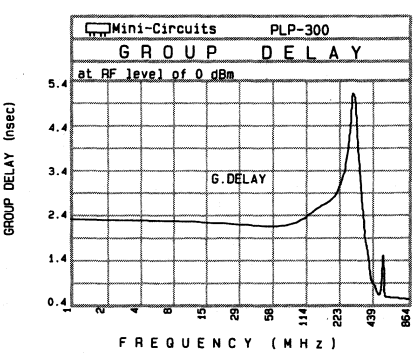


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
10.0	0.03	0.1	28.7	10.0	3.536
20.0	0.03	0.1	24.7	20.0	3.664
80.0	0.20	0.1	16.1	80.0	3.780
100.0	0.28	0.1	14.8	100.0	3.799
165.0	0.27	0.1	24.4	165.0	4.630
217.5	0.60	0.1	16.4	217.5	6.373
225.0	0.64	0.1	20.4	225.0	7.252
240.0	1.59	0.3	8.3	230.0	7.997
250.0	3.87	0.6	3.6	240.0	9.420
260.0	7.27	0.9	1.6	245.0	9.371
280.0	14.62	1.0	0.5	250.0	8.907
300.0	21.27	1.1	0.3	260.0	6.898
310.0	24.28	1.2	0.3	270.0	5.183
315.0	25.71	1.2	0.3	280.0	3.908
320.0	27.12	1.3	0.3	290.0	3.016
330.0	29.77	1.3	0.3	300.0	2.657
350.0	34.87	1.6	0.2	310.0	2.334
370.0	39.35	1.9	0.2	315.0	2.139
380.0	41.63	2.0	0.2	320.0	1.982
390.0	43.91	2.3	0.2	330.0	2.131
400.0	46.09	2.7	0.2	340.0	1.529
580.0	69.80	3.0	0.1	350.0	1.299
682.5	69.02	1.5	0.1	360.0	1.371
785.0	69.27	2.4	0.1	370.0	1.149
890.0	69.72	4.5	0.1	380.0	1.777
992.5	70.16	5.1	0.1	390.0	0.460
1045.0	73.29	6.6	0.1	400.0	0.269
1097.5	70.40	5.6	0.0	580.0	0.252
1147.5	71.08	3.9	0.2	630.0	0.201
1200.0	71.31	2.1	0.2	682.5	0.195

LP-300 DC-270 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	0.02	0.1	47.4	1.0	2.373
49.0	0.13	0.1	19.7	49.0	2.197
97.0	0.17	0.1	18.2	97.0	2.292
145.0	0.15	0.1	28.3	145.0	2.757
193.0	0.28	0.1	17.5	193.0	2.818
241.0	0.36	0.1	17.4	241.0	3.419
270.0	0.53	0.1	15.6	270.0	4.447
280.0	1.00	0.1	9.8	275.0	5.142
297.0	2.83	0.2	4.3	280.0	5.327
300.0	3.29	0.2	3.8	290.0	5.236
340.0	11.27	0.3	0.7	297.0	5.080
360.0	15.31	0.3	0.4	300.0	4.747
380.0	19.09	0.4	0.3	320.0	3.644
400.0	22.62	0.4	0.2	340.0	2.788
410.0	24.31	0.4	0.2	350.0	2.487
450.0	30.64	0.6	0.1	360.0	1.910
490.0	36.51	0.9	0.1	380.0	1.791
520.0	40.88	1.2	0.1	400.0	1.152
530.0	42.34	1.3	0.1	410.0	0.976
540.0	43.72	1.3	0.1	450.0	0.880
550.0	45.07	1.5	0.1	480.0	0.703
700.0	66.82	5.7	0.1	490.0	1.163
864.0	71.78	6.6	0.1	500.0	0.426
960.0	76.06	6.9	0.1	520.0	2.107
1056.0	70.05	3.2	0.1	530.0	0.673
1110.0	73.87	7.7	0.1	540.0	0.651
1120.0	72.31	5.1	0.1	550.0	0.630
1140.0	76.33	5.1	0.1	700.0	0.609
1150.0	72.33	3.5	0.1	800.0	0.592
1200.0	77.29	5.8	0.1	864.0	0.580

rugged, high selectivity

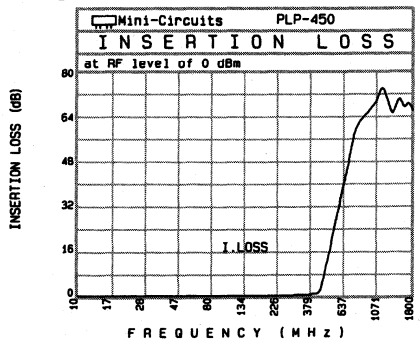
Low Pass Filters

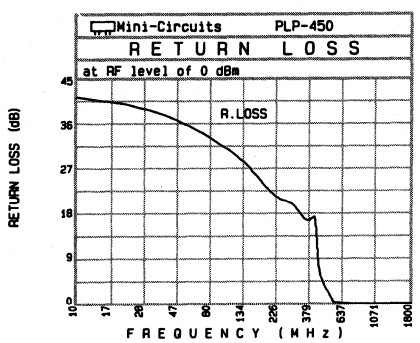
MODEL SELECTION

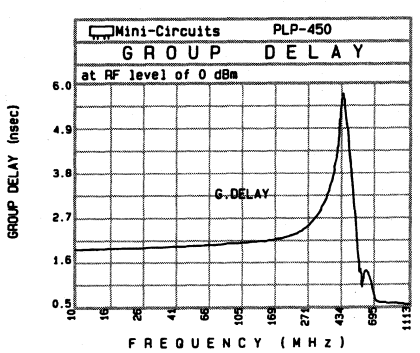
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

LP-450 DC-400 MHz

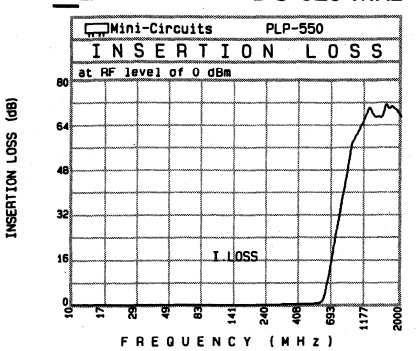


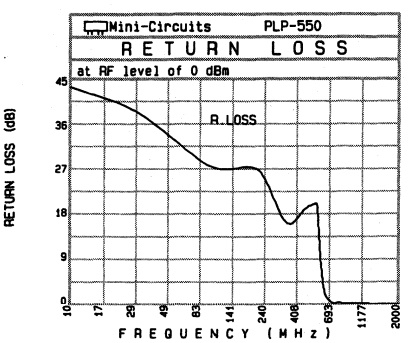


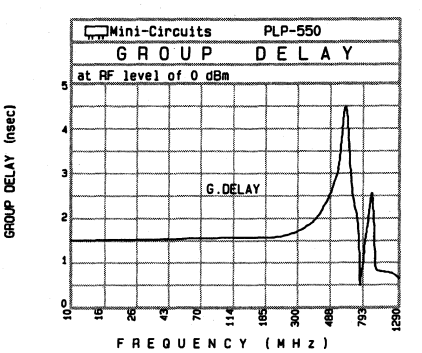


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.02	0.1	42.4	10.0	1.960
80.0	0.06	0.1	33.6	80.0	2.096
147.5	0.10	0.1	28.3	147.5	2.158
217.5	0.19	0.1	21.0	217.5	2.274
285.0	0.25	0.1	21.4	285.0	2.598
355.0	0.46	0.1	16.3	355.0	3.254
400.0	0.63	0.1	18.0	400.0	4.255
420.0	1.01	0.1	12.8	410.0	4.757
440.0	2.84	0.2	5.2	420.0	5.318
545.0	26.52	0.9	0.4	430.0	5.871
555.0	28.57	0.9	0.3	440.0	5.989
565.0	30.55	1.0	0.3	545.0	1.522
570.0	31.51	1.0	0.3	550.0	1.277
575.0	32.52	1.0	0.3	555.0	1.450
580.0	33.47	1.0	0.3	560.0	1.419
590.0	35.44	1.0	0.3	565.0	1.120
620.0	40.86	1.1	0.2	570.0	0.882
680.0	51.19	1.6	0.2	575.0	1.196
700.0	54.79	1.8	0.1	580.0	1.114
720.0	57.91	1.2	0.1	590.0	1.484
750.0	62.99	2.7	0.2	600.0	1.666
975.0	69.53	2.1	0.1	620.0	0.933
1112.5	78.46	9.9	0.1	640.0	1.237
1250.0	68.87	2.9	0.1	680.0	0.642
1387.5	69.76	8.2	0.1	700.0	0.615
1525.0	70.50	5.6	0.1	720.0	0.592
1592.5	68.09	0.9	0.1	750.0	0.581
1662.5	71.23	4.9	0.1	975.0	0.555
1730.0	72.22	6.0	0.1	1042.5	0.530
1800.0	67.80	4.1	0.1	1112.5	0.522

LP-550 DC-520 MHz

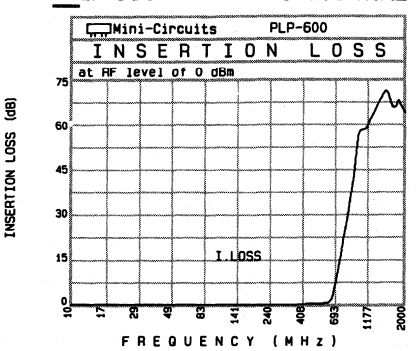


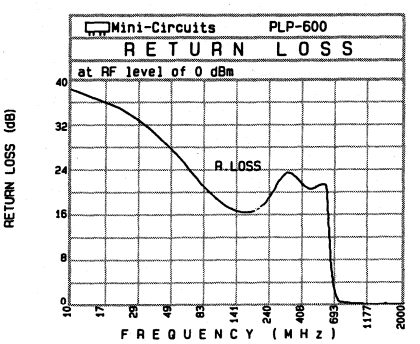


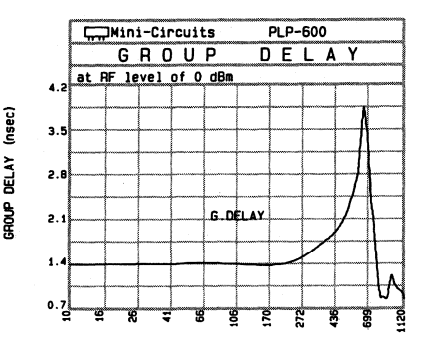


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.02	0.1	44.6	10.0	1.545
152.5	0.10	0.1	28.0	80.0	1.611
222.5	0.15	0.1	28.8	152.5	1.611
295.0	0.27	0.1	18.0	222.5	1.605
365.0	0.38	0.1	15.3	295.0	1.750
437.5	0.36	0.1	19.6	365.0	1.929
520.0	0.57	0.1	20.4	437.5	2.318
550.0	0.75	0.1	20.8	520.0	2.990
570.0	1.17	0.3	12.7	540.0	3.339
580.0	1.68	0.4	9.2	550.0	3.661
620.0	7.07	1.1	2.3	570.0	4.368
720.0	26.51	1.6	0.2	580.0	4.591
730.0	28.52	1.6	0.3	600.0	4.675
740.0	29.95	1.6	0.3	620.0	3.721
750.0	31.57	1.6	0.4	650.0	2.392
760.0	33.24	1.7	0.4	720.0	2.077
800.0	39.85	1.9	0.3	730.0	0.040
870.0	50.78	2.4	0.2	740.0	0.991
900.0	55.60	2.9	0.2	750.0	0.808
910.0	58.10	4.7	0.2	760.0	0.888
920.0	59.19	4.2	0.2	780.0	1.485
1147.5	68.70	3.0	0.2	800.0	1.712
1290.0	68.19	3.5	0.1	850.0	2.480
1432.5	69.02	4.4	0.1	870.0	2.813
1572.5	75.22	5.7	0.1	900.0	1.614
1715.0	73.18	5.2	0.1	910.0	0.907
1787.5	71.84	3.4	0.1	920.0	0.825
1857.5	71.44	3.7	0.1	1147.5	0.801
1930.0	71.78	6.9	0.1	1217.5	0.728
2000.0	68.82	2.1	0.1	1290.0	0.645

LP-600 DC-580 MHz







Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.01	0.1	39.3	10.0	1.412
152.5	0.22	0.2	16.2	80.0	1.438
295.0	0.20	0.1	25.3	152.5	1.382
437.5	0.28	0.1	20.5	222.5	1.417
507.5	0.37	0.1	21.9	295.0	1.590
577.5	0.59	0.1	22.0	365.0	1.787
580.0	0.60	0.1	21.9	437.5	1.948
620.0	1.50	0.3	9.6	507.5	2.267
640.0	2.98	0.4	5.1	577.5	2.856
670.0	7.09	0.6	2.1	580.0	2.854
720.0	15.52	2.0	0.4	600.0	3.364
800.0	28.44	4.7	0.3	620.0	3.840
820.0	31.52	5.4	0.3	630.0	3.984
830.0	33.06	5.7	0.3	640.0	3.809
840.0	34.63	6.1	0.3	670.0	3.367
880.0	41.22	8.0	0.2	700.0	2.262
920.0	48.84	9.9	0.2	720.0	2.297
960.0	58.62	9.9	0.2	750.0	1.483
1000.0	59.95	9.9	0.2	800.0	0.771
1100.0	59.89	8.4	0.1	820.0	0.930
1120.0	62.05	8.8	0.1	830.0	1.543
1360.0	71.05	2.3	0.1	840.0	1.004
1502.5	73.53	9.3	0.2	880.0	0.790
1572.5	70.71	4.9	0.1	900.0	1.010
1650.0	67.12	3.4	0.1	920.0	1.110
1750.0	67.73	7.7	0.1	940.0	1.281
1800.0	70.74	9.5	0.1	960.0	1.145
1850.0	68.64	9.1	0.1	1000.0	1.023
1950.0	68.21	7.1	0.1	1100.0	0.952
2000.0	65.82	4.6	0.1	1120.0	0.852

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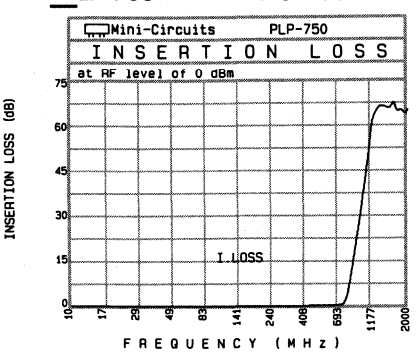
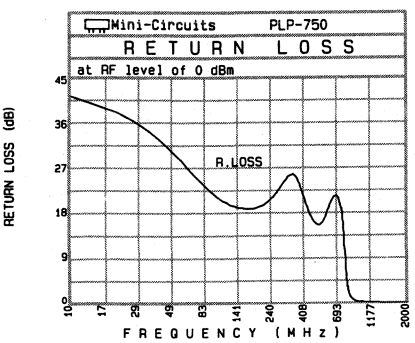
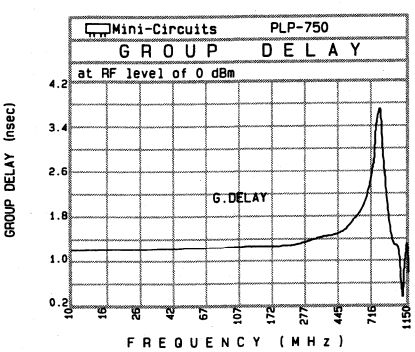
LP-750 DC-700 MHz

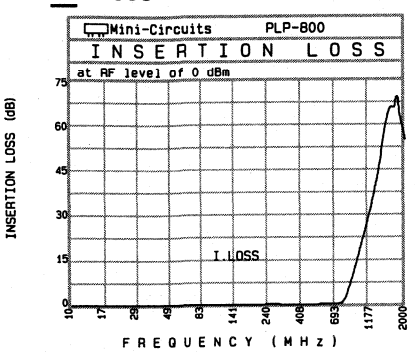


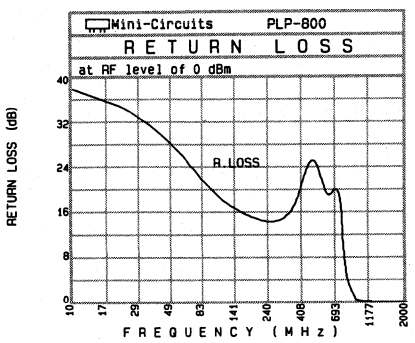


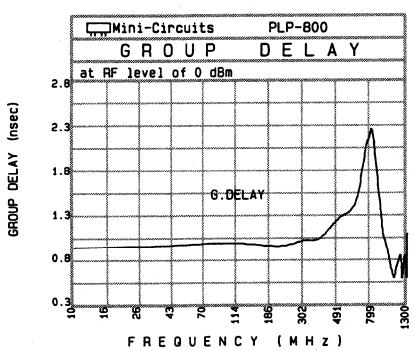


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.01	0.1	42.4	10.0	1.219
142.5	0.13	0.1	18.9	77.5	1.270
275.0	0.13	0.1	24.0	142.5	1.312
407.5	0.24	0.1	19.5	210.0	1.290
540.0	0.34	0.1	16.1	275.0	1.377
672.5	0.50	0.1	22.5	342.5	1.480
700.0	0.61	0.1	19.6	407.5	1.492
720.0	0.75	0.1	18.8	475.0	1.583
770.0	3.29	0.2	4.7	540.0	1.802
780.0	4.47	0.2	3.5	607.5	1.959
820.0	10.67	0.5	1.2	672.5	2.423
900.0	23.62	0.9	0.5	700.0	2.776
920.0	26.64	1.0	0.4	710.0	2.807
940.0	29.60	1.1	0.4	720.0	3.177
1000.0	38.46	1.5	0.3	730.0	3.549
1040.0	44.45	1.5	0.3	770.0	3.814
1080.0	50.55	2.0	0.2	780.0	3.791
1100.0	54.84	3.5	0.2	800.0	2.986
1120.0	57.93	4.7	0.2	820.0	2.719
1150.0	64.79	5.8	0.3	870.0	1.693
1200.0	68.75	5.6	0.1	900.0	1.271
1300.0	69.77	6.9	0.1	920.0	1.114
1535.0	66.70	2.9	0.1	940.0	1.191
1602.5	70.91	7.5	0.2	1000.0	1.450
1667.5	67.12	3.1	0.1	1040.0	0.375
1735.0	66.47	6.6	0.1	1060.0	0.240
1800.0	67.59	9.9	0.1	1080.0	1.052
1867.5	66.42	3.7	0.1	1100.0	1.042
1932.5	65.70	7.4	0.1	1120.0	1.544
2000.0	67.17	5.8	0.1	1150.0	0.787

LP-800 DC-720 MHz

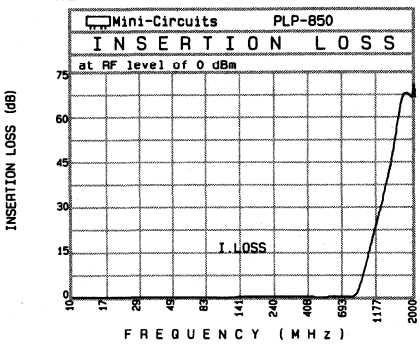


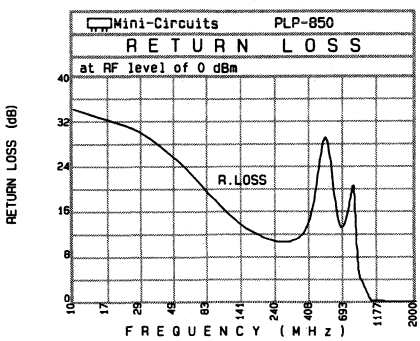


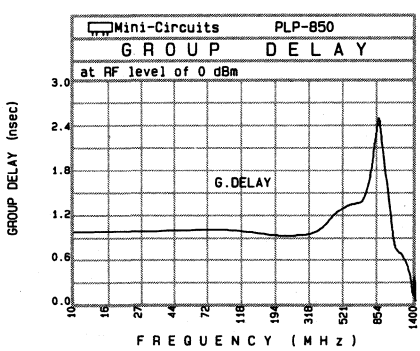


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.04	0.1	38.9	10.0	0.962
152.5	0.20	0.1	16.2	80.0	1.025
295.0	0.26	0.1	15.0	152.5	0.997
437.5	0.18	0.1	26.9	222.5	0.960
577.5	0.32	0.1	18.2	295.0	1.066
650.0	0.35	0.1	21.2	365.0	1.025
720.0	0.48	0.1	20.1	437.5	1.215
760.0	1.36	0.2	8.0	507.5	1.333
800.0	3.45	0.3	3.7	577.5	1.358
900.0	11.91	0.5	0.6	650.0	1.550
950.0	16.24	0.5	0.4	720.0	2.161
1000.0	20.40	0.6	0.3	740.0	2.172
1010.0	21.22	0.6	0.2	760.0	2.231
1050.0	24.40	0.7	0.2	780.0	2.364
1080.0	26.70	0.7	0.2	800.0	2.211
1100.0	28.21	0.7	0.2	900.0	1.274
1190.0	34.98	1.0	0.1	910.0	1.122
1250.0	39.81	1.3	0.1	950.0	1.017
1290.0	43.03	1.5	0.1	970.0	0.961
1300.0	43.66	1.4	0.1	1000.0	0.825
1400.0	53.30	3.1	0.1	1010.0	0.890
1500.0	64.81	3.4	0.1	1050.0	0.804
1600.0	68.20	6.6	0.1	1080.0	0.526
1700.0	66.77	2.9	0.1	1100.0	0.733
1720.0	68.97	6.7	0.1	1150.0	0.789
1735.0	70.75	8.2	0.1	1190.0	0.958
1800.0	71.72	6.9	0.1	1200.0	0.377
1820.0	65.74	5.8	0.1	1250.0	1.115
1900.0	61.76	6.1	0.1	1290.0	0.345
2000.0	56.62	3.2	0.1	1300.0	1.116

LP-850 DC-780 MHz







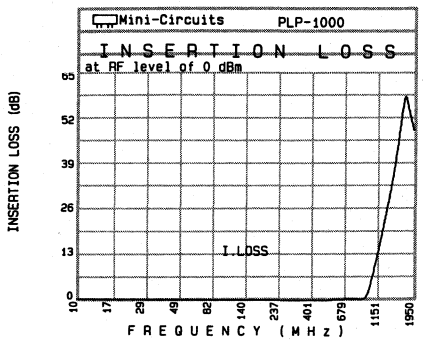
Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.02	0.1	35.0	10.0	0.997
175.0	0.38	0.1	11.8	92.5	1.053
342.5	0.44	0.1	11.3	175.0	0.940
507.5	0.18	0.1	37.1	257.5	0.952
672.5	0.57	0.1	11.8	342.5	0.966
755.0	0.43	0.1	20.2	425.0	1.217
780.0	0.48	0.1	21.5	507.5	1.345
820.0	1.33	0.6	9.1	590.0	1.396
850.0	3.00	0.9	4.4	672.5	1.381
1010.0	17.47	1.1	0.3	755.0	1.847
1030.0	19.18	1.1	0.2	780.0	2.228
1050.0	20.83	1.1	0.2	790.0	2.221
1060.0	21.63	1.1	0.2	820.0	2.549
1070.0	22.41	1.1	0.2	840.0	2.573
1100.0	24.70	1.1	0.2	850.0	2.359
1110.0	25.52	1.1	0.2	1010.0	0.985
1150.0	28.51	1.2	0.2	1020.0	0.915
1350.0	43.25	1.6	0.1	1030.0	0.875
1360.0	44.10	1.9	0.1	1050.0	0.778
1380.0	45.39	1.8	0.1	1060.0	0.753
1400.0	47.43	2.2	0.1	1070.0	0.804
1420.0	48.89	2.1	0.1	1100.0	0.843
1667.5	69.86	3.1	0.1	1110.0	0.702
1750.0	70.13	6.6	0.1	1120.0	0.703
1835.0	69.30	4.7	0.1	1150.0	0.688
1900.0	67.90	2.7	0.1	1300.0	0.445
1920.0	70.63	3.5	0.1	1350.0	0.016
1930.0	69.67	2.6	0.1	1360.0	0.240
1950.0	74.71	7.2	0.1	1380.0	0.484
2000.0	68.74	4.9	0.1	1400.0	0.048

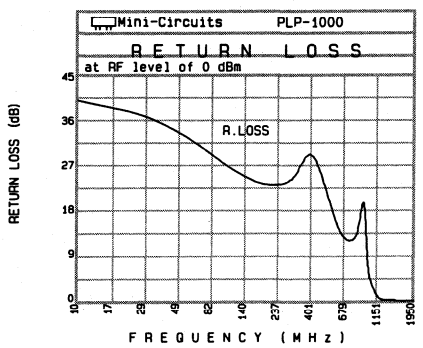
Low Pass Filters

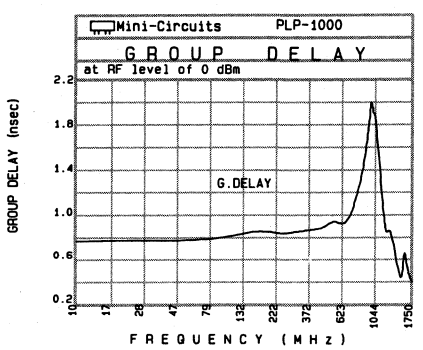
rugged, high selectivity, 50 ohm

MODEL SELECTION
(choose prefix)
P = plug in N = type N
B = BNC S = SMA

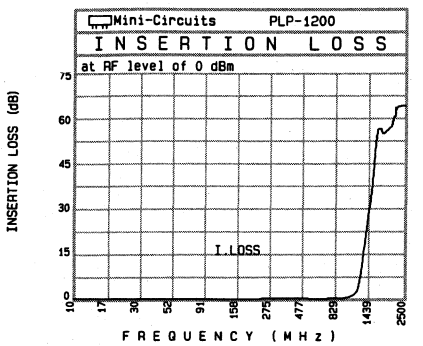
LP-1000 DC-900 MHz

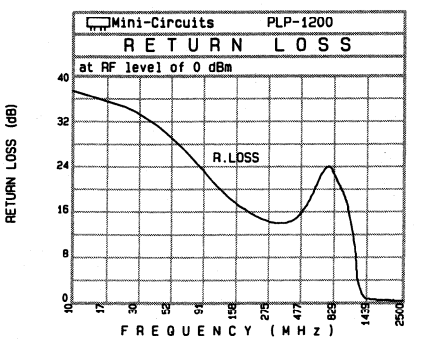


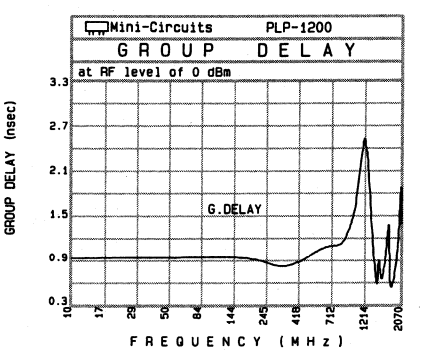




LP-1200 DC-1000 MHz







Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.01	0.0	40.9	10.0	0.765
82.5	0.02	0.0	28.4	82.5	0.773
305.0	0.07	0.1	24.5	157.5	0.880
525.0	0.17	0.1	20.0	230.0	0.825
747.5	0.54	0.1	12.2	305.0	0.856
900.0	0.40	0.1	23.8	377.5	0.872
930.0	0.75	0.1	12.4	452.5	0.886
970.0	2.06	0.2	5.9	525.0	0.970
990.0	3.10	0.2	4.1	600.0	0.912
1115.0	12.75	0.5	0.6	672.5	0.967
1250.0	23.28	0.7	0.2	747.5	1.171
1270.0	24.76	0.8	0.2	820.0	1.385
1280.0	25.53	0.8	0.2	900.0	1.786
1300.0	27.07	0.9	0.2	930.0	2.066
1340.0	30.19	1.0	0.2	950.0	2.007
1400.0	34.90	1.2	0.2	970.0	1.900
1500.0	43.32	1.8	0.2	990.0	1.986
1550.0	48.04	2.6	0.1	1115.0	1.084
1600.0	53.09	3.9	0.2	1190.0	0.764
1700.0	61.90	8.3	0.2	1250.0	0.977
1750.0	58.54	3.6	0.1	1270.0	0.807
1760.0	58.62	6.4	0.1	1280.0	0.338
1790.0	57.18	2.8	0.1	1300.0	0.978
1800.0	56.81	1.9	0.1	1340.0	0.501
1820.0	55.81	3.2	0.1	1400.0	0.795
1850.0	54.77	2.3	0.1	1500.0	0.213
1860.0	53.85	1.3	0.1	1550.0	0.769
1880.0	53.19	1.8	0.1	1600.0	0.547
1900.0	52.56	1.6	0.1	1700.0	0.425
1950.0	50.28	1.1	0.1	1750.0	0.391

Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.03	0.0	38.3	10.0	0.937
195.0	0.16	0.1	15.7	100.0	0.964
380.0	0.43	0.1	14.0	195.0	0.952
565.0	0.24	0.1	19.0	285.0	0.806
750.0	0.29	0.1	25.3	380.0	0.853
930.0	0.48	0.1	20.1	470.0	0.960
1000.0	0.55	0.1	18.1	565.0	1.074
1180.0	4.25	1.9	5.3	655.0	1.112
1200.0	5.69	2.2	3.4	750.0	1.123
1300.0	17.67	3.0	0.7	840.0	1.158
1420.0	32.19	3.6	0.5	930.0	1.432
1500.0	43.83	5.7	0.4	1000.0	1.598
1550.0	53.20	7.9	0.3	1150.0	2.814
1600.0	58.27	7.5	0.3	1180.0	2.356
1620.0	57.94	6.7	0.3	1200.0	2.494
1690.0	58.01	8.4	0.3	1300.0	1.154
1720.0	55.64	6.2	0.2	1400.0	0.488
2000.0	58.68	3.8	0.2	1420.0	0.639
2050.0	61.62	3.9	0.1	1440.0	1.092
2070.0	62.15	5.5	0.1	1500.0	0.447
2100.0	62.95	5.6	0.1	1550.0	0.835
2110.0	62.89	5.0	0.1	1600.0	1.320
2120.0	61.95	4.1	0.1	1620.0	1.060
2130.0	64.71	5.4	0.1	1690.0	1.590
2140.0	66.13	8.4	0.1	1700.0	1.012
2150.0	64.30	6.7	0.1	1720.0	0.307
2160.0	65.10	7.9	0.1	1945.0	1.001
2200.0	65.98	8.1	0.1	2000.0	1.674
2300.0	70.50	9.9	0.1	2050.0	2.089
2500.0	65.98	4.1	0.1	2070.0	1.421

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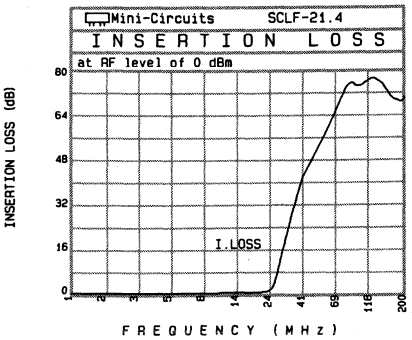
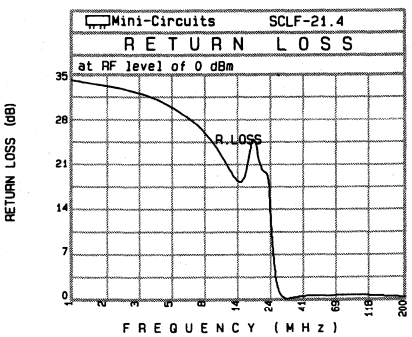
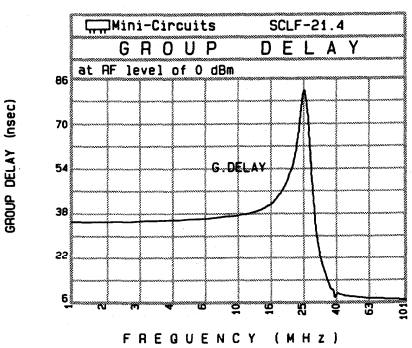
surface mount, 50 ohm Mini-Circuits

SCLF-21.4 DC-22 MHz

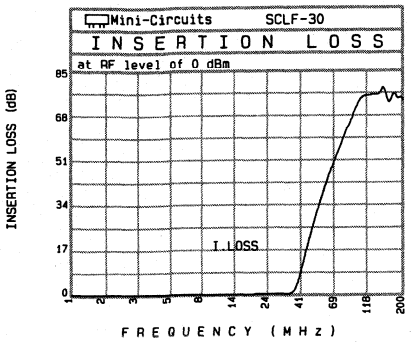


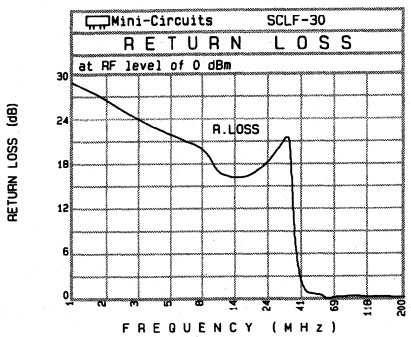


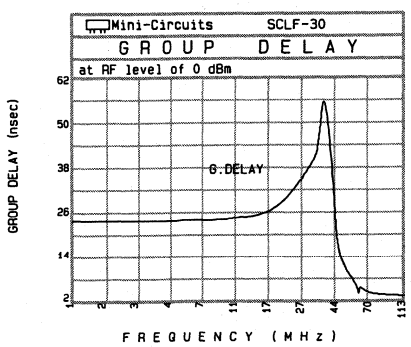


Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.06	0.1	35.0	1.0	35.416
9.0	0.21	0.1	26.3	9.0	37.240
14.0	0.39	0.1	17.5	14.0	40.345
16.0	0.36	0.1	19.2	16.0	42.374
18.0	0.37	0.1	28.4	18.0	46.100
20.0	0.48	0.1	20.3	20.0	51.538
22.0	0.65	0.2	20.3	22.0	59.541
23.5	1.08	0.7	14.3	23.0	68.489
24.5	2.05	1.4	8.1	23.5	73.990
25.0	2.91	1.8	5.7	24.0	78.724
27.0	8.86	2.6	1.1	24.5	83.206
29.0	15.82	2.4	0.2	25.0	84.645
30.0	19.04	2.2	0.1	26.0	77.179
31.0	22.06	2.1	0.1	27.0	61.074
32.0	24.85	2.0	0.1	28.0	45.408
33.0	27.50	1.9	0.2	29.0	34.080
35.0	32.41	1.8	0.3	30.0	27.394
37.0	36.86	1.8	0.4	31.0	22.402
38.0	38.91	1.7	0.4	32.0	19.250
39.0	40.92	1.8	0.5	33.0	16.673
41.0	44.83	1.8	0.5	34.0	15.020
80.5	78.86	3.9	0.7	35.0	13.226
100.5	75.36	2.7	0.6	36.0	9.823
120.5	79.79	7.4	0.6	37.0	11.227
140.5	76.97	3.0	0.5	38.0	6.123
160.0	72.23	2.6	0.4	39.0	10.209
170.0	70.86	2.9	0.4	41.0	7.399
180.0	70.87	3.9	0.4	80.5	7.087
190.0	69.67	3.2	0.3	90.5	6.865
200.0	71.47	3.1	0.3	100.5	6.532

SCLF-30 DC-30 MHz

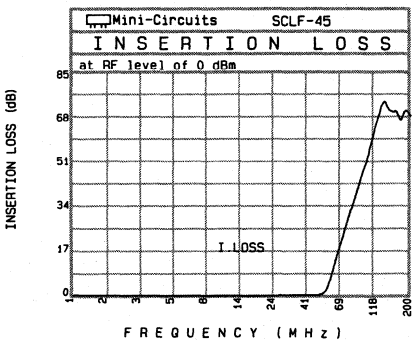


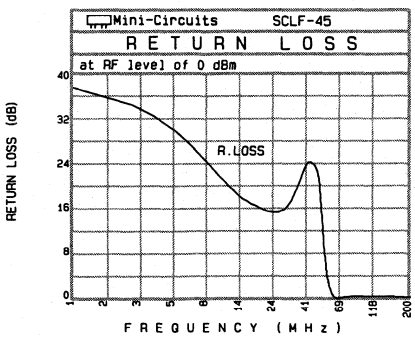


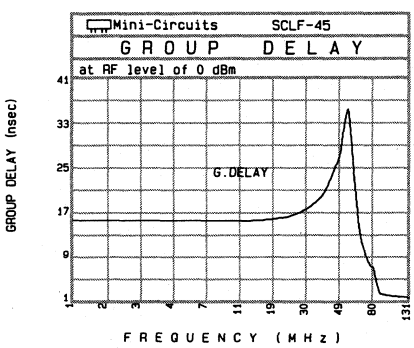


Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.04	0.1	29.6	1.0	24.228
3.0	0.07	0.1	22.8	3.0	24.243
9.0	0.13	0.1	20.6	9.0	24.543
10.0	0.15	0.1	18.2	10.0	24.963
11.0	0.17	0.1	16.7	11.0	25.193
18.0	0.27	0.1	16.3	18.0	26.132
30.0	0.45	0.1	21.6	30.0	39.463
34.0	0.59	0.1	17.0	33.0	42.267
35.0	0.90	0.2	11.7	34.0	47.672
36.0	1.64	0.5	7.6	35.0	52.776
42.0	14.01	1.8	1.0	36.0	58.136
44.0	18.75	1.7	0.8	38.0	54.816
45.0	20.87	1.7	0.8	42.0	31.194
46.0	22.85	1.6	0.7	43.0	22.827
47.0	24.78	1.6	0.7	44.0	18.487
49.0	28.37	1.5	0.6	45.0	15.486
54.0	36.33	1.4	0.5	46.0	14.406
58.0	41.83	1.1	0.1	47.0	12.883
59.0	43.10	1.1	0.1	49.0	11.296
60.0	44.18	1.1	0.1	51.0	9.209
61.0	45.51	0.9	0.0	54.0	6.247
70.0	55.55	1.5	0.3	56.0	6.906
105.0	77.30	9.9	0.3	58.0	6.151
122.0	73.76	4.4	0.3	59.0	2.730
139.0	78.03	9.1	0.3	60.0	5.775
157.0	74.23	4.8	0.2	61.0	5.248
174.0	79.94	4.8	0.2	70.0	3.564
183.0	75.66	3.0	0.2	96.0	3.381
191.0	77.64	7.0	0.2	105.0	3.208
200.0	75.91	6.0	0.2	113.0	3.120

SCLF-45 DC-45 MHz







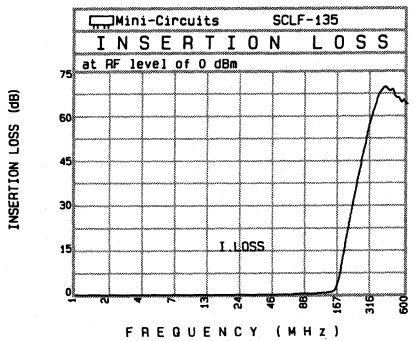
Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.03	0.0	38.4	1.0	15.995
10.0	0.12	0.1	20.7	10.0	15.850
16.5	0.18	0.1	17.1	16.5	16.144
24.0	0.30	0.1	15.2	24.0	16.723
31.5	0.31	0.1	16.8	31.5	18.499
39.5	0.31	0.1	25.9	39.5	21.040
45.0	0.49	0.1	24.4	45.0	26.383
52.0	1.22	0.2	9.9	48.0	27.157
55.0	3.37	0.6	3.8	50.0	31.441
58.0	7.23	0.8	1.3	52.0	34.883
61.0	11.68	0.9	0.4	54.0	36.740
64.0	15.98	0.9	0.1	55.0	35.950
66.0	18.68	0.8	0.1	58.0	27.094
68.0	21.26	0.8	0.2	60.0	21.940
70.0	23.69	0.8	0.3	61.0	20.016
72.0	26.02	0.8	0.3	63.0	15.603
76.0	30.42	0.8	0.4	64.0	14.207
80.0	34.44	0.8	0.4	66.0	11.743
85.0	39.13	0.7	0.5	68.0	10.933
87.0	41.06	0.8	0.5	70.0	9.311
90.0	43.71	0.9	0.5	72.0	7.857
100.0	51.96	1.5	0.5	74.0	6.262
135.0	75.54	9.9	0.5	76.0	7.016
150.0	72.20	4.3	0.4	78.0	7.756
161.5	72.82	3.9	0.4	80.0	5.539
170.0	67.46	2.8	0.4	85.0	2.623
177.0	70.41	5.0	0.4	87.0	2.405
184.5	73.51	4.8	0.3	90.0	2.378
192.5	70.37	4.7	0.3	100.0	2.041
200.0	70.36	5.5	0.3	131.0	1.807

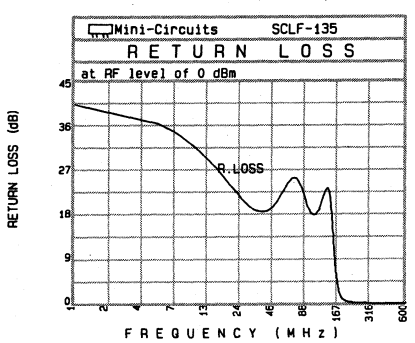
In Stock...Immediate Delivery

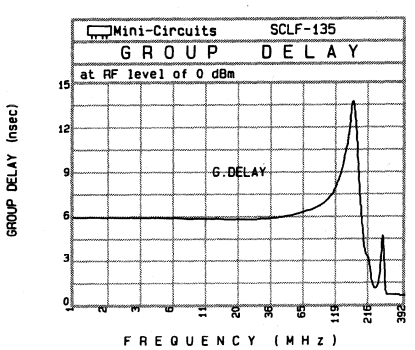
surface mount

Low Pass Filters

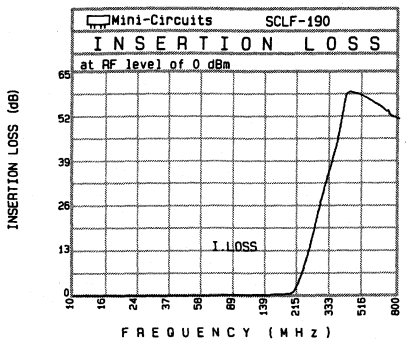
SCLF-135 DC-135 MHz

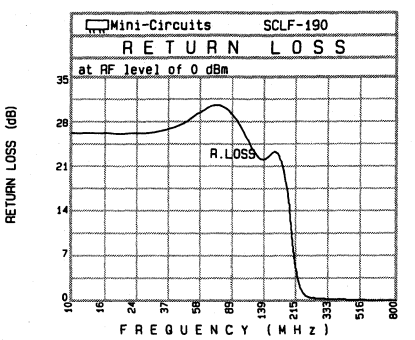


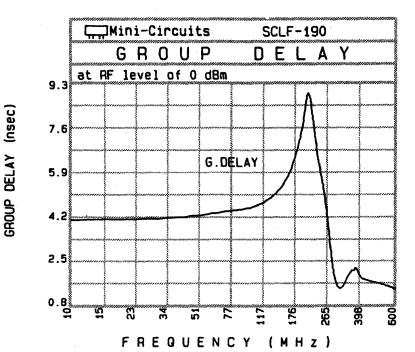




SCLF-190 DC-190 MHz







Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.03	0.1	41.3	1.0	6.053
25.0	0.18	0.1	17.8	25.0	5.852
48.0	0.22	0.1	18.7	48.0	6.148
71.0	0.25	0.1	30.3	71.0	6.567
94.0	0.45	0.1	16.3	94.0	6.982
117.0	0.57	0.1	19.7	117.0	8.089
135.0	0.87	0.1	26.2	135.0	10.404
149.0	1.42	0.1	13.1	145.0	11.861
155.0	2.54	0.2	7.4	149.0	12.964
160.0	4.29	0.4	4.4	152.0	13.888
175.0	12.53	0.7	1.1	155.0	14.123
189.0	20.35	0.8	0.6	160.0	13.839
196.0	23.89	0.8	0.5	168.0	10.809
203.0	27.23	0.8	0.4	175.0	7.919
210.0	30.34	0.9	0.3	182.0	6.031
220.0	34.51	0.9	0.3	189.0	4.243
243.0	43.15	1.1	0.2	196.0	3.351
266.0	50.60	1.1	0.2	203.0	3.348
278.0	54.30	2.2	0.2	210.0	2.977
289.0	58.28	3.6	0.1	220.0	0.924
300.0	60.35	2.8	0.1	232.0	1.884
350.0	69.91	4.3	0.1	243.0	0.039
392.0	72.49	2.5	0.1	255.0	1.016
434.0	69.22	3.4	0.1	266.0	6.799
475.0	67.52	1.5	0.1	278.0	0.422
517.0	67.56	2.1	0.1	289.0	0.702
538.0	65.57	1.8	0.1	300.0	0.652
559.0	67.78	3.0	0.1	350.0	0.631
580.0	65.80	2.4	0.1	371.0	0.608
600.0	65.48	2.6	0.1	392.0	0.599

Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.12	0.1	27.0	10.0	4.198
40.0	0.19	0.1	26.6	40.0	4.252
70.0	0.21	0.1	33.5	70.0	4.536
100.0	0.27	0.1	28.2	100.0	4.633
132.5	0.41	0.1	20.5	132.5	5.079
162.5	0.49	0.1	26.3	162.5	5.932
190.0	0.77	0.1	17.6	190.0	7.687
200.0	1.38	0.1	10.4	195.0	8.442
210.0	3.05	0.1	5.4	200.0	9.065
220.0	5.72	0.1	2.7	205.0	9.197
240.0	11.88	0.1	0.9	210.0	8.881
260.0	18.95	0.3	0.5	220.0	7.664
270.0	22.68	0.4	0.5	230.0	6.614
280.0	26.25	0.5	0.5	240.0	5.956
290.0	29.54	0.6	0.4	250.0	5.216
310.0	35.11	0.8	0.4	260.0	4.318
340.0	42.33	1.2	0.3	270.0	3.160
360.0	47.49	1.6	0.3	280.0	2.123
370.0	50.87	2.4	0.3	290.0	1.620
380.0	54.42	3.6	0.3	310.0	1.339
390.0	57.49	3.2	0.3	320.0	0.852
400.0	62.02	5.2	0.3	340.0	2.479
600.0	57.37	2.3	0.1	350.0	2.312
647.5	56.32	1.4	0.1	360.0	2.108
687.5	55.21	1.8	0.1	370.0	2.379
702.5	54.51	0.9	0.1	380.0	2.112
710.0	54.45	1.3	0.1	390.0	1.943
740.0	53.58	1.3	0.1	400.0	1.816
770.0	53.44	1.4	0.1	500.0	1.681
800.0	53.04	1.1	0.1	600.0	1.454

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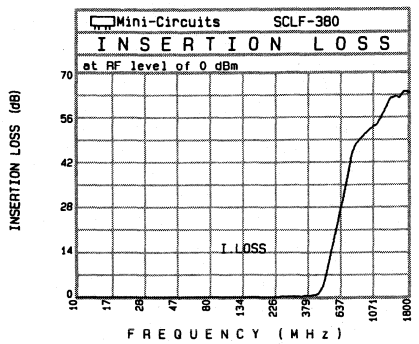
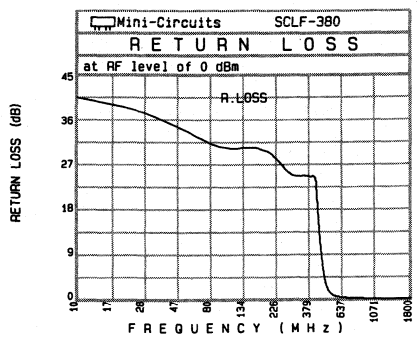
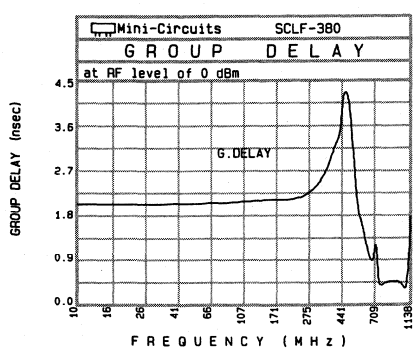
Mini-Circuits

SCLF-380 DC-380 MHz

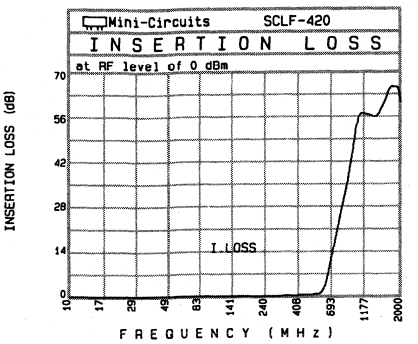


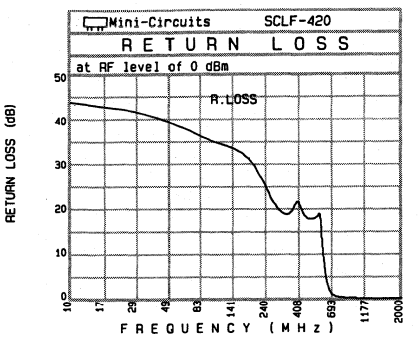


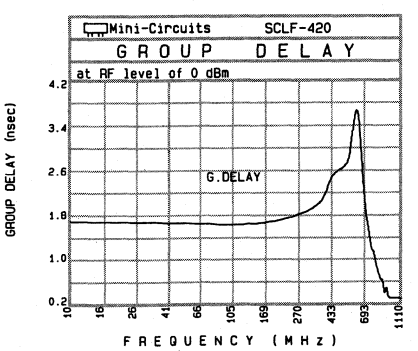


Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
10.0	0.02	0.1	41.4	10.0	2.085
142.5	0.13	0.1	31.6	77.5	2.111
210.0	0.20	0.1	30.5	142.5	2.192
275.0	0.29	0.1	24.6	210.0	2.162
342.5	0.44	0.1	25.6	275.0	2.315
380.0	0.67	0.1	24.9	342.5	2.707
410.0	0.74	0.1	25.6	380.0	3.242
430.0	1.03	0.2	16.4	410.0	3.437
440.0	1.34	0.2	12.2	420.0	3.606
460.0	2.74	0.5	6.5	430.0	4.079
500.0	8.54	0.7	1.8	440.0	4.369
540.0	15.86	0.7	0.8	460.0	4.447
560.0	19.27	0.7	0.6	480.0	4.118
570.0	20.89	0.7	0.5	500.0	3.250
580.0	22.44	0.7	0.5	520.0	2.598
600.0	25.63	0.7	0.4	540.0	1.853
640.0	31.77	0.9	0.4	560.0	1.817
680.0	37.56	1.0	0.3	570.0	1.679
700.0	40.46	1.1	0.3	580.0	1.555
720.0	43.62	1.5	0.2	600.0	1.295
750.0	49.16	2.2	0.2	620.0	1.241
1005.0	54.51	2.7	0.1	640.0	1.022
1137.5	57.05	4.5	0.1	660.0	0.731
1270.0	61.62	6.5	0.1	680.0	1.222
1402.5	63.80	6.1	0.1	700.0	1.336
1535.0	63.45	3.2	0.1	720.0	0.318
1600.0	65.10	3.1	0.1	750.0	0.456
1667.5	66.20	5.4	0.1	1005.0	0.557
1732.5	67.00	7.9	0.1	1070.0	0.084
1800.0	65.32	7.1	0.1	1137.5	1.829

SCLF-420 DC-420 MHz







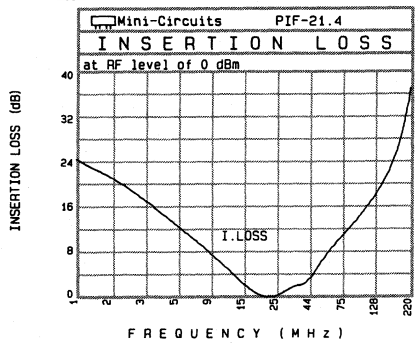
Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
10.0	0.01	0.1	45.1	10.0	1.742
95.0	0.05	0.1	34.9	95.0	1.666
180.0	0.09	0.1	34.3	180.0	1.716
265.0	0.18	0.1	20.5	265.0	1.869
350.0	0.30	0.1	18.2	350.0	2.035
390.0	0.37	0.1	24.5	390.0	2.287
420.0	0.67	0.1	17.9	420.0	2.660
545.0	0.82	0.1	20.1	530.0	2.751
570.0	1.31	0.4	13.6	545.0	3.156
580.0	1.72	0.5	10.3	557.5	3.343
630.0	6.88	1.3	2.5	570.0	3.560
677.5	14.04	1.4	0.9	580.0	3.741
702.5	17.58	1.4	0.7	605.0	3.837
727.5	20.96	1.5	0.6	630.0	3.082
750.0	23.86	1.5	0.5	655.0	2.355
760.0	25.09	1.5	0.4	677.5	1.825
807.5	31.09	1.6	0.3	702.5	1.611
852.5	35.86	1.6	0.3	727.5	1.171
875.0	38.46	1.8	0.3	750.0	1.248
897.5	41.69	1.9	0.2	760.0	1.074
920.0	44.88	2.0	0.2	785.0	0.937
930.0	45.81	1.9	0.2	807.5	0.523
1110.0	58.81	1.8	0.1	830.0	0.573
1287.5	57.73	2.2	0.1	852.5	0.722
1465.0	60.69	5.6	0.1	875.0	0.283
1645.0	66.12	5.4	0.1	897.5	0.589
1732.5	67.71	3.7	0.1	920.0	0.336
1822.5	67.01	4.0	0.1	930.0	0.302
1912.5	67.81	6.3	0.2	1020.0	0.300
2000.0	62.49	1.6	0.2	1110.0	0.295

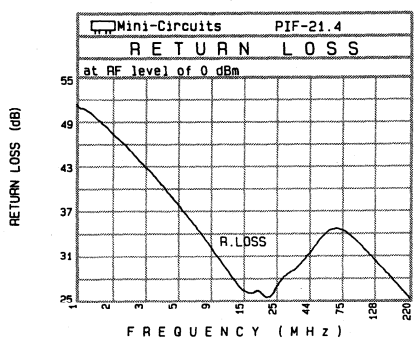
constant impedance

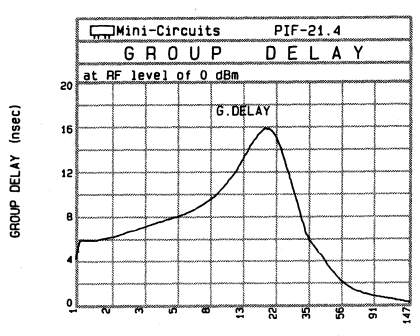
Bandpass Filters

MODEL SELECTION
(choose prefix)
P = plug in N = type N
B = BNC S = SMA

IF-21.4 18-25 MHz

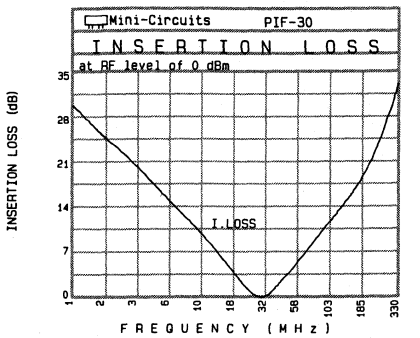


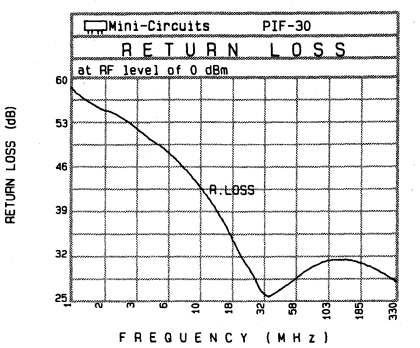


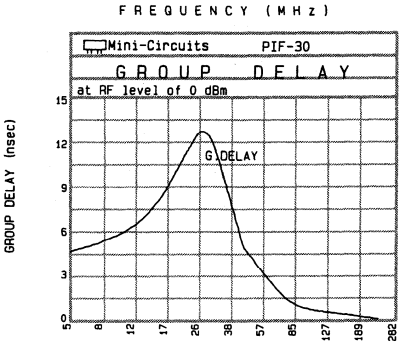


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	25.27	0.2	52.2	1.2	4.399
1.1	24.91	0.2	51.6	1.3	6.493
1.1	24.55	0.2	51.7	1.4	5.803
1.2	24.24	0.2	51.4	2.6	6.877
1.2	23.93	0.2	51.2	3.7	7.658
1.3	23.64	0.2	50.9	4.9	8.204
1.4	23.17	0.2	50.1	5.0	8.142
3.7	15.71	0.1	41.8	7.9	9.473
4.9	13.27	0.1	39.0	11.0	11.528
6.0	11.38	0.1	36.8	14.0	14.015
8.7	7.85	0.1	32.8	15.0	14.909
11.3	5.18	0.1	29.5	17.9	16.385
14.0	2.92	0.1	27.2	18.8	16.348
18.0	0.72	0.1	26.5	19.8	16.309
20.3	0.14	0.1	26.2	20.9	15.915
21.5	0.01	0.1	25.8	21.6	15.629
23.8	0.05	0.1	26.0	22.4	15.139
40.0	2.02	0.2	31.0	23.2	14.502
55.0	7.93	0.2	34.8	24.0	13.843
70.0	10.88	0.2	35.6	24.8	13.162
85.0	13.23	0.2	34.4	26.2	11.927
100.0	15.41	0.2	32.9	32.7	6.934
116.7	17.64	0.2	31.4	33.9	6.349
133.3	19.87	0.1	30.2	51.3	2.263
150.0	22.27	0.1	29.2	67.6	1.347
175.0	26.56	0.2	27.7	84.6	0.959
186.3	28.96	0.2	27.1	86.1	0.936
197.5	31.82	0.3	26.6	107.8	0.693
208.8	35.24	0.6	26.0	128.1	0.484
220.0	38.08	1.4	25.6	147.1	0.321

IF-30 25-35 MHz

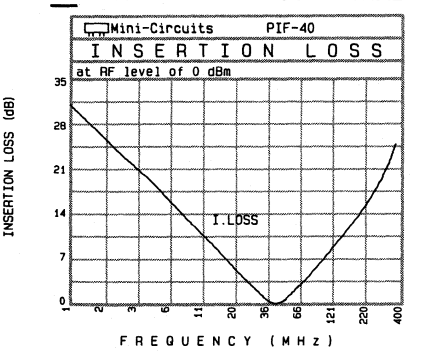


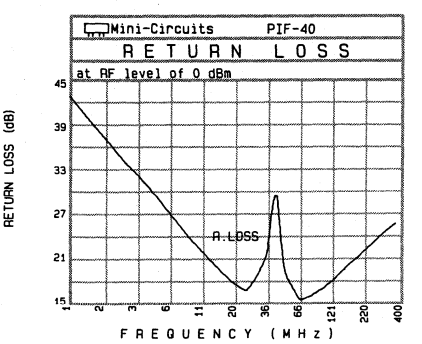


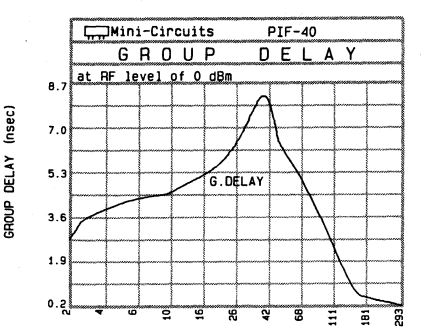


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	30.97	0.1	59.5	5.3	4.911
1.2	29.52	0.1	57.9	7.0	5.392
1.4	28.29	0.1	57.1	8.0	5.612
1.5	27.23	0.1	56.5	12.0	6.685
1.7	26.25	0.1	56.0	16.0	8.448
1.9	25.40	0.1	55.5	20.0	10.612
2.0	24.95	0.1	55.8	21.0	11.190
5.3	16.33	0.1	49.5	25.0	12.864
7.0	13.88	0.1	47.5	26.0	13.075
8.0	12.64	0.1	46.0	27.3	13.145
12.0	8.66	0.1	41.6	28.8	12.980
16.0	5.59	0.1	37.4	30.0	12.639
20.0	3.10	0.1	33.5	31.0	12.237
26.0	0.66	0.1	29.6	32.3	11.647
28.7	0.26	0.1	28.0	33.8	10.775
31.0	0.25	0.1	26.7	35.0	10.047
33.7	0.55	0.1	26.1	36.0	9.449
44.0	2.99	0.1	27.1	44.0	5.471
45.0	3.25	0.1	27.2	45.0	5.093
70.0	8.33	0.1	30.4	70.0	1.581
95.0	11.72	0.1	31.5	95.0	0.883
120.0	14.33	0.1	31.8	120.0	0.718
121.0	14.43	0.1	31.8	121.0	0.703
180.3	19.47	0.1	31.2	150.8	0.518
210.0	21.85	0.1	30.8	180.3	0.428
211.0	21.93	0.1	30.8	210.0	0.305
258.6	26.09	0.2	29.8	233.8	0.196
282.4	28.52	0.2	29.3	234.0	0.246
306.2	31.23	0.3	28.7	258.0	0.031
330.0	34.20	0.4	28.2	282.0	0.378

IF-40 35-49 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	31.97	0.1	43.7	2.3	2.895
1.3	29.62	0.1	41.1	2.6	3.319
1.6	27.72	0.1	39.1	2.7	3.755
2.0	26.20	0.1	37.6	5.2	4.422
2.3	24.90	0.1	36.1	7.5	4.574
2.6	23.77	0.1	34.9	9.9	4.649
3.0	22.54	0.1	33.7	11.0	4.904
5.3	17.56	0.1	28.5	16.1	5.402
7.7	14.41	0.1	25.3	20.9	5.852
10.0	12.05	0.1	23.0	26.2	6.700
11.0	11.21	0.1	22.2	27.1	6.840
15.3	8.20	0.1	19.5	35.1	8.288
19.7	5.92	0.1	17.8	36.3	8.399
35.0	0.86	0.1	21.4	37.6	8.498
40.3	0.23	0.1	30.0	39.6	8.488
44.7	0.31	0.1	25.5	41.7	8.249
50.0	0.88	0.1	18.9	43.2	7.937
65.0	3.17	0.1	15.6	45.4	7.393
99.3	7.37	0.2	17.3	47.0	6.910
133.7	10.43	0.2	19.4	48.7	6.395
168.0	12.93	0.3	21.1	50.4	5.956
212.0	15.76	0.3	22.7	63.1	3.323
256.0	18.46	0.4	24.0	64.2	3.167
300.0	21.25	0.5	25.1	98.9	1.296
301.0	21.32	0.5	25.0	132.6	0.812
320.8	22.67	0.6	25.4	168.9	0.599
340.6	24.13	0.7	25.8	207.7	0.474
360.4	25.67	0.9	26.1	211.3	0.462
380.2	27.40	1.1	26.2	255.6	0.363
400.0	29.24	1.4	26.3	293.4	0.264

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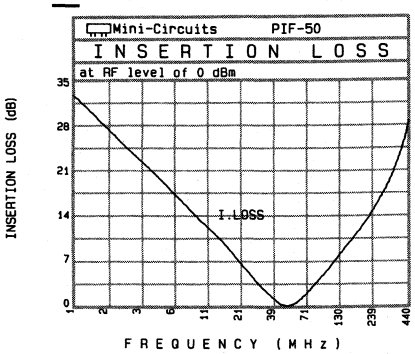
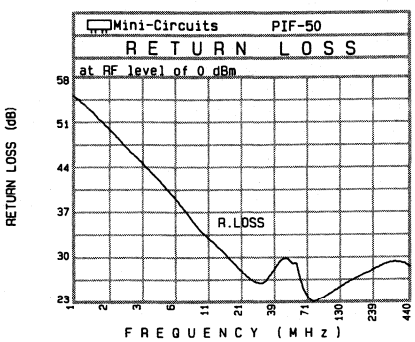
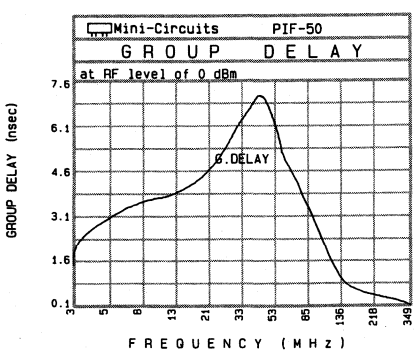
Mini-Circuits

IF-50 41-58 MHz

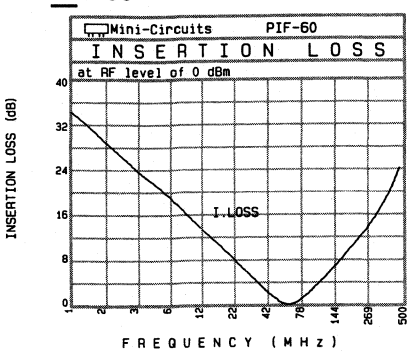


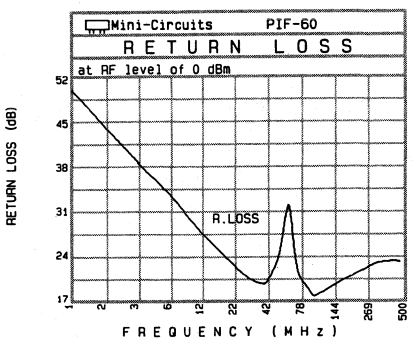


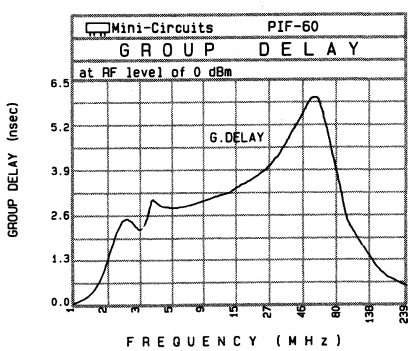


Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
1.0	33.62	0.2	56.3	3.1	1.540
1.4	30.60	0.2	53.5	3.2	2.572
1.8	28.39	0.2	51.1	5.9	3.434
2.3	26.60	0.2	49.3	8.7	3.800
2.7	25.16	0.2	47.6	11.4	3.893
3.1	23.91	0.2	46.4	11.6	3.910
4.0	21.72	0.3	43.9	18.2	4.448
9.0	14.63	0.2	35.6	24.4	5.257
11.5	12.44	0.2	33.2	31.1	6.290
20.0	7.25	0.2	28.5	32.2	6.428
23.7	5.61	0.2	27.1	41.0	7.293
27.3	4.18	0.2	26.3	41.7	7.342
31.0	2.95	0.2	26.2	43.9	7.325
41.0	0.70	0.1	29.3	46.2	7.197
45.5	0.28	0.1	30.2	48.7	6.905
50.0	0.21	0.1	30.0	51.3	6.571
53.0	0.34	0.1	29.3	53.1	6.309
77.0	3.12	0.1	23.2	55.9	5.874
80.0	3.52	0.1	23.1	57.9	5.441
120.0	7.84	0.1	25.4	58.9	5.242
160.0	10.99	0.2	27.0	77.6	2.769
200.0	13.61	0.2	27.5	117.5	1.114
250.0	16.51	0.2	28.8	119.5	1.093
316.7	20.38	0.4	29.6	160.3	0.679
350.0	22.46	0.4	29.7	200.7	0.525
390.0	25.29	0.6	29.5	246.9	0.414
402.5	26.25	0.7	29.5	251.2	0.408
415.0	27.29	0.8	29.3	298.5	0.306
427.5	28.35	0.9	29.2	342.8	0.185
440.0	29.49	1.0	28.9	348.7	0.163

IF-60 50-70 MHz

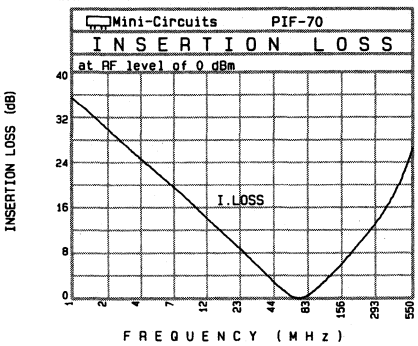


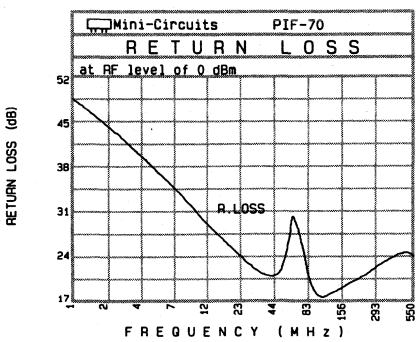


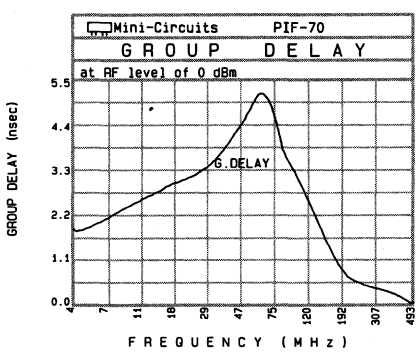


Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
1.0	35.25	0.1	50.9	1.0	0.036
1.6	31.45	0.1	46.7	1.6	0.385
2.1	28.84	0.1	43.8	2.1	2.704
2.7	26.81	0.1	41.8	2.7	2.564
3.2	25.18	0.1	40.0	3.2	1.978
3.8	23.80	0.1	38.6	3.8	3.449
4.0	23.37	0.1	37.9	3.9	2.820
10.7	14.83	0.1	29.0	7.3	2.963
14.0	12.40	0.1	26.6	10.7	3.244
20.0	9.15	0.1	23.6	14.0	3.331
26.0	6.66	0.1	21.4	15.0	3.511
32.0	4.65	0.1	20.2	22.8	3.863
38.0	3.00	0.1	19.9	30.5	4.455
50.0	0.75	0.1	24.5	38.2	5.190
56.4	0.27	0.1	31.0	38.9	5.236
61.9	0.26	0.1	31.0	50.4	6.121
67.3	0.54	0.0	23.7	51.3	6.127
92.0	3.08	0.1	18.0	54.0	6.168
94.0	3.30	0.1	17.9	56.9	6.165
142.7	7.76	0.1	20.3	58.9	6.001
191.3	11.04	0.1	21.4	62.0	5.775
240.0	13.71	0.2	22.5	64.2	5.461
260.0	14.71	0.2	22.9	67.6	5.045
306.7	17.09	0.2	23.5	70.0	4.715
353.3	19.45	0.3	23.6	71.2	4.566
400.0	22.02	0.5	23.7	90.7	2.549
425.0	23.50	0.6	23.7	92.3	2.464
450.0	25.09	0.6	23.5	142.1	1.039
475.0	26.76	0.8	23.4	190.5	0.715
500.0	28.43	0.9	23.1	238.5	0.552

IF-70 58-82 MHz







Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
1.0	36.56	0.2	49.5	4.4	1.965
1.7	32.08	0.2	45.9	4.5	1.803
2.4	29.16	0.2	43.7	8.4	2.416
3.0	27.01	0.2	41.6	12.2	2.736
3.7	25.26	0.2	40.1	16.1	2.984
4.4	23.82	0.2	38.7	17.0	3.059
6.0	21.13	0.2	36.2	26.2	3.326
12.7	14.61	0.2	29.4	35.1	3.817
16.0	12.53	0.2	27.5	43.9	4.422
20.0	10.51	0.2	25.5	44.7	4.419
28.3	7.27	0.2	22.7	57.9	5.270
36.7	4.76	0.2	21.3	58.9	5.288
45.0	2.79	0.1	21.3	62.0	5.357
58.0	0.77	0.1	27.9	65.3	5.248
63.7	0.34	0.1	29.7	68.8	5.146
70.0	0.24	0.1	26.9	72.4	4.843
74.7	0.35	0.1	25.1	75.0	4.639
105.0	2.87	0.1	17.9	79.0	4.231
110.0	3.34	0.2	18.0	81.8	3.959
166.7	7.80	0.2	20.2	83.2	3.803
223.3	11.10	0.2	21.3	105.9	2.168
280.0	13.80	0.3	23.0	107.8	2.082
290.0	14.28	0.3	23.1	166.0	0.886
423.3	20.50	0.9	24.9	222.6	0.581
490.0	24.04	1.4	25.1	278.6	0.458
500.0	24.60	1.5	25.0	342.8	0.360
512.5	25.30	1.5	24.9	348.7	0.351
525.0	25.98	1.6	24.8	421.7	0.199
537.5	26.70	1.6	24.6	484.2	0.031
550.0	27.34	1.4	24.5	492.6	0.079

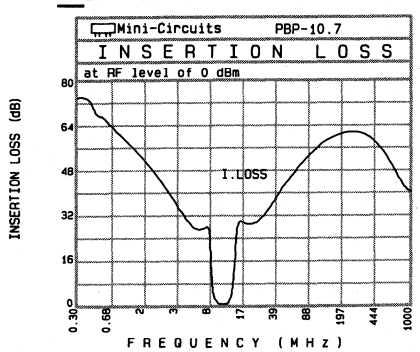
elliptic response

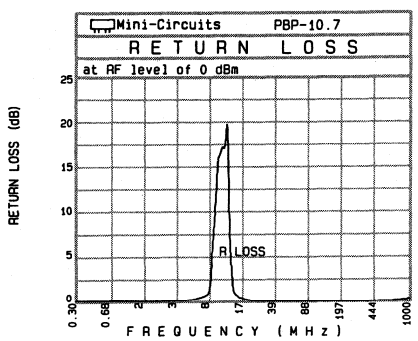
Bandpass Filters

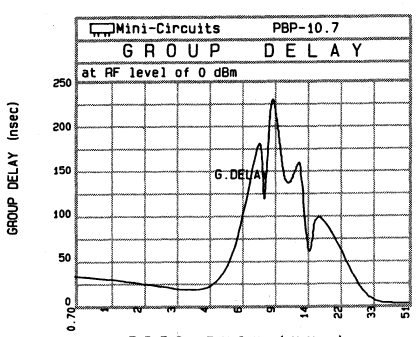
MODEL SELECTION
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

BP-10.7 9.5-11.5 MHz

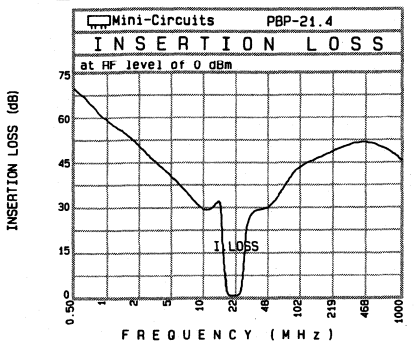


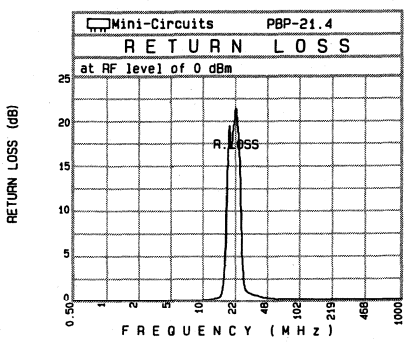


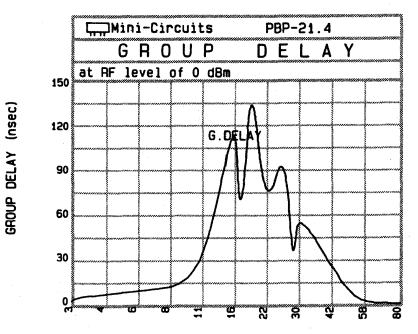


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
0.3	75.80	2.6	0.1	0.7	32.371
0.4	76.10	4.5	0.1	3.0	12.114
0.4	74.62	4.4	0.1	5.2	24.403
0.5	69.06	2.7	0.1	7.5	215.923
0.5	69.33	1.0	0.1	7.9	159.468
0.6	67.91	1.5	0.1	8.0	91.912
1.0	57.74	0.3	0.1	8.5	212.732
5.3	25.94	0.6	0.2	8.9	237.192
7.5	30.37	2.8	0.8	9.1	235.123
7.6	26.43	4.9	0.9	9.4	213.803
8.2	7.00	1.5	3.3	9.6	197.449
8.5	3.15	0.8	7.6	9.8	180.177
8.9	2.45	0.7	9.6	10.2	153.153
9.5	0.99	0.1	16.3	10.4	145.221
9.6	0.97	0.1	16.4	10.6	140.803
10.7	0.86	0.1	17.6	10.9	138.559
11.5	0.92	0.1	18.2	11.3	141.337
12.7	3.16	0.8	7.0	11.5	145.896
13.1	3.82	1.0	5.7	12.5	165.780
13.7	10.81	2.5	1.6	12.8	163.590
14.4	22.10	4.6	0.7	13.3	145.784
15.0	33.97	4.4	0.4	13.6	127.403
20.0	26.84	0.5	0.1	14.1	36.953
40.0	41.22	0.5	0.1	15.0	85.658
50.0	46.00	0.7	0.1	16.0	118.360
100.0	62.57	1.7	0.1	27.1	4.513
325.0	66.25	3.8	0.1	39.0	2.558
550.0	51.22	1.1	0.1	48.7	2.259
775.0	43.48	1.5	0.4	49.7	2.045
1000.0	41.66	1.9	0.4	50.7	2.283

BP-21.4 19.2-23.6 MHz

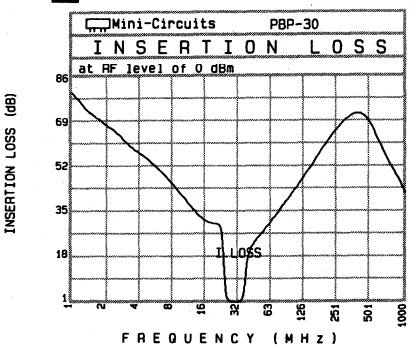


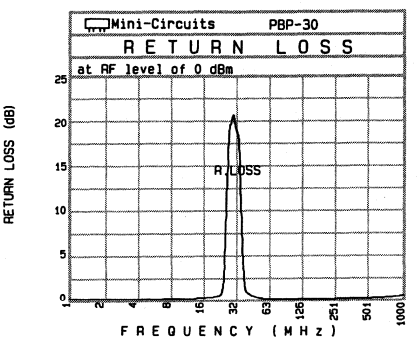


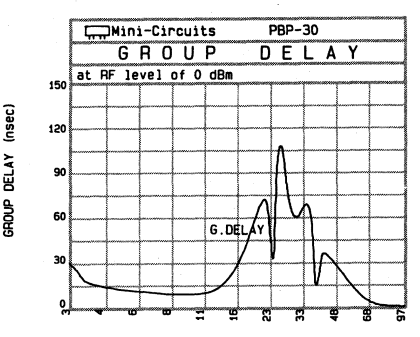


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
0.5	71.63	9.9	0.1	3.0	1.719
1.0	60.77	9.9	0.1	3.1	6.056
1.5	57.59	9.9	0.1	7.3	11.010
2.0	54.26	9.9	0.1	11.4	16.139
2.5	51.03	9.9	0.1	15.6	142.895
3.0	48.32	9.1	0.1	16.1	85.576
4.0	44.25	7.7	0.1	16.4	67.524
7.8	33.81	4.4	0.1	17.3	80.808
11.7	27.91	1.1	0.2	17.9	138.773
15.5	34.76	8.5	0.4	18.8	137.539
16.0	30.17	9.6	0.6	19.2	129.275
16.8	14.18	4.6	1.2	19.5	118.671
17.9	5.30	3.1	4.8	19.8	107.675
19.2	1.05	0.2	21.1	20.5	90.324
20.2	0.95	0.2	16.7	21.3	80.937
21.4	0.86	0.2	20.4	21.6	78.721
22.2	0.85	0.2	22.9	22.4	78.107
25.3	1.90	0.5	11.1	23.2	82.720
26.0	4.97	2.3	5.2	23.6	86.828
27.0	10.74	4.2	2.4	24.8	98.805
28.0	19.34	5.7	1.4	25.3	100.146
29.0	33.39	7.4	1.1	26.2	95.668
30.0	30.79	2.4	0.9	26.6	87.074
63.3	36.27	0.7	0.3	28.0	25.106
80.0	41.42	0.5	0.3	29.0	49.929
100.0	47.07	1.7	0.3	30.0	64.699
325.0	54.13	8.6	0.3	47.0	3.795
550.0	53.01	7.0	0.3	63.1	1.797
775.0	50.30	4.1	0.3	79.0	1.341
1000.0	47.08	3.5	0.3	80.4	1.116

BP-30 27-33 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	81.68	9.6	0.2	2.8	30.059
1.4	73.69	2.1	0.2	3.2	21.884
1.9	70.39	1.8	0.2	3.3	12.226
2.3	67.50	1.2	0.2	9.6	7.216
2.8	65.09	0.9	0.2	15.8	11.923
3.2	61.70	1.3	0.2	22.0	89.768
4.0	58.09	0.6	0.2	23.2	56.479
16.0	30.42	0.6	0.4	23.6	40.798
22.0	32.26	2.3	0.6	24.4	22.806
23.0	26.30	1.7	0.8	24.8	103.619
23.7	15.68	1.1	1.2	26.2	115.164
24.3	8.44	1.0	2.5	27.1	99.025
25.0	3.86	0.6	6.3	28.0	78.962
27.0	1.28	0.1	20.8	28.5	72.223
29.3	1.02	0.1	21.6	29.5	64.660
30.5	1.02	0.1	20.0	30.0	62.760
32.8	1.16	0.1	18.6	31.1	61.836
35.0	2.37	0.3	8.8	31.6	62.724
36.0	4.69	0.5	4.5	32.2	64.652
37.3	11.24	0.9	1.7	32.7	67.765
38.7	21.64	1.2	0.9	33.9	76.095
40.0	38.75	2.0	0.7	35.1	80.917
50.0	26.83	0.5	0.3	36.3	75.838
82.7	39.42	0.4	0.3	37.6	9.558
99.0	43.92	0.6	0.3	38.9	16.978
190.0	65.36	2.3	0.3	40.3	34.601
392.5	80.00	3.9	0.4	41.0	41.413
595.0	59.40	2.2	0.4	59.9	3.448
797.5	50.83	1.8	0.6	80.4	1.230
1000.0	43.35	2.3	0.8	97.2	0.971

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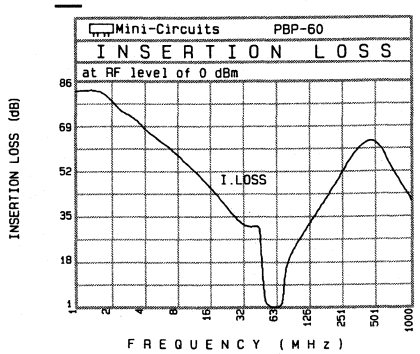
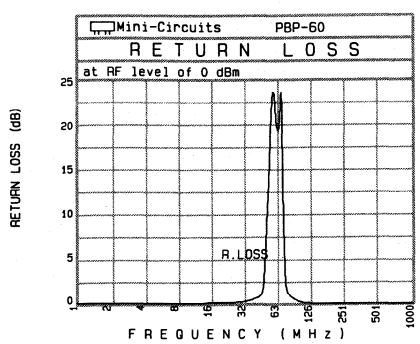
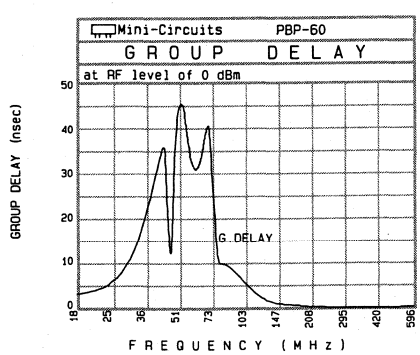
Mini-Circuits

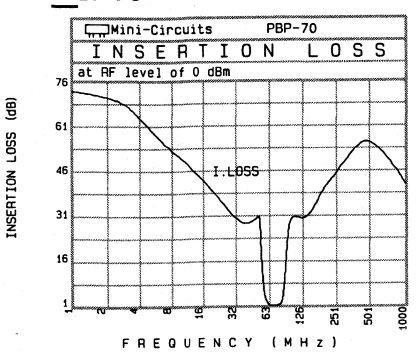
BP-60 55-67 MHz

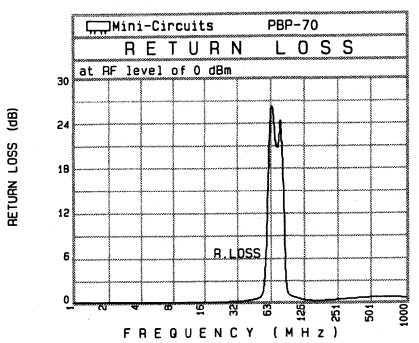


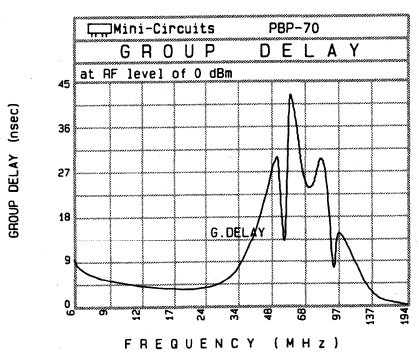




BP-70 63-77 MHz







Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	84.04	7.1	0.1	17.9	3.240
1.7	85.43	7.0	0.1	31.1	5.995
2.4	76.11	2.6	0.1	43.9	39.921
3.2	74.96	2.8	0.1	44.7	35.653
3.9	71.07	2.3	0.1	46.2	16.491
4.6	67.50	1.7	0.1	47.9	6.771
10.0	54.99	0.4	0.1	49.5	46.457
32.7	30.64	0.9	0.2	54.0	47.142
44.0	33.27	4.8	0.9	55.0	43.528
45.0	29.89	6.3	1.1	55.9	40.065
47.0	15.98	3.6	2.0	57.9	34.902
48.6	7.60	2.1	4.7	58.9	33.283
49.8	3.27	0.7	9.8	61.0	31.633
55.0	1.36	0.1	23.3	62.0	31.517
58.7	1.16	0.1	23.8	64.2	32.819
60.3	1.14	0.1	21.0	65.3	34.547
63.7	1.20	0.1	19.8	66.5	36.948
70.5	2.89	0.3	9.8	67.6	39.519
71.0	3.45	0.3	8.0	70.0	42.124
73.7	9.21	0.6	2.4	71.2	41.298
76.3	18.97	0.8	0.9	73.7	26.181
79.0	34.96	1.1	0.5	76.3	1.540
100.0	27.50	0.5	0.1	77.6	7.179
160.0	40.78	0.6	0.1	79.0	12.528
190.0	45.59	0.7	0.1	115.5	1.937
300.0	61.77	1.7	0.1	152.2	0.901
475.0	68.58	5.7	0.1	187.3	0.734
650.0	53.94	1.4	0.1	190.5	0.405
825.0	46.86	1.7	0.1	393.6	0.055
1000.0	42.22	1.9	0.1	595.7	0.502

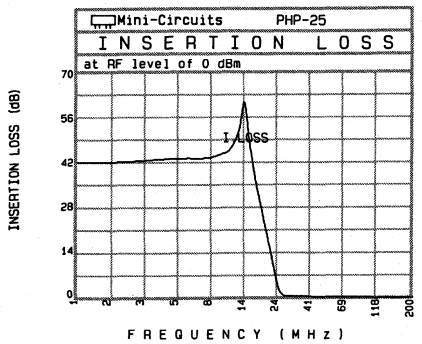
Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	74.05	9.9	0.1	6.0	9.637
2.0	72.12	9.9	0.1	7.0	4.541
3.0	70.17	9.9	0.1	21.6	3.025
4.0	65.27	9.9	0.1	36.3	5.629
5.0	62.16	9.9	0.1	51.3	33.642
6.0	58.09	9.9	0.1	52.2	29.619
10.0	49.84	8.7	0.1	54.0	17.384
37.3	26.90	2.5	0.2	55.9	8.664
51.0	31.67	1.6	0.6	57.9	42.682
52.0	31.71	6.1	0.8	58.9	44.815
55.3	10.89	2.4	2.2	63.1	36.286
57.0	5.56	1.5	4.8	64.2	32.857
58.0	3.59	1.0	7.7	65.3	30.036
63.0	1.24	0.1	26.8	67.6	26.418
66.2	1.10	0.1	27.1	70.0	24.706
70.0	1.11	0.1	22.3	71.2	24.425
72.7	1.18	0.1	21.2	73.7	24.966
82.0	2.13	0.6	18.8	75.0	25.878
85.0	6.18	2.4	5.1	77.6	28.843
88.0	12.70	3.1	2.1	80.4	31.882
91.0	22.06	4.0	1.2	81.8	32.569
94.0	32.17	1.3	0.9	83.2	32.242
95.0	33.31	2.7	0.8	86.1	26.228
160.3	35.43	0.7	0.3	90.7	2.764
193.0	41.33	1.0	0.3	93.9	14.126
200.0	42.38	1.0	0.3	95.5	17.176
400.0	60.24	9.9	0.7	128.1	2.113
600.0	53.81	8.2	0.8	160.3	1.095
800.0	46.59	4.3	0.7	190.5	0.413
1000.0	42.50	2.9	0.7	193.9	0.375

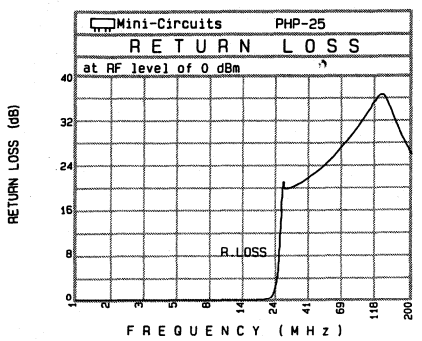
rugged, high selectivity

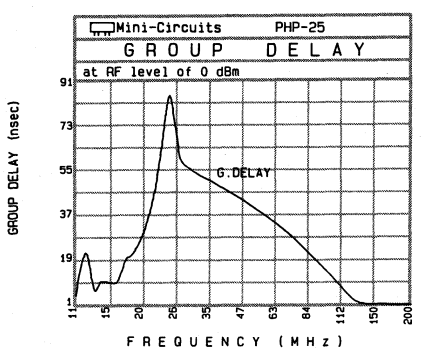
High Pass Filters

MODEL SELECTION
(choose prefix)
P = plug in N = type N
B = BNC S = SMA

HP-25 27.5-200 MHz

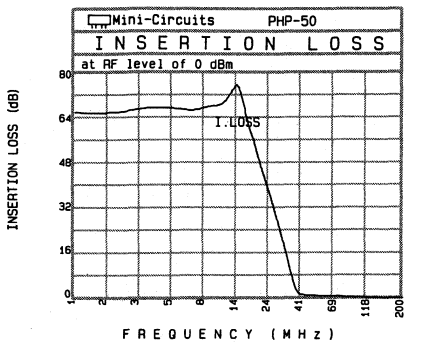


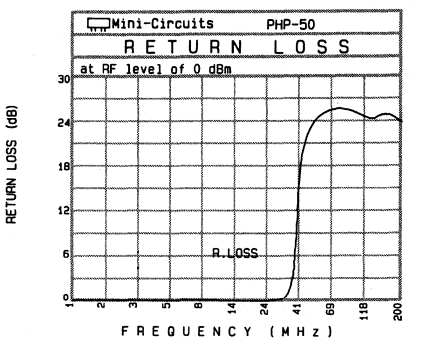


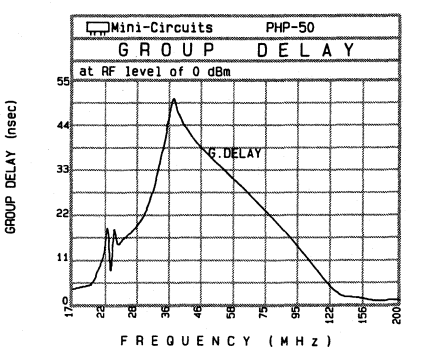


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	43.12	0.1	0.0	11.0	4.434
3.0	43.76	0.6	0.0	12.0	27.529
5.0	44.40	0.7	0.1	12.5	15.992
7.0	44.36	0.9	0.1	13.0	3.882
9.0	45.32	1.0	0.1	13.5	10.687
10.0	45.99	0.9	0.1	14.0	10.456
11.0	46.57	0.9	0.1	15.0	10.214
12.0	49.64	1.1	0.1	16.0	9.291
12.5	51.45	1.2	0.1	17.0	21.160
13.0	53.51	1.5	0.1	17.5	20.414
13.5	58.61	2.1	0.1	18.0	21.904
15.0	51.13	1.7	0.1	19.0	25.997
17.0	36.08	1.3	0.1	19.5	29.467
17.5	33.22	1.1	0.1	20.0	31.466
18.0	30.58	1.2	0.2	21.0	39.765
19.0	25.70	1.2	0.2	22.0	49.674
19.5	23.35	1.2	0.2	23.0	64.868
21.0	16.44	1.3	0.4	24.0	81.191
23.0	7.62	1.3	1.5	24.5	87.113
24.0	4.02	1.0	3.5	25.0	87.595
24.5	2.71	0.8	5.3	26.0	76.808
25.0	1.76	0.6	7.8	26.5	68.461
26.0	0.80	0.2	15.4	27.0	60.967
27.0	0.55	0.1	20.3	27.5	54.670
27.5	0.52	0.1	19.9	117.0	1.854
133.5	0.17	0.1	37.7	133.5	1.651
150.0	0.18	0.1	33.7	150.0	1.355
167.0	0.20	0.1	30.6	167.0	1.288
183.5	0.19	0.1	28.4	183.5	1.254
200.0	0.20	0.1	26.8	200.0	1.161

HP-50 41-200 MHz

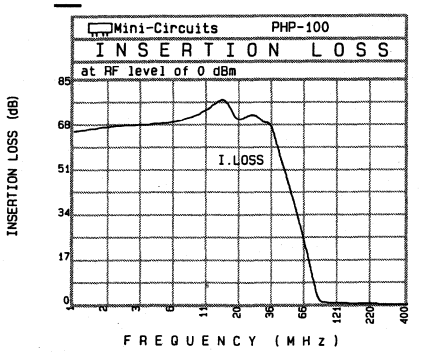


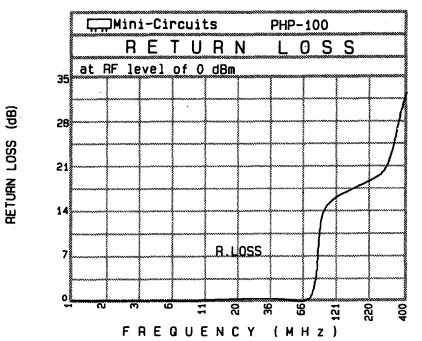


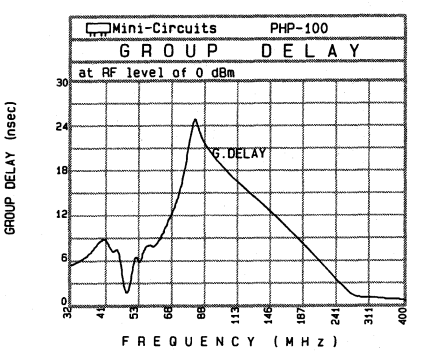


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	67.35	2.1	0.1	17.0	3.769
3.0	69.22	2.0	0.1	18.0	4.219
7.0	67.66	1.8	0.1	19.0	4.549
11.0	69.57	1.3	0.1	20.0	4.911
14.0	78.81	9.5	0.1	21.0	9.747
15.0	74.91	4.7	0.1	22.0	12.748
17.0	62.53	1.4	0.1	22.5	24.544
18.0	59.52	3.2	0.1	23.0	0.688
19.0	54.95	1.7	0.1	23.5	23.431
20.0	51.14	1.0	0.1	24.0	13.444
21.0	47.48	1.0	0.0	25.0	16.301
22.5	42.82	0.7	0.1	26.0	17.224
23.5	39.50	0.6	0.1	28.0	19.352
24.0	38.04	0.5	0.1	29.0	21.299
25.0	34.89	0.6	0.1	30.0	23.365
26.0	31.98	0.5	0.1	32.0	29.865
28.0	26.15	0.5	0.2	34.0	39.026
30.0	20.49	0.5	0.4	36.0	49.410
34.0	9.52	0.4	1.3	36.5	51.690
36.0	4.92	0.2	3.3	37.0	52.351
36.5	4.01	0.2	4.2	38.0	52.064
37.0	3.25	0.2	5.2	39.0	47.838
38.0	2.07	0.1	8.1	41.0	37.113
39.0	1.37	0.1	12.1	120.5	3.012
41.0	0.81	0.1	28.9	133.5	2.107
133.5	0.19	0.1	25.4	147.0	2.072
160.0	0.16	0.1	25.8	160.0	1.408
173.5	0.16	0.1	25.5	173.5	1.036
186.5	0.16	0.1	25.1	186.5	1.543
200.0	0.16	0.1	24.7	200.0	1.271

HP-100 90-400 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	66.80	1.3	0.0	32.0	5.381
5.0	69.56	0.5	0.0	35.0	6.183
12.0	76.93	5.0	0.2	38.0	7.454
18.0	72.01	4.0	0.4	40.0	8.914
25.0	74.64	7.6	0.5	42.0	9.149
30.0	70.54	2.0	0.6	44.0	6.488
32.0	70.63	3.7	0.6	46.0	8.820
35.0	70.04	3.6	0.6	48.0	0.923
38.0	63.40	2.1	0.5	50.0	1.834
40.0	59.85	0.7	0.5	52.0	7.907
42.0	55.56	0.6	0.5	54.0	5.058
46.0	49.83	0.5	0.4	55.0	7.570
50.0	43.77	0.6	0.3	58.0	8.594
52.0	40.75	0.6	0.2	60.0	7.486
54.0	37.94	0.5	0.2	65.0	10.515
55.0	36.57	0.6	0.2	70.0	13.562
58.0	32.40	0.6	0.1	72.0	15.205
65.0	22.98	0.7	0.1	75.0	18.218
72.0	13.63	0.6	0.5	80.0	25.450
75.0	9.75	0.5	1.0	82.0	26.109
80.0	4.23	0.1	3.4	84.0	24.747
82.0	2.74	0.1	5.3	86.0	23.578
84.0	1.74	0.1	8.0	90.0	17.768
86.0	1.16	0.1	11.5	250.5	1.916
90.0	0.72	0.1	17.3	275.5	1.257
275.5	0.23	0.1	21.4	300.0	1.138
325.0	0.21	0.1	25.8	325.0	1.183
350.0	0.21	0.1	29.9	350.0	0.946
375.0	0.21	0.1	32.9	375.0	1.012
400.0	0.21	0.1	33.5	400.0	0.784

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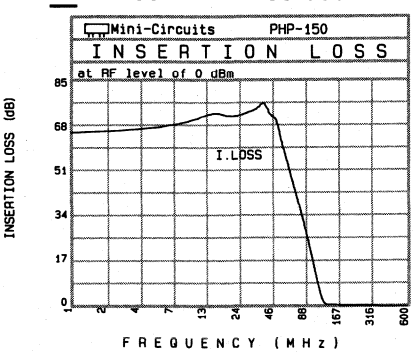
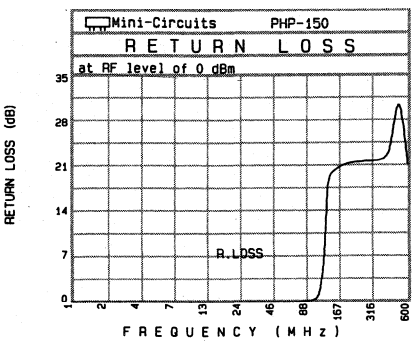
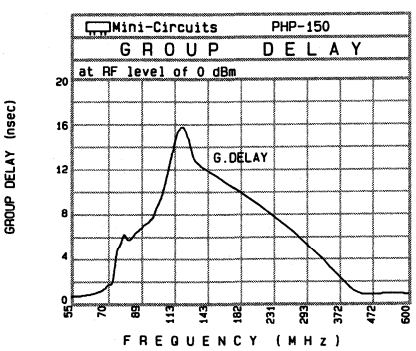
Mini-Circuits

HP-150 133-600 MHz

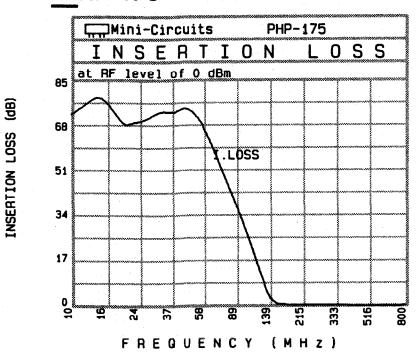


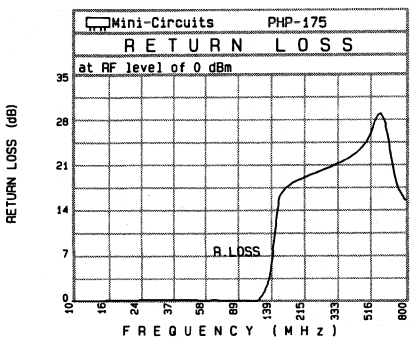


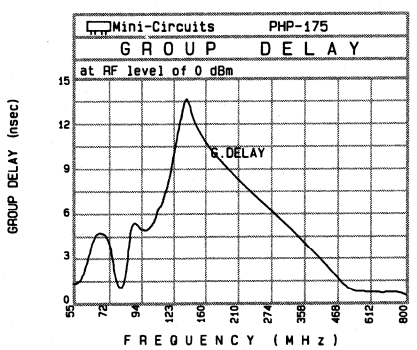


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	67.11	4.7	0.0	55.0	0.616
15.0	75.59	2.2	0.1	60.0	0.695
25.0	73.88	4.2	0.1	65.0	0.888
35.0	76.27	7.6	0.0	70.0	1.268
45.0	72.72	3.5	0.1	72.0	1.943
50.0	74.11	7.3	0.1	74.0	1.444
55.0	64.05	0.8	0.1	76.0	5.400
60.0	58.59	1.0	0.1	78.0	5.113
65.0	51.97	0.7	0.1	80.0	6.914
70.0	46.87	0.5	0.1	82.0	5.512
72.0	45.03	0.4	0.1	85.0	6.344
76.0	40.80	0.4	0.1	95.0	7.609
80.0	36.81	0.4	0.1	98.0	7.851
82.0	34.95	0.4	0.2	100.0	8.843
85.0	32.07	0.4	0.2	102.0	9.202
95.0	22.87	0.3	0.3	104.0	9.931
98.0	20.15	0.3	0.4	106.0	10.651
102.0	16.56	0.3	0.5	110.0	12.856
106.0	13.01	0.2	0.7	112.0	13.914
110.0	9.58	0.2	1.2	120.0	17.483
112.0	7.96	0.2	1.5	122.0	17.073
120.0	2.86	0.3	5.0	125.0	16.065
122.0	2.09	0.3	6.6	130.0	13.384
130.0	0.71	0.1	17.4	133.0	12.227
133.0	0.59	0.1	23.0	400.0	0.825
440.0	0.21	0.1	25.7	440.0	0.992
480.0	0.19	0.1	30.9	480.0	0.909
520.0	0.21	0.1	32.6	520.0	1.025
560.0	0.22	0.1	25.9	560.0	1.015
600.0	0.24	0.1	22.0	600.0	0.918

HP-175 160-800 MHz

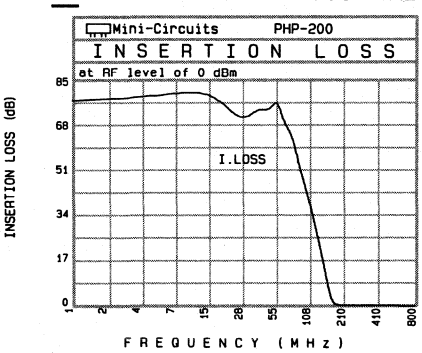


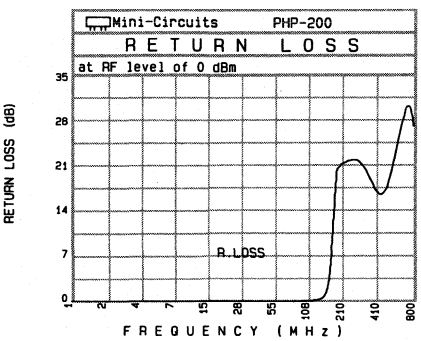


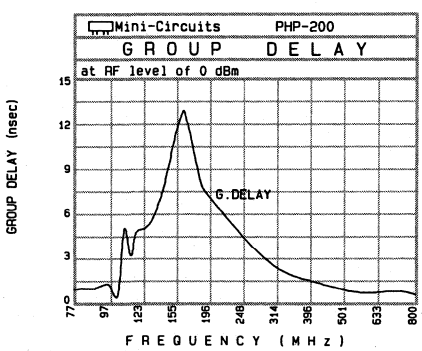


Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
10.0	74.24	5.1	0.1	55.0	1.298
15.0	83.02	3.4	0.1	60.0	1.433
22.5	71.28	2.9	0.2	65.0	4.875
32.5	75.54	2.9	0.3	70.0	4.881
40.0	74.66	2.9	0.3	75.0	4.289
45.0	77.91	4.5	0.3	77.5	1.016
55.0	73.19	4.3	0.2	85.0	0.723
60.0	67.53	1.4	0.2	87.5	6.144
65.0	62.87	1.7	0.3	95.0	5.057
70.0	57.55	1.1	0.2	97.5	5.116
75.0	52.51	0.4	0.2	100.0	4.953
85.0	43.70	0.3	0.2	105.0	5.422
95.0	35.16	0.3	0.2	107.5	5.813
97.5	33.16	0.4	0.2	110.0	6.616
100.0	31.08	0.4	0.2	112.5	6.634
105.0	27.09	0.4	0.2	115.0	7.298
107.5	25.06	0.4	0.1	117.5	7.825
112.5	21.11	0.4	0.1	120.0	8.439
117.5	17.21	0.3	0.1	135.0	13.892
120.0	15.29	0.3	0.3	140.0	14.475
135.0	5.06	0.1	2.6	145.0	13.770
140.0	2.90	0.1	4.8	155.0	10.475
145.0	1.60	0.1	7.9	160.0	8.958
155.0	0.67	0.1	15.8	485.0	0.978
160.0	0.54	0.1	19.6	537.5	0.861
537.5	0.18	0.1	29.2	590.0	0.818
642.5	0.21	0.1	26.1	642.5	0.768
695.0	0.26	0.1	18.5	695.0	0.777
747.5	0.27	0.1	18.0	747.5	0.821
800.0	0.31	0.1	16.1	800.0	0.600

HP-200 185-800 MHz







Freq. (MHz)	I.Loss x̄ (dB)	I.Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G.Delay x̄ (nsec)
1.0	79.13	4.3	0.0	77.0	0.978
15.0	82.18	2.2	0.0	84.0	0.989
29.0	71.32	5.5	0.0	90.0	1.005
43.0	76.14	5.3	0.1	91.0	1.105
56.0	80.66	8.1	0.1	95.0	1.256
63.0	71.77	4.8	0.1	99.0	1.433
70.0	68.26	1.4	0.1	102.0	0.436
77.0	64.30	1.4	0.1	106.0	0.133
84.0	57.15	0.6	0.1	109.0	6.766
90.0	51.69	0.7	0.1	113.0	3.226
91.0	51.14	0.4	0.1	116.0	3.155
99.0	45.20	0.4	0.2	117.0	5.120
106.0	40.04	0.5	0.2	124.0	5.092
109.0	37.91	0.4	0.2	131.0	5.424
113.0	35.09	0.5	0.2	138.0	6.789
116.0	32.89	0.5	0.2	144.0	8.014
117.0	32.20	0.5	0.2	151.0	10.279
131.0	22.48	0.4	0.4	158.0	12.335
144.0	13.65	0.3	0.8	164.0	13.131
151.0	9.11	0.2	1.4	165.0	13.510
158.0	5.16	0.2	2.9	172.0	11.709
164.0	2.79	0.3	5.4	179.0	9.377
165.0	2.50	0.3	5.9	185.0	8.237
179.0	0.74	0.1	16.9	186.0	7.899
185.0	0.60	0.1	20.8	289.0	2.270
289.0	0.32	0.1	23.8	391.0	1.608
493.0	0.34	0.1	17.0	493.0	0.931
596.0	0.29	0.1	21.2	596.0	0.716
698.0	0.26	0.1	34.4	698.0	1.034
800.0	0.27	0.1	27.9	800.0	0.700

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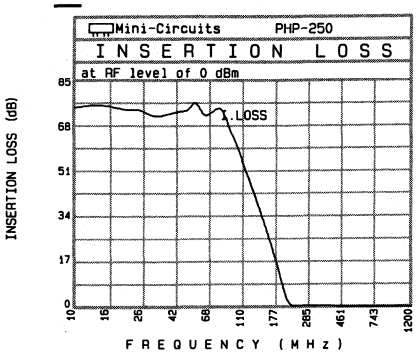
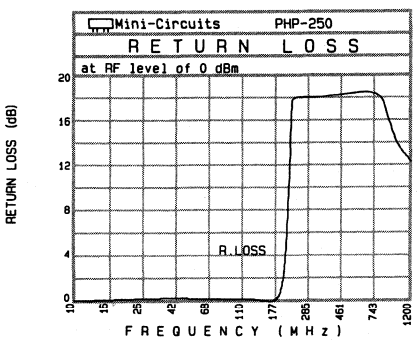
MODEL SELECTION

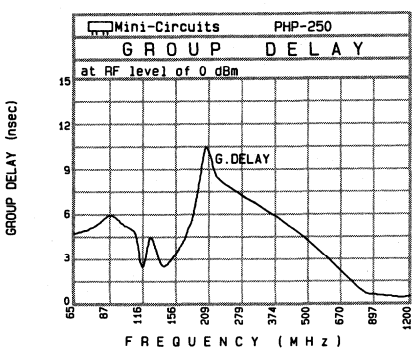
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

HP-250 225-1200 MHz

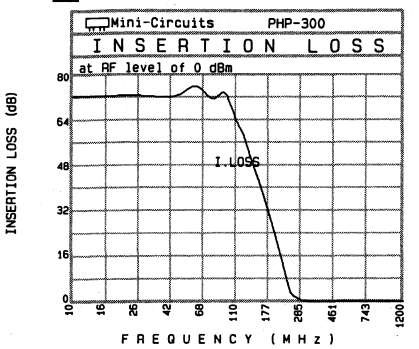


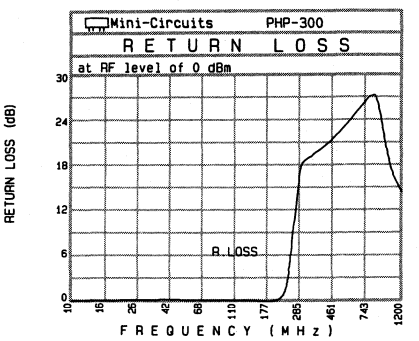


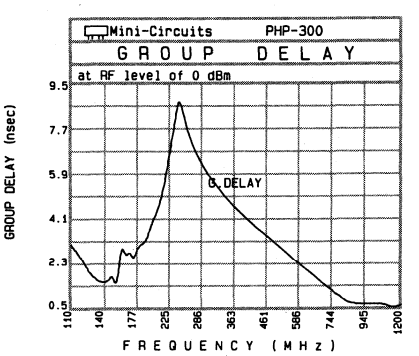


Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	76.72	4.7	0.1	65.0	4.870
20.0	75.31	6.1	0.2	80.0	5.308
30.0	72.93	2.4	0.3	90.0	6.580
45.0	75.64	7.5	0.3	100.0	5.254
55.0	80.00	7.3	0.3	112.5	5.321
60.0	75.56	5.5	0.2	115.0	2.790
65.0	72.15	5.4	0.3	120.0	2.303
80.0	79.38	6.5	0.2	125.0	5.094
90.0	67.76	2.6	0.3	130.0	4.282
100.0	62.37	1.3	0.3	135.0	3.361
112.5	52.78	0.8	0.3	140.0	2.445
120.0	48.75	1.0	0.3	150.0	2.972
130.0	42.50	1.0	0.2	160.0	3.831
135.0	39.68	0.9	0.2	170.0	4.422
140.0	36.80	0.9	0.2	175.0	5.338
150.0	31.25	0.8	0.1	180.0	5.609
160.0	25.78	0.9	0.1	185.0	6.712
175.0	17.58	0.8	0.2	190.0	7.715
185.0	12.12	0.7	0.6	200.0	10.392
190.0	9.45	0.6	1.0	205.0	11.221
200.0	4.68	0.4	2.9	210.0	11.206
205.0	2.91	0.2	5.0	215.0	10.425
210.0	1.73	0.2	8.2	220.0	9.178
220.0	0.78	0.1	19.1	225.0	7.948
225.0	0.69	0.1	18.3	775.0	0.731
860.0	0.38	0.1	16.9	860.0	0.764
945.0	0.43	0.1	15.2	945.0	0.678
1030.0	0.48	0.1	13.9	1030.0	0.631
1115.0	0.52	0.1	12.9	1115.0	0.507
1200.0	0.56	0.1	12.8	1200.0	0.637

HP-300 290-1200 MHz

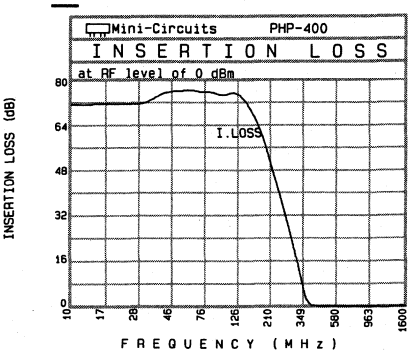


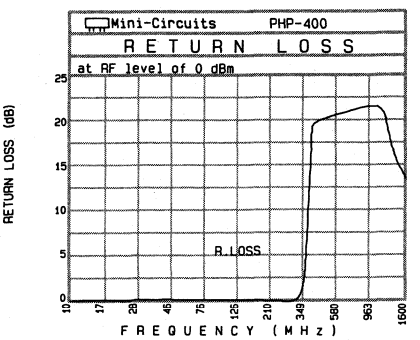


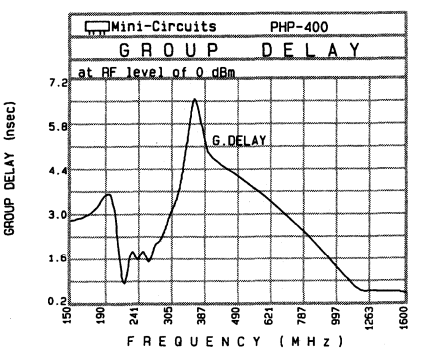


Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	74.21	2.4	0.1	110.0	3.166
30.0	74.57	4.0	0.2	120.0	2.555
50.0	75.03	6.1	0.2	130.0	1.726
70.0	75.11	1.9	0.2	145.0	1.496
90.0	77.67	5.6	0.2	150.0	2.068
100.0	71.90	4.0	0.2	155.0	1.112
110.0	64.71	1.1	0.2	160.0	3.421
120.0	61.50	1.0	0.2	165.0	2.567
130.0	54.50	0.9	0.2	170.0	2.970
145.0	47.14	0.4	0.1	175.0	2.429
150.0	44.66	0.4	0.1	180.0	3.144
160.0	39.74	0.4	0.1	190.0	3.211
170.0	34.99	0.4	0.1	195.0	3.623
175.0	32.61	0.4	0.1	200.0	4.110
180.0	30.36	0.4	0.1	205.0	4.383
190.0	25.67	0.4	0.1	210.0	4.714
195.0	23.38	0.4	0.1	220.0	5.851
205.0	18.79	0.4	0.3	230.0	7.341
220.0	11.96	0.4	0.7	240.0	8.938
230.0	7.65	0.3	1.6	245.0	9.275
240.0	4.02	0.3	3.6	265.0	7.189
245.0	2.69	0.2	5.4	285.0	4.933
265.0	0.66	0.1	22.9	290.0	4.533
285.0	0.52	0.1	19.6	780.0	0.869
290.0	0.52	0.1	18.7	850.0	0.746
850.0	0.28	0.1	27.8	920.0	0.721
990.0	0.33	0.1	19.6	990.0	0.718
1060.0	0.38	0.1	17.1	1060.0	0.745
1130.0	0.42	0.1	15.3	1130.0	0.561
1200.0	0.47	0.1	15.0	1200.0	0.677

HP-400 395-1600 MHz







Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	73.14	1.5	0.1	150.0	2.914
30.0	72.81	1.5	0.2	180.0	3.131
55.0	78.12	7.8	0.2	200.0	4.272
70.0	77.71	7.6	0.2	210.0	2.149
100.0	75.88	7.3	0.2	220.0	0.200
120.0	78.90	6.3	0.3	230.0	2.419
150.0	72.73	3.5	0.2	240.0	1.348
180.0	63.50	1.6	0.2	250.0	2.233
200.0	54.98	1.6	0.2	260.0	1.280
210.0	51.12	1.3	0.2	270.0	2.213
220.0	47.63	0.9	0.2	280.0	2.206
240.0	40.73	0.7	0.1	290.0	2.559
260.0	34.00	0.8	0.1	300.0	3.078
270.0	30.73	0.8	0.1	310.0	3.391
280.0	27.40	0.8	0.1	320.0	3.789
290.0	24.12	0.8	0.1	330.0	4.586
300.0	20.78	0.8	0.2	340.0	5.452
320.0	14.12	0.8	0.5	350.0	6.519
340.0	7.64	0.6	1.5	355.0	6.761
350.0	4.84	0.5	2.8	360.0	6.909
355.0	3.67	0.4	3.8	375.0	6.432
360.0	2.71	0.4	5.1	385.0	5.626
375.0	1.05	0.2	11.5	390.0	5.195
390.0	0.59	0.1	19.8	395.0	4.808
395.0	0.54	0.1	20.9	1102.5	0.632
1202.5	0.26	0.1	20.2	1202.5	0.662
1302.5	0.30	0.1	17.4	1302.5	0.661
1400.0	0.33	0.1	15.9	1400.0	0.647
1500.0	0.38	0.1	14.7	1500.0	0.657
1600.0	0.41	0.1	14.1	1600.0	0.595

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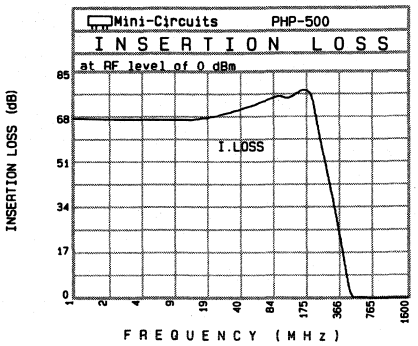
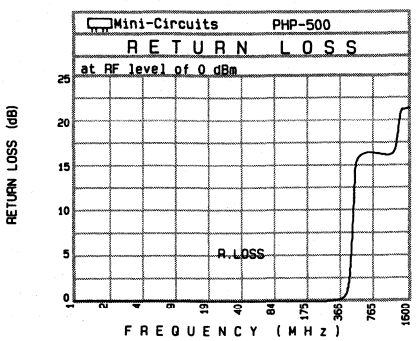
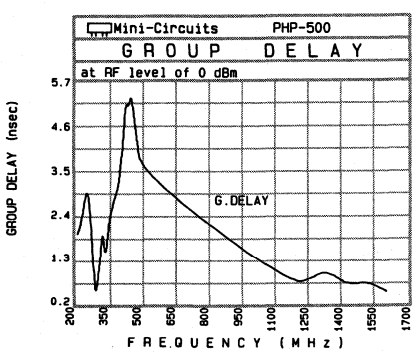
Mini-Circuits

HP-500 500-1600 MHz

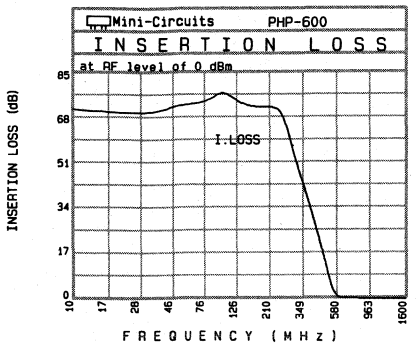


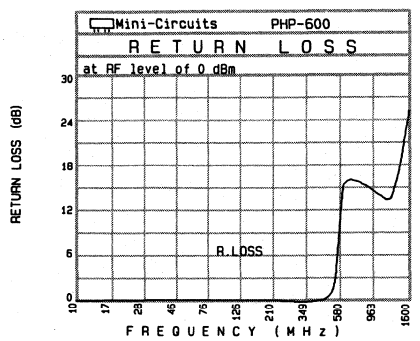


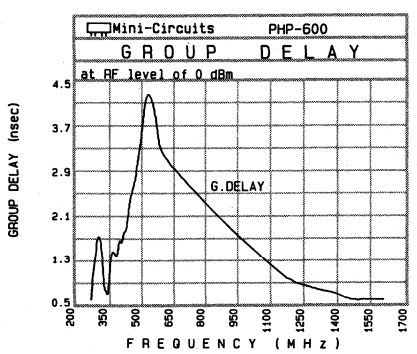


Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	69.51	5.2	0.0	220.0	2.001
20.0	69.93	3.2	0.1	240.0	2.361
90.0	79.06	4.2	0.0	260.0	3.401
120.0	77.49	2.6	0.0	280.0	2.219
180.0	80.98	5.2	0.1	300.0	0.252
200.0	76.65	9.9	0.1	310.0	0.812
220.0	66.04	4.4	0.1	320.0	1.290
240.0	59.18	1.9	0.1	330.0	2.254
260.0	52.45	1.3	0.1	340.0	1.441
280.0	46.56	1.0	0.1	350.0	1.614
300.0	40.96	0.9	0.2	360.0	2.443
320.0	35.47	0.8	0.2	365.0	2.444
340.0	30.06	0.8	0.2	380.0	2.896
350.0	27.36	0.8	0.3	400.0	3.144
360.0	24.72	0.8	0.3	410.0	3.808
365.0	23.44	0.8	0.3	420.0	4.105
380.0	19.44	0.8	0.4	430.0	5.327
410.0	11.64	0.7	0.9	440.0	5.180
430.0	6.88	0.5	1.9	450.0	5.282
440.0	4.89	0.4	2.9	454.0	5.519
450.0	3.30	0.3	4.3	470.0	4.950
454.0	2.79	0.3	5.0	480.0	4.443
470.0	1.44	0.2	8.7	490.0	4.121
490.0	0.76	0.1	14.5	500.0	3.522
500.0	0.64	0.1	17.8	1156.0	0.787
1245.0	0.37	0.1	18.6	1245.0	0.779
1333.0	0.36	0.1	22.3	1333.0	1.168
1422.0	0.35	0.1	22.0	1422.0	0.677
1511.0	0.34	0.1	21.5	1511.0	0.840
1600.0	0.36	0.1	22.2	1600.0	0.578

HP-600 600-1600 MHz

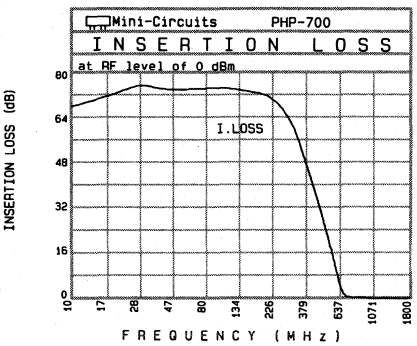


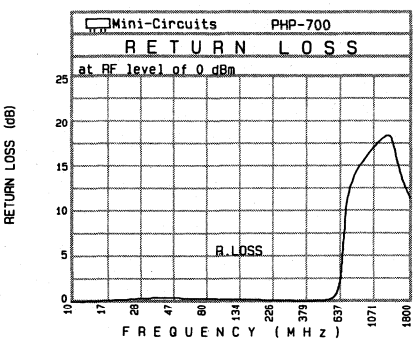


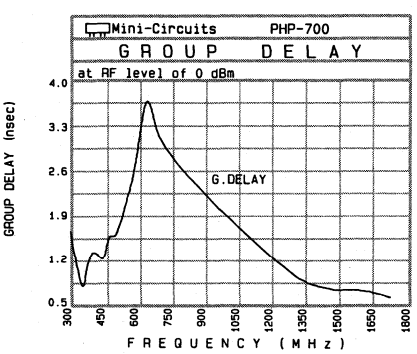


Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	73.34	3.0	0.1	280.0	0.614
50.0	75.79	7.9	0.3	320.0	2.357
100.0	81.25	9.1	0.3	340.0	0.698
150.0	74.62	7.3	0.2	350.0	0.876
220.0	74.57	5.6	0.2	360.0	0.548
250.0	73.20	2.3	0.2	370.0	1.579
280.0	63.08	1.6	0.1	390.0	1.482
320.0	50.76	0.3	0.1	400.0	1.363
340.0	46.03	0.5	0.1	410.0	1.832
350.0	43.60	0.5	0.0	420.0	1.586
360.0	41.20	0.5	0.1	430.0	1.928
390.0	34.33	0.6	0.1	440.0	1.841
410.0	29.83	0.6	0.2	450.0	2.249
420.0	27.62	0.6	0.2	460.0	2.544
430.0	25.37	0.6	0.3	480.0	2.783
440.0	23.19	0.6	0.3	500.0	3.349
450.0	20.99	0.6	0.4	510.0	3.641
480.0	14.50	0.6	0.7	520.0	4.106
510.0	8.36	0.5	1.5	530.0	4.353
520.0	6.52	0.4	2.0	545.0	4.430
530.0	4.89	0.3	2.8	570.0	4.094
545.0	2.97	0.1	4.6	590.0	3.500
570.0	1.21	0.1	9.6	600.0	3.203
590.0	0.72	0.1	15.0	1167.5	0.979
600.0	0.61	0.1	18.0	1237.5	0.932
1237.5	0.47	0.1	14.5	1310.0	0.815
1382.5	0.40	0.1	18.1	1382.5	0.781
1455.0	0.38	0.1	20.9	1455.0	0.618
1527.5	0.37	0.1	26.2	1527.5	0.651
1600.0	0.36	0.1	26.2	1600.0	0.639

HP-700 700-1800 MHz







Freq.	I.Loss		R.L.	Freq.	G.Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	69.97	2.7	0.1	300.0	1.702
30.0	79.30	6.2	0.5	360.0	0.576
70.0	76.67	6.3	0.5	370.0	1.107
120.0	76.75	5.9	0.4	390.0	1.287
220.0	74.46	5.8	0.3	400.0	1.387
300.0	64.87	2.8	0.3	420.0	1.353
360.0	51.59	0.9	0.2	450.0	1.203
370.0	49.50	1.2	0.2	460.0	1.450
390.0	45.90	0.8	0.2	470.0	1.580
400.0	43.94	0.9	0.2	480.0	1.649
420.0	40.15	0.7	0.3	500.0	1.606
460.0	32.96	0.6	0.3	510.0	1.717
480.0	29.32	0.6	0.3	520.0	1.801
500.0	25.76	0.6	0.3	540.0	2.053
510.0	24.00	0.5	0.4	570.0	2.460
520.0	22.24	0.5	0.4	590.0	2.751
540.0	18.71	0.5	0.5	600.0	3.012
590.0	10.13	0.3	1.0	610.0	3.254
610.0	7.01	0.3	1.7	620.0	3.521
620.0	5.60	0.2	2.3	630.0	3.693
630.0	4.36	0.2	3.0	640.0	3.784
640.0	3.29	0.1	3.9	650.0	3.751
650.0	2.44	0.1	5.1	670.0	3.551
670.0	1.30	0.1	8.7	700.0	2.942
700.0	0.65	0.1	15.2	1310.0	0.893
1395.0	0.36	0.1	17.9	1395.0	0.847
1555.0	0.45	0.1	14.7	1475.0	0.758
1635.0	0.50	0.1	13.5	1555.0	0.780
1720.0	0.54	0.1	12.7	1635.0	0.748
1800.0	0.57	0.1	12.0	1720.0	0.645

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MODEL SELECTION
(choose prefix)
P = plug in N = type N
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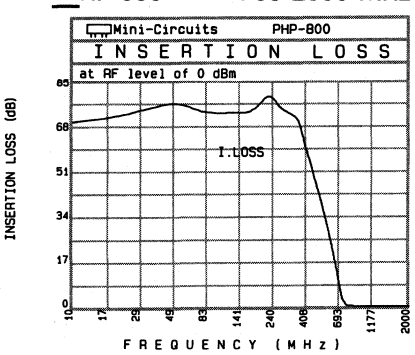
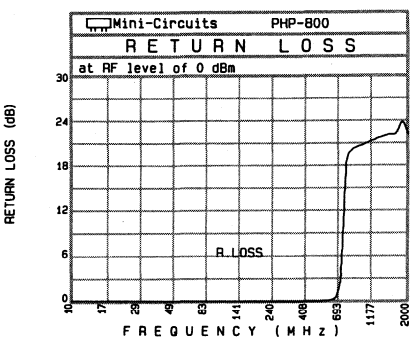
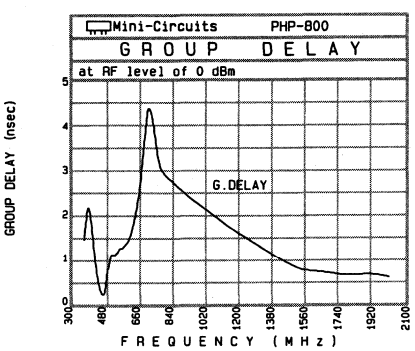
_HP-800 780-2000 MHz

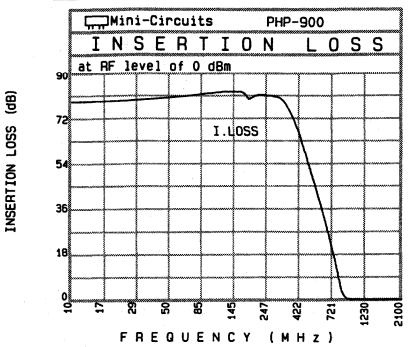


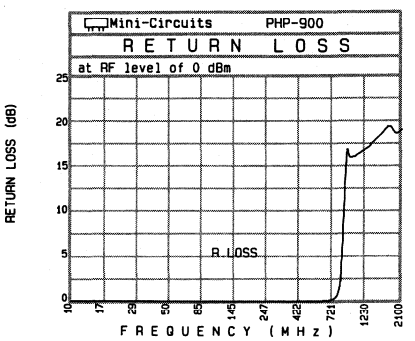


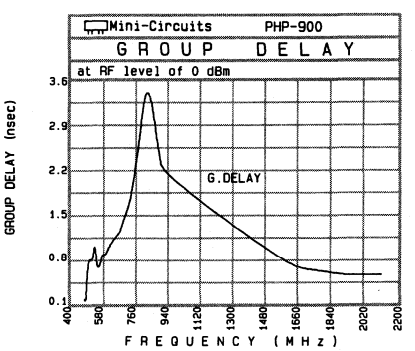


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	71.01	3.2	0.1	370.0	1.486
70.0	73.97	7.6	0.1	390.0	2.630
170.0	74.31	4.7	0.1	420.0	1.264
250.0	78.24	7.6	0.0	445.0	0.344
305.0	74.58	4.6	0.1	480.0	0.092
350.0	73.24	4.5	0.1	490.0	0.806
370.0	68.47	5.1	0.1	500.0	0.834
390.0	62.18	2.2	0.1	510.0	1.199
420.0	56.95	3.2	0.1	530.0	1.112
445.0	51.70	1.7	0.1	550.0	1.226
480.0	45.25	1.4	0.1	560.0	1.329
500.0	41.85	1.2	0.1	570.0	1.281
530.0	36.39	1.1	0.1	590.0	1.407
550.0	32.85	1.0	0.1	610.0	1.485
560.0	31.02	0.9	0.1	630.0	1.831
570.0	29.24	0.9	0.2	660.0	2.471
590.0	25.55	0.8	0.2	690.0	3.777
630.0	17.93	0.7	0.4	700.0	4.215
690.0	6.18	0.7	2.4	705.0	4.425
700.0	4.49	0.6	3.4	710.0	4.504
705.0	3.77	0.6	4.1	730.0	4.395
710.0	3.11	0.5	5.0	760.0	3.363
730.0	1.38	0.3	10.4	780.0	2.835
760.0	0.65	0.1	19.8	1480.0	0.833
780.0	0.59	0.1	20.9	1565.0	0.794
1565.0	0.34	0.1	22.7	1655.0	0.765
1740.0	0.36	0.1	23.6	1740.0	0.695
1825.0	0.33	0.1	25.2	1825.0	0.696
1915.0	0.34	0.1	24.1	1915.0	0.724
2000.0	0.34	0.1	22.9	2000.0	0.644

_HP-900 910-2100 MHz

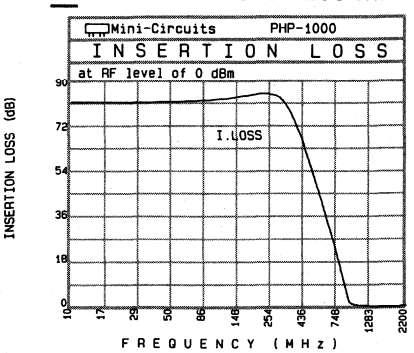


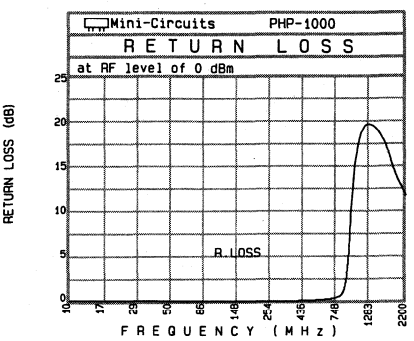


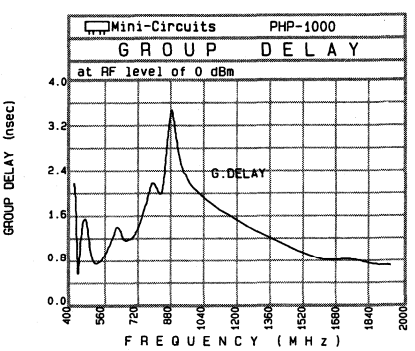


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	80.42	2.0	0.1	480.0	0.195
150.0	85.02	5.3	0.1	490.0	0.104
180.0	80.96	3.8	0.1	500.0	0.834
250.0	83.18	5.7	0.1	520.0	0.818
350.0	78.61	3.6	0.1	530.0	0.817
470.0	56.26	1.2	0.1	540.0	1.169
480.0	54.59	0.9	0.1	550.0	0.655
490.0	52.88	0.8	0.1	570.0	0.721
500.0	51.14	0.9	0.1	580.0	0.932
520.0	48.03	0.9	0.1	600.0	0.876
530.0	46.30	0.8	0.1	620.0	1.069
550.0	43.21	0.7	0.1	660.0	1.193
580.0	38.53	0.8	0.1	680.0	1.294
600.0	35.53	0.7	0.1	700.0	1.495
620.0	32.52	0.7	0.1	720.0	1.653
660.0	26.48	0.7	0.2	740.0	1.900
680.0	23.41	0.7	0.2	760.0	2.256
720.0	17.21	0.7	0.4	780.0	2.699
760.0	10.84	0.6	0.9	800.0	3.209
780.0	7.78	0.5	1.5	820.0	3.565
800.0	4.95	0.3	2.7	850.0	3.356
820.0	2.78	0.1	5.1	870.0	2.884
850.0	1.06	0.1	11.9	900.0	2.376
900.0	0.61	0.1	16.7	910.0	2.204
910.0	0.60	0.1	15.9	1600.0	0.719
1700.0	0.34	0.1	20.1	1700.0	0.673
1800.0	0.35	0.1	19.9	1800.0	0.644
1900.0	0.38	0.1	18.9	1900.0	0.582
2000.0	0.39	0.1	18.6	2000.0	0.590
2100.0	0.39	0.1	19.6	2100.0	0.593

_HP-1000 1000-2200 MHz







Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	83.18	2.8	0.1	420.0	2.224
200.0	87.50	7.1	0.1	430.0	1.926
330.0	81.91	4.5	0.1	440.0	0.042
410.0	69.01	3.7	0.1	450.0	1.378
430.0	64.76	2.6	0.1	480.0	1.800
440.0	63.14	2.6	0.1	500.0	0.668
450.0	61.53	2.3	0.1	550.0	0.759
480.0	56.69	1.8	0.1	610.0	1.255
500.0	53.07	1.3	0.2	620.0	1.481
550.0	45.76	1.0	0.2	640.0	1.373
610.0	36.92	0.6	0.3	650.0	1.219
640.0	32.87	0.5	0.3	660.0	1.184
660.0	30.45	0.5	0.3	670.0	1.180
670.0	29.21	0.5	0.3	700.0	1.227
700.0	25.28	0.4	0.4	720.0	1.365
720.0	22.61	0.4	0.5	770.0	1.949
770.0	15.62	0.4	0.6	790.0	2.348
820.0	9.80	0.5	1.2	820.0	2.039
860.0	4.84	0.4	2.9	840.0	1.970
880.0	2.75	0.4	4.4	860.0	2.877
885.0	2.41	0.4	4.9	880.0	3.588
900.0	1.81	0.4	6.7	885.0	3.562
920.0	1.40	0.3	9.8	900.0	3.220
1000.0	0.57	0.1	22.5	920.0	2.580
1560.0	0.53	0.1	18.5	1000.0	1.904
1745.0	0.42	0.1	15.8	1560.0	0.826
1925.0	0.62	0.1	14.0	1650.0	0.823
2015.0	0.59	0.1	13.5	1745.0	0.869
2110.0	0.77	0.1	12.9	1835.0	0.747
2200.0	0.71	0.1	12.2	1925.0	0.731

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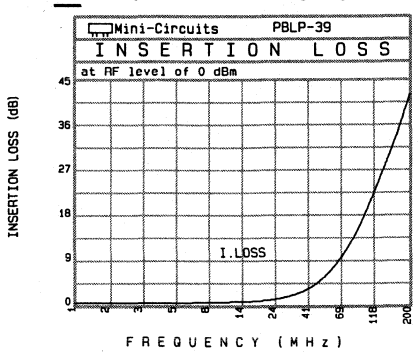
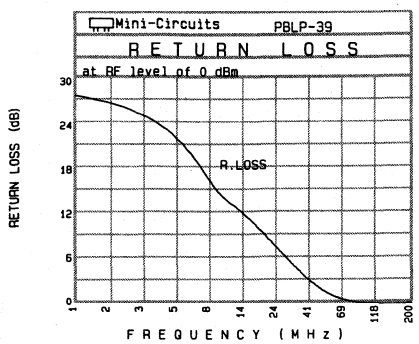
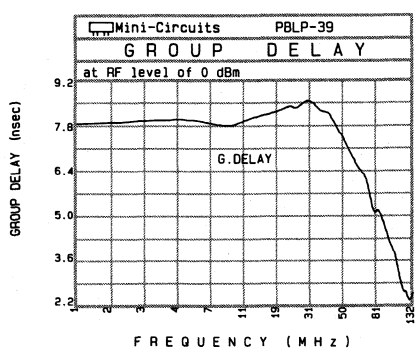
BLP-39 DC-23 MHz

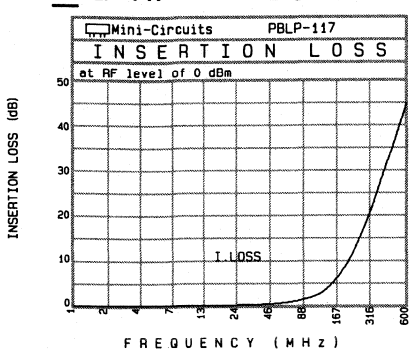


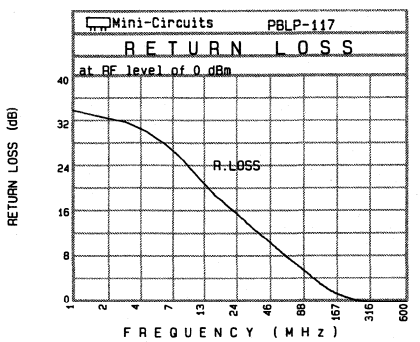


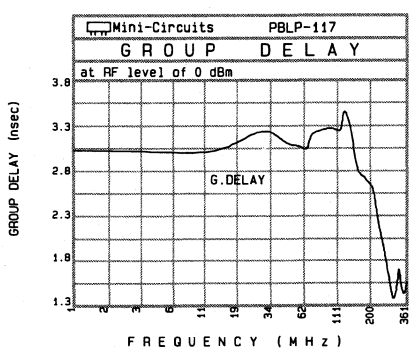


Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.37	0.5	28.6	1.0	8.012
9.0	0.56	0.5	15.4	5.0	8.243
12.0	0.63	0.5	13.7	9.0	7.823
16.0	0.73	0.4	11.7	12.0	8.199
20.0	0.94	0.4	9.6	16.0	8.305
23.0	1.15	0.4	8.3	20.0	8.466
24.0	1.23	0.4	7.9	23.0	8.623
34.0	2.33	0.3	4.7	24.0	8.392
39.0	3.12	0.3	3.6	29.0	8.899
40.0	3.31	0.3	3.4	34.0	8.378
51.0	5.55	0.2	1.9	39.0	8.392
62.0	8.26	0.2	1.1	40.0	8.247
68.0	9.81	0.2	0.8	46.0	7.722
73.0	11.13	0.3	0.7	51.0	7.336
78.0	12.47	0.4	0.5	57.0	6.804
79.0	12.74	0.5	0.5	62.0	6.487
90.0	15.85	0.7	0.3	68.0	6.306
101.0	19.10	0.8	0.3	73.0	5.277
107.0	20.88	0.9	0.2	78.0	5.124
112.0	22.32	0.9	0.2	79.0	5.489
117.0	23.74	1.0	0.2	85.0	5.101
118.0	24.01	1.0	0.2	90.0	4.784
132.0	27.65	1.0	0.2	96.0	4.054
146.0	30.97	1.0	0.2	101.0	3.996
159.0	33.94	1.0	0.2	107.0	3.275
173.0	36.98	1.0	0.2	112.0	2.856
180.0	38.66	1.1	0.2	117.0	2.547
187.0	40.21	1.1	0.2	118.0	2.738
194.0	41.54	1.0	0.2	125.0	2.216
200.0	42.85	1.1	0.2	132.0	2.576

BLP-117 DC-65 MHz

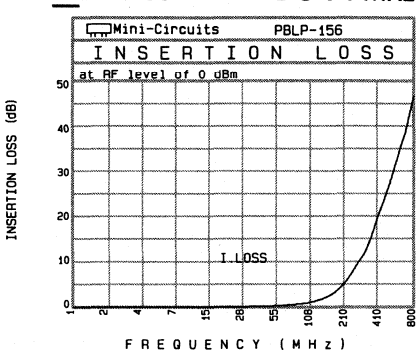


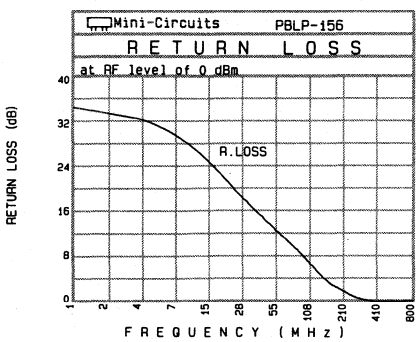


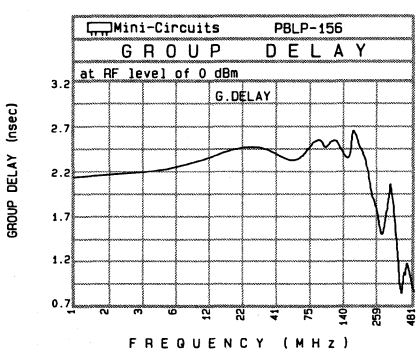


Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.02	0.1	35.3	1.0	3.075
23.0	0.15	0.1	16.8	12.0	3.015
33.0	0.26	0.1	13.8	23.0	3.252
44.0	0.42	0.1	11.5	33.0	3.331
55.0	0.65	0.1	9.6	44.0	3.126
65.0	0.90	0.1	8.3	55.0	3.140
66.0	0.92	0.1	8.2	65.0	3.044
100.0	1.96	0.1	4.8	66.0	3.271
117.0	2.80	0.1	3.5	83.0	3.303
118.0	2.86	0.1	3.5	100.0	3.348
152.0	5.63	0.1	1.9	117.0	3.233
185.0	8.79	0.2	1.2	118.0	3.593
201.0	10.40	0.2	0.9	135.0	3.409
218.0	12.23	0.2	0.7	152.0	2.782
234.0	13.99	0.2	0.5	168.0	2.798
235.0	14.10	0.2	0.5	185.0	2.689
257.0	16.54	0.3	0.3	201.0	2.681
279.0	18.92	0.4	0.3	218.0	2.252
290.0	20.08	0.5	0.2	234.0	2.060
301.0	21.23	0.5	0.2	235.0	2.032
312.0	22.36	0.6	0.2	246.0	1.965
313.0	22.46	0.6	0.2	257.0	1.759
361.0	27.82	0.7	0.2	268.0	1.562
409.0	32.27	0.9	0.2	279.0	1.358
457.0	35.79	1.0	0.2	290.0	1.372
505.0	39.52	1.3	0.2	301.0	1.483
529.0	41.10	1.4	0.2	312.0	1.659
553.0	42.74	1.6	0.2	313.0	1.765
577.0	44.30	1.5	0.3	337.0	1.324
600.0	45.95	2.0	0.3	361.0	1.555

BLP-156 DC-94 MHz







Freq.	I.Loss $\bar{x}$	I.Loss σ	R.L. $\bar{x}$	Freq.	G.Delay $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.05	0.1	35.6	1.0	2.185
32.0	0.17	0.1	17.6	17.0	2.540
48.0	0.30	0.1	14.2	32.0	2.534
63.0	0.46	0.1	11.9	48.0	2.358
79.0	0.68	0.1	10.0	63.0	2.382
94.0	0.92	0.1	8.3	79.0	2.619
95.0	0.93	0.1	8.2	94.0	2.595
136.0	1.98	0.1	4.6	95.0	2.467
156.0	2.79	0.2	3.6	116.0	2.682
157.0	2.85	0.2	3.5	136.0	2.392
202.0	5.33	0.2	2.2	156.0	2.383
246.0	8.75	0.3	1.2	157.0	2.835
268.0	10.25	0.3	0.9	180.0	2.501
290.0	11.57	0.3	0.7	202.0	2.433
312.0	12.97	0.3	0.6	224.0	1.923
313.0	13.03	0.3	0.6	246.0	1.878
343.0	15.67	0.3	0.5	268.0	1.392
372.0	18.60	0.3	0.4	290.0	1.756
387.0	20.01	0.3	0.3	312.0	2.001
402.0	21.23	0.3	0.3	313.0	2.235
416.0	22.25	0.3	0.3	328.0	1.944
417.0	22.32	0.3	0.3	343.0	1.740
481.0	27.17	0.5	0.3	358.0	1.360
545.0	31.67	0.7	0.3	372.0	0.911
609.0	36.32	1.0	0.4	387.0	0.786
673.0	39.65	1.2	0.4	402.0	1.170
705.0	41.78	1.2	0.4	416.0	0.978
737.0	44.07	1.6	0.5	417.0	1.269
769.0	46.28	1.6	0.5	449.0	1.042
800.0	47.95	1.8	0.5	481.0	0.864

In Stock...Immediate Delivery

flat time delay, linear phase

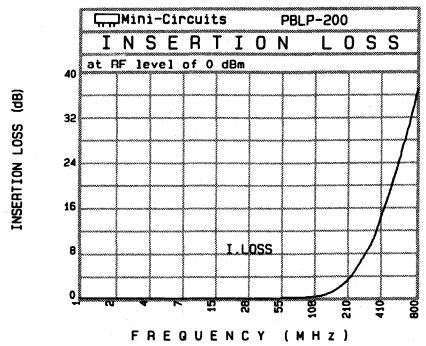
Low Pass Filters

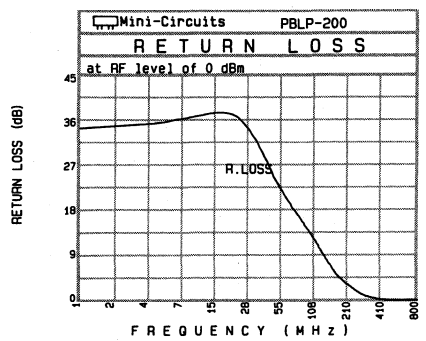
MODEL SELECTION

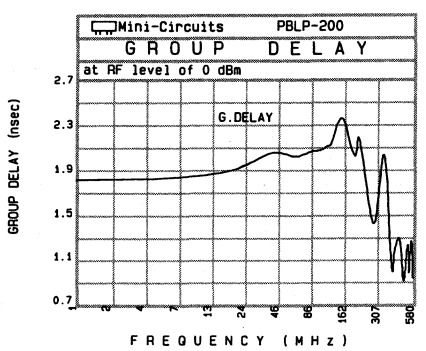
(choose prefix)

P = plug in N = type N
B = BNC S = SMA

BLP-200 DC-120 MHz

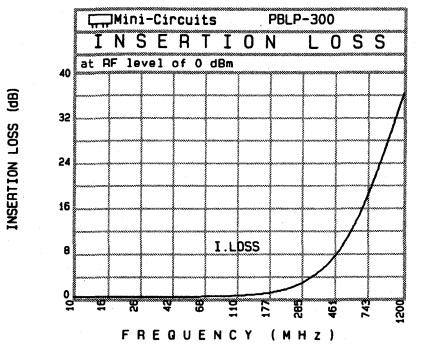


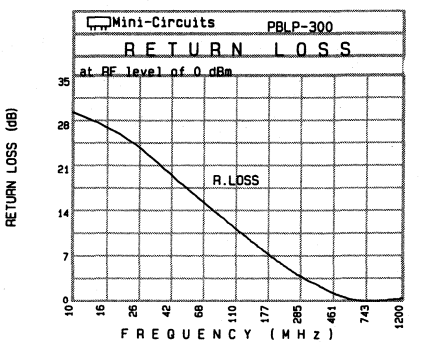


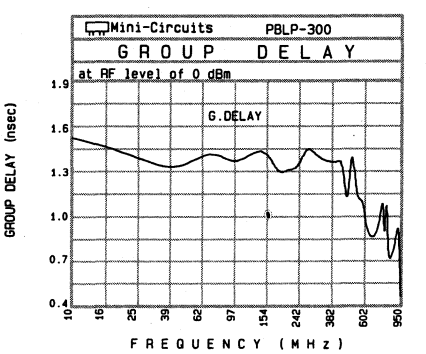


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.0	0.04	0.1	35.5	1.0	1.829
41.0	0.10	0.1	27.0	21.0	1.915
61.0	0.16	0.1	20.6	41.0	2.144
81.0	0.22	0.1	16.6	61.0	2.006
101.0	0.33	0.1	13.4	81.0	2.109
120.0	0.52	0.1	10.4	101.0	2.087
121.0	0.53	0.1	10.2	120.0	2.170
174.0	2.10	0.1	4.7	121.0	2.113
200.0	3.22	0.1	3.5	148.0	2.521
201.0	3.26	0.1	3.5	174.0	2.169
258.0	6.65	0.2	1.6	200.0	1.964
315.0	9.45	0.2	0.9	201.0	2.367
344.0	11.17	0.3	0.7	230.0	1.912
372.0	13.45	0.4	0.5	258.0	1.485
400.0	15.58	0.5	0.4	287.0	1.356
401.0	15.65	0.5	0.4	315.0	2.048
439.0	17.90	0.7	0.3	344.0	2.142
477.0	20.36	0.8	0.3	372.0	1.206
496.0	21.60	0.8	0.2	400.0	0.894
515.0	22.72	0.9	0.2	401.0	1.205
534.0	23.75	0.9	0.2	420.0	1.143
535.0	23.81	0.9	0.2	439.0	0.984
580.0	26.67	1.0	0.2	458.0	1.412
624.0	29.26	1.0	0.2	477.0	0.888
668.0	31.05	1.1	0.2	496.0	0.903
712.0	33.19	1.2	0.3	515.0	1.244
734.0	34.36	1.2	0.3	534.0	1.282
756.0	35.72	1.2	0.3	535.0	0.796
778.0	37.00	1.2	0.3	558.0	1.491
800.0	37.94	1.1	0.3	580.0	0.941

BLP-300 DC-180 MHz

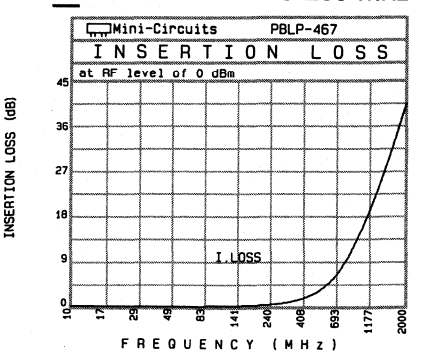


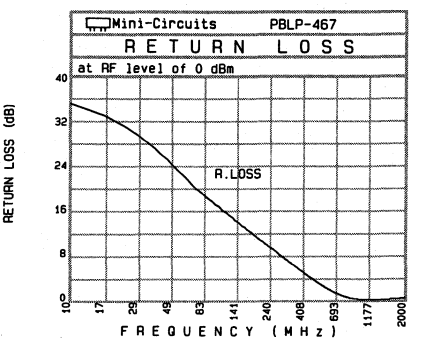


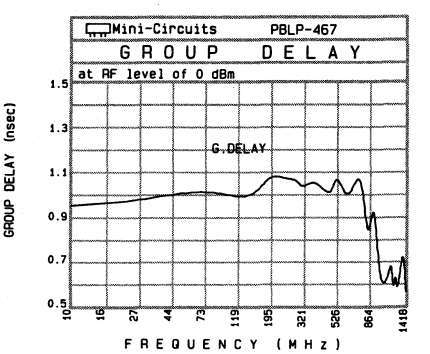


Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.16	0.2	30.7	10.0	1.563
67.0	0.27	0.2	16.4	39.0	1.282
95.0	0.37	0.1	13.4	67.0	1.509
124.0	0.53	0.1	11.1	95.0	1.368
152.0	0.73	0.1	9.4	124.0	1.468
180.0	0.99	0.1	7.9	152.0	1.487
200.0	1.24	0.1	7.1	180.0	1.297
267.0	2.35	0.2	4.9	200.0	1.351
300.0	3.06	0.2	4.1	234.0	1.343
400.0	5.85	0.2	2.5	267.0	1.534
458.0	7.82	0.2	1.8	300.0	1.427
515.0	9.91	0.3	1.3	400.0	1.383
543.0	11.02	0.4	1.1	429.0	1.448
572.0	12.18	0.4	0.9	458.0	0.984
600.0	13.35	0.5	0.8	486.0	1.599
700.0	17.70	0.5	0.5	515.0	1.173
729.0	18.96	0.6	0.5	543.0	1.140
758.0	20.25	0.6	0.5	572.0	1.134
773.0	20.92	0.6	0.5	600.0	0.869
787.0	21.51	0.6	0.5	700.0	0.878
801.0	22.10	0.6	0.5	715.0	0.983
900.0	26.28	0.7	0.6	729.0	0.767
950.0	28.25	0.7	0.7	744.0	1.244
1000.0	30.16	0.8	0.8	758.0	0.807
1050.0	32.02	0.9	0.8	773.0	1.089
1100.0	33.74	0.9	0.9	787.0	1.144
1125.0	34.62	1.1	0.9	801.0	0.587
1150.0	35.50	1.2	1.0	900.0	0.940
1175.0	36.29	1.2	1.0	925.0	0.980
1200.0	37.10	1.4	1.0	950.0	0.475

BLP-467 DC-280 MHz







Freq.	I.Loss x̄	I.Loss σ	R.L. x̄	Freq.	G.Delay x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.0	0.07	0.1	36.0	10.0	0.963
100.0	0.18	0.1	17.3	55.0	1.041
145.0	0.28	0.1	14.2	100.0	1.016
190.0	0.42	0.1	11.8	145.0	0.994
235.0	0.61	0.1	10.0	190.0	1.118
280.0	0.85	0.1	8.5	235.0	1.085
300.0	0.98	0.1	7.9	280.0	1.088
412.5	2.01	0.1	5.2	300.0	1.042
467.0	2.72	0.1	4.2	357.5	1.083
500.0	3.19	0.2	3.6	412.5	1.043
625.0	5.57	0.2	2.1	467.0	1.010
750.0	8.71	0.3	1.1	500.0	1.118
810.0	10.34	0.4	0.9	562.5	1.017
872.5	12.19	0.4	0.7	625.0	1.017
934.0	14.02	0.5	0.6	687.5	1.110
1000.0	15.94	0.5	0.5	750.0	1.055
1072.5	18.12	0.6	0.5	810.0	0.762
1142.5	20.11	0.7	0.5	872.5	1.030
1177.5	21.14	0.7	0.4	934.0	0.736
1212.5	22.15	0.7	0.4	1000.0	0.572
1246.0	23.12	0.8	0.4	1037.5	0.663
1300.0	24.56	0.8	0.5	1072.5	0.675
1417.5	27.75	0.9	0.5	1107.5	0.659
1535.0	30.82	1.0	0.5	1142.5	0.722
1650.0	33.70	1.1	0.6	1177.5	0.551
1767.5	36.46	1.2	0.7	1212.5	0.679
1825.0	37.83	1.5	0.7	1246.0	0.558
1885.0	39.23	1.6	0.7	1300.0	0.668
1942.5	40.45	1.6	0.7	1360.0	0.781
2000.0	41.59	1.8	0.8	1417.5	0.573

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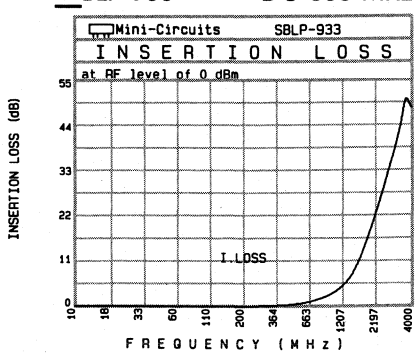
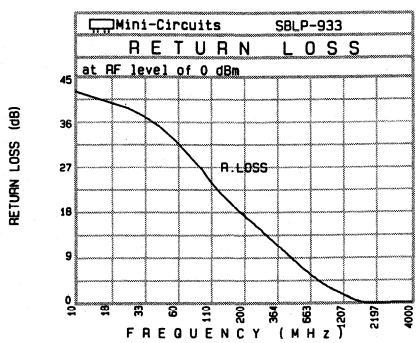
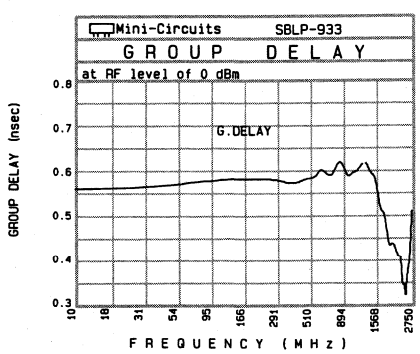
BLP-933 DC-560 MHz

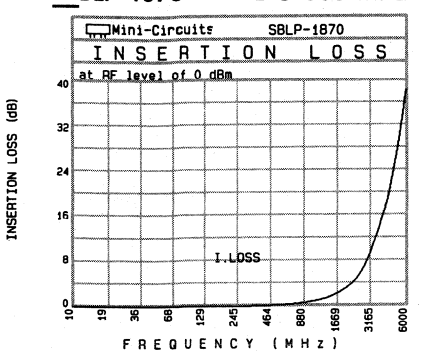


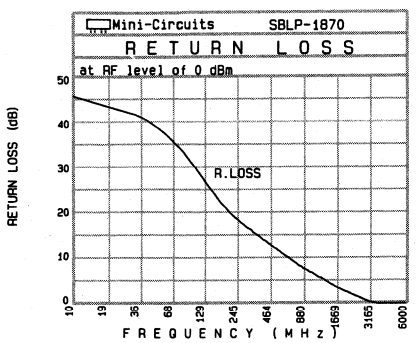


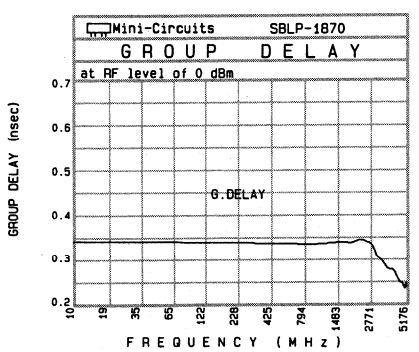


Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
10.0	0.01	0.1	43.3	10.0	0.568
195.0	0.11	0.1	18.1	105.0	0.594
285.0	0.21	0.1	14.5	195.0	0.591
380.0	0.38	0.1	11.6	285.0	0.593
470.0	0.59	0.1	9.4	380.0	0.577
560.0	0.88	0.1	7.6	470.0	0.596
600.0	1.05	0.1	7.0	560.0	0.594
825.0	2.24	0.1	4.2	600.0	0.626
933.0	3.00	0.1	3.3	715.0	0.584
1000.0	3.49	0.1	2.9	825.0	0.654
1250.0	5.97	0.1	1.7	933.0	0.591
1495.0	9.72	0.1	0.8	1000.0	0.609
1620.0	12.16	0.2	0.5	1125.0	0.610
1745.0	14.88	0.2	0.3	1250.0	0.645
1866.0	17.63	0.3	0.2	1375.0	0.601
2000.0	20.52	0.3	0.2	1495.0	0.606
2140.0	23.58	0.3	0.2	1620.0	0.510
2280.0	26.55	0.2	0.2	1745.0	0.528
2350.0	28.00	0.2	0.2	1866.0	0.423
2420.0	29.40	0.2	0.2	2000.0	0.462
2490.0	30.81	0.3	0.3	2070.0	0.422
2500.0	30.99	0.3	0.3	2140.0	0.338
2750.0	35.69	0.5	0.3	2210.0	0.404
3000.0	40.00	1.0	0.4	2280.0	0.430
3250.0	44.45	2.1	0.4	2350.0	0.336
3500.0	50.66	4.7	0.4	2420.0	0.364
3625.0	52.33	4.9	0.3	2490.0	0.310
3750.0	52.01	3.4	0.3	2500.0	0.366
3875.0	50.70	2.2	0.3	2625.0	0.392
4000.0	49.92	2.5	0.3	2750.0	0.519

BLP-1870 DC-850 MHz







Freq. (MHz)	I.Loss $\bar{x}$ (dB)	I.Loss σ (dB)	R.L. $\bar{x}$ (dB)	Freq. (MHz)	G.Delay $\bar{x}$ (nsec)
10.0	0.01	0.1	47.2	10.0	0.347
152.3	0.05	0.1	22.6	152.3	0.346
433.0	0.22	0.1	14.1	290.8	0.345
571.6	0.36	0.1	11.6	433.0	0.344
710.1	0.53	0.1	9.8	571.6	0.344
850.0	0.73	0.1	8.3	710.1	0.343
1002.1	0.96	0.1	7.2	850.0	0.342
1582.4	2.28	0.1	4.0	1002.1	0.343
1870.0	3.21	0.1	3.1	1290.4	0.346
2001.7	3.65	0.1	2.8	1582.4	0.348
2499.6	5.91	0.3	1.6	1870.0	0.345
2997.5	9.36	0.7	0.7	2001.7	0.350
3244.6	11.63	1.0	0.5	2248.8	0.355
3491.7	13.38	1.1	0.3	2499.6	0.347
3740.0	15.60	1.2	0.3	2746.7	0.345
4000.8	17.72	1.2	0.3	2997.5	0.309
4289.1	20.35	1.2	0.3	3244.6	0.308
4573.6	23.49	1.3	0.3	3491.7	0.291
4715.9	25.12	1.3	0.3	3740.0	0.282
4858.2	26.62	1.4	0.2	4000.8	0.287
5000.0	28.10	1.4	0.3	4143.1	0.295
5011.7	28.25	1.4	0.3	4289.1	0.281
5176.4	30.15	1.5	0.2	4431.4	0.262
5341.1	32.09	1.8	0.2	4573.6	0.254
5505.8	34.13	2.6	0.2	4715.9	0.254
5670.6	36.22	4.0	0.2	4858.2	0.249
5752.9	37.22	5.2	0.2	5000.0	0.238
5835.3	38.40	6.7	0.2	5011.7	0.245
5917.6	39.23	8.2	0.2	5094.0	0.258
6000.0	39.53	8.0	0.2	5176.4	0.243

rugged, high selectivity

Low Pass Filters

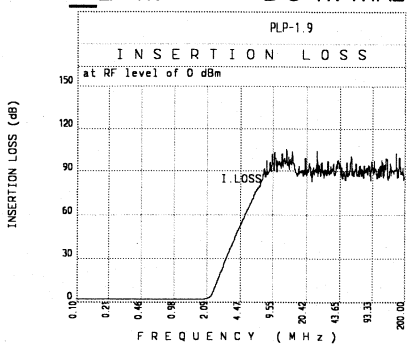
MODEL SELECTION

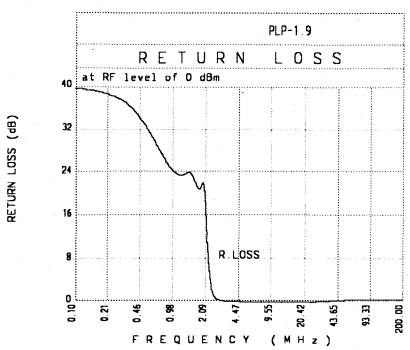
(choose prefix)

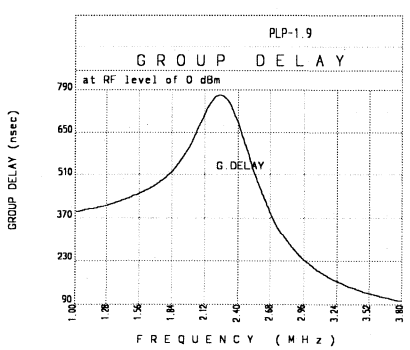
P = plug in N = type N

B = BNC S = SMA

LP-1.9 DC-1.9 MHz

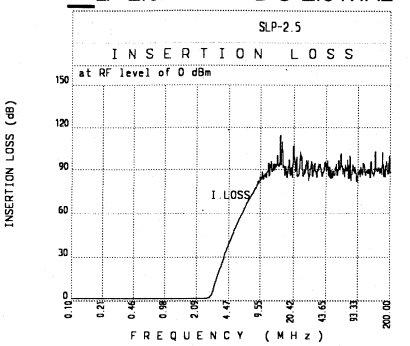


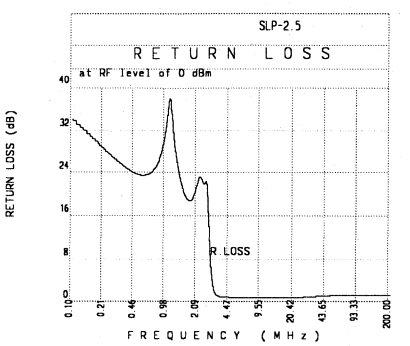


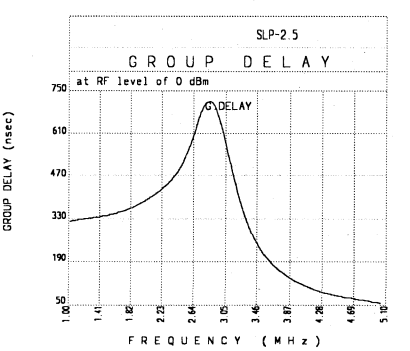


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
0.1	0.09	0.01	40.00	1.0	390.937
1.2	0.24	0.02	22.11	1.0	393.923
1.4	0.26	0.01	23.88	1.1	397.209
1.6	0.31	0.01	26.19	1.1	400.265
1.8	0.40	0.02	21.19	1.2	406.342
1.9	0.45	0.02	21.37	1.3	410.760
2.1	0.75	0.12	15.39	1.3	417.765
2.3	2.93	0.75	5.05	1.4	425.387
2.5	8.32	1.21	1.43	1.4	434.334
2.7	14.69	1.17	0.59	1.5	444.369
2.8	17.71	1.12	0.45	1.6	455.268
3.0	23.30	1.01	0.32	1.6	468.790
3.1	25.89	0.96	0.29	1.7	484.497
3.3	30.68	0.90	0.24	1.8	506.645
3.4	32.92	0.87	0.22	1.9	554.145
3.6	37.12	0.84	0.20	1.9	579.783
3.8	41.00	0.81	0.18	2.0	642.409
4.0	44.61	0.79	0.17	2.1	720.762
4.3	49.67	0.81	0.15	2.2	779.406
4.5	52.78	0.80	0.14	2.3	768.865
4.7	55.74	0.88	0.13	2.4	675.186
5.0	60.00	0.86	0.11	2.5	579.639
29.4	92.50	4.17	0.17	2.7	390.841
53.8	91.19	3.63	0.42	2.8	286.216
78.1	92.39	2.10	0.45	3.0	230.561
102.5	87.80	2.75	0.46	3.1	182.807
126.9	89.65	3.87	0.47	3.3	153.959
151.3	87.17	2.60	0.46	3.4	132.224
175.6	92.87	7.14	0.44	3.6	109.190
200.0	86.82	4.04	0.44	3.8	92.795

LP-2.5 DC-2.5 MHz

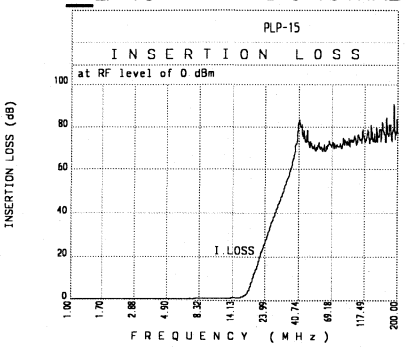


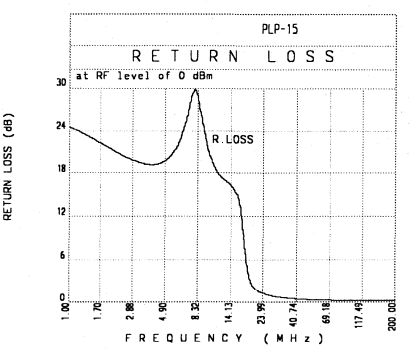


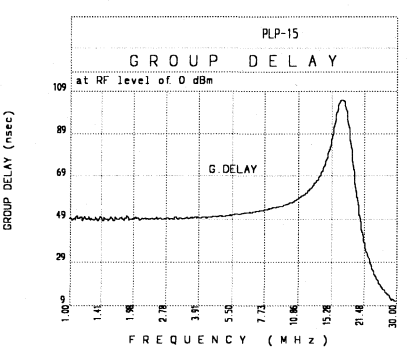


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
0.10	0.06	0.00	33.53	1.00	321.99
0.40	0.08	0.01	23.85	1.06	323.09
0.80	0.10	0.01	25.18	1.12	327.26
1.10	0.12	0.00	32.02	1.18	330.19
1.40	0.17	0.01	21.06	1.25	332.28
1.80	0.24	0.01	18.34	1.32	334.96
2.10	0.28	0.04	21.26	1.40	338.56
2.50	0.45	0.07	18.25	1.48	341.36
2.75	1.34	0.45	9.00	1.56	346.34
3.00	5.99	1.21	2.08	1.65	352.96
3.20	11.74	1.32	0.71	1.74	360.97
3.30	14.61	1.31	0.48	1.84	372.10
3.50	19.96	1.23	0.29	1.94	385.34
3.60	22.44	1.20	0.25	2.05	402.77
3.80	27.02	1.14	0.19	2.17	422.48
4.00	31.16	1.09	0.17	2.29	449.68
4.20	34.94	1.06	0.15	2.42	492.19
4.40	38.42	1.03	0.14	2.50	530.37
4.60	41.65	1.00	0.12	2.75	689.14
4.80	44.65	0.98	0.12	2.86	697.89
5.00	47.46	0.98	0.11	3.02	582.03
5.20	50.11	0.99	0.10	3.19	410.17
29.60	89.73	3.84	0.19	3.37	280.46
53.90	87.32	1.38	0.43	3.56	201.19
78.30	89.67	4.26	0.48	3.80	145.71
102.60	86.70	3.08	0.49	3.98	119.20
127.00	88.19	4.27	0.49	4.20	96.41
151.30	90.79	3.34	0.48	4.44	79.41
175.70	90.31	4.10	0.48	4.74	65.38
200.00	93.47	9.35	0.47	5.01	55.83

LP-15 DC-15 MHz



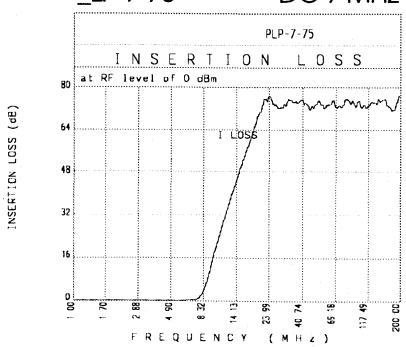


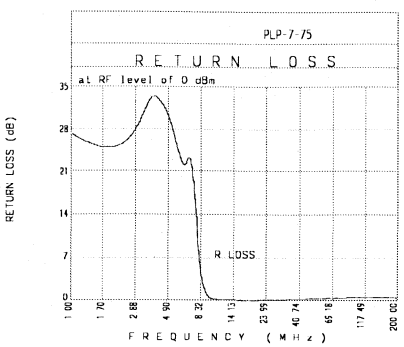


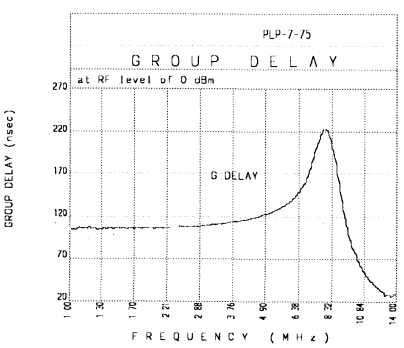
Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.0	0.21	0.04	24.91	1.0	48.066
3.0	0.26	0.04	20.32	1.1	47.912
5.0	0.30	0.04	20.46	1.3	48.205
7.0	0.33	0.05	25.27	1.4	47.673
9.0	0.38	0.05	24.09	1.6	48.070
11.0	0.47	0.07	20.01	1.8	47.675
13.0	0.58	0.07	19.00	2.0	48.304
15.0	0.81	0.06	16.36	2.3	48.444
17.0	2.32	0.37	7.61	2.5	48.367
19.0	8.82	0.63	2.63	2.9	48.628
19.8	12.25	0.57	2.04	3.2	48.625
20.6	15.66	0.53	1.72	3.6	48.802
21.4	18.93	0.50	1.51	4.0	48.884
22.2	22.02	0.48	1.36	4.6	49.475
23.0	24.94	0.48	1.25	5.1	49.491
23.8	27.72	0.47	1.15	5.8	50.430
25.4	32.87	0.50	0.99	6.5	50.770
27.1	37.90	0.60	0.86	7.3	51.865
28.7	42.24	0.70	0.76	8.2	53.054
30.4	46.55	0.86	0.67	9.3	54.468
32.0	50.45	1.02	0.60	10.4	56.611
33.6	54.18	1.48	0.55	11.7	60.328
54.4	77.82	6.04	0.22	13.1	66.075
75.2	77.17	4.69	0.12	15.0	80.268
96.0	81.80	4.39	0.09	17.0	100.527
116.8	80.95	4.80	0.08	18.8	81.421
137.6	80.75	3.87	0.07	21.1	43.840
158.4	83.26	4.95	0.07	23.0	28.306
179.2	79.58	3.64	0.06	26.6	15.724
200.0	80.96	5.21	0.06	30.0	10.368

75 ohm

_LP-7-75 DC-7 MHz

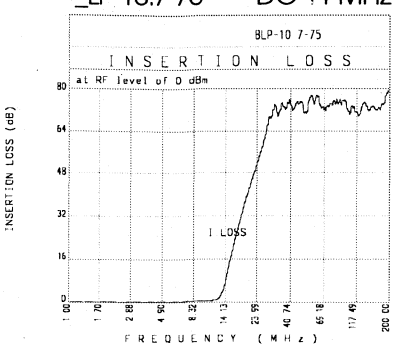


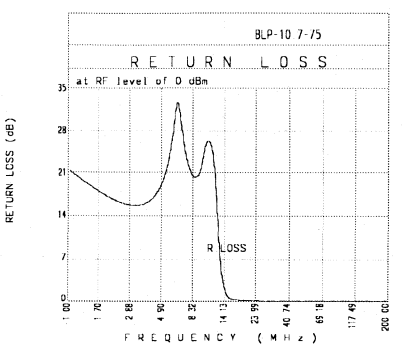


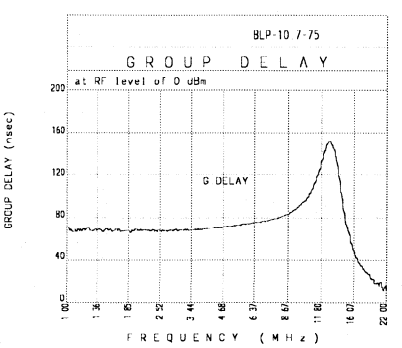


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.06	0.01	27.26	1.0	107.235
1.90	0.09	0.02	26.75	1.1	107.376
2.80	0.11	0.01	32.01	1.2	107.499
3.60	0.16	0.03	30.71	1.3	105.846
4.50	0.22	0.05	24.86	1.4	106.618
5.40	0.26	0.04	25.76	1.6	107.456
6.30	0.32	0.04	25.44	1.7	106.187
7.00	0.46	0.07	22.50	1.9	106.593
8.00	2.33	0.89	8.77	2.1	107.523
9.00	10.19	1.45	1.18	2.3	109.352
9.40	14.08	1.33	0.63	2.5	108.046
9.80	17.83	1.18	0.40	2.7	109.745
10.20	21.33	1.06	0.30	2.9	111.164
10.60	24.60	0.97	0.24	3.2	112.800
11.00	27.65	0.91	0.21	3.5	113.534
12.00	34.53	0.87	0.17	3.9	115.603
12.60	38.24	0.89	0.15	4.2	117.833
13.20	41.68	0.91	0.14	4.6	120.939
13.80	44.93	0.87	0.13	5.0	125.580
14.40	48.03	0.85	0.12	5.5	132.465
15.00	51.02	0.86	0.11	6.1	142.489
16.00	55.73	1.23	0.11	6.6	158.579
39.00	74.24	0.82	0.18	7.0	175.527
62.00	74.55	1.78	0.32	8.0	230.761
85.00	74.27	1.16	0.46	8.8	175.885
108.00	73.91	0.74	0.51	9.6	99.259
131.00	74.48	0.58	0.51	11.0	49.804
154.00	74.76	2.43	0.51	11.6	39.928
177.00	72.74	1.60	0.50	12.8	27.720
200.00	73.75	2.71	0.51	14.0	25.136

_LP-10.7-75 DC-11 MHz

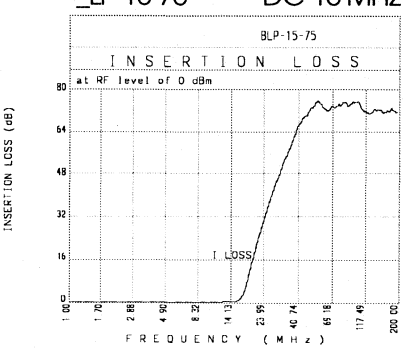


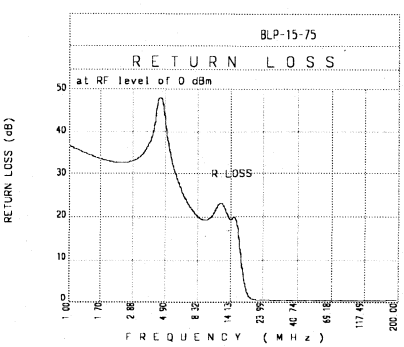


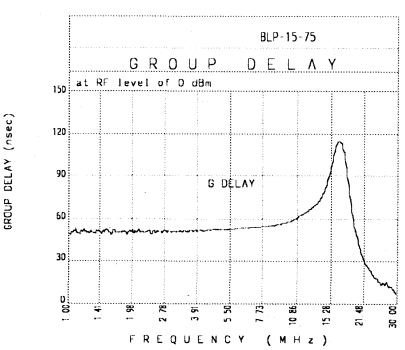


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.11	0.00	21.77	1.00	68.81
2.60	0.23	0.01	16.16	1.12	67.57
4.30	0.24	0.01	17.81	1.24	68.38
5.90	0.22	0.01	31.76	1.38	67.69
7.50	0.30	0.01	23.25	1.54	67.33
9.10	0.37	0.01	23.48	1.71	68.36
11.00	0.52	0.02	31.19	1.90	68.28
12.40	1.45	0.12	10.50	2.11	66.85
14.00	8.90	0.31	1.41	2.35	66.16
15.60	19.20	0.26	0.40	2.61	67.72
16.30	23.22	0.24	0.31	2.90	68.04
17.00	26.93	0.23	0.26	3.22	68.32
17.60	29.90	0.23	0.23	3.58	69.11
18.30	33.15	0.21	0.20	3.98	68.90
19.00	36.20	0.22	0.18	4.42	70.18
19.70	39.07	0.23	0.17	4.91	71.73
20.60	42.53	0.28	0.15	5.46	73.45
21.40	45.54	0.27	0.14	6.07	74.72
22.30	48.58	0.35	0.13	6.75	76.69
23.10	51.17	0.36	0.12	7.50	78.91
24.00	53.98	0.26	0.12	8.33	82.64
24.90	56.67	0.48	0.11	9.26	88.48
46.80	76.14	1.09	0.05	10.29	99.26
68.70	74.18	1.65	0.04	11.00	111.04
90.60	73.55	1.76	0.04	12.82	151.87
112.50	73.13	1.14	0.04	14.00	113.88
134.30	74.86	0.92	0.04	15.97	48.35
156.20	73.72	1.40	0.05	17.75	28.43
178.10	75.53	2.93	0.05	19.00	21.51
200.00	75.97	4.06	0.05	22.00	11.34

_LP-15-75 DC-15 MHz







Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.03	0.00	35.82	1.00	52.11
3.00	0.06	0.01	31.00	1.13	52.17
5.00	0.09	0.01	34.16	1.26	50.65
7.00	0.14	0.01	22.80	1.42	50.65
9.00	0.22	0.04	19.40	1.59	50.11
11.00	0.25	0.03	22.11	1.78	51.43
13.00	0.34	0.04	19.32	1.99	51.32
15.00	0.50	0.06	18.45	2.25	51.21
17.00	2.82	0.33	6.89	2.52	50.76
19.00	11.43	0.90	0.98	2.85	51.26
19.80	15.30	1.06	0.56	3.19	50.32
20.60	18.94	1.18	0.38	3.61	51.52
21.40	22.33	1.26	0.29	4.04	51.58
22.20	25.47	1.33	0.24	4.57	52.49
23.00	28.41	1.37	0.21	5.12	53.16
23.80	31.15	1.41	0.19	5.78	53.42
25.40	36.18	1.48	0.16	6.48	54.00
27.10	41.00	1.55	0.15	7.32	54.67
28.70	45.10	1.68	0.13	8.20	56.16
30.40	48.98	1.74	0.12	9.26	57.17
32.00	52.36	1.61	0.11	10.38	60.22
33.60	55.41	1.61	0.10	11.72	65.05
54.40	74.86	1.20	0.08	13.14	71.10
75.20	73.58	2.20	0.11	15.00	89.63
96.00	74.15	0.86	0.14	17.00	116.22
116.80	73.97	1.20	0.17	18.79	75.17
137.60	73.54	1.19	0.20	21.05	35.03
158.40	73.80	1.67	0.22	23.00	23.17
179.20	74.50	3.05	0.24	26.65	13.67
200.00	73.86	4.45	0.28	30.00	8.48

rugged, high selectivity

Low Pass Filters

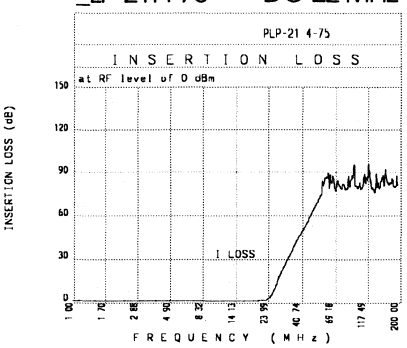
MODEL SELECTION

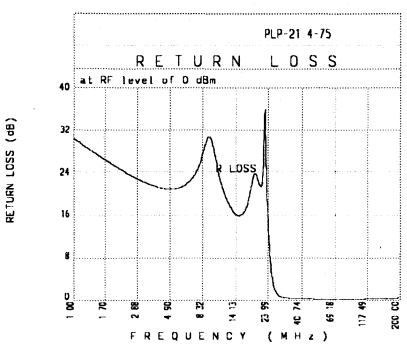
(choose prefix)

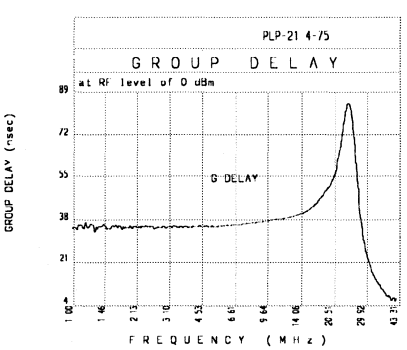
P = plug in

B = BNC

_LP-21.4-75 DC-22 MHz

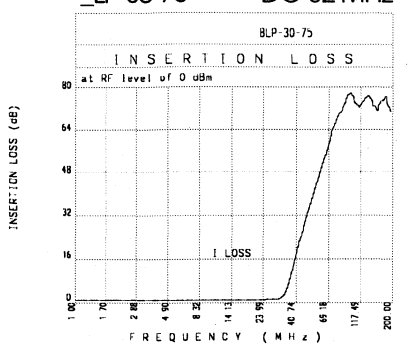


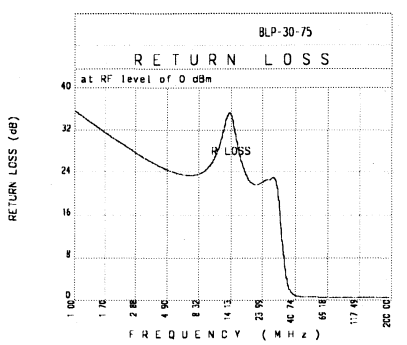


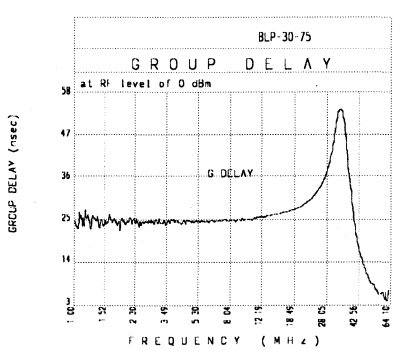


Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.00	0.03	0.02	31.92	1.00	34.25
3.90	0.08	0.02	22.80	1.15	35.37
6.90	0.10	0.02	24.45	1.31	34.65
9.80	0.12	0.02	34.47	1.49	34.57
12.80	0.21	0.03	20.46	1.70	34.69
15.70	0.28	0.04	19.77	1.94	34.46
18.60	0.33	0.03	30.82	2.22	34.18
22.00	0.57	0.05	22.89	2.53	35.06
24.50	1.68	0.34	9.60	2.89	35.37
26.50	6.69	0.88	2.21	3.30	35.39
27.60	10.63	0.91	1.11	3.76	35.25
28.70	14.56	0.86	0.68	4.29	35.22
29.80	18.27	0.80	0.48	4.90	35.14
30.90	21.71	0.76	0.38	5.59	35.69
32.00	24.92	0.72	0.33	6.38	35.99
33.10	27.92	0.68	0.29	7.28	36.15
34.70	31.99	0.65	0.26	8.31	36.84
36.30	35.75	0.64	0.23	9.48	37.34
37.80	39.04	0.63	0.21	10.82	38.10
39.40	42.36	0.66	0.20	12.22	38.68
41.00	45.59	0.70	0.19	13.94	40.03
42.60	48.48	0.68	0.18	15.74	42.23
62.30	86.22	7.37	0.15	17.96	46.34
82.00	84.27	2.85	0.16	20.27	52.21
101.60	80.44	2.15	0.17	22.00	60.69
121.30	85.58	2.35	0.19	24.50	82.98
141.00	83.93	5.17	0.20	29.79	30.12
160.70	87.05	7.84	0.23	32.00	19.61
180.30	84.80	4.04	0.26	41.00	6.24
200.00	86.54	5.90	0.32	43.00	5.59

_LP-30-75 DC-32 MHz

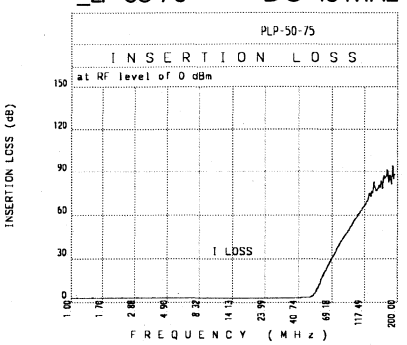


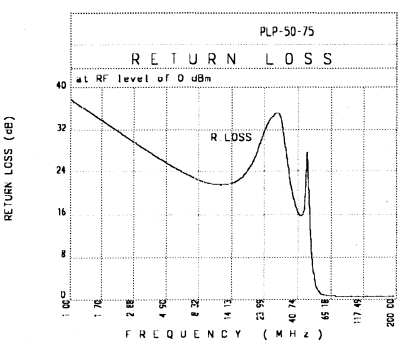


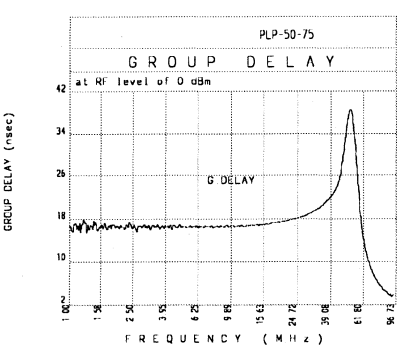


Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.00	0.03	0.00	36.48	1.00	26.18
5.30	0.07	0.01	24.91	1.17	27.11
9.50	0.11	0.00	25.56	1.35	25.77
13.80	0.12	0.00	39.12	1.56	23.82
18.00	0.17	0.01	24.63	1.81	25.02
22.30	0.23	0.01	22.84	2.09	25.16
26.50	0.29	0.02	27.40	2.42	25.16
32.00	0.71	0.12	16.94	2.80	23.94
35.00	2.88	0.37	5.94	3.25	23.99
38.00	8.19	0.35	1.63	3.73	25.10
39.80	12.12	0.33	0.82	4.31	24.36
41.60	16.01	0.34	0.49	4.95	24.94
43.40	19.70	0.36	0.35	5.73	24.71
45.20	23.14	0.38	0.28	6.58	24.62
47.00	26.35	0.40	0.24	7.62	24.85
48.80	29.36	0.40	0.22	8.75	24.95
51.20	33.07	0.40	0.19	10.13	25.02
53.70	36.65	0.39	0.17	11.63	25.78
56.10	39.87	0.40	0.16	13.46	26.08
58.60	42.97	0.44	0.15	15.46	26.70
61.00	45.75	0.46	0.14	17.89	27.46
63.40	48.44	0.46	0.13	20.54	28.63
80.50	64.44	1.22	0.09	23.78	30.81
97.60	73.89	2.14	0.08	27.30	34.75
114.60	74.29	0.87	0.08	32.00	47.08
131.70	75.22	2.28	0.09	35.00	52.78
148.80	74.58	0.98	0.08	42.00	22.47
165.90	73.73	0.66	0.08	47.00	12.73
182.90	75.31	1.49	0.07	61.00	4.77
200.00	74.39	2.85	0.07	64.10	4.98

_LP-50-75 DC-48 MHz



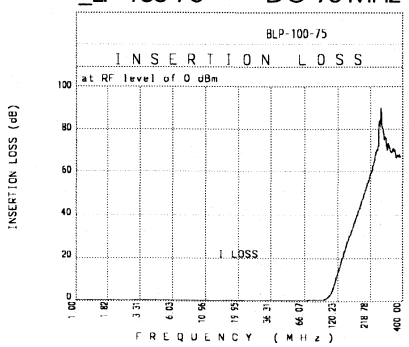


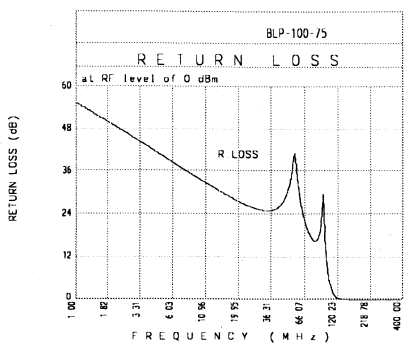


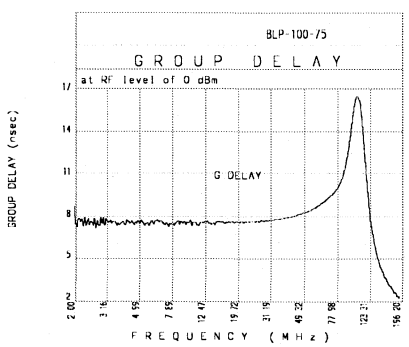
Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.00	0.01	0.00	38.19	1.00	16.76
7.80	0.08	0.00	23.31	1.17	17.94
14.50	0.12	0.01	22.43	1.37	16.55
21.30	0.14	0.01	28.49	1.59	16.64
28.00	0.19	0.01	39.87	1.86	16.96
34.80	0.27	0.02	25.97	2.17	16.16
41.50	0.48	0.03	16.38	2.53	16.75
48.00	0.63	0.04	20.68	2.95	16.20
55.00	3.81	0.50	4.27	3.45	16.18
62.00	14.53	0.69	0.76	4.02	16.52
63.60	16.91	0.68	0.62	4.69	16.48
65.20	19.16	0.69	0.53	5.47	16.26
66.80	21.32	0.68	0.47	6.38	16.76
68.40	23.37	0.68	0.43	7.53	16.62
70.00	25.32	0.68	0.40	8.78	16.58
71.60	27.20	0.68	0.38	10.36	16.64
75.30	31.26	0.69	0.33	12.08	16.61
79.00	35.00	0.70	0.31	14.25	16.83
82.60	38.35	0.70	0.28	16.63	17.06
86.30	41.53	0.76	0.27	19.61	17.35
90.00	44.62	0.79	0.25	22.88	17.79
93.70	47.42	0.86	0.24	26.98	18.37
107.00	56.64	1.34	0.21	31.48	19.30
120.30	64.18	2.20	0.20	37.13	20.94
133.60	72.29	3.53	0.19	43.31	23.52
146.90	77.99	7.23	0.19	48.00	29.12
160.10	81.98	4.24	0.19	55.00	36.74
173.40	84.80	2.33	0.18	70.00	8.86
186.70	84.07	3.68	0.16	90.00	3.63
200.00	83.20	6.05	0.15	96.73	3.25

75 ohm

_LP-100-75 DC-98 MHz

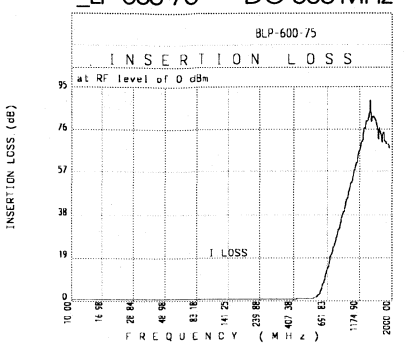


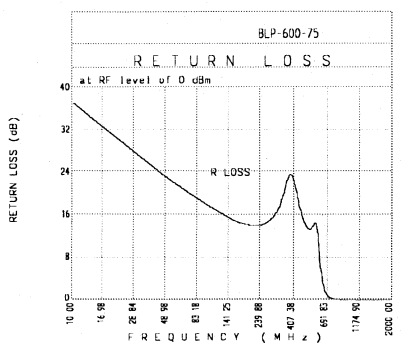


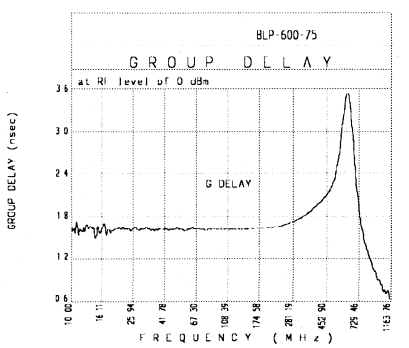


Freq.	I. Loss		R.L.	Freq.	G. Delay
	x̄	σ	x̄		x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.00	0.01	0.00	55.39	2.00	8.34
14.40	0.09	0.00	31.44	2.34	7.84
27.80	0.14	0.00	26.34	2.73	7.56
41.10	0.18	0.01	25.69	3.19	7.79
54.50	0.22	0.01	30.30	3.72	7.62
67.90	0.29	0.01	22.73	4.34	7.59
81.30	0.45	0.04	16.35	5.07	7.61
98.00	0.62	0.07	19.63	5.91	7.74
108.00	2.25	0.40	6.07	6.90	7.59
118.00	7.71	0.73	1.47	8.05	7.58
123.60	11.47	0.75	0.78	9.39	7.69
129.20	15.15	0.72	0.50	10.96	7.75
134.80	18.64	0.71	0.37	12.94	7.74
140.40	21.90	0.69	0.30	15.10	7.71
146.00	24.97	0.68	0.26	17.83	7.72
151.60	27.86	0.69	0.23	20.81	7.74
159.10	31.52	0.70	0.21	24.57	7.77
166.60	34.94	0.73	0.19	28.67	7.76
174.00	38.15	0.75	0.18	33.85	7.90
181.50	41.21	0.85	0.18	39.50	8.02
189.00	44.21	0.98	0.17	46.64	8.21
196.50	47.04	1.03	0.17	54.43	8.54
221.90	56.41	1.79	0.16	64.27	9.03
247.40	67.24	4.43	0.14	75.00	9.68
272.80	77.49	6.61	0.11	88.56	11.21
298.30	75.88	6.64	0.10	98.00	14.05
323.70	73.99	6.37	0.08	108.00	16.77
349.10	71.06	5.19	0.08	146.00	4.66
374.60	69.94	3.57	0.08	189.00	2.25
400.00	68.59	2.49	0.08	196.20	2.29

_LP-600-75 DC-580 MHz

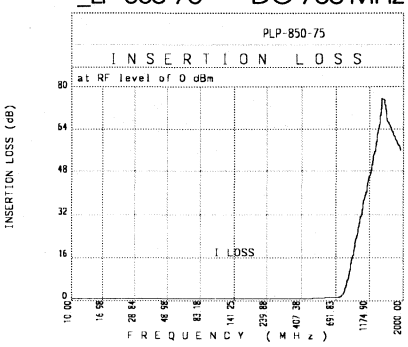


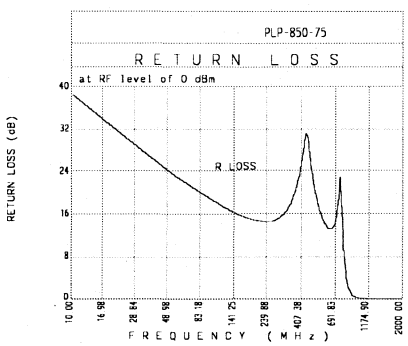


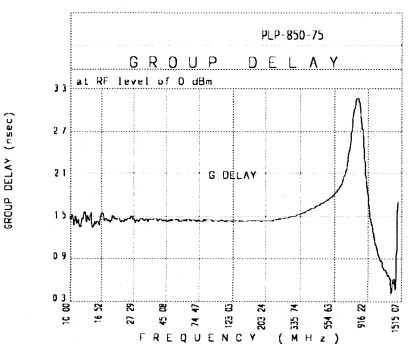


Freq.	I. Loss		R.L.	Freq.	G. Delay
	x̄	σ	x̄		x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	0.03	0.01	39.03	10.00	1.68
88.80	0.06	0.02	20.33	11.91	1.58
167.50	0.17	0.03	15.95	14.07	1.73
246.30	0.23	0.02	14.87	16.62	1.77
325.00	0.24	0.02	17.52	19.64	1.66
403.80	0.23	0.04	24.71	23.20	1.61
482.50	0.45	0.10	16.54	27.40	1.68
580.00	0.67	0.11	18.62	32.37	1.65
640.00	3.15	1.32	5.36	38.24	1.65
700.00	11.10	2.40	1.10	45.17	1.65
728.00	15.12	2.59	0.69	53.36	1.65
756.00	19.01	2.76	0.52	63.04	1.66
784.00	22.88	2.93	0.40	74.46	1.66
812.00	26.53	3.06	0.34	87.96	1.65
840.00	29.84	3.26	0.32	103.91	1.65
868.00	33.13	3.50	0.28	122.75	1.65
918.40	39.24	4.03	0.25	145.00	1.66
968.80	44.53	4.60	0.23	171.29	1.67
1019.20	50.42	5.97	0.22	202.35	1.68
1069.60	56.66	9.07	0.22	235.74	1.71
1120.00	61.58	9.70	0.22	278.48	1.77
1170.00	64.81	7.30	0.22	324.43	1.84
1273.80	71.86	7.17	0.21	383.24	1.98
1377.50	74.32	4.38	0.21	446.48	2.14
1481.30	77.46	5.00	0.21	527.43	2.48
1585.00	78.86	4.18	0.21	580.00	3.15
1688.80	76.30	5.08	0.21	640.00	3.69
1792.50	75.09	5.40	0.20	840.00	1.27
1896.30	71.89	4.47	0.20	1120.00	1.50
2000.00	71.83	6.46	0.19	1163.76	1.13

_LP-850-75 DC-750 MHz





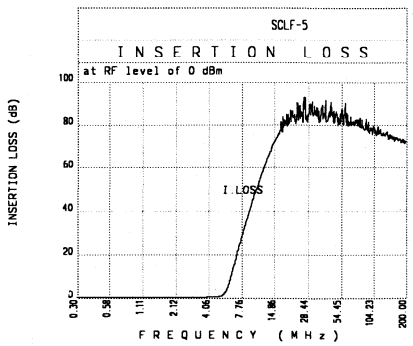


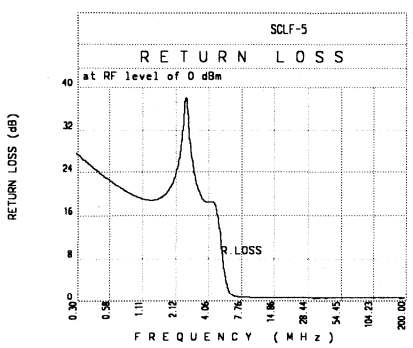
Freq.	I. Loss		R.L.	Freq.	G. Delay
	x̄	σ	x̄		x̄
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	0.03	0.01	39.00	10.00	1.54
115.00	0.11	0.00	17.92	11.91	1.41
220.00	0.25	0.01	14.64	14.07	1.60
325.00	0.26	0.03	16.02	16.62	1.61
430.00	0.21	0.03	25.19	19.64	1.51
535.00	0.32	0.03	21.89	23.52	1.51
640.00	0.53	0.06	15.89	27.79	1.44
750.00	0.71	0.06	23.37	33.28	1.49
850.00	5.06	1.38	3.44	39.32	1.45
950.00	16.83	2.42	0.70	47.09	1.49
990.00	21.45	2.68	0.50	55.63	1.48
1030.00	26.20	2.84	0.42	66.64	1.49
1070.00	30.43	2.97	0.35	78.72	1.47
1110.00	34.44	3.19	0.31	94.29	1.48
1150.00	38.50	3.39	0.28	111.38	1.46
1190.00	42.33	3.61	0.27	133.41	1.47
1250.00	47.58	4.02	0.25	157.60	1.47
1310.00	53.01	4.55	0.26	188.78	1.47
1370.00	58.31	5.90	0.22	223.00	1.47
1430.00	65.46	9.61	0.23	267.11	1.50
1490.00	70.21	7.22	0.21	315.54	1.53
1550.00	72.57	2.22	0.20	377.96	1.60
1606.30	75.16	7.29	0.21	446.48	1.68
1662.50	69.79	3.15	0.19	534.80	1.78
1718.80	66.56	1.75	0.21	631.76	1.97
1775.00	64.92	2.48	0.20	750.00	2.68
1831.30	62.90	1.72	0.20	850.00	3.04
1887.50	61.09	1.20	0.20	1150.00	0.90
1943.80	59.41	1.25	0.21	1490.00	0.62
2000.00	58.48	1.28	0.24	1515.07	1.15

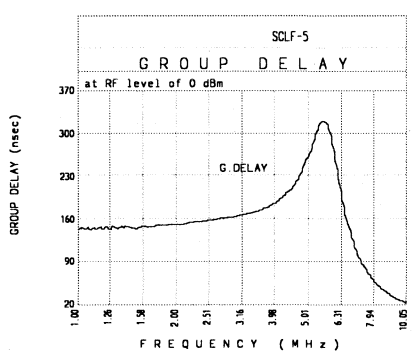
rugged, high selectivity

Low Pass Filters

SCLF-5 DC-5 MHz

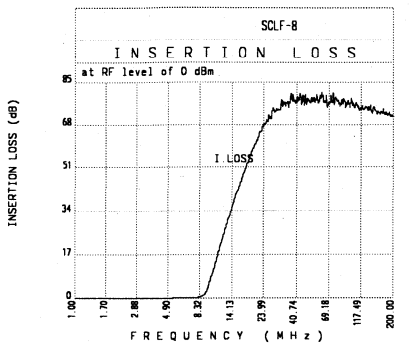


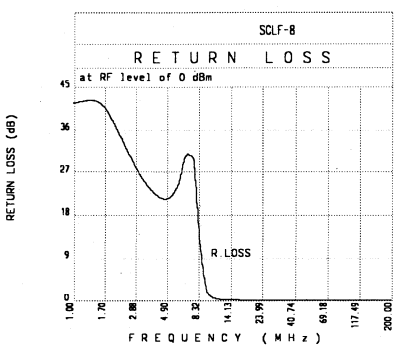


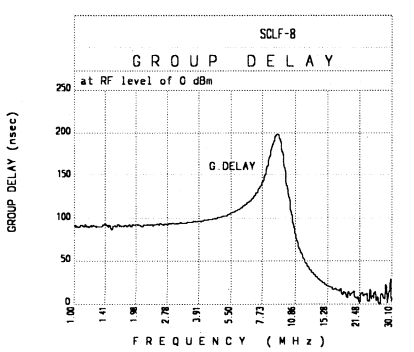


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
0.30	0.05	0.00	27.93	1.00	150.94
1.00	0.11	0.01	19.79	1.09	149.44
1.70	0.13	0.01	20.83	1.18	149.56
2.40	0.15	0.00	35.97	1.29	151.58
3.10	0.24	0.02	20.96	1.39	153.73
3.70	0.34	0.04	17.62	1.51	153.16
4.40	0.44	0.02	18.29	1.64	154.81
5.00	0.71	0.05	14.82	1.78	157.02
5.80	4.39	0.64	3.50	1.93	157.96
6.50	13.41	0.69	0.92	2.09	159.54
6.80	17.44	0.61	0.69	2.27	161.84
7.10	21.22	0.55	0.59	2.46	163.94
7.40	24.76	0.52	0.53	2.67	166.34
7.70	28.06	0.49	0.49	2.90	169.53
8.00	31.17	0.48	0.46	3.14	172.46
8.30	34.08	0.47	0.44	3.41	177.65
8.60	36.83	0.46	0.42	3.70	184.69
9.00	40.28	0.44	0.40	3.98	193.77
9.30	42.71	0.42	0.39	4.31	209.32
9.70	45.76	0.39	0.38	4.64	230.37
10.00	47.94	0.39	0.38	5.00	267.85
10.30	50.00	0.45	0.37	5.42	321.82
34.00	82.82	4.44	0.27	5.80	316.39
57.70	81.71	2.14	0.28	6.32	210.99
81.40	79.29	0.47	0.28	6.86	128.64
105.20	78.72	1.24	0.28	7.38	87.23
128.90	76.10	1.22	0.28	8.00	60.47
152.60	74.23	1.04	0.27	8.61	45.55
176.30	73.30	0.56	0.27	9.34	33.91
200.00	72.10	0.48	0.27	10.05	26.94

SCLF-8 DC-8 MHz

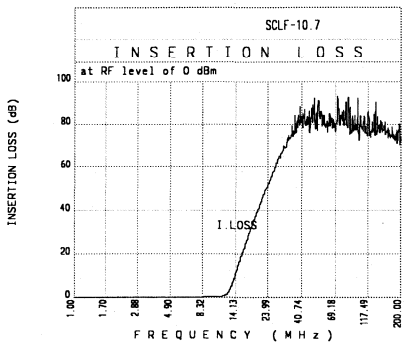


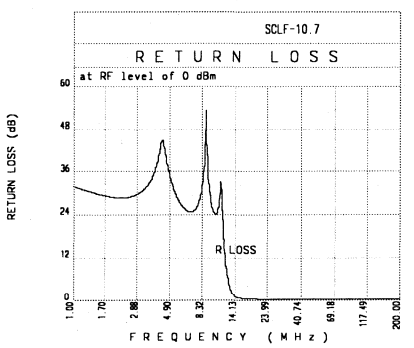


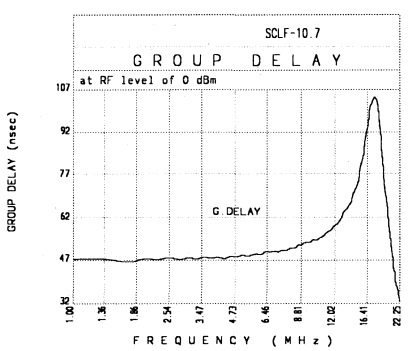


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.10	0.00	40.06	1.00	91.52
2.00	0.12	0.00	33.40	1.11	91.74
3.10	0.18	0.00	25.86	1.22	93.54
4.10	0.24	0.00	22.93	1.35	93.59
5.10	0.28	0.01	24.30	1.49	90.73
6.10	0.33	0.01	30.96	1.64	94.47
7.20	0.44	0.03	26.45	1.81	92.85
8.00	0.61	0.05	22.38	1.99	92.60
9.20	3.61	0.72	4.02	2.20	94.01
10.40	12.71	1.14	0.72	2.42	93.63
10.80	15.86	1.13	0.51	2.67	93.50
11.20	18.87	1.11	0.40	2.94	94.57
11.70	22.37	1.09	0.32	3.25	96.13
12.10	25.02	1.06	0.29	3.58	96.71
12.50	27.54	1.04	0.26	3.95	97.50
12.90	29.93	1.03	0.24	4.35	99.92
13.60	33.85	1.00	0.21	4.80	103.15
14.30	37.48	0.98	0.19	5.24	105.85
15.10	41.35	0.95	0.18	5.78	110.64
15.80	44.50	0.95	0.17	6.32	116.81
16.50	47.49	0.95	0.15	6.97	126.26
17.20	50.24	0.90	0.14	8.00	160.20
40.10	84.12	6.09	0.05	8.40	182.19
62.90	82.28	2.97	0.05	9.20	193.07
85.80	81.77	3.85	0.04	10.13	124.09
108.60	79.35	2.00	0.05	11.08	74.77
131.50	76.99	1.88	0.05	12.50	43.78
154.30	75.85	2.02	0.05	13.35	34.62
177.20	74.76	1.46	0.05	14.72	25.34
200.00	72.72	1.09	0.06	16.10	20.37

SCLF-10.7 DC-11 MHz







Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.08	0.00	31.64	1.00	48.11
2.60	0.13	0.00	28.56	1.75	47.67
4.30	0.18	0.00	41.09	2.50	48.58
5.90	0.24	0.01	26.82	3.25	48.31
7.50	0.31	0.01	26.80	4.00	49.23
9.10	0.40	0.01	30.03	4.75	49.68
11.00	0.64	0.02	29.83	5.50	50.01
12.40	2.53	0.24	6.13	6.25	50.99
14.00	11.64	0.45	0.93	7.00	50.93
14.50	14.82	0.45	0.65	7.75	51.92
15.40	20.14	0.43	0.43	8.50	53.33
16.30	24.95	0.40	0.33	9.25	54.81
17.20	29.31	0.39	0.28	10.00	55.15
18.10	33.33	0.38	0.25	11.00	57.71
19.00	37.05	0.37	0.22	11.50	59.16
19.50	38.99	0.38	0.22	12.25	61.62
20.40	42.29	0.36	0.20	13.00	64.98
21.30	45.46	0.36	0.19	14.00	69.83
22.20	48.48	0.40	0.17	14.50	73.95
23.10	51.09	0.34	0.16	15.25	81.85
24.00	53.92	0.49	0.15	16.00	91.73
25.00	56.48	0.64	0.14	16.75	102.32
46.90	81.67	4.73	0.09	17.50	104.54
68.80	83.17	5.36	0.08	18.25	94.87
90.60	79.31	1.74	0.07	19.00	77.77
112.50	78.10	2.32	0.06	19.75	62.47
134.40	96.52	45.46	0.07	20.25	53.47
156.30	77.69	2.10	0.07	21.00	43.41
178.10	76.01	0.73	0.06	21.50	38.19
200.00	74.48	2.60	0.06	22.25	31.78

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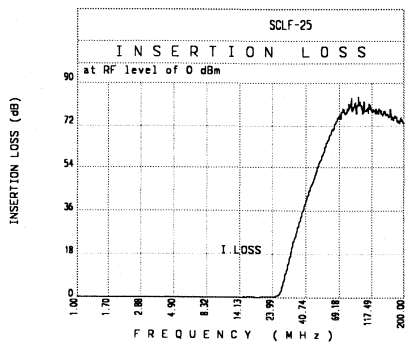
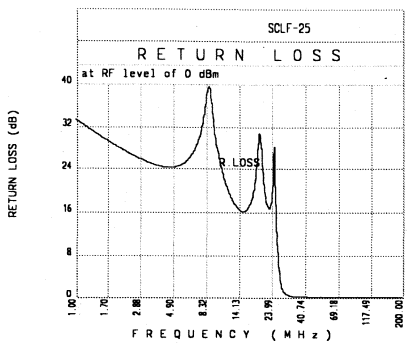
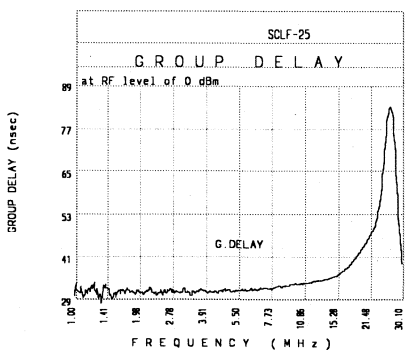
SCLF-25 DC-25 MHz

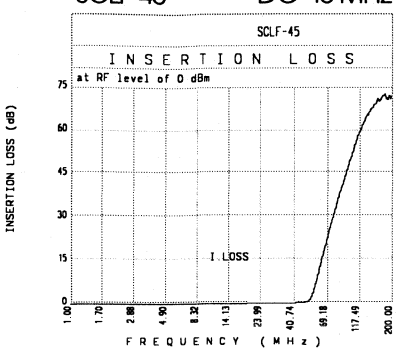


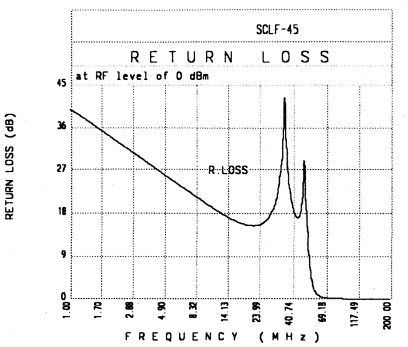


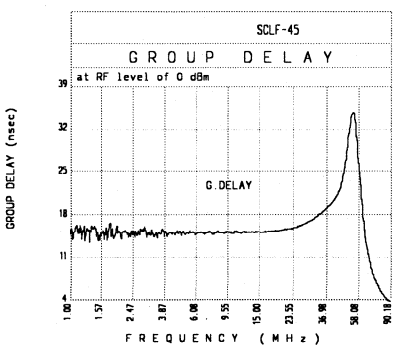


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.05	0.00	32.56	1.01	32.01
4.40	0.09	0.01	23.49	1.16	32.94
7.80	0.11	0.01	30.39	1.33	32.05
11.10	0.18	0.01	22.27	1.52	31.10
14.50	0.33	0.05	15.52	1.75	33.16
17.90	0.37	0.09	17.90	2.01	32.62
21.30	0.43	0.04	22.06	2.29	32.76
25.00	0.69	0.07	24.64	2.63	32.84
28.00	5.05	0.48	2.98	2.99	32.44
31.00	15.41	0.95	0.58	3.44	32.56
32.00	18.60	0.99	0.43	3.91	32.97
33.00	21.59	1.01	0.35	4.49	33.08
34.00	24.38	1.00	0.29	5.12	33.22
35.00	26.99	1.00	0.26	5.88	33.61
36.00	29.47	0.99	0.23	6.69	33.61
37.00	31.81	0.99	0.21	7.68	34.04
39.00	36.17	0.96	0.18	8.75	34.47
41.00	40.15	0.94	0.16	10.05	35.05
43.00	43.83	0.89	0.15	11.44	35.52
45.00	47.19	0.89	0.14	13.14	36.30
47.00	50.37	0.83	0.13	14.96	37.14
49.00	53.45	0.85	0.12	17.18	39.70
67.90	73.04	1.07	0.09	19.57	44.14
86.80	78.20	2.52	0.08	22.46	50.79
105.60	78.85	2.36	0.08	25.00	68.11
124.50	77.86	2.40	0.07	28.00	74.56
143.40	75.82	0.86	0.07	33.45	20.04
162.30	75.31	1.03	0.07	36.00	13.80
181.10	73.92	0.62	0.07	47.00	5.30
200.00	72.80	0.65	0.08	50.23	5.23

SCLF-45 DC-45 MHz

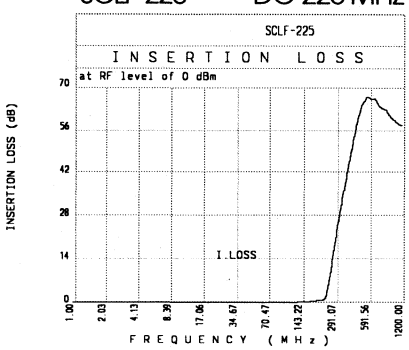


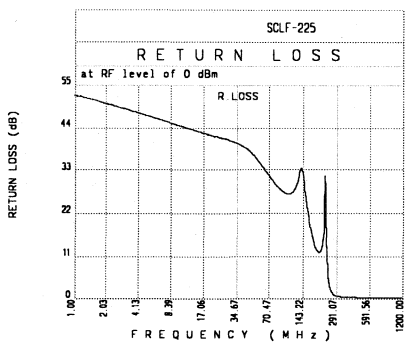


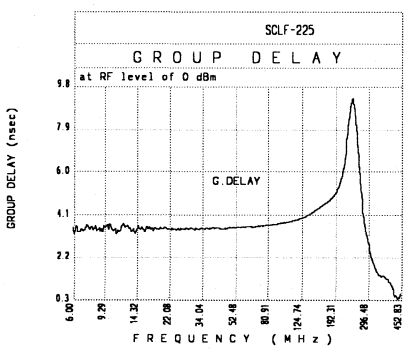


Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.04	0.04	35.97	1.00	15.21
7.80	0.10	0.04	22.49	1.18	15.25
14.50	0.18	0.04	19.49	1.37	15.07
21.30	0.27	0.06	18.51	1.60	15.90
28.00	0.32	0.05	18.03	1.87	15.24
34.80	0.35	0.06	26.84	2.18	15.44
45.00	0.65	0.06	17.05	2.54	15.74
48.30	0.79	0.08	18.18	2.97	14.92
55.00	2.88	0.96	6.54	3.46	14.99
61.70	11.74	1.43	1.13	4.04	15.29
63.40	14.23	1.41	0.87	4.72	15.46
65.00	16.49	1.39	0.71	5.51	15.41
66.70	18.81	1.36	0.61	6.43	15.41
68.30	20.89	1.36	0.54	7.50	15.32
70.00	23.00	1.38	0.49	8.75	15.35
72.00	25.38	1.38	0.45	10.21	15.49
75.60	29.37	1.42	0.39	11.92	15.56
79.20	33.07	1.45	0.37	13.91	15.44
82.80	36.52	1.52	0.34	16.23	15.65
86.40	39.74	1.56	0.33	18.94	15.92
90.00	42.78	1.62	0.31	22.10	16.23
93.60	45.68	1.69	0.30	25.79	16.72
106.90	55.20	1.97	0.27	30.10	17.46
120.20	63.17	2.42	0.25	35.13	18.87
133.50	69.38	3.19	0.24	40.99	20.85
146.80	73.85	3.73	0.22	45.00	22.89
160.10	75.71	2.99	0.21	55.00	35.48
173.40	77.03	2.89	0.20	70.00	9.52
186.70	77.41	4.70	0.20	77.27	6.34
200.00	76.93	2.74	0.20	90.18	3.92

SCLF-225 DC-225 MHz





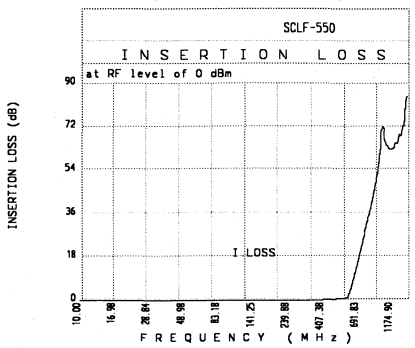


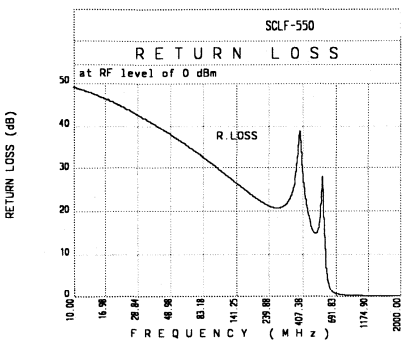
Freq. (MHz)	I. Loss x̄ (dB)	I. Loss σ (dB)	R.L. x̄ (dB)	Freq. (MHz)	G. Delay x̄ (nsec)
1.00	0.02	0.00	51.46	6.00	3.63
32.10	0.09	0.00	39.91	6.94	3.72
63.30	0.13	0.00	35.05	8.02	3.69
94.40	0.18	0.01	28.86	9.28	3.69
125.50	0.24	0.01	30.90	10.73	3.34
156.60	0.34	0.01	22.98	12.40	3.54
187.80	0.63	0.03	13.73	14.34	3.66
225.00	0.85	0.05	19.61	16.58	3.59
250.00	4.47	0.90	4.58	19.17	3.67
275.00	13.44	1.06	0.95	22.40	3.56
288.00	18.01	1.02	0.63	25.90	3.60
301.00	22.28	0.98	0.49	30.25	3.58
314.00	26.30	0.97	0.42	34.98	3.60
327.00	30.03	0.97	0.37	40.86	3.66
340.00	33.46	0.98	0.34	47.25	3.65
353.00	36.62	1.01	0.31	55.20	3.66
370.40	40.58	1.05	0.27	63.82	3.70
387.80	44.45	1.13	0.24	74.56	3.73
405.20	48.13	1.21	0.22	86.20	3.80
422.60	51.39	1.27	0.21	100.71	3.89
440.00	54.18	1.31	0.19	116.44	4.00
457.00	56.71	1.41	0.17	136.03	4.22
549.90	64.60	1.52	0.12	157.28	4.54
642.80	65.07	1.93	0.08	183.74	4.95
735.60	62.97	1.53	0.05	225.00	7.52
828.50	61.45	1.33	0.03	250.00	8.59
921.40	59.95	1.27	0.03	286.96	3.56
1014.30	58.65	1.10	0.04	340.00	1.54
1107.10	57.59	1.12	0.04	440.00	0.58
1200.00	56.79	1.07	0.05	452.83	0.74

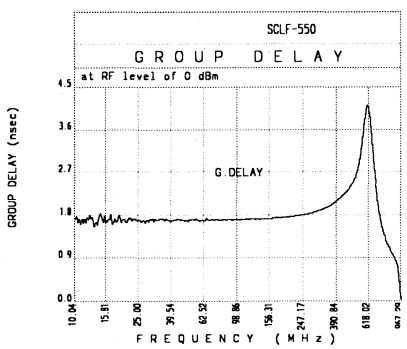
rugged, high selectivity

Low Pass Filters

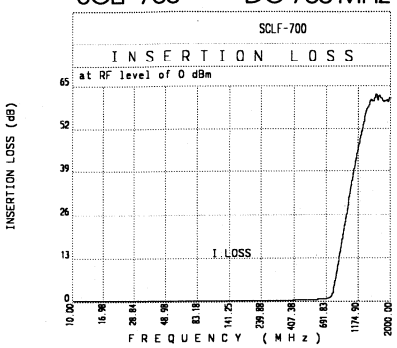
SCLF-550 DC-550 MHz

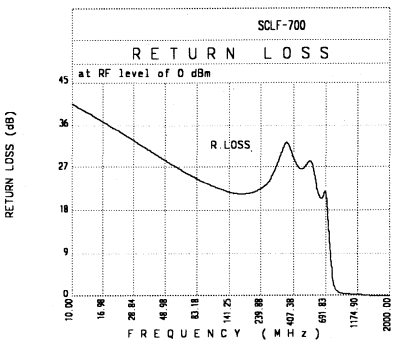


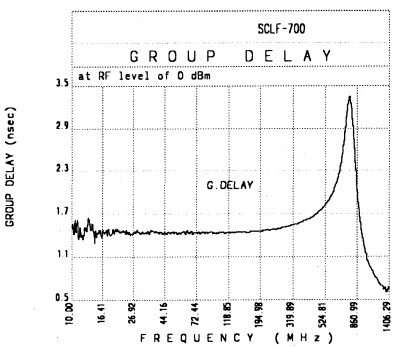




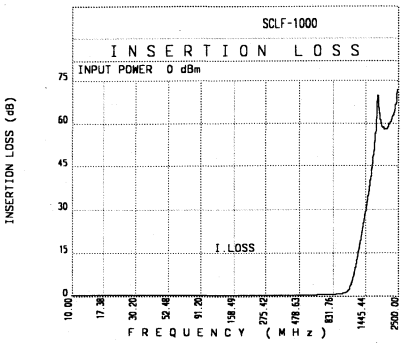
SCLF-700 DC-700 MHz

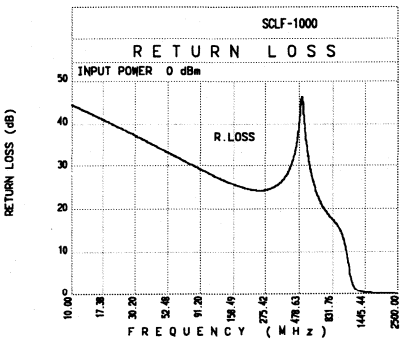


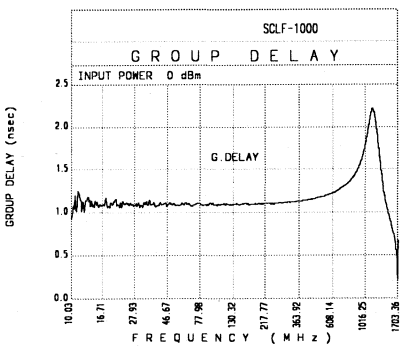




SCLF-1000 DC-1000 MHz







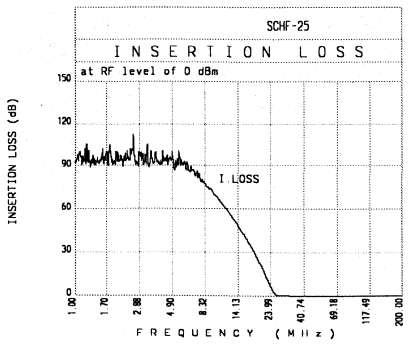
Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	0.03	0.00	48.70	10.00	1.66
84.40	0.08	0.00	32.94	11.85	1.74
158.80	0.13	0.00	25.63	13.97	1.78
233.10	0.20	0.01	21.50	16.48	1.84
307.50	0.25	0.01	21.08	19.44	1.70
381.90	0.29	0.01	30.87	22.93	1.69
456.30	0.44	0.02	19.57	27.05	1.67
550.00	0.70	0.02	20.04	31.90	1.67
605.00	2.21	0.29	7.56	37.63	1.68
660.00	9.74	0.62	1.40	44.38	1.70
688.00	14.38	0.63	0.82	52.35	1.70
716.00	18.81	0.64	0.59	61.74	1.70
744.00	23.02	0.63	0.48	72.83	1.69
772.00	27.05	0.64	0.41	85.90	1.70
800.00	30.94	0.66	0.37	100.21	1.70
828.00	34.76	0.71	0.33	118.20	1.71
872.40	40.79	0.84	0.28	137.89	1.72
916.80	47.07	1.09	0.24	162.64	1.74
961.20	54.10	1.62	0.23	189.73	1.75
1005.60	63.67	3.21	0.20	223.79	1.79
1050.00	72.37	1.21	0.18	261.07	1.82
1100.00	68.33	2.87	0.18	307.93	1.89
1212.50	66.09	1.64	0.16	359.23	2.00
1325.00	71.09	2.35	0.14	423.71	2.19
1437.50	80.39	4.11	0.13	494.29	2.48
1550.00	73.52	3.11	0.13	550.00	3.12
1662.50	66.16	1.26	0.15	605.00	4.08
1775.00	63.13	0.38	0.15	800.00	1.20
1887.50	60.27	0.84	0.16	1050.00	3.00
2000.00	58.50	0.60	0.17	1103.87	1.37

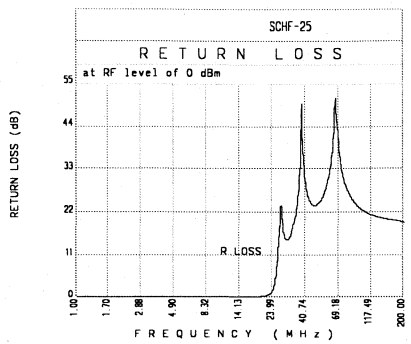
Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	0.03	0.00	40.31	10.00	1.49
105.00	0.10	0.01	23.01	11.85	1.48
200.00	0.15	0.01	21.02	14.13	1.32
295.00	0.18	0.02	24.09	16.66	1.50
390.00	0.21	0.01	32.41	19.87	1.48
485.00	0.28	0.01	36.21	23.44	1.48
580.00	0.41	0.02	24.66	27.95	1.48
700.00	0.71	0.08	24.05	32.97	1.46
750.00	1.69	0.48	9.65	39.32	1.44
770.00	2.84	0.73	6.00	46.38	1.46
790.00	4.60	0.94	3.68	55.31	1.44
874.00	15.12	1.04	0.85	65.24	1.46
916.00	20.37	0.95	0.65	77.80	1.43
958.00	25.26	0.87	0.56	91.76	1.44
1000.00	29.87	0.81	0.51	109.43	1.44
1042.00	34.21	0.77	0.49	129.07	1.44
1093.60	39.27	0.71	0.45	153.93	1.45
1145.20	44.02	0.69	0.42	181.56	1.46
1196.80	48.51	0.67	0.39	216.52	1.47
1248.40	52.85	0.79	0.35	255.38	1.50
1300.00	56.02	0.93	0.32	304.56	1.53
1350.00	58.93	1.15	0.27	359.23	1.58
1431.30	61.47	1.39	0.20	428.40	1.65
1512.50	62.21	1.27	0.13	505.29	1.77
1593.80	62.37	1.17	0.06	602.59	2.03
1675.00	62.10	1.10	0.01	700.00	2.69
1756.30	61.44	0.94	0.06	770.00	3.30
1837.50	60.59	0.85	0.09	1000.00	1.09
1918.80	59.96	0.75	0.10	1300.00	0.62
2000.00	60.93	0.73	0.11	1406.29	0.76

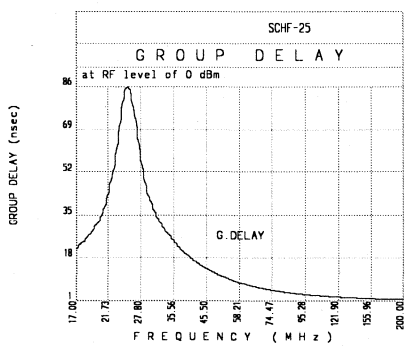
Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	0.02	0.00	44.48	10.00	0.92
158.80	0.10	0.00	26.24	12.02	1.06
307.50	0.15	0.01	25.76	14.39	1.02
456.30	0.18	0.01	41.15	17.24	1.22
605.00	0.25	0.01	26.42	20.65	1.08
753.80	0.36	0.01	19.75	24.74	1.15
902.50	0.51	0.02	17.81	29.64	1.08
1000.00	0.75	0.06	14.56	35.50	1.12
1200.00	6.95	1.52	2.33	42.53	1.11
1400.00	23.38	1.76	0.60	50.94	1.13
1444.00	27.06	1.78	0.52	61.02	1.13
1488.00	30.75	1.82	0.46	73.10	1.13
1532.00	34.51	1.90	0.43	87.57	1.13
1576.00	38.36	2.02	0.39	104.89	1.12
1620.00	42.38	2.25	0.36	125.65	1.11
1664.00	46.84	2.62	0.33	150.52	1.12
1751.20	58.46	4.42	0.28	180.30	1.12
1838.40	67.24	3.96	0.24	215.98	1.13
1925.60	60.92	1.89	0.23	258.72	1.13
2012.80	59.62	1.38	0.21	313.44	1.15
2100.00	59.60	1.31	0.20	375.46	1.16
2188.00	61.19	1.07	0.19	454.87	1.19
2227.00	62.60	1.41	0.19	544.88	1.22
2266.00	63.29	1.62	0.18	660.11	1.28
2305.00	64.33	1.52	0.17	790.74	1.39
2344.00	65.40	1.89	0.18	1000.00	1.82
2383.00	67.40	2.48	0.19	1200.00	2.02
2422.00	68.35	1.68	0.19	1390.23	1.15
2461.00	72.36	4.87	0.20	1620.00	0.68
2500.00	73.62	3.38	0.21	2017.53	0.45

Mini-Circuits

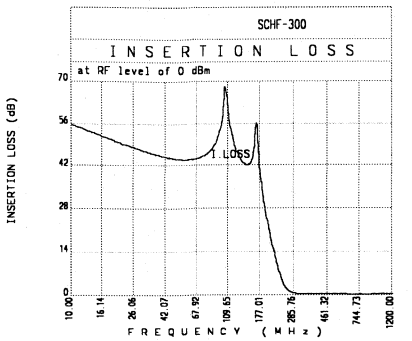
SCHF-25 DC-98 MHz

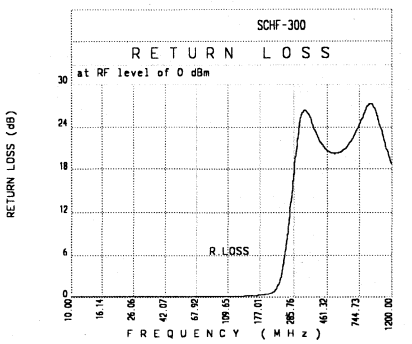


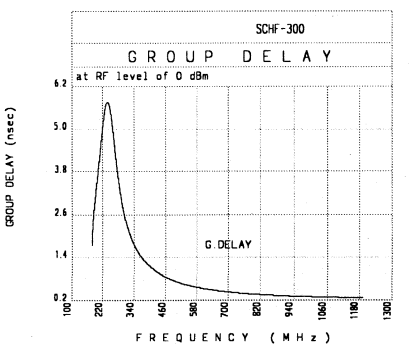




SCHF-300 DC-580 MHz







Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
1.00	97.06	3.36	0.01	13.79	18.09
2.40	99.98	10.24	0.01	15.08	18.42
3.80	95.59	2.11	0.00	16.50	20.45
5.10	91.10	2.49	0.00	18.04	23.64
6.50	87.15	3.20	0.00	19.00	26.28
7.90	79.31	1.79	0.01	21.57	39.52
9.30	72.14	1.56	0.02	23.59	63.75
10.60	65.41	1.43	0.02	25.00	81.43
12.00	58.58	1.28	0.04	27.50	62.44
13.00	53.83	1.26	0.04	30.84	35.84
14.10	48.78	1.22	0.05	34.00	26.89
15.10	44.29	1.19	0.07	37.18	21.31
16.20	39.48	1.14	0.08	40.99	16.66
17.20	35.17	1.15	0.10	44.83	13.43
18.30	30.50	1.20	0.13	49.42	10.78
19.00	27.56	1.24	0.16	54.04	8.90
19.70	24.61	1.27	0.19	59.58	7.31
20.40	21.64	1.32	0.24	65.15	6.10
21.10	18.68	1.37	0.32	71.82	5.03
21.80	15.69	1.43	0.45	78.54	4.25
22.50	12.70	1.47	0.67	86.59	3.54
25.00	3.40	1.06	4.60	94.68	3.02
27.50	0.67	0.08	23.05	104.39	2.54
68.80	0.21	0.01	39.55	114.15	2.19
90.60	0.23	0.00	25.49	125.84	1.87
112.50	0.24	0.01	22.39	137.61	1.63
134.40	0.25	0.01	21.21	151.71	1.42
156.30	0.26	0.00	20.59	165.90	1.25
178.10	0.28	0.01	20.14	182.89	1.10
200.00	0.29	0.01	19.67	200.00	1.04

Freq.	I. Loss		R.L.	Freq.	G. Delay
	$\bar{x}$	σ	$\bar{x}$		$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(MHz)	(nsec)
10.00	55.73	0.06	0.00	183.00	2.21
25.90	48.01	0.08	0.00	190.00	2.98
41.80	45.00	0.09	0.01	208.85	4.28
57.60	44.22	0.13	0.01	223.15	5.31
73.50	45.29	0.11	0.02	245.00	6.01
89.40	49.98	0.37	0.03	254.76	5.66
105.30	66.87	2.34	0.04	272.20	4.52
121.10	47.40	0.29	0.07	290.00	3.47
137.00	42.96	0.26	0.10	310.76	2.68
145.00	42.79	0.41	0.12	332.03	2.18
153.60	45.49	1.07	0.14	354.77	1.84
162.20	55.61	1.89	0.18	379.06	1.59
170.80	40.59	1.95	0.21	405.01	1.40
179.40	31.75	1.18	0.26	432.75	1.24
188.00	25.63	0.92	0.32	462.38	1.11
190.00	24.40	0.89	0.34	494.04	1.01
192.00	23.24	0.85	0.36	527.86	0.92
194.00	22.11	0.83	0.38	564.01	0.86
196.00	21.01	0.80	0.41	602.63	0.80
198.00	19.96	0.78	0.43	643.89	0.75
200.00	18.94	0.77	0.46	687.98	0.71
245.00	3.21	0.30	4.53	735.08	0.68
290.00	0.51	0.01	18.97	785.41	0.64
483.80	0.26	0.01	20.46	839.19	0.62
603.10	0.25	0.01	21.06	884.85	0.60
722.50	0.24	0.01	23.93	945.44	0.58
841.90	0.24	0.01	27.43	996.89	0.57
961.30	0.26	0.01	25.66	1065.14	0.56
1080.60	0.29	0.01	21.55	1123.10	0.55
1200.00	0.33	0.01	18.30	1200.00	0.54

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SPECIFICATIONS CHECKLIST

Filters

If your particular requirements are not met with a Mini-Circuits catalog item, please complete the check list below and mail, phone, or fax it to Mini-Circuits, Applications Engineering.

Please indicate: Critical Parameter ✔✔ Important Parameter ✔

Application: ☐ Industrial/Commercial ☐ Military ☐ Space

Electrical:

☐ Low pass ☐ High pass ☐ Band Pass
Passband _____ MHz
Passband insertion loss _____ dB max.
Stopband _____ dB min. at _____ MHz
_____ dB min. at _____ MHz
_____ dB min. at _____ MHz
_____ dB min. at _____ MHz
Passband VSWR _____ max.
or return loss _____ dB min.
Impedance ☐ 50 ohms ☐ 75 ohms ☐ Other
Power input _____ dBm max.
Group delay (passband) _____ ns max.
Group delay variation (for flat delay)
DC-fco _____ ns max.
DC-2fco _____ ns max.
DC-2.67fco _____ ns max.
Operating temperature _____ °C

Environmental requirements:

_____
_____
_____
_____
_____
_____
_____

Diagram of application:

Mechanical:

Standard case style _____ *(for outline drawings see Table of Contents. Non-standard case, complete list below).*

PC Board Mounting

☐ Plug-in ☐ Flat pack
☐ Surface-mount

Coaxial Connector
(Specify connector for input & output separately)

☐ BNC ☐ TNC ☐ Isolated female BNC
☐ SMA ☐ Type N ☐ Other

Special Requirements: _____

_____

Name _____ Title _____

Company _____ Dept. _____

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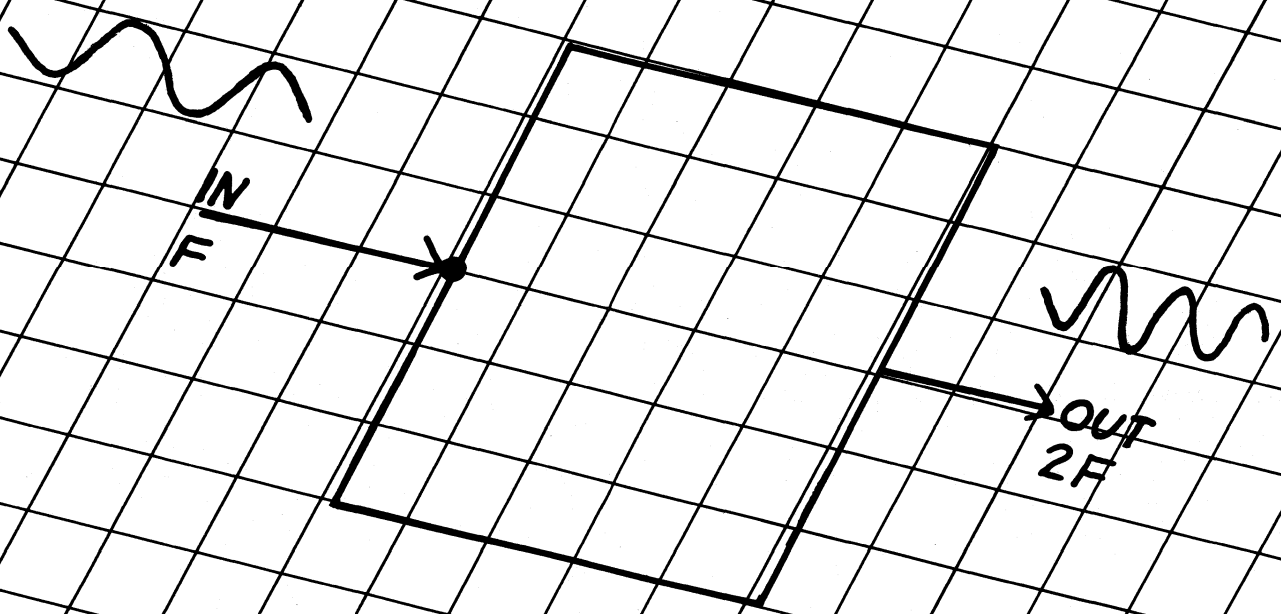
FREQUENCY DOUBLERS



contents of this section

product specifications
5 kHz to 3000 MHz models 9-2,9-3
computer data and curves. . . . . 9-6 thru 9-8

FREQUENCY DOUBLERS 50Ω Surface Mount,

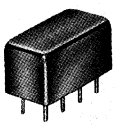
HIGH HARMONIC REJECTION 5 kHz to 3000 MHz

SURFACE MOUNT

SYK

SK

AK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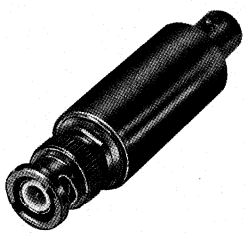
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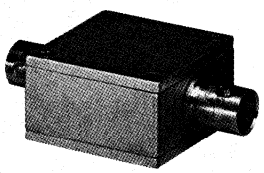
FK

MODEL NO.	FREQUENCY MHz Input	Output	RF INPUT PWR. dBm Min.	Max.	CONVERSION LOSS dB Input freq.	Typ.	Max.	*HARMONIC OUTPUT, dB F1 Typ.	F1 Min.	F3 Typ.	F3 Min.	F4 Typ.	F4 Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
SYK-2R	10-1000	20-2000	12	16	10-500	10.5	14.0	35	25	42	25	20	10	—	TTT167	gc	29.95
					500-1000	11.5	16.0	32	20	37	20	20	10				
SK-2	1-500	2-1000	1	10	1-100	13.0	15.0	40	30	50	40	16	12	9-6	B02	df	26.45
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	17.5	20	15	30	25	16	12				
AK-2	1-500	2-1000	1	10	1-100	13.0	15.0	40	30	50	40	16	12	9-6	A03	dg	20.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	17.5	20	15	30	25	16	12				
AK-3000	70-1500	140-3000	12	15	70-1000	10.5	14.0	31	20	40	25	14	10	9-8	A03	ga	59.95
					1000-1500	11.5	16.0	22	15	30	20	30	14				
RK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	A01	dg	17.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
RK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	A01	dh	15.95
					50-150	11.5	15.0	35	20	40	20	16	12				
RK-5	10-800	20-1600	10	20	10-100	13.0	15.0	20	12	25	20	15	12	9-7	A01	dg	49.95
					100-400	12.5	16.0	20	12	30	20	15	12				
					400-800	13.0	16.0	20	12	25	18	15	10				
RK-6	0.005-25	0.01-50	0	10	0.005-1	11.0	13.0	40	30	45	30	16	12	9-8	A01	dj	25.95
					1-25	11.5	15.0	35	20	40	20	16	12				
RK-3000	70-1500	140-3000	12	15	70-1000	11.0	14.0	31	20	40	25	15	10	9-8	A01	ga	54.95
					1000-1500	12.0	17.5	22	15	30	20	30	14				
FD-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	FF55	-	40.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
FK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	16	20	15	10	9-7	H16	-	69.95
					600-1000	14.0	17.0	20	10	25	20	25	15				
△ FK-3000	70-1500	140-3000	12	15	70-1000	11.0	14.0	31	20	40	25	15	10	9-8	H16	-	79.95
					1000-1500	12.0	17.5	22	15	30	20	30	14				

NSN GUIDE

MCL NO.	NSN		
AK-2	5895-01-131-4569	RK-2	5895-01-268-7337
FD-2	5895-00-087-7925	RK-3	5895-01-143-3726
FK-5	5985-01-204-9746	RK-3-TX	5895-01-160-8656
MK-3BR	5895-01-332-8582	SK-2	6625-01-247-8425

pin connections

see case style outline drawings for pin locations

PORT	df	dg	dh	dj	dk	ga	gc
INPUT	1,2 ^	1,3,4 ^	1,3,4 ^	1,3,4 ^	4	1	2
OUTPUT	4	8	8	8	8	8	1
GND EXT.	3	2,5,6,7	2,5,6,7	2,5,6,7	1,2,3,5,6,7	2,3,4,5,6,7	4
CASE GND	3	2,5,6,7	2	—	1,2,3,5,6,7	2,3,4,5,6,7	4
NOT USED	—	—	—	—	—	—	3

^ pins must be connected together externally

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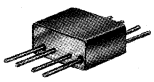
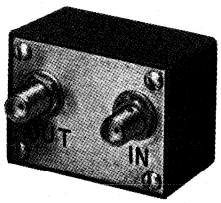
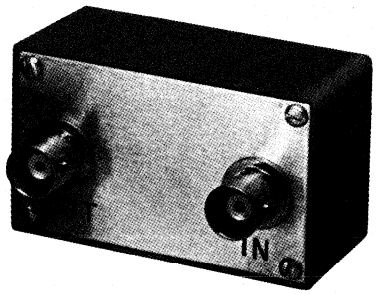


LK



MK



GK

MODEL NO.	FREQUENCY MHz		RF INPUT PWR. dBm		CONVERSION LOSS dB			*HARMONIC OUTPUT, dB						CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
								F1		F3		F4					
	Input	Output	Min.	Max.	Input freq.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Page	Note B		Qty. (1-9)
LK-3000	70-1500	140-3000	12	15	70-1000	10.5	14.0	31	20	40	25	15	10	9-8	BB48	dk	64.95
					1000-1500	11.5	16.0	22	15	35	20	20	14				
MK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	L19	-	52.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
MK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	L19	-	47.95
					50-150	11.5	15.0	35	20	40	20	16	12				
MK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	26	20	15	10	9-7	L19	-	76.95
					600-1000	14.0	17.0	20	10	25	20	25	15				
GK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	L20	-	45.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
GK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	L20	-	43.95
					50-150	11.5	15.0	35	20	40	20	16	12				
GK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	26	20	15	10	9-7	L20	-	67.95
					600-1000	14.0	17.0	20	15	25	20	25	15				

NOTES:

❑ Non-hermetic
* Harmonic output below power level of F2
** Minimum input power +13 dBm above 700 MHz
△ Available only with SMA connectors
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF Input power, 200mW
1b. FD-2 input is at Male BNC.

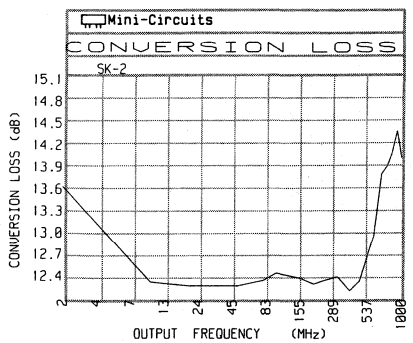
high rejection of 1st and 3rd harmonics

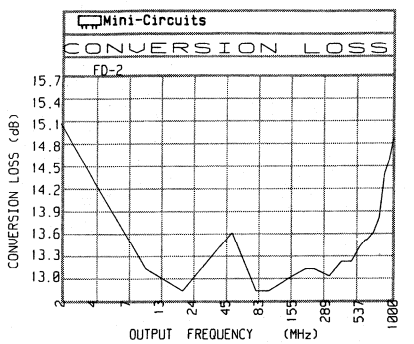
Frequency Doublers

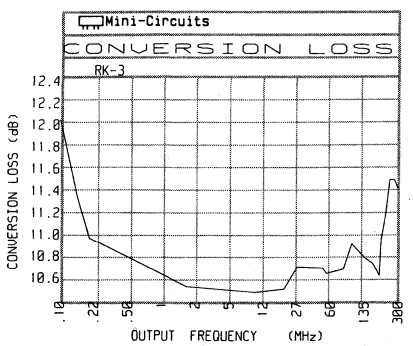
AK-2
SK-2
Input: 1 to 500 MHz
Output: 2 to 1000 MHz

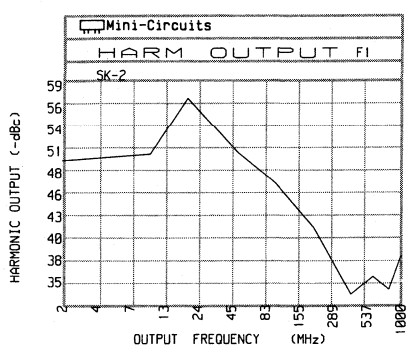
MK-2
FD-2
GK-2
RK-2
Input: 1 to 500 MHz
Output: 2 to 1000 MHz

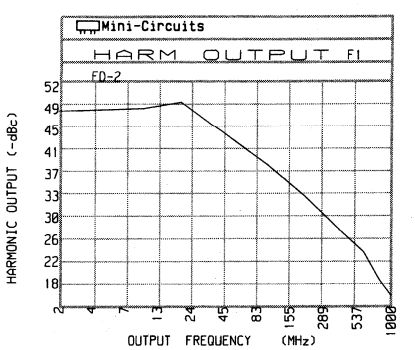
GK-3
MK-3
RK-3
Input: 0.05 to 150 MHz
Output: 0.10 to 300 MHz

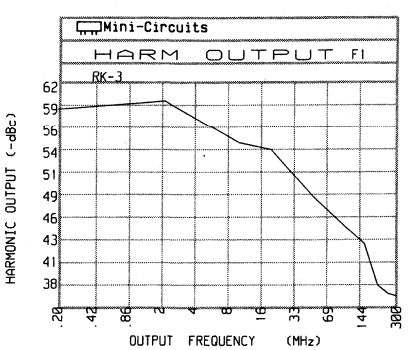


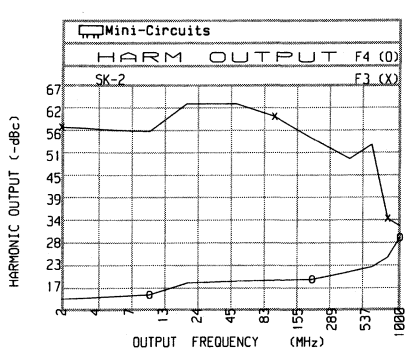


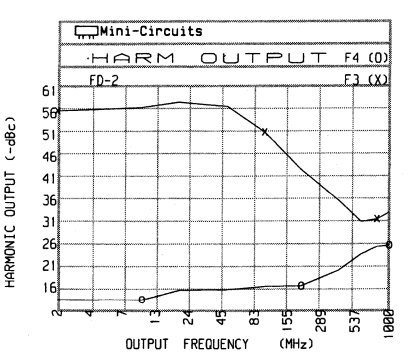


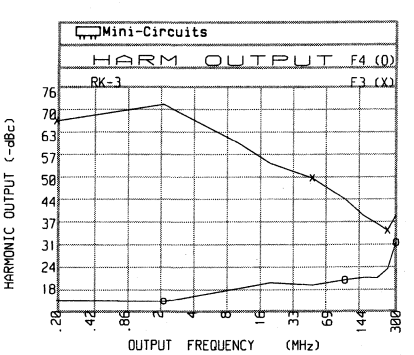












Output Freq. (MHz)	Conversion Loss (dB) x̄	σ	Harmonic Output (-dBc) F1	F3	F4
2.00	13.72	.13	50.0	58.0	13.9
10.00	12.35	.06	50.8	57.0	15.0
20.00	12.29	.05	57.7	64.0	18.0
50.00	12.34	.05	51.0	64.0	18.5
100.00	12.47	.04	47.2	60.8	18.7
200.00	12.35	.05	41.8	55.2	18.9
400.00	12.26	.03	33.4	50.0	20.8
600.00	12.94	.04	35.6	53.6	22.0
800.00	13.94	.08	34.0	34.5	24.4
1000.00	13.88	.14	38.2	32.5	29.6

Output Freq. (MHz)	Conversion Loss (dB) x̄	σ	Harmonic Output (-dBc) F1	F3	F4
2.00	15.26	.34	48.2	57.0	13.7
10.00	13.06	.23	48.7	57.8	13.8
20.00	12.72	.16	49.8	59.0	16.0
50.00	13.52	.16	43.6	58.0	16.2
100.00	12.74	.13	39.0	52.2	16.9
200.00	13.04	.13	33.6	43.6	17.0
400.00	13.06	.17	27.2	36.4	20.6
600.00	13.28	.27	23.7	31.6	24.2
800.00	14.00	.39	18.9	32.2	25.9
1000.00	15.04	.58	16.0	33.7	26.2

Output Freq. (MHz)	Conversion Loss (dB) x̄	σ	Harmonic Output (-dBc) F1	F3	F4
.20	10.92	.15	59.0	68.0	14.4
2.00	10.44	.03	60.0	73.0	14.2
10.00	10.38	.03	55.0	61.6	18.2
20.00	10.47	.03	54.2	55.6	20.0
50.00	10.62	.03	48.6	51.3	19.3
100.00	10.78	.06	45.0	45.0	20.8
150.00	10.63	.05	43.0	40.0	21.5
200.00	10.93	.08	38.0	37.6	21.4
250.00	11.39	.09	37.0	35.6	24.0
300.00	11.43	.06	36.7	40.0	32.0

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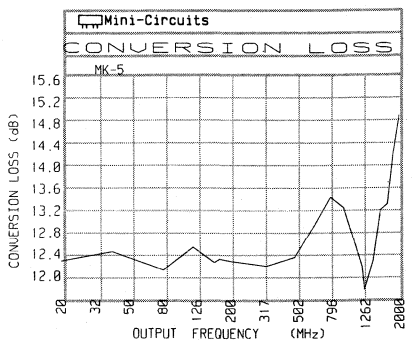
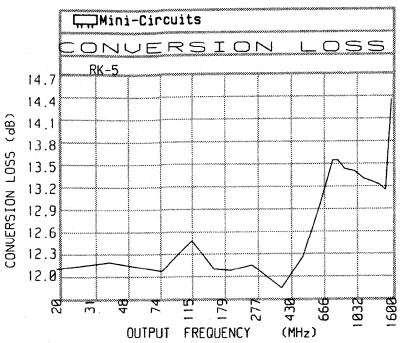
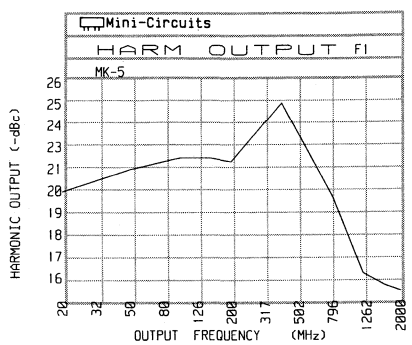
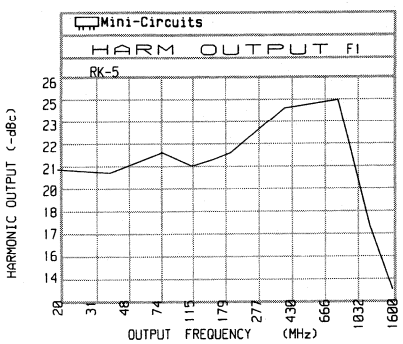
FK-5
GK-5 Input: 10 to 1000 MHz
MK-5 Output: 20 to 2000 MHz

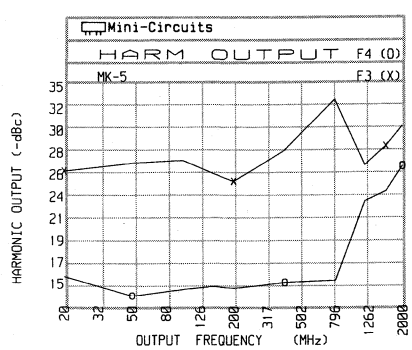
RK-5 Input: 10 to 800 MHz
Output: 20 to 1600 MHz

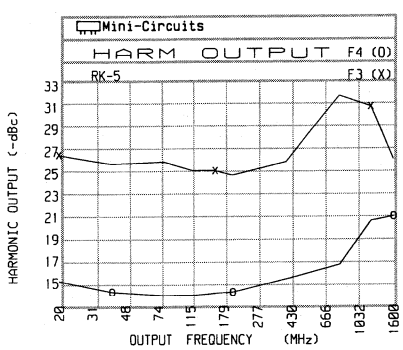












Output Freq. (MHz)	Conversion Loss (dB) $\bar{x}$	σ	Harmonic Output (-dBc) F1	F3	F4
20.00	12.28	.11	20.3	26.2	15.6
50.00	12.35	.04	21.4	27.0	13.6
100.00	12.31	.05	22.0	27.3	14.3
150.00	12.35	.08	22.0	26.0	14.6
200.00	12.27	.07	21.8	25.2	14.4
400.00	12.27	.05	24.8	28.3	15.0
800.00	13.42	.06	20.0	33.4	15.2
1200.00	12.09	.11	16.2	26.8	23.2
1600.00	12.92	.22	15.6	28.7	24.2
2000.00	14.71	.33	15.3	30.7	26.7

Output Freq. (MHz)	Conversion Loss (dB) $\bar{x}$	σ	Harmonic Output (-dBc) F1	F3	F4
20.00	12.09	.07	20.8	27.0	15.5
40.00	12.24	.09	20.6	26.2	14.5
80.00	12.08	.06	21.8	26.4	14.2
120.00	12.37	.07	21.0	25.6	14.2
160.00	12.08	.07	21.4	25.6	14.4
200.00	12.10	.10	21.8	25.2	14.5
400.00	11.88	.06	24.5	26.4	15.7
800.00	13.60	.12	25.0	32.4	17.0
1200.00	13.25	.20	17.4	31.4	21.0
1600.00	14.47	.38	13.6	26.6	21.4

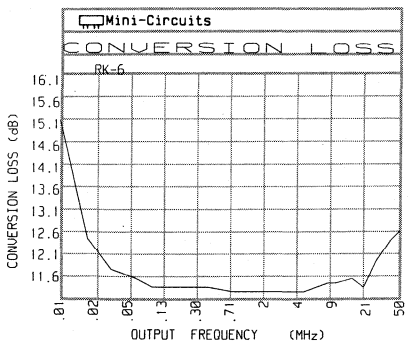
high rejection of 1st and 3rd harmonics

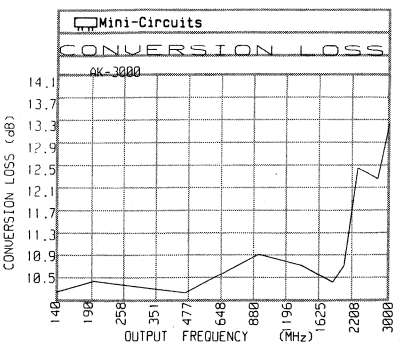
Frequency Doublers

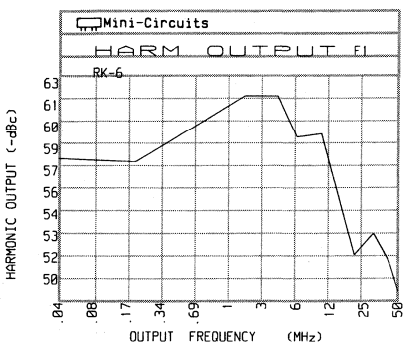
50 ohms

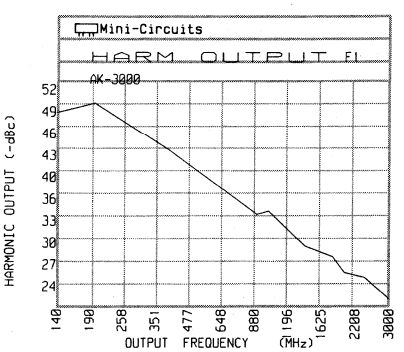
RK-6 Input: 0.005 to 25 MHz Output: 0.010 to 50 MHz

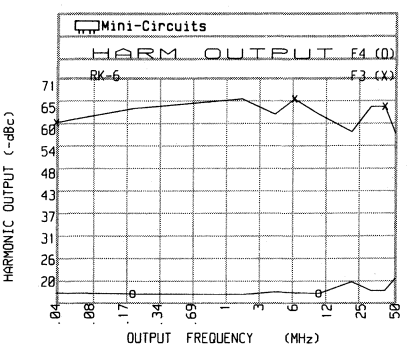
AK-3000, FK-3000, LK-3000, RK-3000 Input: 70 to 1500 MHz Output: 140 to 3000 MHz

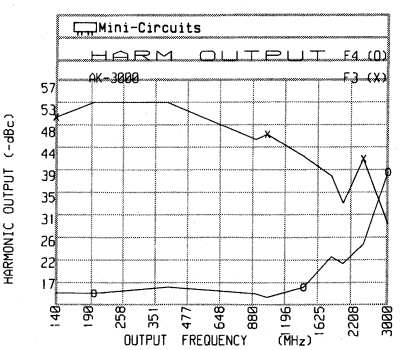












Output Freq. (MHz)	Conversion Loss (dB) $\bar{x}$	σ	Harmonic Output (-dBc) F1	F3	F4
0.040	15.14	.13	58.0	61.7	17.0
0.200	11.47	.04	57.8	65.4	16.8
2.000	11.30	.00	62.0	68.0	16.7
4.000	11.30	.00	62.0	64.0	17.4
6.000	11.38	.00	59.4	68.0	17.2
10.000	11.50	.00	59.6	64.0	17.0
20.000	11.40	.00	51.8	59.4	20.0
30.000	12.11	.01	53.2	66.0	17.7
40.000	12.52	.04	51.6	66.0	17.7
50.000	12.76	.05	49.4	59.0	20.8

Output Freq. (MHz)	Conversion Loss (dB) $\bar{x}$	σ	Harmonic Output (-dBc) F1	F3	F4
140.00	10.32	.04	49.2	51.2	15.7
200.00	10.54	.05	50.6	54.2	15.6
400.00	10.39	.05	43.7	54.1	16.9
900.00	10.94	.05	34.3	46.8	15.6
1000.00	10.91	.07	34.8	47.8	14.9
1400.00	10.69	.16	29.7	43.4	16.9
1800.00	10.56	.19	28.1	39.5	23.1
2000.00	10.82	.15	25.8	33.9	21.7
2400.00	12.43	.31	25.1	42.9	25.6
3000.00	13.30	.29	21.9	29.7	40.2

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SECTION 10

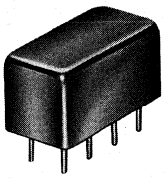
BIAS-TEES AND LIMITERS

contents of this section

product specifications

surface mount bias tees 10-4
plug-in and coaxial bias tees 10-5
bias-tees computer data & curves 10-6
limiters, +3 to +20 dBm input models 10-2
limiters computer data and curves 10-2, 10-3

6 to 20 dBm 10 kHz to 900 MHz Minimum Δ Phase



PLS

MODEL NO.	FREQUENCY MHz F_L F_U	INPUT dBm Min.	Max.	*OUTPUT dBm Typ.	CONTROL CURRENT (mA) Typ.	LIMITING Input range, Δ Output/Δ 1dB Input dBm	amp, dB	phase, deg.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
PLS-1	0.1 - 150	6	20	-- 4.0	3	6 to 10 10 to 16 16 to 20	0.10 0.15 0.15	0.8 0.8 0.7	10-3	A01	dm	22.95
PLS-2	100 - 900	3	15	-- 5.0	5	3 to 8 8 to 12 12 to 15	0.20 0.40 0.40	2.0 2.0 2.0	10-3	A01	dn	22.95
PLS-6	0.01 - 1	6	20	-- 0.5	5	6 to 10 10 to 16 16 to 20	0.20 0.10 0.20	1.0 1.0 1.5	10-2	A01	dp	35.95

NOTES:

* Typical output level at typical control current, level may be changed by varying current.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current rating:
   1a. RF input power, 100mW
   1b. Control current, 10mA

NSN GUIDE

MCL NO.	NSN
PLS-1	5895-01-105-7820
PLS-2	5895-01-390-0151
PLS-6	5820-01-249-8320

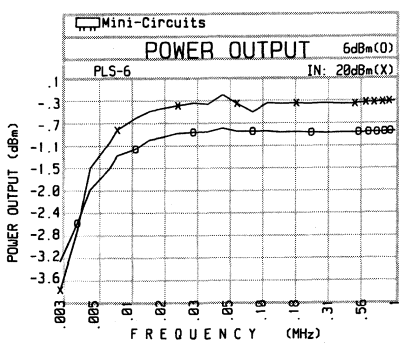
pin connections

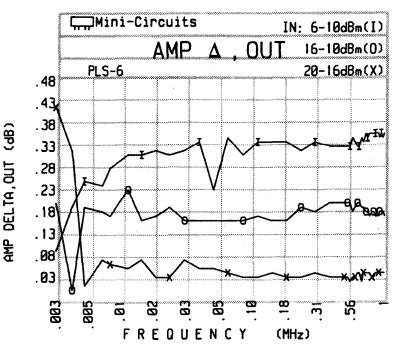
see case style outline drawings

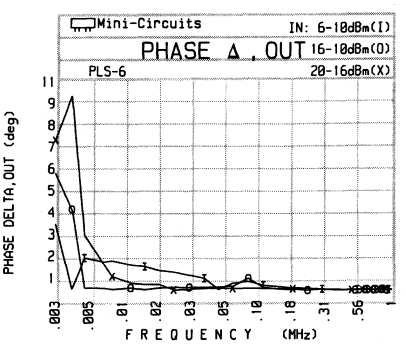
PORT	dm	dn	dp
INPUT	1	1	1
OUTPUT	8	8	8
CONTROL	3,4 ^	3,4 ^	3,4
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7
CASE GND	2	2,5,6,7	—

^ pins must be connected together externally

PLS-6 0.003 to 1 MHz







FREQ. (MHz)	POWER OUTPUT (20dBm IN) (dBm)	(6dBm IN) (dBm)	DELTA (dB)	AMPLITUDE DELTA, out dBm Input 20-16 (dB)	16-10 (dB)	10-6 (dB)	PHASE DELTA, out dBm Input 20-16 (deg)	16-10 (deg)	10-6 (deg)
0.003	-3.87	-3.32	0.55	0.42	0.20	0.09	7.57	5.89	3.33
0.005	-1.52	-1.94	0.43	0.01	0.19	0.25	2.78	0.14	1.64
0.008	-0.79	-1.29	0.50	0.06	0.17	0.28	0.69	0.05	1.47
0.014	-0.43	-0.98	0.56	0.07	0.16	0.31	0.30	0.04	1.20
0.023	-0.32	-0.85	0.53	0.03	0.19	0.31	0.03	0.16	0.92
0.050	-0.11	-0.75	0.64	0.05	0.16	0.23	0.10	0.17	0.05
0.084	-0.44	-0.81	0.37	0.03	0.16	0.31	0.10	0.60	0.44
0.139	-0.28	-0.83	0.55	0.04	0.16	0.34	0.07	0.07	0.19
0.234	-0.28	-0.83	0.55	0.03	0.19	0.32	0.09	0.00	0.09
0.390	-0.28	-0.83	0.56	0.03	0.20	0.33	0.01	0.04	0.04
0.529	-0.26	-0.82	0.57	0.03	0.20	0.33	0.00	0.00	0.04
0.577	-0.26	-0.83	0.57	0.03	0.18	0.35	0.02	0.01	0.04
0.629	-0.25	-0.82	0.57	0.04	0.20	0.33	0.07	0.02	0.04
0.677	-0.25	-0.82	0.57	0.02	0.19	0.35	0.02	0.02	0.04
0.728	-0.25	-0.82	0.57	0.04	0.18	0.36	0.02	0.01	0.03
0.806	-0.24	-0.82	0.58	0.03	0.18	0.36	0.02	0.04	0.04
0.853	-0.24	-0.81	0.58	0.04	0.17	0.36	0.04	0.03	0.05
0.905	-0.23	-0.81	0.58	0.04	0.17	0.36	0.04	0.01	0.03
0.946	-0.23	-0.81	0.58	0.04	0.18	0.36	0.02	0.03	0.03
1.000	-0.23	-0.81	0.58	0.04	0.17	0.36	0.04	0.02	0.03

Data taken @ control current 5mA

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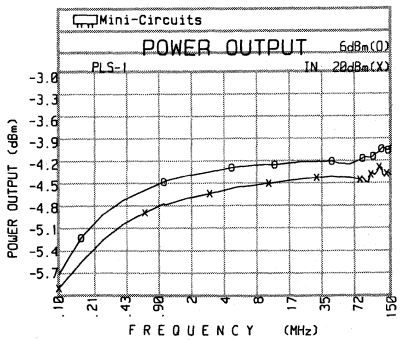
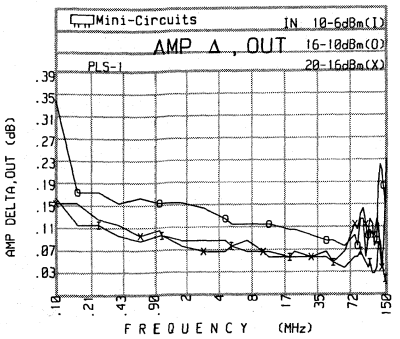
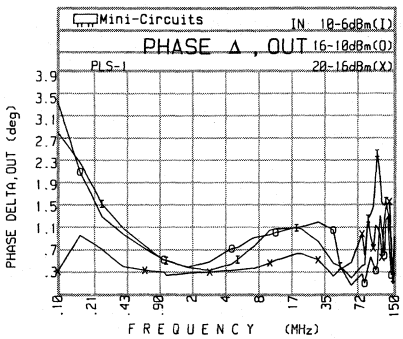
PLS-1

0.1 to 150 MHz





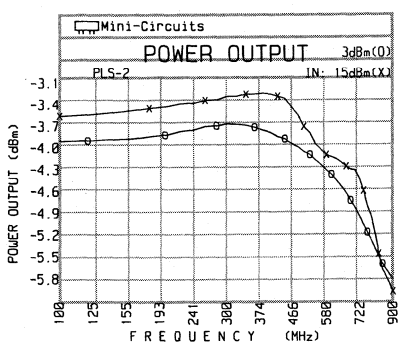


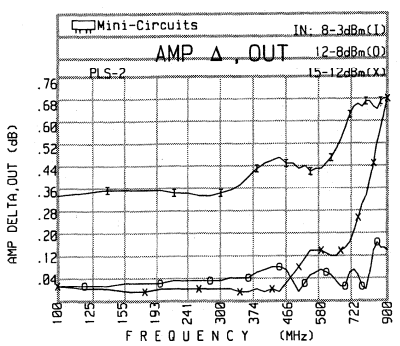
FREQ.	POWER OUTPUT (20dBm IN)	POWER OUTPUT (6dBm IN)	DELTA	AMPLITUDE DELTA, out dBm Input 20-16	AMPLITUDE DELTA, out dBm Input 16-10	AMPLITUDE DELTA, out dBm Input 10-6	PHASE DELTA, out dBm Input 20-16	PHASE DELTA, out dBm Input 16-10	PHASE DELTA, out dBm Input 10-6
(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)	(deg)	(deg)	(deg)
0.100	-5.87	-5.68	0.19	0.16	0.35	0.17	0.28	3.41	2.84
0.260	-5.21	-4.86	0.36	0.13	0.18	0.12	0.69	1.29	1.52
0.660	-4.83	-4.52	0.31	0.10	0.17	0.09	0.30	0.70	0.75
1.059	-4.72	-4.39	0.33	0.10	0.16	0.10	0.21	0.49	0.48
1.708	-4.63	-4.32	0.31	0.08	0.16	0.09	0.25	0.36	0.35
4.417	-4.50	-4.21	0.29	0.07	0.13	0.09	0.30	0.70	0.42
7.106	-4.46	-4.18	0.28	0.07	0.12	0.09	0.34	0.90	0.74
11.406	-4.42	-4.17	0.25	0.06	0.12	0.07	0.49	0.99	1.06
20.076	-4.37	-4.13	0.24	0.06	0.11	0.07	0.61	1.10	1.06
40.319	-4.33	-4.12	0.21	0.06	0.09	0.07	0.20	1.04	0.44
46.734	-4.34	-4.15	0.19	0.05	0.09	0.05	0.32	0.37	0.38
75.087	-4.37	-4.10	0.28	0.12	0.10	0.06	0.97	0.24	0.39
85.225	-4.40	-4.06	0.34	0.14	0.13	0.07	1.24	0.37	1.25
95.367	-4.30	-4.07	0.23	0.12	0.06	0.05	0.71	0.42	1.46
104.061	-4.31	-4.02	0.29	0.11	0.13	0.05	1.09	0.42	2.45
114.499	-4.20	-3.99	0.22	0.10	0.08	0.03	0.54	1.06	1.55
120.761	-4.21	-3.95	0.26	0.13	0.09	0.04	1.25	0.58	1.49
129.949	-4.33	-3.94	0.39	0.07	0.23	0.09	1.52	1.29	1.37
139.975	-4.28	-3.97	0.32	0.08	0.19	0.03	0.90	0.22	0.68
150.000	-4.32	-3.91	0.41	0.24	0.16	0.01	0.27	0.66	0.92

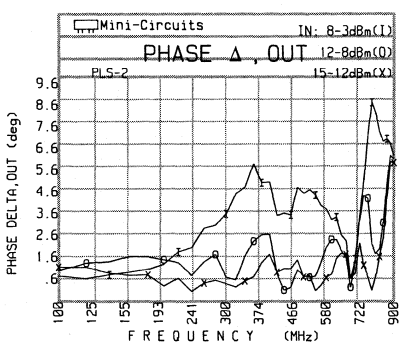
Data taken @ control current 3mA

PLS-2

100 to 900 MHz



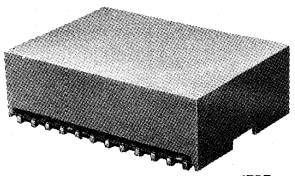




FREQ.	POWER OUTPUT (15dBm IN)	POWER OUTPUT (3dBm IN)	DELTA	AMPLITUDE DELTA, out dBm Input 15-12	AMPLITUDE DELTA, out dBm Input 12-8	AMPLITUDE DELTA, out dBm Input 8-3	PHASE DELTA, out dBm Input 15-12	PHASE DELTA, out dBm Input 12-8	PHASE DELTA, out dBm Input 8-3
(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)	(deg)	(deg)	(deg)
100.000	-3.51	-3.86	0.35	0.02	0.02	0.35	1.10	0.94	0.70
140.000	-3.46	-3.83	0.37	0.01	0.02	0.37	0.83	1.36	0.76
180.000	-3.40	-3.79	0.38	0.00	0.03	0.37	0.76	1.59	1.01
220.000	-3.34	-3.72	0.38	0.01	0.04	0.36	0.61	1.32	1.81
260.000	-3.29	-3.65	0.36	0.01	0.04	0.35	0.39	1.36	2.90
320.000	-3.23	-3.62	0.39	0.01	0.05	0.37	0.21	0.54	4.48
360.000	-3.20	-3.66	0.46	0.00	0.05	0.42	0.67	2.30	5.85
400.000	-3.20	-3.73	0.53	0.00	0.08	0.47	1.70	2.61	5.03
440.000	-3.26	-3.82	0.56	0.00	0.09	0.49	1.05	0.08	3.60
480.000	-3.49	-3.93	0.44	0.06	0.04	0.47	1.44	0.99	4.78
520.000	-3.74	-4.04	0.30	0.12	0.03	0.46	0.75	0.66	4.68
560.000	-3.97	-4.18	0.21	0.15	0.07	0.45	0.28	1.32	3.94
600.000	-4.07	-4.31	0.25	0.14	0.07	0.47	0.80	2.38	3.30
640.000	-4.15	-4.48	0.33	0.13	0.04	0.52	1.75	1.89	2.59
680.000	-4.24	-4.67	0.43	0.16	0.02	0.60	0.59	0.20	0.60
740.000	-4.54	-5.00	0.46	0.27	0.06	0.69	1.21	4.40	5.11
780.000	-4.89	-5.22	0.33	0.35	0.01	0.70	0.06	2.16	8.70
820.000	-5.40	-5.44	0.04	0.47	0.15	0.68	1.59	1.94	7.33
860.000	-5.71	-5.62	0.09	0.60	0.16	0.70	4.24	4.91	7.02
900.000	-5.92	-5.75	0.17	0.71	0.15	0.71	5.90	6.07	6.23

Data taken @ control current 5mA

HIGH CURRENT 100 kHz to 6000 MHz



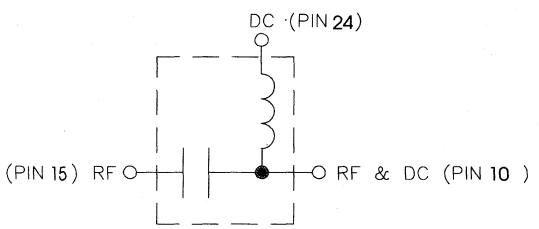
JEBT

MODEL NO.	FREQ. RANGE MHz f_L-f_U	INSERTION LOSS*, dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	ISOLATION*, dB (RF-DC, RF&DC-DC) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JEBT-4R2G	10-4200	0.15	0.6	0.6	1.2	0.6	1.6	32	20	40	20	40	20	10-6	BL301	hr	39.95
JEBT-6G	10-6000	0.15	0.6	0.7	1.4	1.3	2.9	32	20	40	20	40	17	10-6	BL301	hr	59.95
JEBT-4R2GW	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6	25	15	40	20	40	20	10-6	BL301	hr	59.95
JEBT-6GW	0.1-6000	0.15	0.8	0.7	1.4	1.3	2.9	25	15	40	20	30	17	10-6	BL301	hr	69.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

features

- wide band coverage 0.1 to 6000 MHz
- low insertion loss 0.6 dB typ.
- good isolation 40dB typ.
- small size (JEBT) 1.26 X 0.94 X 0.39 inch
- feedthrough version (FT) available for coaxial models



NOTES:

- ❑ Non-hermetic
- ✪ When only specification for M range given, specification applies to entire frequency range.
- * Insertion loss and isolation are guaranteed up to 20 dBm-RF power and 200 mA DC current.
- ** VSWR measured with open and short at DC port.
- ✣ Insertion loss 1 dB Max. and isolation 7 dB Min. 0.1 to 0.3 MHz.
- ▼ Connectors: SMA-F at "RF", and SMA-M at "RF & DC" port. For DC port, ZFBT available with SMA-F and for ZFBT-FT available with feedthrough terminal.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).

B. Case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   - 1a. max. input current: 500 mA
   - 1b. max. RF power: 30 dBm
   - 1c. max. voltage at DC port: 30V; JEBT series, 25V.
2. DC resistance from DC to RF & DC port: 4.5 ohm typical.

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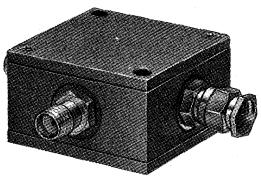
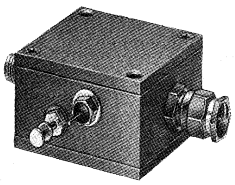
WIDEBAND 0.1 to 6000 MHz

PBTC


ZFBT

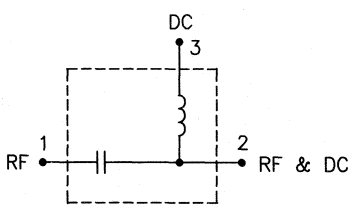

ZFBT-FT

MODEL NO.	FREQ. MHz f_L-f_U	INSERTION LOSS*, dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	ISOLATION*, dB (RF port to DC port) (RF&DC port to DC port) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR** (:1) L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE ▼ Note B	CONNECTION	PRICE $ Qty. (1-9)
PBTC-1G	10-1000	0.15	0.7	0.3	0.7	0.3	1.0	27	20	33	20	30	20	1.06	1.2	1.06	1.2	1.1	1.38	10-6	CO7	hh	25.95
PBTC-3G	10-3000	0.15	0.7	0.3	1.5	1.0	2.5	27	20	30	20	35	20	1.06	1.2	1.13	1.66	1.6	1.7	10-6	CO7	hh	35.95
✣ PBTC-1GW	0.1-1000	0.15	0.8	0.3	0.7	0.3	1.0	25	15	33	20	30	20	1.06	1.6	1.06	1.2	1.1	1.38	10-6	CO7	hh	35.95
✣ PBTC-3GW	0.1-3000	0.15	0.8	0.3	1.5	1.0	2.5	25	15	30	20	35	20	1.06	1.6	1.13	1.66	1.6	1.7	10-6	CO7	hh	46.95
ZFBT-4R2G	10-4200	0.15	0.6	0.6	1.2	0.6	1.6	32	20	40	20	50	20	1.06	1.2	1.13	1.3	1.13	1.3	10-6	K18	gf	59.95
ZFBT-4R2G-FT	10-4200	0.15	0.6	0.6	1.2	0.6	1.6							1.06	1.2	1.13	1.3	1.13	1.3	10-6	Y39	hf	59.95
ZFBT-6G	10-6000	0.15	0.6	0.6	1.4	1.0	2.2	32	20	40	20	30	17	1.06	1.2	1.13	1.3	1.13	1.5	10-6	K18	gf	79.95
ZFBT-6G-FT	10-6000	0.15	0.6	0.6	1.4	1.0	2.2							1.06	1.2	1.13	1.3	1.13	1.5	10-6	Y39	hf	79.95
✣ ZFBT-4R2GW	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6	25	15	40	20	50	20	1.06	1.6	1.13	1.3	1.13	1.3	10-6	K18	gf	79.95
✣ ZFBT-4R2GW-FT	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6							1.06	1.6	1.13	1.3	1.13	1.3	10-6	Y39	hf	79.95
✣ ZFBT-6GW	0.1-6000	0.15	0.8	0.6	1.4	1.0	2.2	25	15	40	20	30	17	1.06	1.6	1.13	1.3	1.13	1.5	10-6	K18	gf	89.95
✣ ZFBT-6GW-FT	0.1-6000	0.15	0.8	0.6	1.4	1.0	2.2							1.06	1.6	1.13	1.3	1.13	1.5	10-6	Y39	hf	89.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

applications

- biasing amplifiers
- biasing of laser diodes
- DC return
- DC blocking
- good for digital & analog applications.



pin & coaxial connections

PORT	gf	hf	hh	hr
RF	1	in	9	15
RF & DC	2	out	12	10
DC	3	+15	3	24
GND	—	—	all other pins	all other pins

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wideband
Bias-Tees

ZFBT & JEBT SERIES

0.1 to 6000 MHz

FREQ. (MHz)	Pin (dBm)	INSERTION LOSS (dB) with current 0mA	20mA	50mA	100mA	150mA	200mA	ISOLATION (dB) (Pin = -10dBm) with current 10mA	20mA	50mA	100mA	150mA	200mA	VSWR (:1)
0.100	19.8	0.17	0.17	0.16	0.17	0.20	0.24	19.46	19.04	17.83	14.58	12.66	11.75	1.16
0.266	19.8	0.13	0.13	0.13	0.14	0.14	0.15	25.86	25.53	24.52	21.43	19.31	18.16	1.07
0.531	19.8	0.12	0.12	0.12	0.11	0.11	0.11	29.17	28.98	28.36	26.18	24.40	23.37	1.04
1.059	19.8	0.13	0.13	0.12	0.11	0.12	0.12	30.81	30.74	30.56	29.62	28.62	27.92	1.02
10.000	18.5	0.16	0.17	0.17	0.16	0.16	0.16	30.06	30.07	30.07	30.20	30.38	30.56	1.04
114.750	19.5	0.22	0.25	0.24	0.22	0.22	0.22	34.45	34.49	34.27	33.99	33.83	33.59	1.07
324.250	19.7	0.50	0.55	0.53	0.52	0.53	0.56	44.65	44.61	44.25	43.90	43.91	43.34	1.06
743.250	18.7	0.28	0.31	0.30	0.29	0.29	0.29	51.19	50.50	50.16	50.65	51.69	52.47	1.06
952.750	18.2	0.31	0.33	0.33	0.31	0.32	0.33	40.75	40.80	40.97	40.97	40.93	40.95	1.11
1581.250	18.0	0.46	0.48	0.47	0.46	0.48	0.49	42.58	42.59	43.94	43.77	44.36	44.17	1.13
2000.250	17.1	0.46	0.48	0.47	0.46	0.46	0.47	45.46	45.57	45.73	45.48	46.14	45.28	1.12
2524.000	14.4	0.40	0.42	0.41	0.42	0.43	0.44	53.15	53.72	52.19	53.17	52.67	53.67	1.12
3047.750	14.2	0.45	0.48	0.47	0.46	0.46	0.49	52.46	52.25	51.55	51.33	51.46	50.99	1.09
3676.250	15.1	0.73	0.74	0.75	0.75	0.75	0.75	46.32	47.19	46.36	45.53	46.19	45.65	1.07
4200.000	17.9	1.04	1.07	1.07	1.06	1.05	1.06	28.42	28.36	28.24	28.14	28.01	27.92	1.09
4502.500	-0.6	1.17	1.19	1.18	1.19	1.17	1.16	28.15	28.10	28.05	27.96	27.84	27.87	1.14
4802.000	-0.7	1.26	1.26	1.27	1.25	1.22	1.20	37.95	38.01	38.19	37.93	37.58	37.51	1.12
5251.250	-1.1	1.19	1.17	1.16	1.13	1.11	1.09	49.68	51.04	49.12	49.37	49.13	48.19	1.11
5550.750	-2.0	1.65	1.63	1.60	1.56	1.54	1.51	38.44	38.56	38.36	38.07	37.85	38.19	1.10
6000.000	-2.4	1.70	1.71	1.65	1.59	1.54	1.50	34.37	34.36	34.23	34.40	34.49	34.48	1.12

PBTC SERIES

0.1 to 3000 MHz

FREQ. (MHz)	Pin (dBm)	INSERTION LOSS (dB) with current 0mA	20mA	50mA	100mA	150mA	200mA	ISOLATION (dB) (Pin = -10dBm) with current 10mA	20mA	50mA	100mA	150mA	200mA	VSWR (:1)
0.100	19.91	0.01	0.22	0.24	0.34	0.47	0.60	16.77	16.38	15.07	12.23	10.85	10.02	1.19
0.149	19.90	0.03	0.20	0.21	0.27	0.33	0.41	19.48	18.98	17.69	14.60	12.92	11.80	1.13
1.000	19.20	0.02	0.15	0.15	0.15	0.15	0.16	30.27	30.21	29.76	28.40	27.06	25.91	1.02
5.050	19.91	0.07	0.17	0.18	0.18	0.18	0.18	32.03	31.73	31.24	31.01	31.05	31.05	1.02
7.525	19.82	0.09	0.17	0.18	0.20	0.20	0.19	31.82	31.38	30.76	30.39	30.35	30.49	1.02
10.000	19.79	0.11	0.15	0.16	0.17	0.17	0.18	31.50	31.01	29.96	29.26	29.22	29.42	1.02
15.000	21.83	0.14	0.18	0.18	0.21	0.21	0.15	31.07	30.42	28.95	27.53	27.08	27.10	1.02
141.862	20.57	0.21	0.25	0.25	0.26	0.27	0.23	33.27	33.24	33.17	33.06	32.90	32.75	1.02
276.187	20.83	0.33	0.37	0.36	0.34	0.36	0.36	33.42	33.39	33.57	33.84	33.99	34.10	1.01
403.050	20.98	0.21	0.25	0.22	0.24	0.27	0.22	40.88	41.42	41.56	42.17	41.76	42.32	1.04
791.100	20.55	0.24	0.27	0.28	0.30	0.32	0.29	35.93	36.18	36.01	35.69	35.76	36.04	1.13
925.425	20.01	0.26	0.28	0.26	0.29	0.33	0.29	30.93	30.83	30.98	30.93	31.00	31.02	1.16
1000.050	19.70	0.33	0.34	0.35	0.35	0.38	0.38	35.63	35.41	35.62	35.80	35.55	35.86	1.17
1313.475	19.25	0.38	0.42	0.41	0.43	0.44	0.44	37.38	37.67	37.35	37.42	38.05	38.00	1.26
1701.525	20.14	1.45	1.46	1.50	1.49	1.50	1.45	34.14	33.79	33.97	34.12	34.23	34.09	1.38
1962.712	19.86	0.81	0.79	0.85	0.85	0.84	0.81	34.01	34.04	34.25	34.12	34.13	34.42	1.40
2350.762	20.42	0.74	0.80	0.80	0.78	0.80	0.76	39.61	38.75	38.52	38.86	38.96	38.75	1.50
2477.625	20.80	1.34	1.38	1.41	1.42	1.41	1.36	37.19	37.73	37.85	36.87	37.46	36.98	1.48
2873.137	21.04	1.83	1.92	1.93	1.91	1.93	1.93	40.84	40.10	39.86	41.04	40.12	39.78	1.39
3000.000	21.16	1.80	1.91	1.92	1.90	1.92	1.91	34.25	34.42	34.80	37.52	35.61	34.79	1.31

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SECTION 11

I&Q, QPSK AND BPSK MODULATORS/ DEMODULATORS

contents of this section

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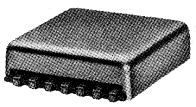
1/Q modulators plug-in, coaxial 11-4
1/Q modulators surface mount 11-5
1/Q demodulators 11-6, 11-7

computer data and curves

CAPD information . . . . . 11-10 thru 11-30

BPSK 500 to 1000 MHz

SURFACE MOUNT



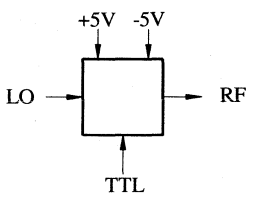
JCBM

180° phase shift, ttl input

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	Baseband Min.	Typ.	INSERTION LOSS (dB) Typ.	Max.	DIFF. BETWEEN STATES AMPLITUDE (dB) Typ.	Max.	PHASE (DEG.) REL. TO 180 DEG Typ.	Max.	SUPPLY CURRENT AT ± 5.0V (mA) Typ.	Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCBM-1000DR	500	1000	DC	80	2.7	4.0	0.2	0.6	±1	±6	12	20	11-23	BG291	hw	19.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- small size 0.8 X 0.87 X 0.25 inch
- low insertion loss, 2.7 dB typ
- low phase shift error, ±1 degree typ
- constant amplitude, ±0.2 dB typ between states
- fast switching, 50% TTL to 90% RF 3 ns typ.



BPSK Modulator Block Diagram

pin connections

see case style outline drawing

PORT	hw
LO(carrier)	8
RF(signal)	1
BASEBAND	14
+5V	12
-5V	3
GND EXT.	all others

NOTES:

❑ Non-hermetic

1. Absolute maximum power, voltage and current rating:
   1a. LO power, 250 mW
   1b. Supply voltages ±4.8V to 5.8V; TTL < positive supply voltage
2. 1dB compression: 19 dBm typ.
3. TTL HIGH: threshold 2.0V min; current 5 mA max. at 5V
   TTL LOW: threshold 0.8V max; current (into device) 0.2 mA max

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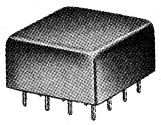
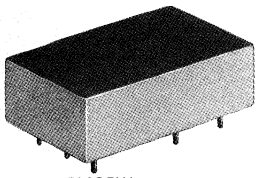
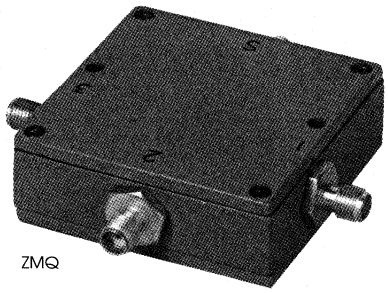
QPSK 30 to 1050 MHz


QMC


PMQPW
PMQ

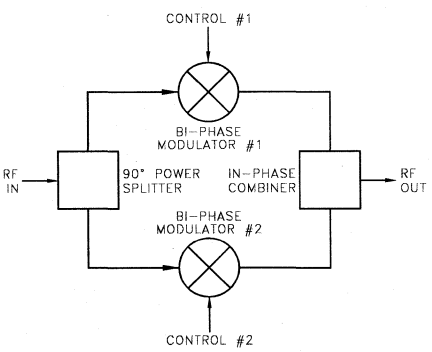

ZMQ

wideband 360° in 90° steps

MODEL NO.	FREQ. (MHz)	INSERTION LOSS dB Typ.	INSERTION LOSS dB Max.	AMPLITUDE UNBAL., dB Typ.	AMPLITUDE UNBAL., dB Max.	PHASE UNBAL., Deg (±) Typ.	PHASE UNBAL., Deg (±) Max.	1 dB COMPRESSION dBm Typ.	VSWR, Typ. IN	VSWR, Typ. OUT	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
QMC-100	50-100	5.6	7.5	0.2	0.8	3	6	4	1.5:1	1.9:1	11-17	C07	dq	128.95
QMC-170	90-170	5.6	7.5	0.3	0.8	3	6	4	1.3:1	1.5:1	11-19	C07	dq	128.95
QMC-1050	800-1050	5.5	7.5	0.5	1.0	3	7	4	2.0:1	2.0:1	11-19	C07	dr	119.95
PMQ-94	47-94	5.5	7.0	0.4	1.2	3	5	4	1.7:1	1.7:1	11-16	AAA118	ds	119.95
PMQ-330	200-330	5.8	8.0	0.4	1.5	3	6	4	1.5:1	1.5:1	11-16	AAA118	ds	119.95
PMQ-440	240-440	5.9	8.0	0.5	1.8	3	7	4	1.5:1	1.5:1	11-18	AAA118	ds	119.95
PMQPW-150*	30-150	6.0	10.5	0.4	0.9	3	8	4	2:1	2:1	11-18	AAA118	ds	172.95
PMQPW-250*	50-250	6.5	10.5	0.5	1.2	3	8	4	1.7:1	1.4:1	11-17	AAA118	ds	172.95
△ ZMQ-1050	800-1050	5.5	7.5	0.5	1.0	3	7	4	2.0:1	2.0:1	11-19	HHH141	du	169.95

features

- octave & multi-octave bandwidth
- good phase & amplitude balance
- hermetically sealed metallic enclosure with plug-in version.
- capable of meeting MIL-M-28837 requirements



pin and coaxial connections

see case style outline drawings for pin locations

PORT	dq	dr	ds	du
RF IN	13	13	8	3
RF OUT	1	2	4	1
CONTROL-1	5	4	2	4
CONTROL-2	8	1	6	2
NOT USED	2	9,12,16	—	—
GND EXT.	3,4,6,7,9,10, 11,12,14,15,16	3,5,6,7,8, 10,11,14,15	1,3,5,7	—
CASE GND	3,4,6,7,10, 11,14,15	3,5,6,7,8, 10,11,14,15	1,3,5,7	—

PHASE SHIFT VS. CONTROL CURRENT

CONT-1 (mA)	CONT-2 (mA)	PHASE SHIFT (Deg.)
+20	+20	0 (REF)
+20	-20	90
-20	-20	180
-20	+20	270

NOTES:

* Protected under patent No. 4,673,898
△ Available only with SMA connectors
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating: 1a. Input power, 100mW; 1b. Control current, 40mA
2. All specifications at control current ±20mA
3. Control ports drive with 50 ohms source

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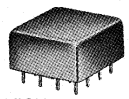
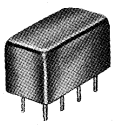
MODULATORS

Plug-In & Coaxial

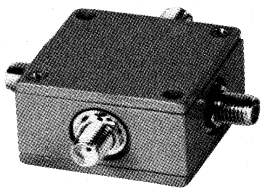
I&Q 9 MHz to 1880 MHz



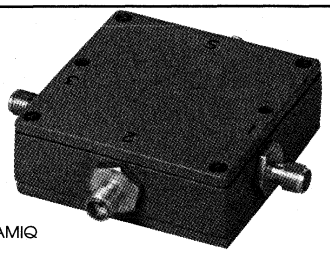
MIQY
MIQC



MIQA



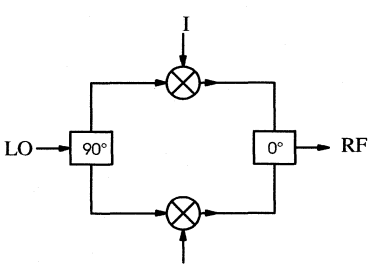
ZFMIQ



ZAMIQ

high rejection of carrier and sideband

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	CARRIER REJECTION (-dBc) Typ.	Min.	SIDEBAND REJECTION (-dBc) Typ.	Min.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MIQA-10M	9	11	DC	2	5.8	0.20	7.0	41	30	40	30	58	48	68	58	11-10	A06	dv	49.95
MIQA-21M	20	23	DC	3	6.2	0.14	7.0	50	40	40	30	48	40	65	55	11-10	A06	gd	39.95
MIQA-70M	66	73	DC	5	6.2	0.10	7.0	38	30	38	30	48	45	58	55	11-20	A06	dv	39.95
MIQA-70ML	66	73	DC	5	5.7	0.10	6.5	38	30	38	30	48	43	58	55	11-26	A06	dv	49.95
MIQA-91M	86	95	DC	5	5.5	0.10	6.5	38	30	38	30	48	45	58	55	11-22	A06	dv	49.95
MIQA-100M	95	105	DC	5	5.5	0.10	6.5	38	30	38	30	48	45	58	55	11-22	A06	dv	49.95
MIQA-108M	103	113	DC	5	5.5	0.10	6.5	38	30	38	30	48	43	58	55	11-23	A06	dv	49.95
MIQA-195M	185	205	DC	5	5.6	0.10	6.5	38	30	38	30	48	45	58	55	11-23	A06	dv	49.95
MIQC-38M	34	38	DC	4	5.6	0.10	7.0	48	38	37	30	54	40	65	55	11-11	C07	gu	49.95
MIQC-88M	52	88	DC	5	5.7	0.10	7.5	41	35	34	30	52	40	66	50	11-20	C07	dx	49.95
MIQC-176M	104	176	DC	5	5.5	0.10	7.0	38	30	36	30	47	35	70	50	11-21	C07	dx	54.95
MIQC-895M	868	895	DC	5	8.0	0.10	10.5	40	30	40	30	52	35	58	50	11-21	C07	dw	99.95
MIQC-1785M	1710	1785	DC	5	9.0	0.30	10.5	35	25	35	25	40	33	65	50	11-11	C07	dx	99.95
MIQC-1880M	1805	1880	DC	5	9.0	0.30	10.5	35	25	35	25	40	33	65	50	11-25	C07	dx	99.95
△ ZAMIQ-895M	868	895	DC	5	8.0	0.10	10.5	40	30	40	30	52	35	58	50	11-17	HHH141	gv	149.95
△ ZFMIQ-10M	9	11	DC	2	5.8	0.20	7.0	41	30	40	30	58	45	68	58	11-10	J17	dz	89.95
△ ZFMIQ-70ML	66	73	DC	5	5.7	0.1	6.5	38	30	38	30	48	43	58	55	11-22	J17	dz	89.95
△ ZFMIQ-91M	86	95	DC	5	5.5	0.17	6.5	38	30	38	30	48	45	58	55	11-22	J17	dz	89.95
△ ZFMIQ-100M	95	105	DC	5	5.5	0.17	6.5	38	30	38	30	48	45	58	55	11-22	J17	dz	89.95
△ ZFMIQ-108M	103	113	DC	5	5.8	0.12	6.5	38	30	38	30	48	43	58	55	11-19	J17	dz	89.95
																			Qty. (1-49)
❑ MIQY-70M	67	73	DC	5	5.8	0.20	7.0	40	35	36	30	47	40	60	50	11-20	C07	dy	19.95
❑ MIQY-140M	137	143	DC	5	5.8	0.20	7.0	34	30	36	30	45	35	60	50	11-26	C07	dy	19.95



NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency ($f_L+f_U/4$)
- σ Standard deviation
- ❑ Non-hermetic
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
   1a. LO power, 50mW
   1b. I&Q current, 40mA
2. Operating LO power: 10 ± 1dBm
3. 1dB compression: 0dBm typical
4. Conversion Loss = (I+Q) power, dBm - RF power, dBm
5. Carrier and sideband rejections measured at -5dBm I/Q power.
6. Q=I-90° for MIQA-70M
   Q=I+90° for all other models

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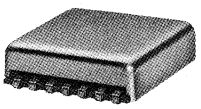
I&Q 52 MHz to 176 MHz



JCIQ

high rejection of carrier and sideband

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION $\bar{x}$	σ	Max.	CARRIER REJECTION (-dBc) Typ.	Min.	SIDEBAND REJECTION (-dBc) Typ.	Min.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCIQ-88M	52	88	DC	5	5.6	0.1	7.0	40	32	35	30	45	35	65	50	11-24	BG291	hs	49.95
JCIQ-176M	104	176	DC	5	5.6	0.1	7.0	35	30	35	30	45	35	65	50	11-24	BG291	hs	54.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- small size 0.8 X 0.87 X 0.25 inch
- good carrier and sideband rejections
- excellent 3rd and 5th order harmonic suppression
- all MIQA and MIQC models, metal case and hermetically sealed

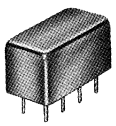
pin and coaxial connections

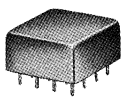
see case style outline drawings

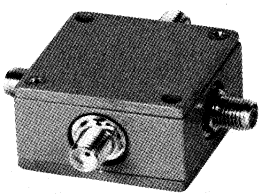
PORT	dv	dw	dx	dy	dz	gd	gu	gv	hs
LO (carrier)	1	13	13	13	1	1	13	1	2
RF (signal)	8	2	1	1	3	8	1	3	9
I (0°)(ref.)	7	4	8	8	S	7	8	4	4
Q (90°)*	4	1	5	5	2	4	5	2	11
ISOLATED**	—	9,12,16	—	10,11	—	—	10,11	—	—
50W TERM. EXT.	2	—	—	—	—	—	—	—	—
NOT USED	—	—	—	—	—	2	—	—	—
GND EXT.	3,5,6	3,5,6,7,8, 10,11,14,15	2,3,4,6,7,9,10, 11,12,14,15,16	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	2,3,4,6,7,9, 12,14,15,16	—	1,3,5,6,7,8,10 12,13,14
CASE GND	3,5,6	3,5,6,7,8, 10,11,14,15	3,4,6,7,10,11, 14,15	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	3,4,6,7, 14,15	—	—

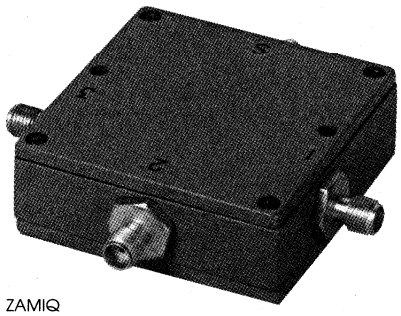
* For I&Q modulators: Q(90°) for lower sideband suppression.
** For MIQY, MIQC-38M external variable capacitors can be connected at pins 10 & 11 to ground for improvement of sideband rejection.

I&Q 1.15 to 895 MHz


MIQA


MIQY
MIQC

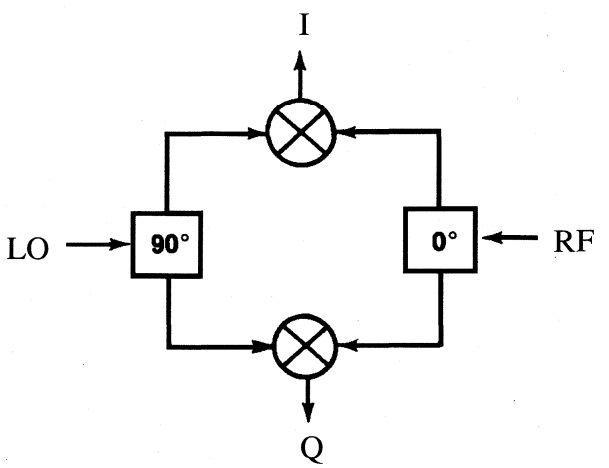

ZFMIQ


ZAMIQ

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	AMPLITUDE UNBALANCE (dB) Typ.	Max.	PHASE UNBALANCE (Deg.) Typ.	Max.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MIQA-10D	9	11	DC	2	6.0	0.10	7.0	0.15	0.3	1.0	3.0	50	35	65	55	11-24	A06	dv	49.95
MIQA-21D	20	23	DC	3	6.1	0.15	7.0	0.15	0.6	0.7	3.0	64	35	67	50	11-26	A06	gd	49.95
MIQA-70D	66	73	DC	3	6.2	0.10	7.0	0.15	0.5	0.7	3.0	56	45	58	55	11-26	A06	dv	49.95
MIQC-38D	34	38	DC	4	5.5	0.10	7.0	0.10	0.6	0.5	3.0	60	40	65	55	11-27	CO7	gu	49.95
MIQC-60WD	20	60	DC	5	5.3	0.10	7.0	0.15	0.6	1.0	5.0	55	45	67	55	11-27	C07	dx	79.95
MIQC-895D	868	895	DC	5	8.0	0.20	10.5	0.15	0.3	1.5	4.0	40	35	55	50	11-24	C07	dw	99.95
△ ZFMIQ-10D	9	11	DC	2	6.0	0.10	7.0	0.15	0.3	1.0	3.0	50	35	65	55	11-26	J17	dz	89.95
△ ZFMIQ-70D	66	73	DC	2	6.2	0.10	7.0	0.15	0.5	0.7	3.0	56	45	58	55	11-26	J17	dz	89.95
△ ZAMIQ-895D	868	895	DC	5	8.0	0.20	10.5	0.15	0.3	1.5	4.0	52	35	58	50	11-20	HHH141	gv	149.95 Qty. (1-49)
❑ MIQY-1.25D	1.15	1.35	DC	0.2	5.0	0.10	6.0	0.15	0.4	1.0	3.0	59	40	67	55	11-30	C07	gu	29.95
❑ MIQY-70D	67	73	DC	5	5.5	0.25	7.0	0.10	0.6	0.5	3.0	52	40	66	50	11-25	C07	dy	19.95
❑ MIQY-140D	137	143	DC	5	5.5	0.25	7.0	0.10	0.6	0.5	3.0	47	35	70	50	11-25	C07	dy	19.95

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency ($f_L+f_U/4$)
- σ Standard deviation
- ❑ Non-hermetic
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current rating: 1a. LO/RF power, 50mW. 1b. I&Q current, 40mA
- 2. Operating LO power: 10 ± 0.5dBm
- 3. 1dB compression at +4dBm RF input
- 4. DC offset 1mV typical
- 5. Conversion Loss = RF power, dBm - (I+Q) power, dBm



I&Q Demodulation Block Diagram

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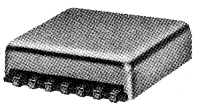
I&Q 104 MHz to 1880 MHz



JCIQ

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	AMPLITUDE UNBALANCE (dB) Typ.	Max.	PHASE UNBALANCE (Deg.) Typ.	Max.	HARMONIC SUPPRESSION (-dBc) 3xl/Q Typ.	Min.	5xl/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCIQ-176D	104	176	DC	5	5.5	0.1	7.0	0.15	0.6	2	5	52	40	65	50	11-28	BG291	hs	54.95
JCIQ-895D	868	895	DC	5	8.6	0.1	10.5	0.2	0.6	1	4	45	35	65	50	11-28	BG291	hs	99.95
JCIQ-1785D	1710	1785	DC	5	8	0.2	10.5	0.2	0.6	2	5	50	35	65	50	11-29	BG291	hs	99.95
JCIQ-1880D	1805	1880	DC	5	8	0.2	10.5	0.2	0.6	2	5	50	35	65	50	11-29	BG291	hs	99.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- good amplitude and phase unbalance
- excellent 3rd and 5th order harmonic suppression
- small size 0.8 X 0.87 X 0.25 inch

pin and coaxial connections

see case style outline drawings

PORT	dv	dw	dx	dy	dz	gd	gu	gv	hs
LO (carrier)	1	13	13	13	1	1	13	1	2
RF (signal)	8	2	1	1	3	8	1	3	9
I (0°)(ref.)	7	4	8	8	S	7	8	4	4
Q (90°)*	4	1	5	5	2	4	5	2	11
ISOLATED**	—	9,12,16	—	10,11	—	—	10,11	—	—
50W TERM. EXT.	2	—	—	—	—	—	—	—	—
NOT USED	—	—	—	—	—	2	—	—	—
GND EXT.	3,5,6	3,5,6,7,8, 10,11,14,15	2,3,4,6,7,9,10, 11,12,14,15,16	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	2,3,4,6,7,9, 12,14,15,16	—	1,3,5,6,7,8,10 12,13,14
CASE GND	3,5,6	3,5,6,7,8, 10,11,14,15	3,4,6,7,10,11, 14,15	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	3,4,6,7, 14,15	—	—

For I&Q demodulators:

Models MIQA-70D and ZFMIQ-70D: Q= +90° for LO>RF
Q= -90° for LO<RF

All other models: Q=+90° for LO<RF
Q=-90° for LO>RF

** For MIQY, MIQC-38D, external variable capacitors can be connected at pins 10 & 11 to ground for improvement of phase unbalance.

In Stock... Immediate Delivery

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For Custom Versions Of Standard Models Consult Our Applications Dept.

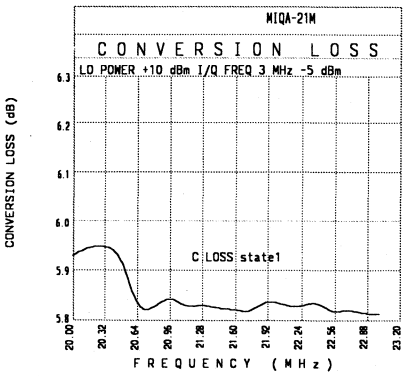
high rejection of carrier and sideband

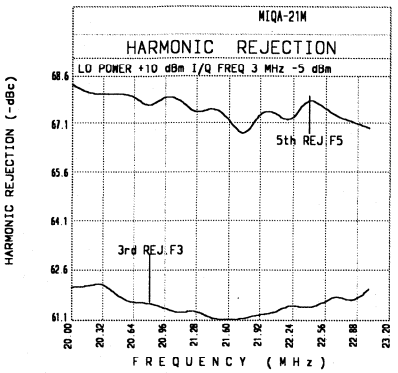
I&Q Modulator

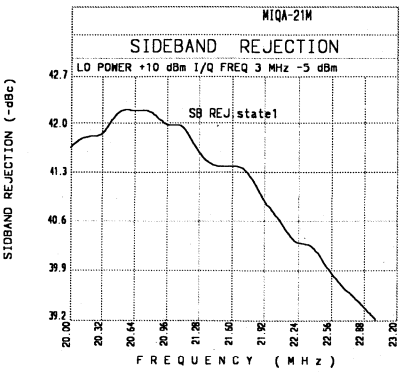
50 ohms

MIQA-21M

20 to 23 MHz



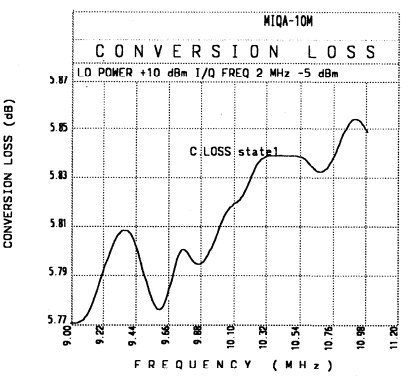


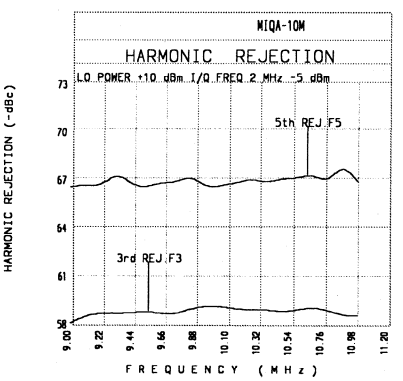


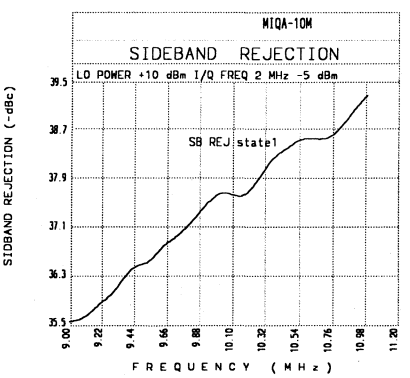
CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
20.00	5.91	0.04	43.34	42.73	55.61	54.19	62.14	49.79	67.81	71.33	-0.21
20.16	5.92	0.04	43.32	42.65	55.18	54.49	62.28	49.76	67.35	71.99	-0.21
20.32	5.93	0.03	43.18	42.53	55.38	54.26	62.25	49.79	67.92	71.76	-0.21
20.47	5.92	0.03	42.68	43.11	55.35	55.03	62.01	50.37	67.65	72.60	-0.21
20.63	5.89	0.05	42.65	42.89	55.38	55.12	61.88	50.49	67.34	72.25	-0.21
20.79	5.89	0.04	42.31	42.86	54.99	54.89	61.93	50.56	67.59	71.96	-0.21
20.95	5.92	0.04	42.29	42.85	55.08	54.92	61.68	50.58	67.68	72.38	-0.21
21.11	5.90	0.05	42.48	42.85	55.15	54.91	61.45	50.61	67.65	72.48	-0.21
21.26	5.90	0.04	42.41	42.78	55.28	54.78	61.58	50.68	67.48	72.48	-0.21
21.42	5.89	0.04	42.32	42.93	55.24	54.67	61.41	50.67	67.44	71.97	-0.21
21.58	5.90	0.04	42.41	43.07	55.07	54.83	61.10	50.73	67.27	71.89	-0.20
21.74	5.89	0.04	42.37	43.50	54.99	54.70	61.42	50.80	67.16	72.34	-0.20
21.89	5.91	0.04	42.24	43.40	54.99	54.66	61.29	50.80	67.42	72.13	-0.20
22.05	5.90	0.04	42.25	43.58	54.97	54.70	61.43	50.83	67.27	72.27	-0.20
22.21	5.89	0.05	42.53	43.55	55.10	54.72	61.50	50.85	67.56	72.35	-0.20
22.37	5.93	0.05	42.59	44.03	54.69	54.71	61.52	50.88	67.45	72.08	-0.20
22.53	5.91	0.06	42.92	44.40	54.81	54.77	61.45	50.90	67.51	72.23	-0.20
22.68	5.92	0.06	43.09	44.65	54.91	54.67	61.51	50.90	66.98	72.20	-0.20
22.84	5.91	0.06	43.43	45.19	54.68	54.50	61.68	50.80	67.14	72.36	-0.20
23.00	5.92	0.06	43.40	45.23	54.83	54.26	61.73	50.82	66.93	72.22	-0.20

MIQA-10M/ZFMIQ-10M

9 to 1880 MHz







CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
9.00	5.75	0.05	35.58	36.08	57.16	56.84	59.79	50.88	67.42	70.24	0.08
9.11	5.74	0.05	35.91	36.34	57.12	57.23	60.05	50.93	67.39	70.97	0.08
9.21	5.76	0.05	36.15	36.57	56.98	57.32	59.95	50.99	67.41	70.92	0.08
9.32	5.75	0.05	36.38	36.88	57.33	56.88	59.83	51.01	67.29	71.08	0.08
9.42	5.75	0.05	36.60	37.17	57.09	57.26	60.02	51.06	67.09	71.26	0.08
9.53	5.75	0.04	36.86	37.38	57.33	57.59	60.13	51.09	67.20	71.66	0.08
9.63	5.74	0.04	37.17	37.62	57.47	57.27	59.87	51.10	67.03	72.10	0.08
9.74	5.75	0.04	37.33	37.84	57.23	56.86	60.06	51.10	66.99	71.83	0.08
9.84	5.74	0.04	37.40	37.92	56.85	57.27	60.39	51.30	67.19	72.23	0.08
9.95	5.74	0.05	37.79	38.40	56.95	57.76	60.28	51.26	67.45	69.86	0.08
10.05	5.74	0.06	37.97	38.68	56.95	56.86	60.29	51.26	67.15	70.00	0.08
10.16	5.74	0.06	38.14	38.80	56.73	57.25	60.17	51.25	67.47	73.11	0.08
10.26	5.77	0.06	38.39	38.96	56.82	57.24	60.15	51.31	67.55	72.08	0.08
10.37	5.76	0.07	38.69	39.40	56.82	57.23	59.95	51.30	67.32	71.97	0.08
10.47	5.78	0.06	38.88	39.56	56.64	57.39	59.91	51.25	67.51	72.22	0.09
10.58	5.77	0.06	39.02	39.64	56.96	57.09	60.13	51.32	67.43	72.29	0.09
10.68	5.75	0.06	39.12	39.63	56.83	57.08	60.23	51.32	67.66	72.08	0.09
10.79	5.78	0.07	39.25	39.80	57.09	57.23	60.03	51.30	67.29	72.10	0.09
10.89	5.79	0.07	39.53	40.09	56.74	57.01	59.84	51.21	67.74	71.68	0.09
11.00	5.78	0.07	39.79	40.25	56.63	57.17	59.63	51.17	67.13	72.17	0.09

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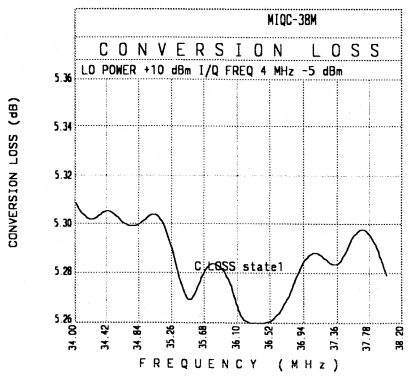
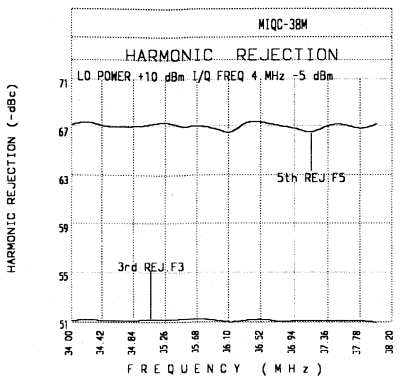
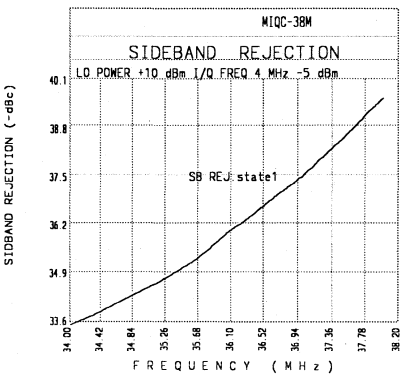
MIQC-38M

34 to 38 MHz



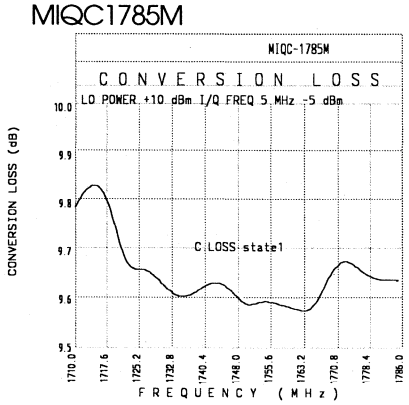


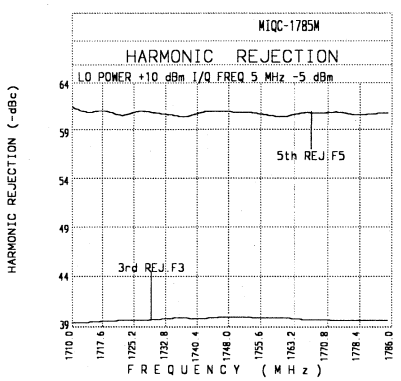


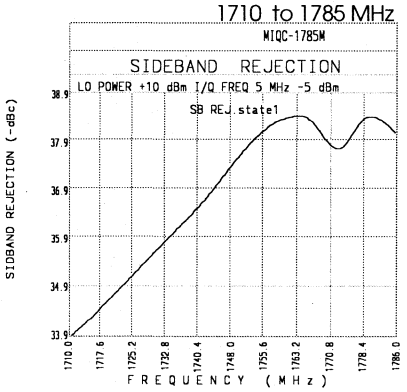
CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
34.00	5.29	0.05	39.17	38.87	46.34	47.31	55.47	54.15	67.08	66.75	-0.22
34.21	5.29	0.04	39.35	39.08	46.59	47.29	55.51	54.16	66.82	66.83	-0.22
34.42	5.30	0.04	39.50	39.23	46.54	47.40	55.60	54.13	66.90	66.90	-0.22
34.63	5.29	0.04	39.73	39.48	46.52	47.44	55.56	54.14	66.99	66.71	-0.22
34.84	5.29	0.04	39.92	39.73	46.53	47.35	55.83	54.08	67.10	66.65	-0.22
35.05	5.30	0.04	40.16	39.91	46.52	47.45	55.68	54.05	67.05	67.12	-0.22
35.26	5.28	0.04	40.37	40.18	46.48	47.22	55.58	54.02	67.02	67.03	-0.22
35.47	5.25	0.02	40.57	40.49	46.42	47.18	55.79	54.11	66.69	66.88	-0.22
35.68	5.27	0.02	40.83	40.69	46.45	47.32	55.55	53.98	67.09	66.99	-0.22
36.00	5.27	0.02	41.11	41.11	46.35	47.16	55.41	53.96	66.58	66.83	-0.21
36.11	5.27	0.03	41.22	41.18	46.45	47.08	55.38	53.95	66.69	67.02	-0.21
36.32	5.25	0.04	41.36	41.39	46.39	47.23	55.46	53.93	66.86	66.90	-0.21
36.53	5.26	0.03	41.51	41.61	46.29	47.30	55.43	53.90	66.70	66.84	-0.21
36.74	5.25	0.04	41.60	41.77	46.29	47.07	55.39	53.84	66.50	67.14	-0.21
36.95	5.28	0.04	41.69	41.91	46.23	47.28	55.30	53.81	66.54	66.91	-0.21
37.16	5.28	0.03	41.75	41.97	46.18	47.01	55.38	53.75	66.38	67.15	-0.21
37.37	5.29	0.04	41.78	42.01	46.21	47.11	55.34	53.75	66.91	67.28	-0.21
37.58	5.30	0.03	41.81	42.08	46.14	46.98	55.31	53.65	66.78	67.02	-0.21
37.79	5.28	0.04	41.79	42.11	46.18	47.00	55.48	53.70	66.81	66.90	-0.21
38.00	5.29	0.03	41.83	42.14	46.04	47.06	55.44	53.62	66.57	66.96	-0.21

MIQC1785M

1710 to 1785 MHz







CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
1710.00	9.37	0.36	35.84	36.70	32.00	32.14	39.59	39.09	61.39	64.29	-4.75
1713.95	9.36	0.38	35.67	36.50	32.40	32.37	39.64	39.11	61.31	64.55	-4.77
1717.89	9.37	0.37	35.55	36.27	32.83	32.64	39.72	38.99	61.19	64.76	-4.79
1721.84	9.31	0.33	35.42	36.08	33.37	32.96	39.78	39.11	61.05	64.38	-4.82
1725.79	9.33	0.33	35.32	36.03	33.98	33.24	39.80	39.10	61.03	64.90	-4.85
1729.74	9.30	0.33	35.28	35.90	34.32	33.60	39.77	39.14	61.00	64.31	-4.88
1733.68	9.27	0.33	35.26	35.75	34.74	33.92	39.82	39.28	61.08	64.22	-4.91
1737.63	9.29	0.32	35.17	35.70	34.90	34.02	39.94	39.27	61.30	63.97	-4.94
1741.58	9.30	0.33	35.15	35.67	34.89	33.89	39.97	39.44	61.04	63.94	-4.97
1745.53	9.32	0.29	35.10	35.62	34.71	33.65	40.03	39.41	61.36	64.21	-4.99
1749.47	9.26	0.31	35.04	35.64	34.49	33.31	40.09	39.52	61.19	64.12	-5.02
1753.42	9.27	0.31	35.01	35.62	34.30	33.04	40.12	39.54	61.29	64.14	-5.04
1757.37	9.23	0.32	34.84	35.51	34.12	32.75	40.08	39.66	60.98	63.96	-5.05
1761.32	9.23	0.32	34.75	35.39	34.05	32.59	40.12	39.66	61.08	63.99	-5.05
1765.26	9.22	0.31	34.56	35.24	34.00	32.43	39.99	39.69	60.99	63.89	-5.04
1769.21	9.25	0.33	34.37	34.96	33.99	32.19	39.96	39.63	60.93	63.66	-5.02
1773.16	9.27	0.33	34.11	34.72	34.01	32.12	39.93	39.56	60.90	63.56	-4.99
1777.11	9.23	0.33	34.12	34.76	33.89	31.89	40.00	39.64	61.14	63.97	-5.03
1781.05	9.23	0.33	33.91	34.55	33.94	31.86	39.98	39.59	60.75	63.76	-4.99
1785.00	9.23	0.33	33.69	34.24	34.05	31.83	39.93	39.57	61.03	63.67	-4.94

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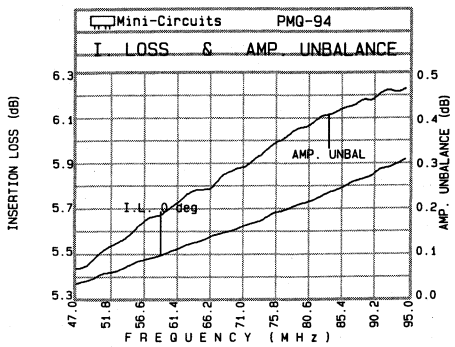
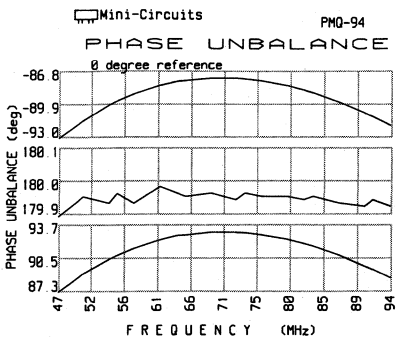
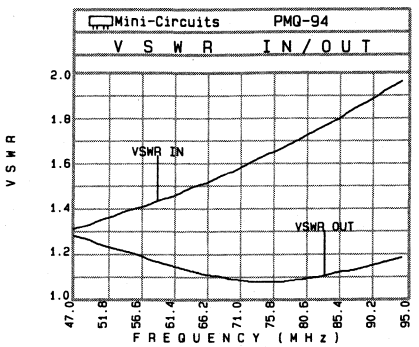
QPSK Modulators

PMQ-94

47 to 94 MHz



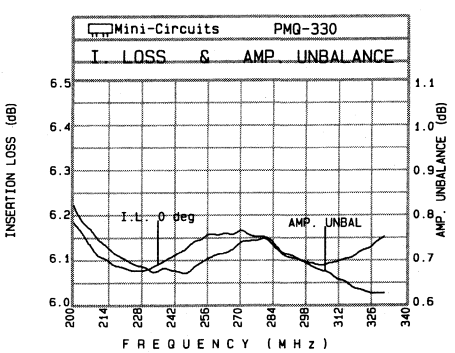


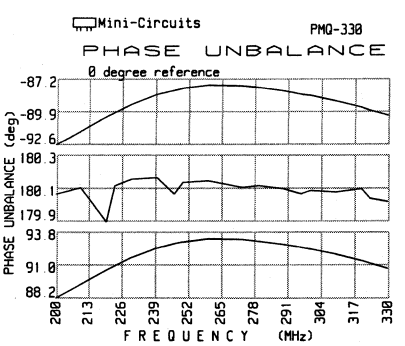


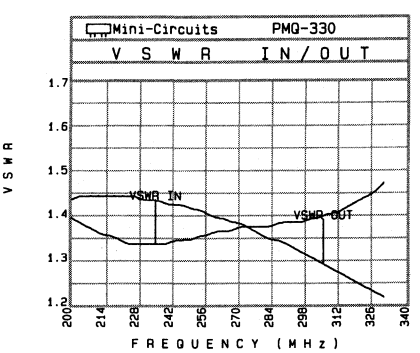
Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°	In	Out
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
47.000	5.31	0.09	0.120	87.57	179.95	-92.70	1.30	1.29
50.643	5.36	0.09	0.150	89.34	180.01	-91.02	1.34	1.25
54.285	5.39	0.09	0.160	90.73	179.99	-89.58	1.38	1.21
55.460	5.40	0.09	0.160	91.12	180.02	-89.20	1.39	1.20
57.810	5.42	0.09	0.180	91.78	179.99	-88.55	1.42	1.18
61.453	5.45	0.10	0.190	92.59	180.04	-87.76	1.46	1.15
63.920	5.48	0.10	0.210	93.01	180.02	-87.37	1.49	1.13
65.095	5.49	0.10	0.210	93.05	180.01	-87.31	1.51	1.12
68.738	5.52	0.10	0.230	93.33	180.02	-87.09	1.56	1.09
72.263	5.56	0.11	0.250	93.32	180.00	-87.09	1.61	1.07
73.555	5.57	0.11	0.250	93.27	180.02	-87.16	1.62	1.07
75.905	5.60	0.11	0.270	93.07	180.01	-87.34	1.66	1.07
79.548	5.64	0.11	0.280	92.65	180.01	-87.79	1.72	1.08
81.897	5.66	0.12	0.300	92.24	180.00	-88.21	1.76	1.08
83.190	5.68	0.12	0.290	91.99	180.01	-88.48	1.78	1.09
86.715	5.72	0.12	0.320	91.15	179.99	-89.34	1.84	1.11
90.358	5.77	0.13	0.340	90.06	179.98	-90.38	1.91	1.14
91.533	5.78	0.13	0.350	89.73	180.00	-90.73	1.93	1.15
92.825	5.80	0.13	0.350	89.30	179.99	-91.18	1.95	1.16
94.000	5.82	0.13	0.350	88.93	179.98	-91.56	1.97	1.17

PMQ-330

200 to 330 MHz







Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°	In	Out
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
200.000	6.07	0.14	0.640	88.47	180.06	-92.35	1.47	1.47
210.075	5.98	0.14	0.550	89.63	180.10	-91.25	1.43	1.47
220.150	5.93	0.14	0.490	90.83	179.89	-90.05	1.41	1.47
223.400	5.92	0.15	0.480	91.18	180.11	-89.71	1.40	1.47
229.900	5.91	0.15	0.460	91.88	180.15	-89.04	1.40	1.46
239.975	5.93	0.15	0.440	92.70	180.16	-88.22	1.39	1.45
246.800	5.95	0.15	0.440	93.08	180.06	-87.89	1.40	1.45
250.050	5.96	0.16	0.450	93.22	180.13	-87.72	1.40	1.44
260.125	5.97	0.16	0.460	93.50	180.14	-87.47	1.40	1.42
269.875	5.96	0.16	0.460	93.46	180.11	-87.51	1.40	1.40
273.450	5.94	0.17	0.460	93.43	180.10	-87.53	1.40	1.39
279.950	5.93	0.18	0.460	93.26	180.11	-87.67	1.39	1.38
290.025	5.88	0.18	0.430	92.99	180.09	-87.97	1.38	1.35
296.525	5.86	0.19	0.420	92.76	180.06	-88.24	1.38	1.33
300.100	5.85	0.19	0.410	92.61	180.08	-88.33	1.38	1.32
309.850	5.85	0.20	0.410	92.17	180.07	-88.80	1.38	1.29
319.925	5.86	0.21	0.410	91.60	180.09	-89.33	1.40	1.26
323.175	5.86	0.21	0.410	91.38	180.03	-89.59	1.41	1.25
326.750	5.88	0.21	0.420	91.14	180.03	-89.78	1.41	1.24
330.000	5.88	0.22	0.430	90.93	180.01	-89.99	1.43	1.23

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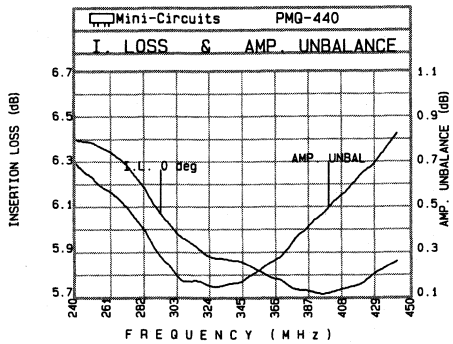
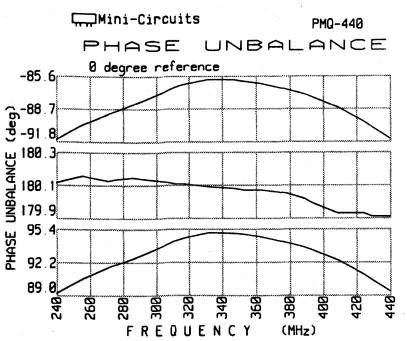
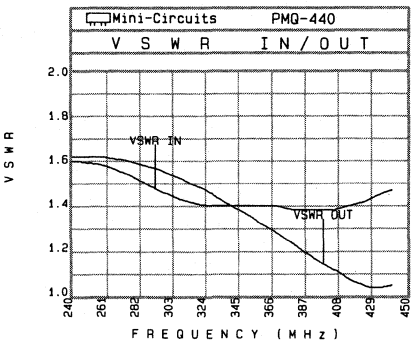
Mini-Circuits

PMQ-440

240 to 440 MHz



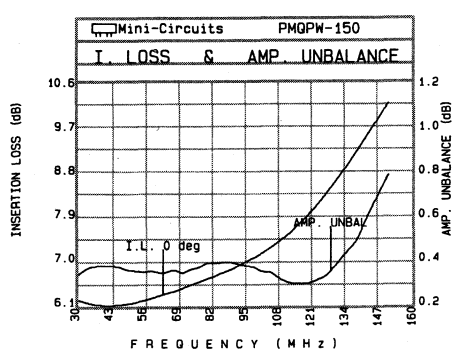


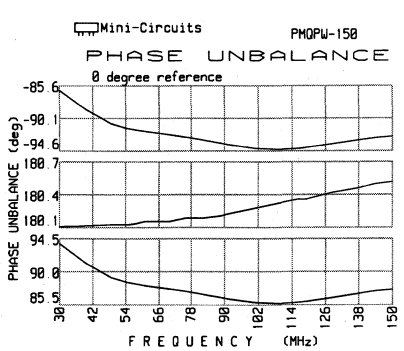


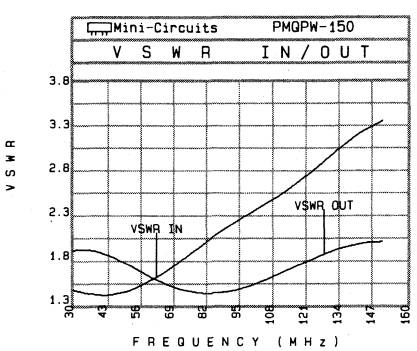
Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°	In	Out
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
240.000	6.40	0.10	0.600	89.33	180.13	-91.54	1.65	1.67
255.500	6.36	0.10	0.510	90.71	180.17	-90.15	1.63	1.67
271.000	6.27	0.11	0.390	91.83	180.14	-89.12	1.60	1.66
276.000	6.23	0.11	0.350	92.10	180.15	-88.83	1.58	1.65
286.000	6.11	0.11	0.290	92.70	180.16	-88.19	1.54	1.63
301.500	5.95	0.10	0.290	93.70	180.14	-87.24	1.48	1.58
312.000	5.89	0.10	0.310	94.37	180.12	-86.58	1.45	1.55
317.000	5.86	0.10	0.310	94.61	180.12	-86.34	1.44	1.53
332.500	5.82	0.10	0.340	95.13	180.10	-85.87	1.43	1.47
347.500	5.78	0.10	0.380	95.07	180.09	-85.90	1.43	1.40
353.000	5.76	0.10	0.410	94.98	180.08	-86.05	1.43	1.37
363.000	5.71	0.10	0.480	94.72	180.08	-86.27	1.42	1.33
378.500	5.64	0.10	0.600	94.15	180.06	-86.82	1.41	1.25
388.500	5.63	0.10	0.680	93.73	180.03	-87.24	1.40	1.20
394.000	5.62	0.11	0.710	93.42	180.00	-87.57	1.40	1.18
409.000	5.65	0.11	0.820	92.48	179.94	-88.52	1.41	1.12
424.500	5.69	0.13	0.920	91.06	179.94	-89.91	1.44	1.07
429.500	5.71	0.13	0.970	90.53	179.92	-90.45	1.46	1.07
435.000	5.73	0.14	1.020	89.99	179.93	-91.02	1.48	1.07
440.000	5.75	0.15	1.080	89.46	179.92	-91.52	1.50	1.08

PMQPW-150

30 to 150 MHz







Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°	In	Out
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
30.000	6.22	0.07	0.310	93.98	180.09	-85.97	1.48	1.90
39.300	6.11	0.07	0.360	91.35	180.10	-88.60	1.41	1.90
48.600	6.15	0.07	0.330	89.38	180.11	-90.57	1.42	1.79
54.600	6.22	0.06	0.320	88.73	180.11	-91.24	1.48	1.70
57.600	6.26	0.07	0.310	88.53	180.12	-91.45	1.52	1.66
60.900	6.31	0.06	0.310	88.31	180.14	-91.64	1.57	1.61
69.900	6.45	0.06	0.290	87.85	180.14	-92.11	1.73	1.50
76.200	6.57	0.04	0.300	87.51	180.17	-92.47	1.86	1.46
82.200	6.67	0.05	0.290	87.12	180.17	-92.87	1.98	1.44
88.500	6.79	0.05	0.280	86.69	180.19	-93.31	2.10	1.45
91.500	6.87	0.05	0.250	86.48	180.21	-93.53	2.15	1.47
100.800	7.11	0.08	0.210	86.01	180.26	-94.03	2.30	1.54
110.100	7.43	0.11	0.170	85.86	180.31	-94.18	2.45	1.66
116.100	7.70	0.13	0.170	85.99	180.34	-94.06	2.57	1.75
119.100	7.86	0.15	0.160	86.12	180.34	-93.93	2.63	1.79
128.400	8.44	0.20	0.170	86.63	180.40	-93.43	2.83	1.92
137.700	9.12	0.26	0.230	87.20	180.44	-92.90	3.04	2.02
143.700	9.59	0.29	0.340	87.54	180.48	-92.60	3.14	2.06
147.000	9.86	0.32	0.410	87.66	180.48	-92.49	3.19	2.07
150.000	10.09	0.32	0.480	87.73	180.50	-92.40	3.23	2.08

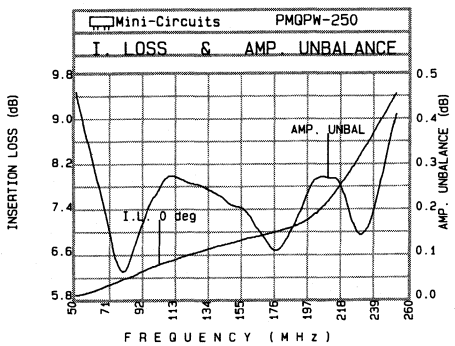
In Stock...Immediate Delivery

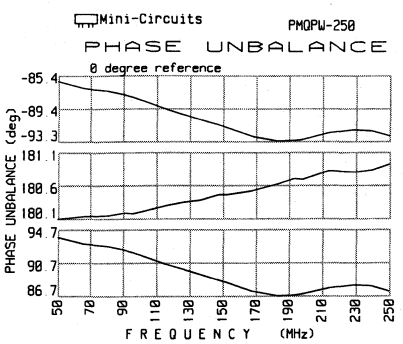
wideband, 360° in 90° steps

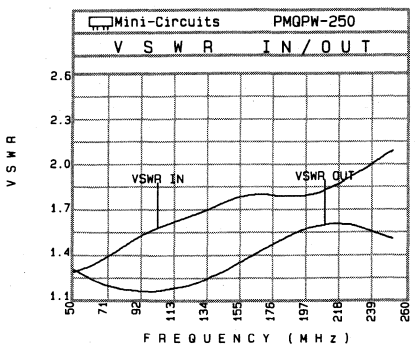
QPSK Modulators

PMQPW-250

50 to 250 MHz



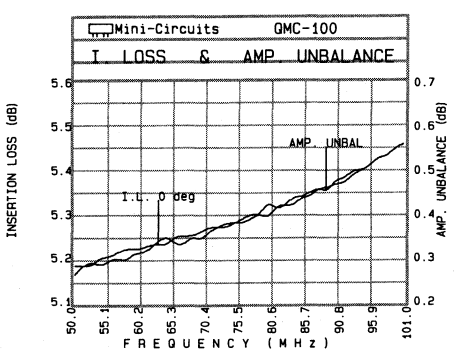


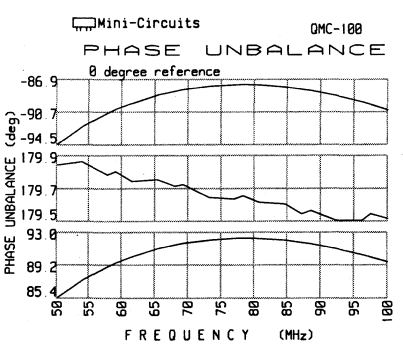


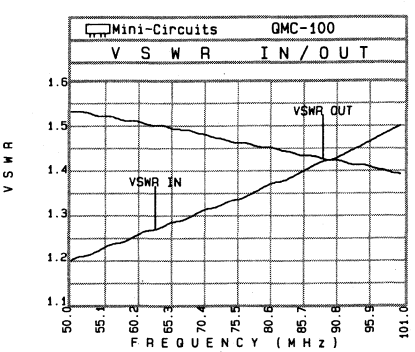
Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°		
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	In $\bar{x}$	Out $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
50.000	5.91	0.22	0.650	94.17	180.17	-85.82	1.28	1.30
65.500	5.98	0.12	0.410	93.39	180.21	-86.63	1.35	1.21
81.000	6.13	0.06	0.190	93.06	180.22	-87.00	1.45	1.16
91.000	6.23	0.08	0.170	92.64	180.26	-87.45	1.52	1.15
96.000	6.28	0.10	0.200	92.33	180.25	-87.74	1.54	1.15
101.500	6.33	0.11	0.220	91.97	180.28	-88.11	1.57	1.16
116.500	6.48	0.12	0.250	90.91	180.37	-89.17	1.61	1.18
127.000	6.56	0.11	0.220	90.28	180.42	-89.84	1.64	1.21
137.000	6.65	0.10	0.210	89.66	180.45	-90.44	1.67	1.26
147.500	6.72	0.10	0.210	89.00	180.53	-91.04	1.69	1.30
152.500	6.74	0.10	0.220	88.71	180.53	-91.37	1.70	1.33
168.000	6.84	0.10	0.280	87.63	180.59	-92.41	1.69	1.41
183.500	6.94	0.15	0.410	87.06	180.69	-92.97	1.65	1.49
193.500	7.07	0.21	0.520	87.14	180.77	-92.91	1.64	1.53
198.500	7.15	0.23	0.570	87.30	180.76	-92.80	1.64	1.55
214.000	7.55	0.30	0.620	87.99	180.89	-92.01	1.69	1.57
229.500	8.10	0.34	0.550	88.35	180.87	-91.64	1.78	1.55
239.500	8.49	0.38	0.510	88.24	180.90	-91.77	1.84	1.52
245.000	8.70	0.39	0.500	87.99	181.00	-91.99	1.88	1.50
250.000	8.91	0.41	0.480	87.59	180.99	-92.36	1.92	1.48

QMC-100

50 to 100 MHz







Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				@ 90°	@ 180°	@ -90°		
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	In $\bar{x}$	Out $\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
50.000	5.20	0.06	0.200	85.71	179.87	-94.13	1.21	1.56
53.875	5.22	0.06	0.200	87.69	179.89	-92.10	1.23	1.56
57.750	5.24	0.06	0.210	89.23	179.81	-90.55	1.25	1.54
59.000	5.25	0.06	0.210	89.67	179.83	-90.09	1.25	1.54
61.500	5.26	0.06	0.220	90.39	179.77	-89.41	1.27	1.53
65.375	5.28	0.07	0.230	91.32	179.78	-88.44	1.28	1.52
68.000	5.29	0.08	0.240	91.77	179.74	-88.02	1.30	1.51
69.250	5.30	0.07	0.250	91.98	179.75	-87.82	1.30	1.51
73.125	5.32	0.08	0.260	92.32	179.67	-87.45	1.32	1.50
76.875	5.34	0.08	0.280	92.52	179.66	-87.30	1.34	1.48
78.250	5.34	0.08	0.280	92.55	179.68	-87.25	1.35	1.48
80.750	5.36	0.08	0.290	92.50	179.64	-87.30	1.36	1.47
84.625	5.39	0.09	0.320	92.32	179.63	-87.55	1.38	1.46
87.125	5.41	0.10	0.330	92.04	179.57	-87.83	1.40	1.45
88.500	5.42	0.10	0.330	91.90	179.59	-87.97	1.40	1.45
92.250	5.45	0.10	0.350	91.31	179.53	-88.56	1.43	1.43
96.125	5.49	0.11	0.390	90.61	179.53	-89.30	1.45	1.42
97.375	5.49	0.11	0.400	90.35	179.57	-89.57	1.46	1.42
98.750	5.51	0.11	0.400	90.00	179.52	-89.94	1.47	1.41
100.000	5.52	0.10	0.420	89.78	179.54	-90.23	1.48	1.41

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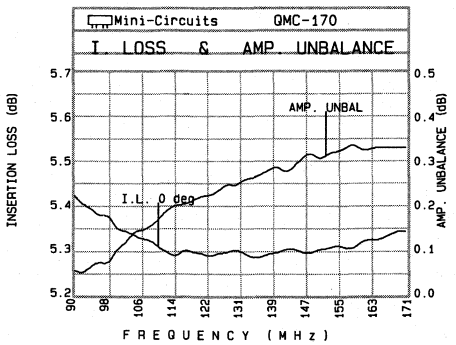
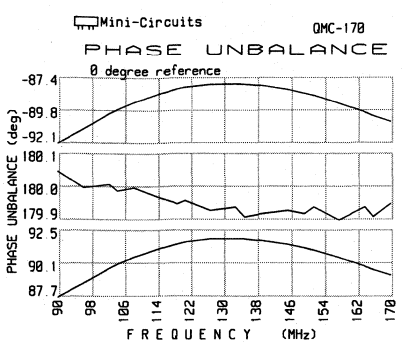
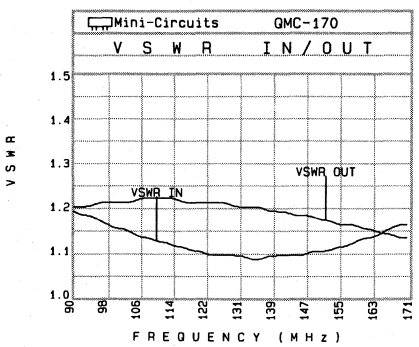
Mini-Circuits

QMC-170

90 to 170 MHz



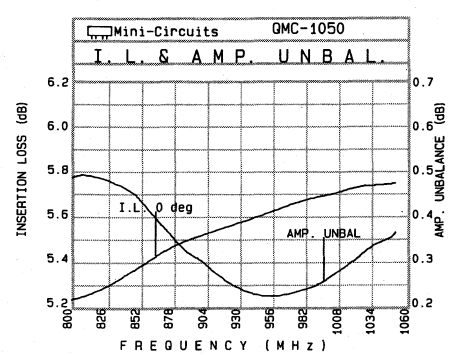


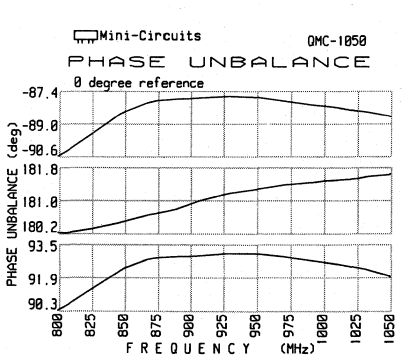


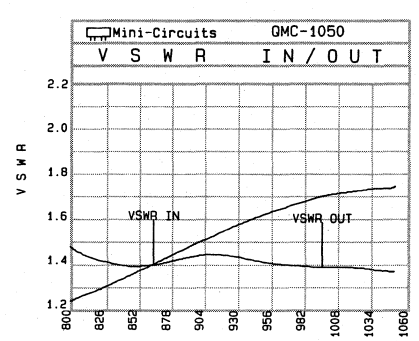
Freq.	Ins. Loss		Amp. Unbal	Phase Unbal			VSWR	
				90°	180°	-90°	In	Out
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
90.000	5.49	0.09	0.130	87.93	180.02	-91.89	1.22	1.20
96.200	5.44	0.08	0.100	88.95	179.97	-90.86	1.20	1.21
102.400	5.40	0.07	0.100	90.01	179.98	-89.76	1.18	1.22
104.400	5.38	0.07	0.100	90.32	179.96	-89.47	1.17	1.22
108.400	5.36	0.06	0.120	90.85	179.97	-88.94	1.16	1.22
114.600	5.33	0.06	0.160	91.47	179.94	-88.32	1.14	1.22
118.800	5.32	0.05	0.180	91.77	179.92	-88.00	1.13	1.22
120.800	5.32	0.05	0.190	91.91	179.93	-87.88	1.13	1.22
127.000	5.31	0.04	0.230	92.13	179.90	-87.68	1.12	1.22
133.000	5.30	0.05	0.250	92.14	179.91	-87.65	1.12	1.22
135.200	5.29	0.04	0.270	92.13	179.88	-87.68	1.12	1.22
139.200	5.31	0.05	0.290	92.01	179.89	-87.77	1.12	1.21
145.400	5.31	0.04	0.310	91.74	179.90	-88.06	1.13	1.20
149.400	5.31	0.04	0.320	91.49	179.89	-88.34	1.14	1.20
151.600	5.32	0.04	0.330	91.32	179.91	-88.49	1.14	1.20
157.600	5.31	0.03	0.360	90.78	179.87	-89.06	1.16	1.19
163.800	5.32	0.04	0.370	90.14	179.91	-89.69	1.17	1.17
165.800	5.33	0.04	0.380	89.89	179.88	-89.95	1.18	1.17
168.000	5.33	0.05	0.380	89.67	179.88	-90.19	1.19	1.16
170.000	5.33	0.04	0.380	89.48	179.92	-90.37	1.20	1.16

QMC-1050, ZMQ-1050

800 to 1050 MHz





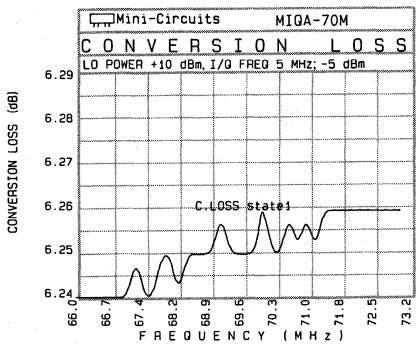


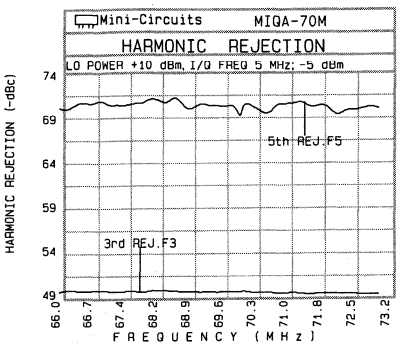
Freq.	Ins.Loss		Amp.Unbal	Phase Unbal			VSWR	
				90°	180°	−90°		
	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(Deg.)	(Deg.)		
800.000	5.33	0.21	0.550	90.43	180.31	-90.46	1.20	1.45
806.500	5.34	0.20	0.550	90.65	180.30	-90.22	1.21	1.44
825.750	5.38	0.19	0.540	91.46	180.40	-89.37	1.25	1.41
846.750	5.44	0.17	0.510	92.33	180.55	-88.42	1.30	1.42
850.250	5.45	0.17	0.510	92.47	180.58	-88.31	1.30	1.43
867.750	5.51	0.16	0.490	92.89	180.73	-87.87	1.35	1.46
874.750	5.52	0.16	0.490	92.97	180.77	-87.76	1.37	1.48
888.750	5.56	0.15	0.480	93.03	180.87	-87.69	1.41	1.51
899.250	5.58	0.14	0.480	93.04	180.98	-87.67	1.43	1.53
908.000	5.60	0.14	0.470	93.07	181.08	-87.63	1.46	1.54
929.000	5.66	0.14	0.470	93.18	181.26	-87.56	1.51	1.55
950.000	5.70	0.14	0.460	93.17	181.36	-87.60	1.56	1.53
971.000	5.74	0.14	0.460	93.03	181.47	-87.78	1.61	1.53
992.000	5.79	0.14	0.480	92.84	181.53	-87.97	1.64	1.53
1000.750	5.81	0.14	0.490	92.76	181.57	-88.02	1.65	1.53
1011.250	5.84	0.14	0.510	92.66	181.59	-88.10	1.66	1.53
1025.250	5.87	0.14	0.550	92.50	181.62	-88.26	1.68	1.54
1032.250	5.88	0.15	0.570	92.42	181.67	-88.31	1.68	1.53
1049.750	5.91	0.15	0.610	92.10	181.72	-88.51	1.69	1.52
1050.000	5.92	0.14	0.620	92.04	181.75	-88.55	1.70	1.52

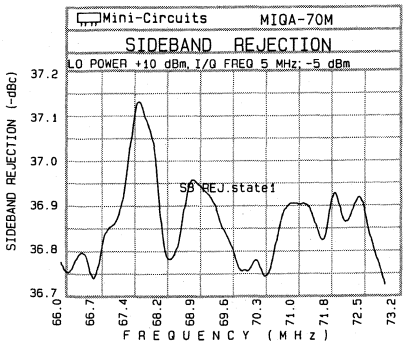
high rejection of carrier and sideband
I&Q Modulator

MIQA-70M, MIQY-70M

66 to 73 MHz



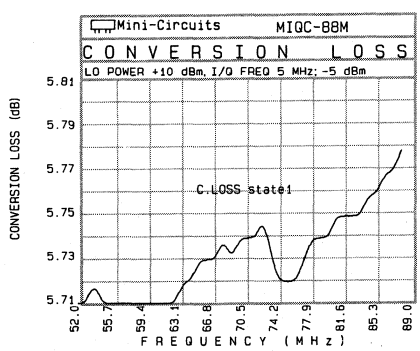


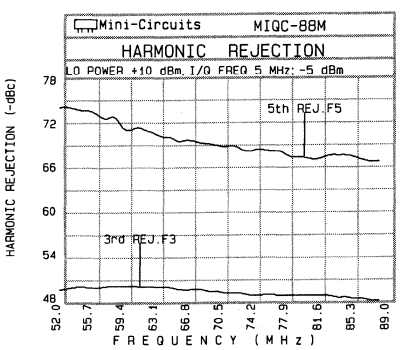


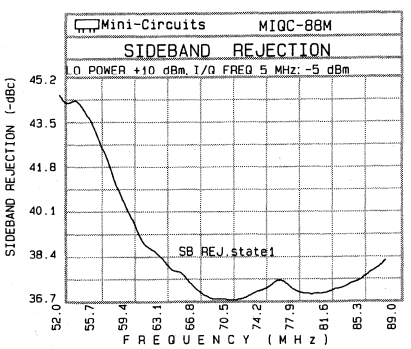
CARRIER Freq. (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ (mV)
66.0	6.17	0.05	35.29	37.71	52.10	52.12	49.98	58.32	70.26	63.44	0.16
66.6	6.17	0.05	35.42	37.86	52.24	52.25	49.94	58.19	70.66	63.23	0.17
67.1	6.18	0.05	35.54	37.94	52.08	52.10	49.92	58.28	70.10	63.32	0.16
67.3	6.18	0.05	35.60	38.01	52.04	52.18	49.96	58.56	70.22	63.16	0.16
67.7	6.18	0.04	35.75	38.10	51.90	52.23	50.00	58.39	70.26	63.53	0.16
68.2	6.18	0.04	35.77	38.34	52.02	52.06	50.04	58.58	69.94	63.42	0.17
68.6	6.19	0.05	35.84	38.47	51.96	51.92	49.98	58.56	70.08	63.30	0.17
68.8	6.19	0.04	35.90	38.56	51.94	51.98	49.94	58.40	69.94	63.38	0.16
69.3	6.19	0.04	36.01	38.78	51.86	51.92	50.02	58.34	69.74	63.20	0.17
69.9	6.19	0.05	36.08	38.87	51.70	51.83	50.00	58.31	69.98	63.15	0.17
70.0	6.19	0.05	36.11	38.94	51.84	52.10	49.86	58.20	69.30	63.12	0.17
70.2	6.19	0.04	36.15	38.88	51.74	51.75	49.96	58.31	70.10	63.29	0.17
70.8	6.19	0.04	36.23	38.93	51.83	51.91	49.83	58.19	69.89	63.33	0.17
71.2	6.19	0.05	36.27	39.08	51.72	51.81	49.92	58.05	69.58	63.05	0.17
71.3	6.19	0.05	36.35	39.13	51.61	51.85	49.71	58.23	70.09	63.13	0.17
71.9	6.20	0.04	36.45	39.21	51.62	51.79	49.72	57.95	70.46	63.29	0.17
72.5	6.20	0.04	36.51	39.21	51.59	51.58	49.75	57.72	70.21	62.82	0.17
72.6	6.20	0.04	36.49	39.35	51.45	51.67	49.71	57.71	69.69	62.77	0.17
72.8	6.20	0.04	36.48	39.38	51.33	51.56	49.75	57.66	69.45	62.84	0.17
73.0	6.20	0.04	36.53	39.39	51.37	51.38	49.67	57.66	69.55	62.98	0.17

MIQC-88M

52 to 88 MHz







CARRIER Freq. (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ (mV)
52.0	5.69	0.02	42.86	39.69	44.15	44.21	50.41	58.95	77.85	66.29	-0.10
54.7	5.69	0.03	41.30	38.12	43.80	43.74	50.66	59.53	76.40	65.83	-0.10
57.4	5.69	0.03	39.19	36.53	43.49	43.35	50.60	59.64	75.26	65.54	-0.09
59.2	5.69	0.03	37.98	35.67	43.26	43.28	50.57	59.53	74.57	65.23	-0.09
60.1	5.69	0.03	37.56	35.29	43.06	43.04	50.56	59.19	74.22	65.09	-0.09
62.8	5.69	0.03	36.43	34.51	42.85	42.71	50.32	59.20	73.56	64.62	-0.09
65.5	5.70	0.03	35.96	33.92	42.53	42.59	50.00	58.97	72.38	64.13	-0.09
67.3	5.71	0.03	35.66	33.67	42.39	42.38	49.89	58.76	72.39	64.00	-0.08
68.2	5.71	0.03	35.53	33.66	42.24	42.26	49.73	58.45	72.11	63.79	-0.08
70.9	5.72	0.03	35.54	33.66	41.98	42.01	49.49	57.70	71.65	63.68	-0.08
73.6	5.70	0.03	35.91	33.98	41.52	41.53	49.28	56.96	71.88	63.48	-0.07
75.4	5.69	0.03	36.14	34.00	41.37	41.34	49.27	56.68	71.35	63.24	-0.07
76.3	5.69	0.03	36.16	34.06	41.27	41.25	49.32	56.64	71.22	63.20	-0.07
79.0	5.71	0.03	35.95	34.02	41.12	41.10	49.29	56.42	70.83	62.88	-0.08
81.7	5.72	0.03	36.05	34.11	40.95	40.92	49.23	56.37	70.21	62.83	-0.08
83.5	5.72	0.03	36.14	34.25	40.81	40.82	49.00	56.26	70.28	62.68	-0.08
84.4	5.73	0.03	36.34	34.38	40.78	40.77	48.99	56.14	69.77	62.76	-0.08
86.2	5.74	0.03	36.84	34.71	40.75	40.69	48.73	55.97	69.85	62.71	-0.09
87.1	5.74	0.03	36.99	34.87	40.69	40.67	48.44	55.69	69.56	62.69	-0.09
88.0	5.75	0.03	37.34	35.01	40.64	40.65	48.44	55.49	69.84	62.83	-0.08

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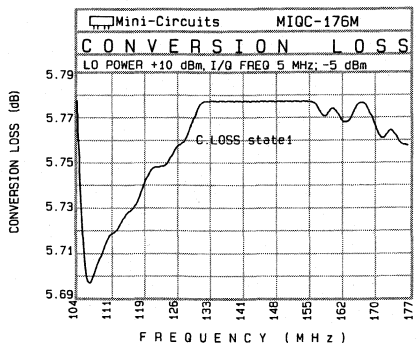
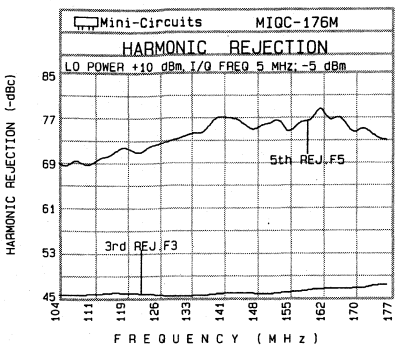
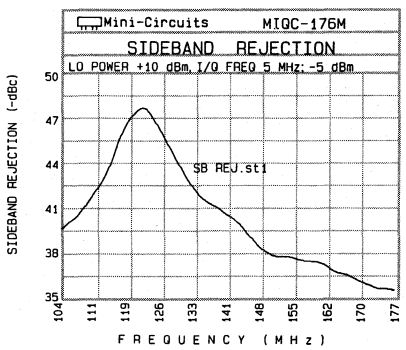
MIQC-176M

104 to 176 MHz



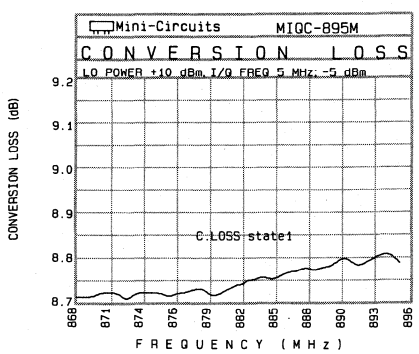


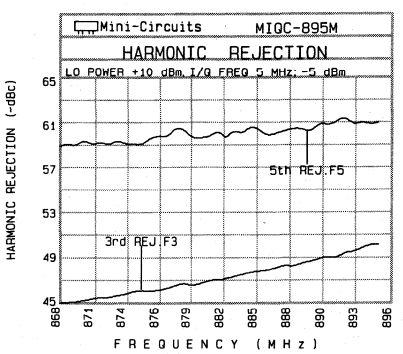


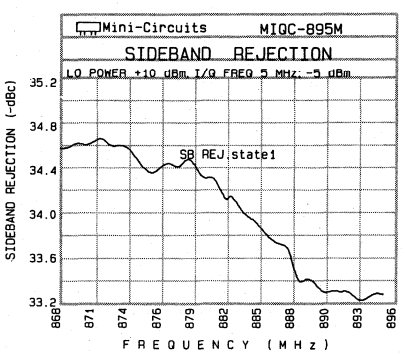
CARRIER Freq. (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
104.0	5.75	0.02	44.00	40.36	39.60	39.63	46.08	50.09	71.54	64.27	-0.12
109.4	5.74	0.04	43.65	39.80	39.30	39.32	46.33	50.87	72.31	64.71	-0.11
114.8	5.72	0.04	46.03	39.54	38.98	38.99	46.63	51.30	73.65	64.68	-0.11
118.4	5.73	0.03	46.55	39.15	38.72	38.76	46.75	51.20	74.99	64.74	-0.11
120.2	5.73	0.03	46.21	38.88	38.66	38.68	46.88	51.14	75.24	64.26	-0.11
125.6	5.72	0.03	43.79	37.74	38.38	38.41	46.71	51.25	76.05	64.77	-0.11
131.0	5.74	0.03	41.41	36.65	38.11	38.16	46.80	51.78	76.42	65.40	-0.11
134.6	5.75	0.03	39.82	35.86	37.98	38.02	46.93	52.13	77.57	65.53	-0.10
136.4	5.75	0.03	39.31	35.61	37.90	37.97	47.01	52.05	76.99	65.63	-0.10
141.8	5.75	0.03	38.19	35.02	37.65	37.74	47.45	52.38	77.87	66.22	-0.12
147.2	5.75	0.03	36.87	34.30	37.46	37.58	47.53	52.93	77.43	65.79	-0.09
150.8	5.76	0.03	36.55	34.12	37.40	37.49	47.54	53.01	77.12	66.03	-0.08
152.6	5.75	0.03	36.56	34.13	37.37	37.47	47.87	53.14	76.91	65.90	-0.10
158.0	5.75	0.02	36.53	34.07	37.23	37.34	48.53	54.08	76.27	65.56	-0.08
163.4	5.75	0.02	36.15	34.03	37.17	37.29	49.21	56.24	75.31	65.88	-0.08
167.0	5.75	0.03	36.09	34.06	37.22	37.29	49.33	56.91	74.11	65.51	-0.09
168.8	5.75	0.02	36.03	34.16	37.16	37.30	49.47	56.85	73.67	65.43	-0.09
172.4	5.75	0.02	36.00	34.31	37.12	37.27	50.03	57.15	73.61	66.29	-0.09
174.2	5.74	0.02	36.25	34.46	37.14	37.27	50.26	57.25	73.42	65.85	-0.08
176.0	5.74	0.02	36.38	34.68	37.12	37.25	50.39	57.13	72.67	65.63	-0.08

MIQC-895M/ZAMIQ-895M

868 to 895 MHz







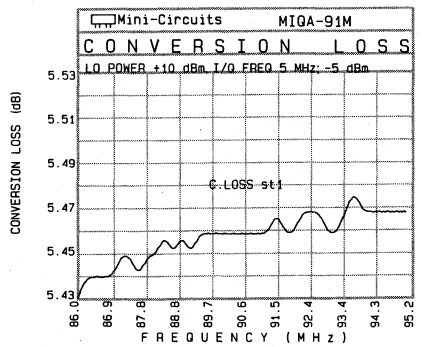
CARRIER Freq. (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
868.0	8.64	0.06	40.37	39.42	40.28	40.16	46.63	44.24	59.35	62.87	-1.24
870.1	8.65	0.06	40.44	39.60	40.36	40.27	46.71	44.38	59.33	63.25	-1.23
872.3	8.66	0.04	40.41	39.49	40.37	40.45	46.95	44.52	59.48	62.84	-1.23
873.0	8.67	0.05	40.42	39.34	40.48	40.50	47.02	44.51	59.52	62.94	-1.23
874.4	8.67	0.05	40.80	39.30	40.45	40.46	47.21	44.68	59.44	62.90	-1.23
876.5	8.68	0.05	40.96	39.03	40.61	40.68	47.35	44.85	59.78	63.10	-1.22
877.9	8.69	0.04	40.97	38.86	40.65	40.77	47.56	45.02	59.79	62.97	-1.24
878.7	8.69	0.04	41.04	38.97	40.72	40.78	47.62	45.16	59.91	62.83	-1.24
880.8	8.69	0.04	41.23	38.95	40.96	41.03	47.85	45.23	60.03	63.19	-1.23
882.2	8.70	0.04	41.39	38.79	40.94	40.96	48.04	45.38	59.82	63.02	-1.22
882.9	8.71	0.04	41.46	38.73	40.98	41.04	48.15	45.51	60.04	63.04	-1.23
884.3	8.70	0.04	41.69	38.80	41.22	41.17	48.41	45.63	60.30	63.38	-1.22
886.5	8.73	0.04	41.24	38.56	41.27	41.07	48.52	45.76	59.96	62.74	-1.24
887.9	8.72	0.04	41.92	38.57	41.54	41.28	48.70	45.92	60.17	62.61	-1.23
888.6	8.73	0.04	41.48	38.50	41.55	41.22	48.75	46.03	60.16	62.54	-1.23
890.7	8.75	0.04	41.30	38.38	41.60	41.30	48.99	46.19	60.01	62.41	-1.24
892.9	8.75	0.04	41.13	38.40	41.87	41.39	49.19	46.47	59.93	62.57	-1.26
893.6	8.76	0.04	40.96	38.38	42.02	41.37	49.20	46.48	59.96	62.14	-1.26
894.3	8.77	0.04	40.78	38.18	42.08	41.39	49.24	46.54	59.88	61.92	-1.27
895.0	8.75	0.04	40.87	38.27	42.42	41.73	49.31	46.61	60.07	62.33	-1.26

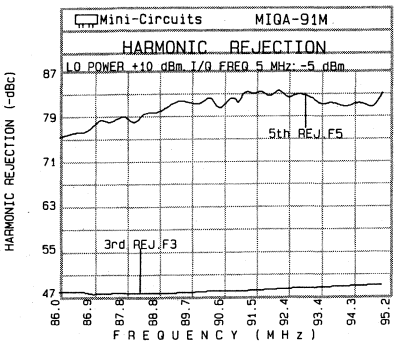
high rejection of carrier and sideband

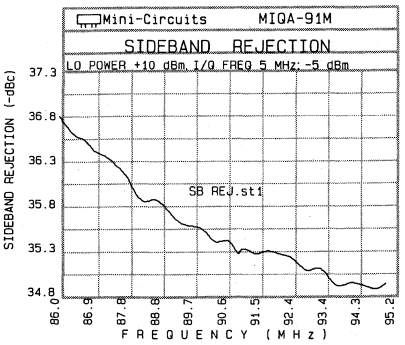
I&Q Modulator

MIQA-91M, ZFMIQ-91M

86 to 95 MHz



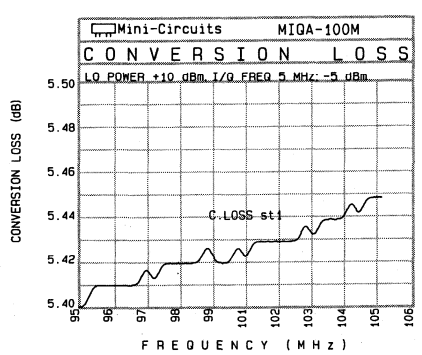


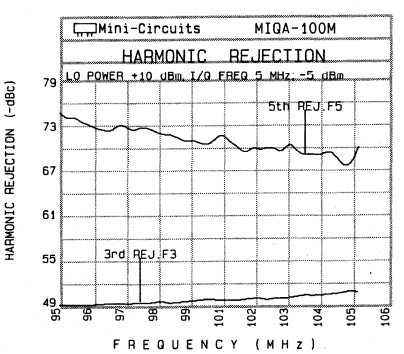


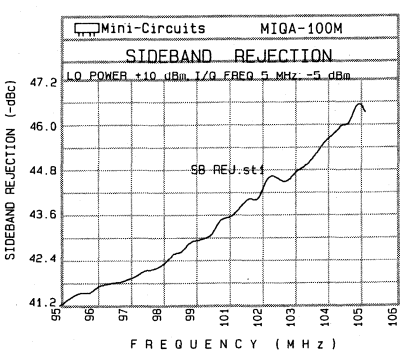
CARRIER Frequency (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
86.0	5.43	0.01	38.25	38.49	47.39	47.41	47.59	53.41	75.27	77.69	0.37
86.7	5.44	0.02	38.88	38.76	47.31	47.24	47.45	53.41	76.83	78.37	0.36
87.4	5.44	0.02	39.63	39.13	47.26	46.98	47.43	53.21	78.67	79.85	0.36
87.7	5.44	0.01	39.92	39.24	47.12	47.06	47.47	53.28	78.61	80.58	0.36
88.1	5.44	0.02	40.07	39.46	47.09	47.03	47.47	53.36	79.35	80.87	0.36
88.8	5.45	0.01	40.65	40.03	47.07	47.04	47.61	53.31	81.11	82.87	0.37
89.3	5.45	0.02	40.92	40.31	46.95	46.77	47.57	53.45	82.03	82.83	0.37
89.6	5.45	0.02	41.33	40.49	46.93	46.95	47.69	53.41	82.17	83.19	0.36
90.3	5.45	0.02	41.81	40.74	46.86	46.89	47.83	53.73	82.93	83.93	0.36
91.0	5.45	0.02	41.90	41.32	46.84	46.76	47.93	53.87	81.69	82.39	0.36
91.0	5.45	0.02	42.04	41.44	46.86	46.74	47.95	53.85	81.69	83.45	0.36
91.4	5.46	0.02	42.53	41.58	46.81	46.63	47.98	54.05	81.60	81.45	0.37
92.2	5.45	0.02	42.75	42.00	46.56	46.52	48.17	54.33	82.23	81.55	0.37
92.6	5.46	0.02	42.71	42.24	46.64	46.45	48.33	54.37	80.81	80.47	0.37
92.9	5.45	0.02	42.83	42.24	46.53	46.54	48.29	54.49	81.21	80.15	0.36
93.6	5.46	0.02	43.10	43.00	46.43	46.24	48.58	54.97	79.58	78.29	0.36
94.3	5.46	0.02	42.97	43.22	46.26	46.25	48.76	55.09	78.26	78.29	0.37
94.5	5.46	0.02	42.97	43.37	46.21	46.15	48.77	55.14	78.45	77.70	0.37
94.8	5.46	0.02	42.93	43.40	46.27	46.13	48.91	55.36	78.95	77.40	0.37
95.0	5.46	0.02	42.82	43.50	46.23	46.17	48.89	55.30	78.71	76.78	0.38

MIQA-100M

95 to 105 MHz







CARRIER Frequency (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
95.0	5.38	0.02	39.29	44.75	52.53	52.54	48.67	54.98	76.21	73.88	0.21
95.8	5.39	0.03	39.55	44.33	52.71	52.13	48.79	55.31	76.43	73.83	0.20
96.5	5.39	0.03	39.78	44.03	52.17	52.17	48.93	55.49	75.07	72.99	0.20
97.0	5.40	0.03	39.85	43.85	52.19	51.95	49.01	55.77	75.07	72.63	0.19
97.3	5.40	0.03	39.94	43.81	51.97	51.60	48.99	55.76	75.07	73.12	0.21
98.0	5.41	0.03	40.12	43.30	51.77	51.53	49.23	56.37	74.79	72.51	0.21
98.8	5.41	0.03	40.48	42.87	51.40	51.45	49.28	56.69	73.94	71.49	0.21
99.3	5.42	0.02	40.62	42.62	51.50	51.43	49.38	56.91	73.90	71.57	0.21
99.5	5.41	0.03	40.74	42.63	51.44	51.27	49.42	57.03	73.36	71.15	0.23
100.0	5.42	0.03	40.81	42.25	51.12	51.35	49.58	57.31	73.12	70.29	0.22
100.5	5.42	0.03	41.05	41.97	51.12	51.29	49.60	57.59	73.10	70.95	0.21
101.3	5.43	0.02	41.29	41.72	51.06	50.78	49.68	58.16	71.94	70.18	0.22
101.8	5.43	0.02	41.52	41.56	50.81	50.88	49.83	58.36	72.01	70.24	0.21
102.0	5.43	0.02	41.58	41.38	50.89	50.72	49.91	58.72	71.99	70.24	0.21
102.8	5.43	0.02	41.77	41.03	50.55	50.44	50.07	59.22	72.27	69.68	0.21
103.5	5.44	0.02	42.08	40.55	50.35	50.45	50.27	60.13	71.39	69.29	0.23
104.0	5.44	0.02	42.37	40.32	50.07	50.23	50.35	60.23	71.41	69.13	0.23
104.3	5.44	0.02	42.39	40.23	50.37	50.07	50.47	60.33	70.63	69.29	0.23
104.8	5.45	0.02	42.79	40.02	50.00	49.85	50.64	61.17	69.98	69.15	0.23
105.0	5.45	0.02	42.75	39.83	49.95	49.99	50.81	61.15	70.53	68.43	0.23

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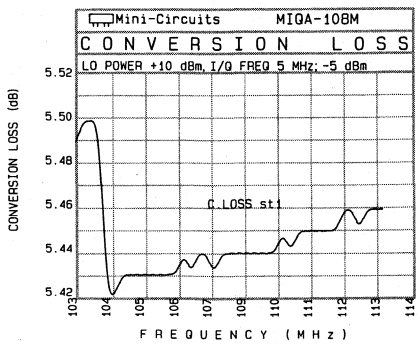
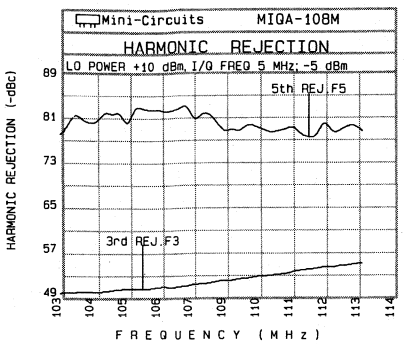
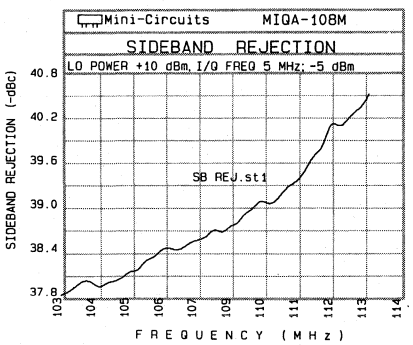
Mini-Circuits

MIQA-108M/ZFMIQ-108M

103 to 113 MHz



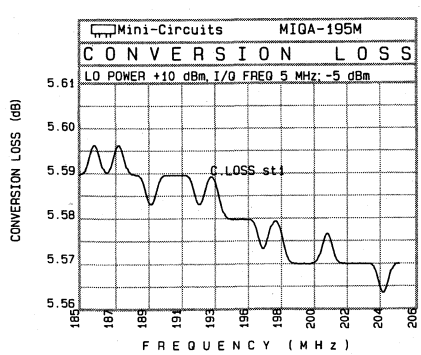


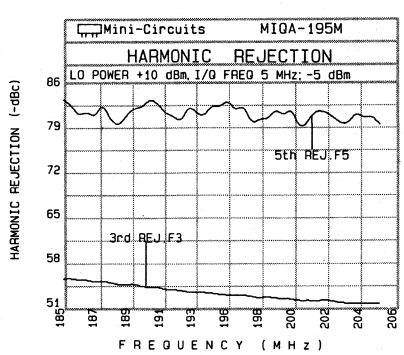


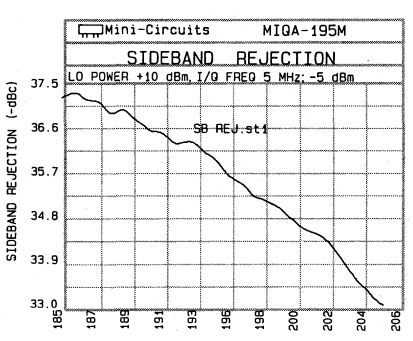
CARRIER Frequency (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
103.0	5.48	0.01	39.66	40.66	49.00	48.98	49.84	58.54	75.90	76.16	0.41
103.8	5.47	0.03	39.74	40.65	49.04	48.98	49.94	58.94	77.26	77.20	0.42
104.5	5.45	0.03	39.71	40.52	48.90	48.90	50.00	59.40	78.42	78.34	0.44
105.0	5.45	0.03	39.86	40.54	48.90	48.67	50.18	59.71	78.86	79.15	0.43
105.3	5.45	0.03	39.82	40.62	48.74	48.71	50.22	59.79	78.98	79.51	0.44
106.0	5.45	0.03	39.97	40.42	48.60	48.71	50.34	60.23	80.80	80.27	0.44
106.8	5.46	0.03	40.05	40.63	48.46	48.45	50.62	60.99	81.40	79.85	0.43
107.3	5.46	0.03	40.19	40.77	48.52	48.50	50.82	62.04	81.02	81.16	0.42
107.5	5.46	0.03	40.28	40.90	48.41	48.36	51.03	62.12	80.57	79.04	0.44
108.3	5.44	0.02	40.39	41.02	48.32	48.34	51.50	64.32	79.92	80.04	0.44
109.0	5.45	0.02	40.72	41.53	48.14	48.32	51.96	66.84	80.34	79.10	0.43
109.5	5.45	0.02	41.02	41.78	48.13	48.10	52.29	68.46	80.47	78.26	0.42
109.8	5.45	0.02	41.10	41.85	48.13	48.18	52.29	69.38	79.43	78.30	0.44
110.5	5.45	0.02	41.51	42.03	48.04	47.93	52.83	68.81	79.75	77.15	0.43
111.3	5.46	0.02	42.01	42.68	47.92	47.96	53.53	68.35	79.83	77.01	0.44
111.8	5.46	0.02	42.53	42.99	47.85	47.67	53.85	67.83	79.65	77.59	0.45
112.0	5.46	0.02	42.69	43.30	47.79	47.72	53.80	67.29	79.54	76.87	0.45
112.5	5.47	0.02	43.13	43.52	47.70	47.80	54.24	67.03	79.10	76.93	0.46
112.8	5.47	0.02	43.20	43.67	47.79	47.66	54.46	67.39	80.36	77.35	0.45
113.0	5.46	0.02	43.22	43.73	47.72	47.71	54.48	67.40	79.70	76.20	0.44

MIQA-195M

185 to 205 MHz





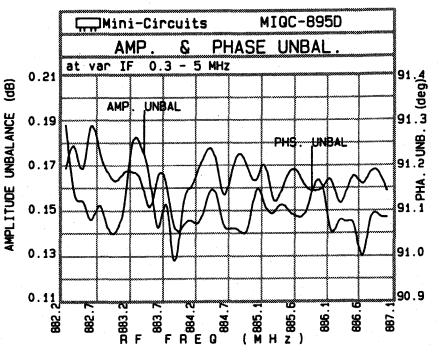


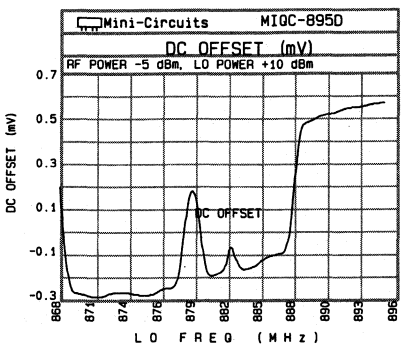
CARRIER Frequency (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ mV
185.0	5.60	0.03	39.87	42.64	41.48	41.50	55.49	49.15	79.33	77.29	0.47
186.5	5.60	0.03	39.95	42.51	41.31	41.31	55.07	48.98	80.07	77.46	0.47
188.0	5.60	0.03	39.88	42.29	41.14	41.17	54.59	48.72	79.11	77.26	0.47
189.0	5.60	0.03	39.91	42.13	41.01	41.01	54.45	48.70	79.29	77.02	0.48
189.5	5.59	0.03	39.88	41.95	40.97	41.00	54.40	48.68	79.50	77.74	0.48
191.0	5.59	0.02	39.76	41.88	40.85	40.88	54.02	48.54	79.84	77.26	0.47
192.5	5.59	0.03	39.64	41.32	40.77	40.76	53.58	48.33	79.22	77.41	0.47
193.5	5.59	0.02	40.04	41.09	40.67	40.66	53.38	48.28	79.56	77.42	0.49
194.0	5.58	0.03	39.57	40.99	40.65	40.66	53.20	48.16	79.68	76.94	0.49
195.5	5.58	0.03	39.15	40.43	40.52	40.50	52.75	48.00	80.31	76.48	0.49
197.0	5.58	0.03	38.64	39.99	40.41	40.45	52.61	47.96	78.35	77.12	0.50
198.0	5.58	0.03	38.43	39.68	40.36	40.35	52.53	47.72	79.79	77.68	0.51
198.5	5.57	0.03	38.27	39.38	40.31	40.31	52.41	47.74	80.05	76.06	0.50
200.0	5.58	0.03	37.95	39.04	40.17	40.21	51.99	47.60	78.17	76.04	0.51
200.5	5.58	0.02	37.80	38.83	40.11	40.10	51.99	47.56	78.51	76.18	0.52
202.0	5.58	0.03	37.23	38.09	40.01	39.99	51.96	47.45	79.84	76.57	0.53
203.0	5.57	0.02	36.87	37.64	39.91	39.93	51.76	47.38	77.80	75.84	0.54
203.5	5.57	0.03	36.64	37.44	39.82	39.79	51.73	47.36	78.95	75.34	0.54
204.5	5.57	0.03	36.20	36.98	39.74	39.76	51.53	47.32	78.55	75.42	0.54
205.0	5.57	0.02	35.96	36.44	39.69	39.74	51.64	47.20	77.88	75.46	0.55

good amplitude and phase unbalance
I&Q Demodulator

MIQC-895D

868 to 895 MHz



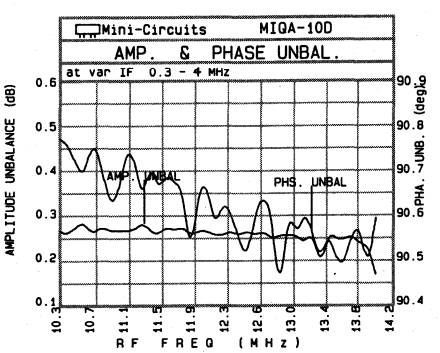


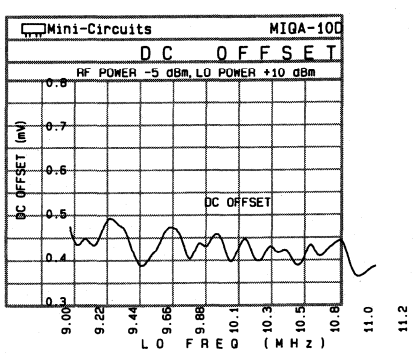
FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	AMP UNBAL. x̄ (dB)	PHASE (I-Q) x̄ (deg.)	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET x̄ (mV)
* 882.300	0.30	8.79	0.11	0.13	90.93	868.000	868.10	0.88
882.660	0.65	8.78	0.11	0.12	90.92	870.130	870.23	0.69
883.020	1.03	8.77	0.10	0.12	90.92	872.260	872.36	0.70
883.140	1.15	8.77	0.11	0.13	90.87	872.970	873.07	0.70
883.380	1.38	8.76	0.11	0.13	90.76	874.390	874.50	0.70
883.750	1.76	8.75	0.10	0.14	90.89	876.530	876.63	0.73
883.990	1.99	8.74	0.10	0.13	90.78	877.950	878.05	0.74
884.110	2.11	8.73	0.11	0.13	90.80	878.660	878.76	0.91
884.470	2.46	8.71	0.10	0.13	90.86	880.790	880.89	0.79
884.830	2.84	8.70	0.10	0.13	90.69	882.210	882.31	0.86
884.950	2.96	8.69	0.11	0.14	90.76	882.920	883.02	0.81
885.190	3.19	8.68	0.10	0.13	90.77	884.340	884.44	0.83
885.550	3.54	8.65	0.11	0.14	90.79	886.470	886.57	0.87
885.790	3.80	8.63	0.11	0.13	90.71	887.890	888.00	1.08
885.920	3.92	8.62	0.10	0.12	90.84	888.610	888.71	1.08
886.280	4.27	8.60	0.10	0.11	90.79	890.740	890.84	1.09
886.640	4.65	8.59	0.11	0.13	90.68	892.870	892.97	0.87
886.760	4.76	8.60	0.11	0.14	90.83	893.580	893.68	0.88
886.880	4.88	8.60	0.11	0.13	90.79	894.290	894.39	0.87
887.000	5.00	8.59	0.10	0.13	90.68	895.000	895.10	0.87

* LO freq. at 882 MHz

MIQA-10D

9 to 11 MHz





FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS (dB)	AMP UNBAL. (dB)	PHASE (I-Q) (deg.)	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET (mV)
** 10.300	0.300	5.85	0.27	90.78	9.000	9.100	0.480
10.585	0.587	5.82	0.29	90.69	9.158	9.258	0.420
10.869	0.873	5.80	0.27	90.63	9.316	9.416	0.480
10.964	0.966	5.80	0.27	90.64	9.368	9.468	0.480
11.154	1.151	5.83	0.27	90.75	9.474	9.574	0.380
11.439	1.438	5.78	0.26	90.66	9.632	9.732	0.480
11.628	1.632	5.77	0.27	90.68	9.737	9.837	0.460
11.723	1.724	5.77	0.28	90.67	9.790	9.889	0.380
12.008	2.011	5.75	0.27	90.68	9.947	10.047	0.470
12.292	2.289	5.73	0.27	90.61	10.000	10.100	0.460
12.387	2.390	5.73	0.26	90.55	10.158	10.258	0.470
12.577	2.576	5.72	0.26	90.62	10.211	10.311	0.400
12.862	2.862	5.71	0.26	90.40	10.316	10.416	0.450
13.051	3.047	5.70	0.26	90.55	10.474	10.574	0.390
13.146	3.149	5.69	0.24	90.62	10.579	10.679	0.460
13.431	3.426	5.67	0.27	90.57	10.632	10.732	0.400
13.715	3.713	5.63	0.26	90.56	10.790	10.890	0.460
13.810	3.806	5.62	0.24	90.59	10.895	10.995	0.360
13.905	3.907	5.61	0.24	90.47	10.947	11.047	0.380
14.000	4.000	5.61	0.17	90.60	11.000	11.100	0.390

** LO freq. at 10 MHz

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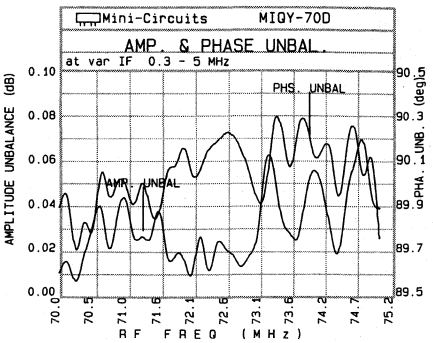
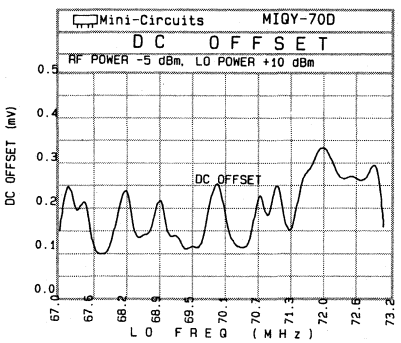
50 ohms

Mini-Circuits

MIQY-70D

67 to 73 MHz



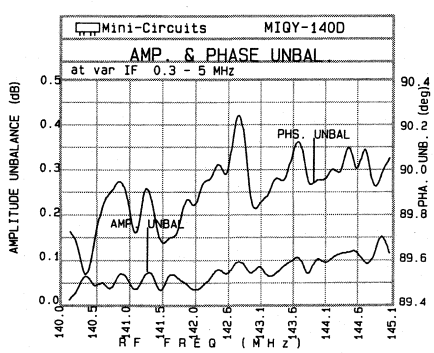


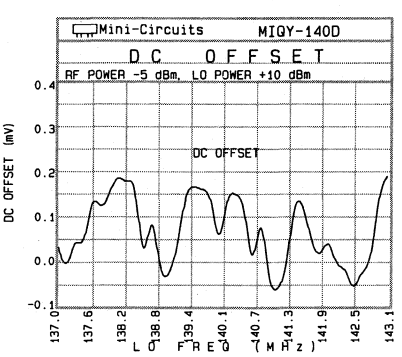
FREQUENCY RF (MHz)	I&Q (MHz)	CONVERSION LOSS x̄ (dB)	σ (dB)	AMP UNBAL x̄ (dB)	PHASE (I-Q) x̄ (deg.)	FREQUENCY LO (MHz)	RF (MHz)	DC OFFSET x̄ mV
70.010	0.30	5.60	0.03	0.00	89.78	67.000	67.10	0.20
70.394	0.66	5.59	0.03	0.02	89.86	67.462	67.56	0.22
70.778	1.03	5.59	0.03	0.01	89.77	67.923	68.02	0.20
70.906	1.15	5.58	0.03	0.01	89.94	68.077	68.18	0.22
71.161	1.38	5.58	0.03	0.01	89.65	68.385	68.49	0.22
71.545	1.75	5.58	0.03	0.05	89.85	68.846	68.95	0.26
71.801	1.99	5.59	0.03	0.02	89.92	69.154	69.25	0.21
71.929	2.11	5.59	0.03	0.01	89.99	69.308	69.41	0.18
72.313	2.47	5.59	0.03	0.00	90.08	69.769	69.87	0.25
72.697	2.83	5.59	0.03	0.01	90.15	70.231	70.33	0.25
72.825	2.96	5.59	0.03	0.02	90.14	70.385	70.49	0.27
73.081	3.19	5.59	0.03	0.00	89.99	70.692	70.79	0.26
73.465	3.56	5.60	0.03	0.00	90.15	71.154	71.25	0.25
73.720	3.79	5.58	0.03	0.01	90.05	71.462	71.56	0.29
73.849	3.92	5.60	0.03	0.04	90.23	71.615	71.72	0.26
74.232	4.27	5.59	0.03	0.02	89.95	72.077	72.18	0.24
74.616	4.64	5.59	0.03	0.06	90.23	72.539	72.64	0.28
74.744	4.75	5.59	0.03	0.08	89.86	72.692	72.79	0.27
74.872	4.88	5.59	0.03	0.04	90.06	72.846	72.95	0.26
*75.000	5.00	5.59	0.03	0.06	89.78	73.000	73.10	0.29

* Lo freq. at 70 MHz

MIQY-140D

137 to 143 MHz





FREQUENCY RF (MHz)	I&Q (MHz)	CONVERSION LOSS x̄ (dB)	σ (dB)	AMP UNBAL x̄ (dB)	PHASE (I-Q) x̄ (deg.)	FREQUENCY LO (MHz)	RF (MHz)	DC OFFSET x̄ mV
140.100	0.30	5.52	0.05	0.05	89.79	137.000	137.10	-0.08
140.477	0.66	5.50	0.05	0.05	89.81	137.462	137.56	-0.16
140.854	1.03	5.49	0.05	0.06	89.93	137.923	138.02	-0.06
140.980	1.15	5.49	0.05	0.10	89.99	138.077	138.18	-0.13
141.231	1.38	5.49	0.05	0.08	90.09	138.385	138.49	-0.13
141.608	1.75	5.50	0.05	0.06	89.96	138.846	138.95	-0.19
141.859	1.99	5.50	0.06	0.04	89.97	139.154	139.25	-0.14
141.985	2.11	5.50	0.06	0.06	90.00	139.308	139.41	-0.08
142.362	2.47	5.50	0.06	0.10	90.17	139.769	139.87	-0.07
142.739	2.83	5.50	0.06	0.11	90.19	140.231	140.33	-0.07
142.864	2.96	5.51	0.05	0.07	90.04	140.385	140.49	-0.11
143.115	3.19	5.51	0.06	0.08	90.14	140.692	140.79	-0.18
143.492	3.56	5.51	0.06	0.12	90.22	141.154	141.25	-0.17
143.744	3.79	5.51	0.06	0.08	89.94	141.461	141.56	-0.14
143.869	3.92	5.51	0.06	0.13	90.00	141.615	141.72	-0.19
144.246	4.27	5.51	0.05	0.13	90.07	142.077	142.18	-0.17
144.623	4.64	5.51	0.05	0.11	90.12	142.539	142.64	-0.11
144.749	4.75	5.52	0.05	0.12	90.07	142.692	142.79	-0.15
144.874	4.88	5.52	0.05	0.16	90.04	142.846	142.95	-0.12
**145.000	5.00	5.52	0.05	0.13	90.11	143.000	143.10	-0.10

** Lo freq. at 140 MHz

In Stock...Immediate Delivery

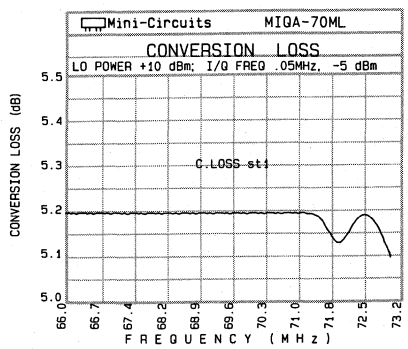
high rejection of carrier and sideband

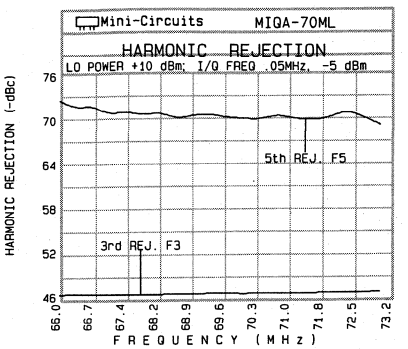
I&Q Modulator

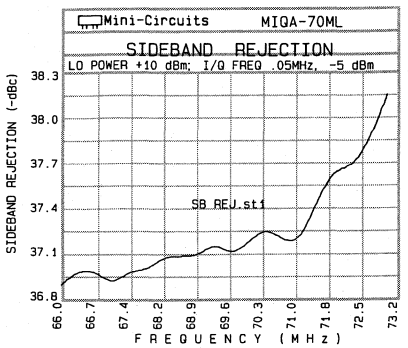
50 ohms

MIQA-70ML/ZFMIQ-70ML

66 to 73 MHz



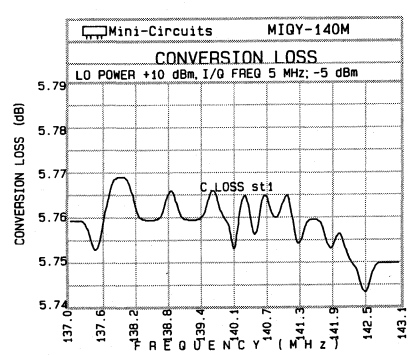


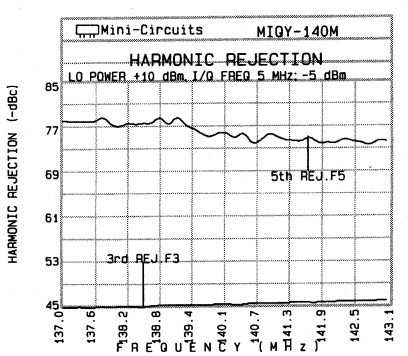


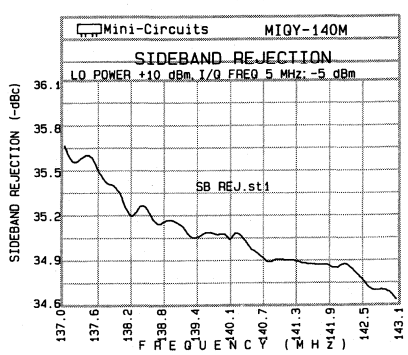
CARRIER Freq. (MHz)	CONVERSION LOSS x̄ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION (x̄) LSB (-dBc)	SIDEBAND REJECTION (x̄) USB (-dBc)	CARRIER REJECTION (x̄) LSB (-dBc)	CARRIER REJECTION (x̄) USB (-dBc)	3rd. HARMONIC REJECTION (x̄) LSB (-dBc)	3rd. HARMONIC REJECTION (x̄) USB (-dBc)	5th. HARMONIC REJECTION (x̄) LSB (-dBc)	5th. HARMONIC REJECTION (x̄) USB (-dBc)	DC OFFSET x̄ (mV)
66.0	5.20	0.00	38.26	37.56	54.72	55.04	47.30	47.58	74.90	73.48	0.09
66.4	5.20	0.00	38.36	37.72	54.40	54.88	47.32	47.66	75.06	73.86	0.09
66.7	5.20	0.00	38.50	37.76	54.58	54.66	47.34	47.68	75.52	74.60	0.09
67.1	5.20	0.00	38.54	37.92	54.10	54.64	47.34	47.68	74.94	75.12	0.09
67.5	5.20	0.00	38.60	38.08	54.36	54.30	47.42	47.72	74.76	75.22	0.09
67.8	5.20	0.00	38.72	38.22	53.88	53.98	47.44	47.74	74.84	74.94	0.08
68.2	5.20	0.00	38.74	38.40	53.96	53.92	47.48	47.72	75.42	74.58	0.08
68.6	5.20	0.00	38.78	38.58	53.56	53.70	47.44	47.74	74.38	74.54	0.08
69.0	5.18	0.04	38.88	38.76	53.64	54.10	47.52	47.80	75.04	75.38	0.08
69.3	5.20	0.00	38.94	38.94	53.36	54.12	47.56	47.80	74.86	75.12	0.08
69.7	5.20	0.00	38.98	39.06	53.16	53.78	47.50	47.76	75.14	74.96	0.08
70.1	5.20	0.00	39.12	39.30	53.02	53.70	47.54	47.78	73.92	75.16	0.08
70.4	5.18	0.04	39.18	39.46	53.16	53.52	47.58	47.72	73.98	74.88	0.08
70.8	5.20	0.00	39.20	39.68	53.10	53.54	47.58	47.72	74.16	75.04	0.08
71.2	5.18	0.04	39.24	39.88	53.02	53.34	47.58	47.72	74.02	74.48	0.08
71.5	5.20	0.00	39.30	40.00	52.62	53.52	47.60	47.76	73.80	74.98	0.08
71.9	5.18	0.04	39.46	40.18	52.78	53.30	47.60	47.80	73.76	74.44	0.08
72.3	5.20	0.00	39.50	40.36	52.40	53.58	47.58	47.74	74.30	74.66	0.08
72.6	5.20	0.00	39.66	40.50	52.30	53.22	47.64	47.78	73.72	74.46	0.09
73.0	5.18	0.04	39.76	40.76	52.16	53.02	47.62	47.78	72.70	73.16	0.09

MIQY-140M

137 to 143 MHz







CARRIER Freq. (MHz)	CONVERSION LOSS (dB)	SIDEBAND REJECTION LSB (-dBc)	SIDEBAND REJECTION (-dBc)	CARRIER REJECTION LSB (-dBc)	CARRIER REJECTION (-dBc)	3rd. HARMONIC REJECTION LSB (-dBc)	3rd. HARMONIC REJECTION (-dBc)	5th. HARMONIC REJECTION LSB (-dBc)	5th. HARMONIC REJECTION (-dBc)	DC OFFSET (mV)
137.000	5.76	35.71	36.70	33.27	33.31	45.22	57.87	79.42	81.57	-0.08
137.462	5.75	35.67	36.51	33.24	33.30	45.22	58.08	79.42	79.88	-0.16
137.923	5.77	35.45	36.52	33.19	33.29	45.30	58.58	78.70	77.98	-0.06
138.231	5.76	35.18	36.15	33.22	33.28	45.40	58.58	79.20	79.38	-0.07
138.385	5.76	35.33	36.27	33.23	33.27	45.50	58.58	78.60	79.78	-0.13
138.846	5.77	35.21	36.25	33.15	33.26	45.69	58.78	80.69	77.68	-0.19
139.308	5.76	35.06	36.14	33.13	33.19	45.79	59.07	78.39	78.87	-0.08
139.615	5.77	35.13	36.06	33.15	33.25	45.80	59.27	77.00	78.97	-0.11
139.769	5.76	35.09	35.94	33.18	33.20	45.78	59.47	76.28	77.87	-0.07
140.077	5.76	35.13	35.90	33.15	33.19	45.89	59.77	77.39	77.17	-0.07
140.539	5.77	34.97	35.99	33.14	33.19	46.10	60.17	74.80	75.37	-0.18
140.846	5.76	34.94	36.12	33.09	33.22	45.98	60.37	77.28	76.87	-0.17
141.000	5.77	34.92	35.98	33.10	33.21	46.09	60.38	76.59	75.38	-0.17
141.461	5.76	34.90	36.02	33.10	33.13	46.20	60.78	75.40	75.98	-0.19
141.923	5.76	34.85	35.86	33.06	33.11	46.28	61.06	75.58	75.06	-0.17
142.231	5.75	34.85	35.95	33.05	33.16	46.39	61.28	76.29	74.88	-0.21
142.385	5.74	34.80	35.96	33.02	33.17	46.38	61.58	75.48	74.48	-0.11
142.692	5.75	34.72	35.93	33.04	33.11	46.30	61.58	74.60	73.38	-0.12
142.846	5.75	34.72	35.91	33.02	33.16	46.39	62.18	75.89	74.98	-0.10
143.000	5.75	34.65	36.01	33.02	33.11	46.49	61.58	75.59	72.48	-0.11

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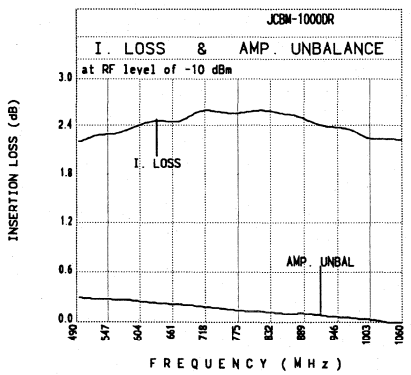
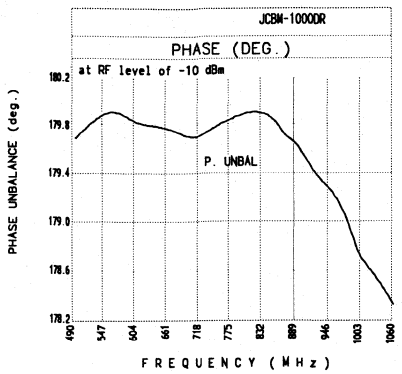
BPSK Modulator

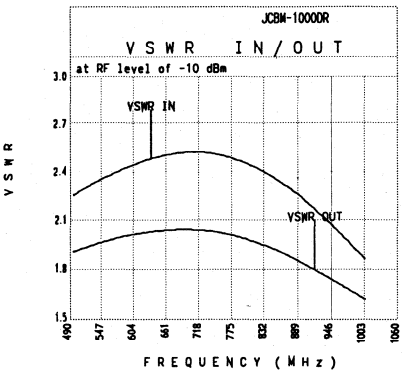
JCBM-1000DR

50 ohms

500 to 1000 MHz







Freq.	Ins. Loss		Amp. Unbal.	Phase Unbal.	In VSWR	Out
	$\bar{X}$	σ	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$
(MHz)	(dB)	(dB)	(dB)	(Deg.)	(dB)	(dB)
495.500	2.24	0.12	0.31	179.72	2.28	1.93
499.000	2.23	0.12	0.30	179.74	2.28	1.93
530.500	2.34	0.13	0.28	179.88	2.35	1.97
565.500	2.32	0.13	0.28	179.98	2.41	2.01
604.000	2.46	0.15	0.26	179.84	2.48	2.04
639.000	2.52	0.16	0.23	179.83	2.52	2.05
674.000	2.45	0.15	0.22	179.79	2.54	2.07
709.000	2.67	0.17	0.20	179.70	2.55	2.07
747.500	2.59	0.17	0.17	179.82	2.54	2.05
782.500	2.59	0.17	0.14	179.90	2.50	2.02
817.500	2.65	0.18	0.14	179.96	2.45	1.99
852.500	2.58	0.18	0.11	179.90	2.37	1.94
870.000	2.58	0.19	0.11	179.73	2.33	1.90
891.000	2.52	0.18	0.12	179.70	2.28	1.87
926.000	2.41	0.17	0.08	179.38	2.16	1.80
961.000	2.43	0.18	0.07	179.27	2.04	1.73
996.000	2.30	0.16	0.04	178.83	1.91	1.65
999.500	2.27	0.16	0.05	178.74	1.90	1.64
1034.500	2.28	0.16	0.00	178.55	1.76	1.57
1069.500	2.25	0.13	0.00	178.27	1.64	1.50

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

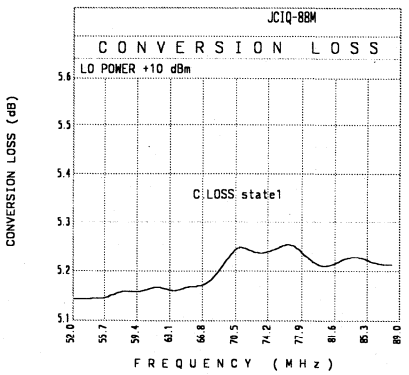
high rejection of carrier and sideband

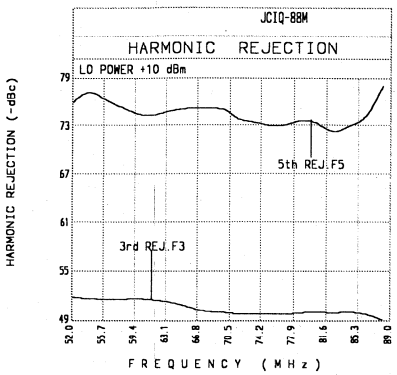
I&Q Modulator

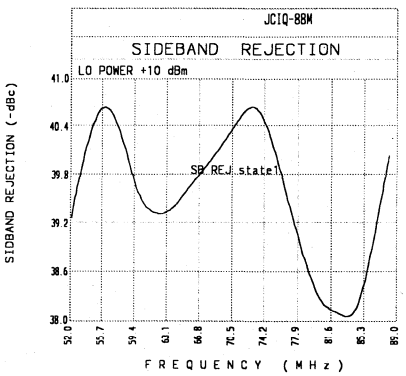
50 ohms

JCIQ-88M

52 MHz to 88 MHz



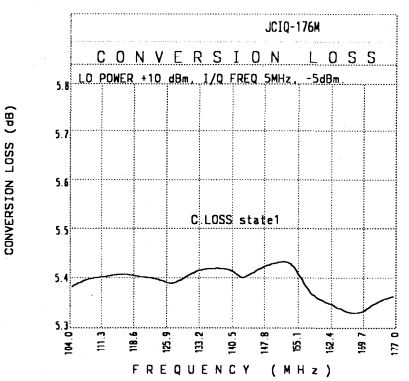


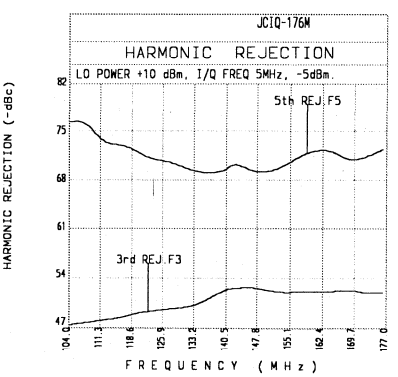


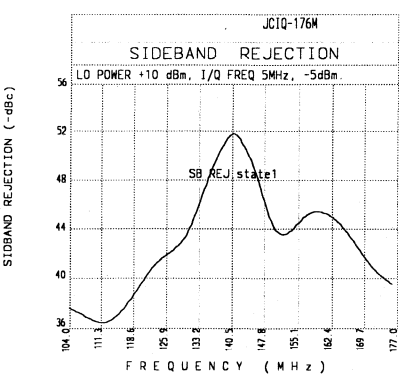
CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
52.00	5.22	0.05	36.97	37.65	43.38	43.31	52.68	55.74	77.71	66.44	-0.09
53.89	5.22	0.06	37.45	38.38	43.18	43.06	52.39	55.40	78.23	66.23	-0.09
55.79	5.21	0.05	37.68	38.74	43.01	42.82	52.29	55.33	76.92	66.50	-0.09
57.68	5.22	0.04	37.29	38.62	42.73	42.82	52.32	55.69	77.52	66.09	-0.09
59.58	5.22	0.05	37.10	38.14	42.51	42.66	52.39	56.29	76.79	66.29	-0.09
61.47	5.22	0.05	37.34	38.13	42.24	42.41	52.35	56.74	76.42	65.70	-0.09
63.37	5.21	0.05	38.17	38.36	42.12	42.14	52.24	57.04	76.37	65.54	-0.09
65.26	5.22	0.05	38.93	38.85	42.02	41.92	51.75	56.96	77.08	65.07	-0.09
67.16	5.21	0.05	39.52	39.23	41.83	41.75	50.99	56.54	76.89	64.48	-0.09
70.00	5.24	0.04	40.36	39.80	41.38	41.26	50.81	56.24	76.15	64.21	-0.09
70.95	5.24	0.05	40.67	40.04	41.26	41.18	50.70	56.27	75.33	64.14	-0.09
72.84	5.23	0.04	40.90	40.45	41.06	41.14	50.66	56.46	74.83	64.16	-0.09
74.74	5.24	0.04	40.75	40.23	40.86	40.94	50.64	56.22	75.24	63.63	-0.09
76.63	5.26	0.04	40.29	39.72	40.76	40.78	50.76	56.14	75.16	63.41	-0.09
78.53	5.23	0.04	39.50	39.13	40.48	40.56	50.83	55.76	75.46	63.59	-0.09
80.42	5.22	0.04	38.93	38.78	40.32	40.45	50.94	55.27	75.28	63.71	-0.09
82.32	5.25	0.05	38.66	38.82	40.20	40.25	50.78	54.88	74.08	63.38	-0.08
84.21	5.25	0.05	38.62	38.89	40.03	40.09	51.05	55.07	74.38	63.27	-0.07
86.11	5.26	0.05	38.83	39.07	39.97	39.89	50.76	55.61	75.66	62.42	-0.06
88.00	5.24	0.04	38.60	38.69	39.81	39.73	50.25	55.64	81.59	62.31	-0.07

JCIQ-176M

104 MHz to 176 MHz







CARRIER Freq. (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	SIDEBAND REJECTION ($\bar{X}$) LSB (-dBc)	SIDEBAND REJECTION ($\bar{X}$) USB (-dBc)	CARRIER REJECTION ($\bar{X}$) LSB (-dBc)	CARRIER REJECTION ($\bar{X}$) USB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	3rd. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) LSB (-dBc)	5th. HARMONIC REJECTION ($\bar{X}$) USB (-dBc)	DC OFFSET $\bar{X}$ (mV)
104.00	5.35	0.03	38.01	39.57	39.43	39.44	47.21	54.01	78.31	66.20	-0.13
107.79	5.34	0.06	37.68	39.13	39.25	39.27	47.65	53.60	78.75	66.59	-0.12
111.58	5.33	0.06	36.90	37.99	39.07	39.09	48.06	53.94	74.43	66.47	-0.11
115.37	5.33	0.06	37.74	38.67	38.86	38.87	48.44	54.08	73.94	66.95	-0.11
119.16	5.33	0.06	40.20	40.80	38.56	38.57	49.02	55.33	73.32	66.99	-0.11
122.95	5.32	0.07	43.65	43.66	38.30	38.39	49.21	56.84	72.28	67.13	-0.10
126.74	5.31	0.06	45.69	45.11	38.08	38.12	49.54	58.78	72.41	67.31	-0.13
130.53	5.30	0.08	47.80	46.70	37.87	37.96	49.82	60.28	70.82	66.62	-0.13
134.32	5.32	0.07	51.66	51.65	37.70	37.78	50.26	61.03	69.09	66.73	-0.12
140.00	5.32	0.06	49.72	48.38	37.39	37.39	52.16	57.69	69.73	67.86	-0.11
141.89	5.29	0.07	49.91	48.01	37.30	37.32	52.10	57.53	71.40	66.80	-0.11
145.68	5.33	0.06	50.30	48.52	37.10	37.15	51.99	58.01	69.86	66.11	-0.10
149.47	5.33	0.07	50.97	45.73	37.13	37.00	51.89	58.50	69.06	65.53	-0.09
153.26	5.34	0.07	48.83	45.05	36.79	36.70	52.28	59.65	69.67	64.62	-0.10
157.05	5.34	0.05	47.06	46.56	36.56	36.64	52.45	60.22	70.48	64.39	-0.09
160.84	5.32	0.05	44.14	44.76	36.39	36.45	52.40	60.72	71.94	64.02	-0.08
164.63	5.30	0.04	43.01	43.43	36.23	36.29	52.22	59.35	72.72	63.55	-0.07
168.42	5.30	0.04	42.44	42.10	36.02	36.09	52.54	57.87	71.64	63.41	-0.04
172.21	5.33	0.04	41.12	40.73	35.93	36.01	52.08	56.14	72.31	63.71	-0.02
176.00	5.34	0.04	39.50	39.70	35.75	35.83	52.25	55.12	73.41	63.55	-0.02

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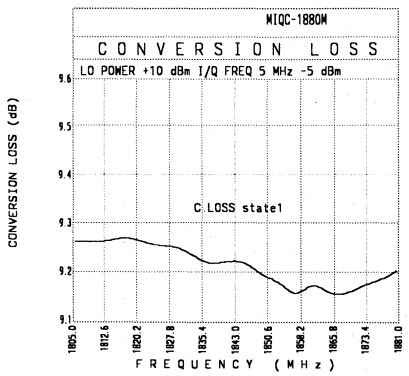
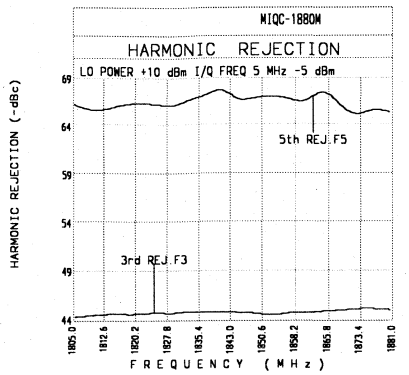
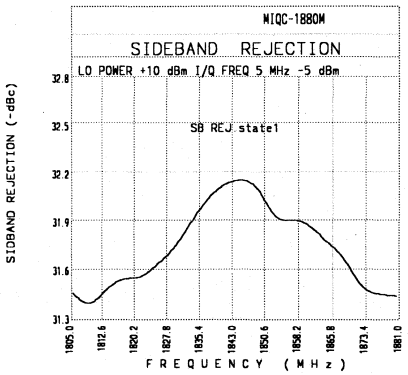
MIQC-1880M







CARRIER	CONVERSION LOSS		SIDEBAND REJECTION ($\bar{X}$)		CARRIER REJECTION ($\bar{X}$)		3rd. HARMONIC REJECTION ($\bar{X}$)		5th. HARMONIC REJECTION ($\bar{X}$)		DC OFFSET
Freq. (MHz)	$\bar{X}$ (dB)	σ (dB)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	$\bar{X}$ (mV)
1805.00	9.38	0.37	33.92	34.44	31.10	31.28	43.54	43.99	69.14	69.65	-6.01
1808.95	9.41	0.36	33.98	34.39	31.32	31.41	43.65	44.11	69.95	69.38	-5.91
1812.89	9.41	0.36	34.03	34.59	31.57	31.58	43.71	44.16	69.75	70.06	-5.81
1816.84	9.43	0.35	34.13	34.46	31.72	31.79	43.75	44.23	70.15	69.76	-5.71
1820.79	9.41	0.35	34.13	34.40	31.89	31.93	43.83	44.30	70.89	70.60	-5.60
1824.74	9.41	0.36	34.12	34.39	32.05	32.11	44.05	44.24	70.68	70.45	-5.49
1828.68	9.52	0.26	34.09	34.70	32.19	32.24	44.01	44.39	71.40	70.56	-5.38
1832.63	9.50	0.27	33.93	34.67	32.23	32.32	44.16	44.68	71.56	71.15	-5.26
1836.58	9.51	0.27	33.90	34.45	32.28	32.37	44.27	44.66	72.57	71.27	-5.14
1840.53	9.52	0.27	33.78	34.40	32.28	32.34	44.40	44.73	70.87	71.86	-5.03
1844.47	9.52	0.27	33.52	34.44	31.88	32.15	44.34	44.77	71.54	70.38	-4.92
1848.42	9.51	0.27	33.39	34.28	31.96	32.24	44.43	44.84	71.92	71.05	-4.80
1852.37	9.51	0.28	33.37	33.86	31.86	31.94	44.46	44.69	72.29	71.56	-4.69
1856.32	9.48	0.30	33.38	33.80	31.71	31.74	44.71	44.69	72.65	71.25	-4.58
1860.26	9.50	0.29	33.25	33.64	31.50	31.58	44.72	44.74	72.05	71.80	-4.47
1864.21	9.49	0.31	33.18	33.52	31.35	31.35	45.08	44.80	73.41	72.47	-4.36
1868.16	9.50	0.31	33.05	33.45	31.14	31.17	45.06	44.81	72.72	71.61	-4.26
1872.11	9.51	0.31	33.08	33.37	30.95	31.00	45.24	44.80	72.80	71.64	-4.18
1876.05	9.52	0.32	32.97	33.27	30.81	30.91	45.26	44.81	72.69	72.01	-4.09
1880.00	9.53	0.32	32.94	33.29	30.73	30.78	45.22	44.71	72.82	71.41	-4.02

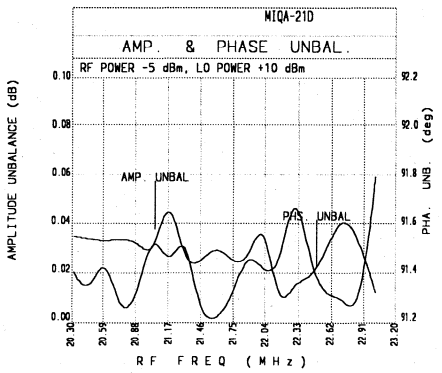
good amplitude and phase unbalance

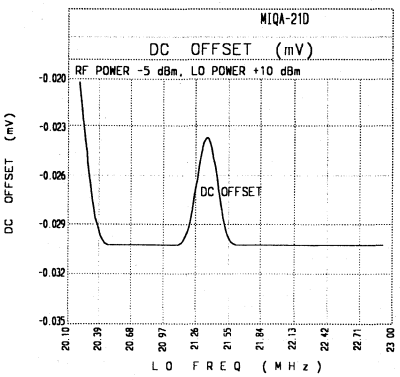
I&Q Demodulator

50 ohms

MIQA-21D

20 MHz to 23 MI

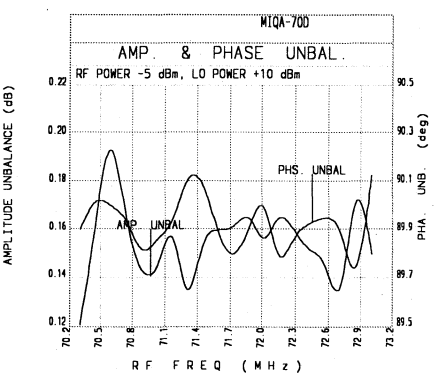


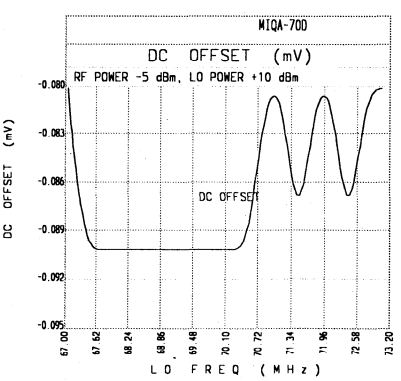


FREQUENCY		CONVERSION LOSS		AMP UNBAL	PHASE (I&Q)	FREQUENCY		DC OFFSET
RF (MHz)	I&Q (MHz)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	$\bar{X}$ (deg.)	LO (MHz)	RF (MHz)	$\bar{X}$ (mV)
20.30	0.30	5.91	0.03	0.05	91.55	20.20	20.30	-0.03
20.44	0.44	5.91	0.03	0.04	91.60	20.34	20.44	-0.04
20.58	0.58	5.94	0.03	0.05	91.63	20.48	20.58	-0.04
20.73	0.73	5.95	0.03	0.02	91.60	20.63	20.73	-0.04
20.87	0.87	5.94	0.03	0.04	91.47	20.77	20.87	-0.04
21.01	1.01	5.89	0.03	0.05	91.51	20.91	21.01	-0.04
21.15	1.15	5.91	0.03	0.05	91.70	21.05	21.15	-0.04
21.29	1.29	5.93	0.03	0.06	91.55	21.19	21.29	-0.04
21.44	1.44	5.95	0.03	0.04	91.59	21.34	21.44	-0.04
21.58	1.58	5.94	0.03	0.04	91.62	21.48	21.58	-0.04
21.72	1.72	5.91	0.03	0.04	91.64	21.62	21.72	-0.04
21.86	1.86	5.91	0.03	0.05	91.52	21.76	21.86	-0.04
22.01	2.01	5.90	0.03	0.06	91.54	21.91	22.01	-0.04
22.15	2.15	5.91	0.03	0.04	91.35	22.05	22.15	-0.04
22.29	2.29	5.92	0.03	0.06	91.57	22.19	22.29	-0.04
22.43	2.43	5.92	0.03	0.04	91.37	22.33	22.43	-0.04
22.57	2.57	5.94	0.03	0.03	91.63	22.47	22.57	-0.04
22.72	2.72	5.95	0.03	0.04	91.53	22.62	22.72	-0.04
22.86	2.86	5.92	0.03	0.03	91.51	22.76	22.86	-0.04
23.00	3.00	5.92	0.03	0.05	91.36	22.90	23.00	-0.04

MIQA-70D/ZFMIQ-70D

66 MHz to 73 MHz





FREQUENCY		CONVERSION LOSS		AMP UNBAL	PHASE (I&Q)	FREQUENCY		DC OFFSET
RF (MHz)	I&Q (MHz)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	$\bar{X}$ (deg.)	LO (MHz)	RF (MHz)	$\bar{X}$ (mV)
70.30	0.30	6.10	0.04	0.19	89.81	67.00	67.10	-0.01
70.44	0.44	6.08	0.03	0.18	89.97	67.32	67.42	-0.01
70.58	0.58	6.13	0.04	0.21	89.88	67.63	67.73	-0.02
70.73	0.73	6.12	0.04	0.19	89.84	67.95	68.05	-0.01
70.87	0.87	6.13	0.04	0.16	89.83	68.26	68.36	-0.02
71.01	1.01	6.07	0.04	0.18	89.80	68.58	68.68	-0.02
71.15	1.15	6.10	0.04	0.18	89.92	68.89	68.99	-0.02
71.29	1.29	6.10	0.04	0.17	89.91	69.21	69.31	-0.02
71.43	1.43	6.13	0.04	0.20	89.93	69.53	69.63	-0.02
71.58	1.58	6.12	0.04	0.17	89.98	69.84	69.94	-0.02
71.72	1.72	6.10	0.04	0.18	89.71	70.16	70.26	-0.02
71.86	1.86	6.10	0.04	0.19	89.87	70.47	70.57	-0.02
72.00	2.00	6.09	0.04	0.17	89.85	70.79	70.89	-0.02
72.14	2.14	6.10	0.04	0.19	89.95	71.11	71.21	-0.02
72.28	2.28	6.11	0.04	0.20	89.81	71.42	71.52	-0.02
72.43	2.43	6.10	0.04	0.19	89.89	71.74	71.84	-0.02
72.57	2.57	6.11	0.05	0.18	89.96	72.05	72.15	-0.02
72.71	2.71	6.11	0.04	0.18	89.86	72.37	72.47	-0.02
72.85	2.85	6.10	0.04	0.20	89.82	72.68	72.78	-0.02
73.00	3.00	6.11	0.04	0.19	89.89	73.00	73.10	-0.02

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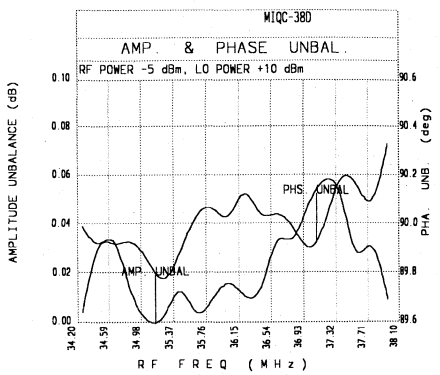
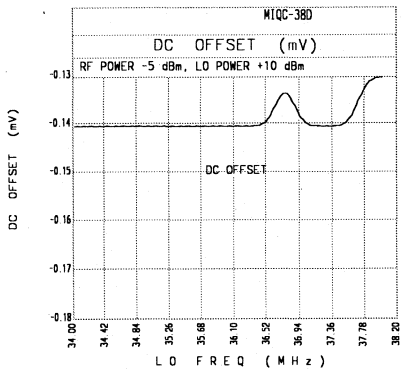
MIQC-38D

34 MHz to 38 MHz

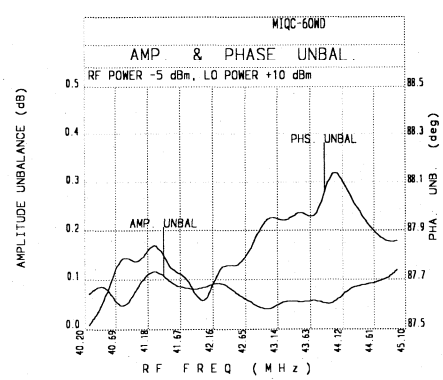


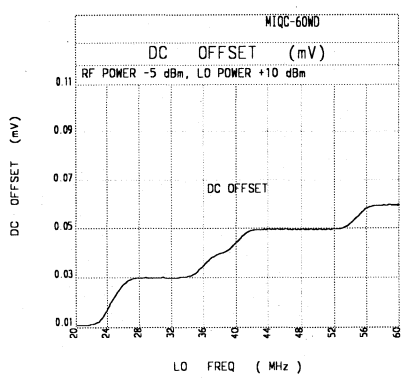


FREQUENCY		CONVERSION LOSS		AMP UNBAL	PHASE (I&Q)	FREQUENCY		DC OFFSET
RF (MHz)	I&Q (MHz)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	$\bar{X}$ (deg.)	LO (MHz)	RF (MHz)	$\bar{X}$ (mV)
34.30	0.30	5.46	0.10	0.05	89.89	34.00	34.10	-0.03
34.49	0.49	5.43	0.10	0.04	90.06	34.21	34.31	-0.03
34.69	0.69	5.43	0.10	0.04	89.94	34.42	34.52	-0.03
34.88	0.88	5.44	0.10	0.04	89.94	34.63	34.73	-0.03
35.08	1.08	5.41	0.10	0.06	89.97	34.84	34.94	-0.03
35.27	1.27	5.43	0.11	0.05	89.64	35.05	35.15	-0.03
35.47	1.47	5.41	0.11	0.04	90.05	35.26	35.36	-0.03
35.66	1.66	5.41	0.11	0.05	90.04	35.47	35.57	-0.03
35.86	1.86	5.44	0.12	0.05	90.03	35.68	35.78	-0.03
36.05	2.05	5.42	0.11	0.06	90.05	35.89	35.99	-0.03
36.25	2.25	5.45	0.11	0.05	90.19	36.11	36.21	-0.03
36.44	2.44	5.44	0.11	0.04	89.89	36.32	36.42	-0.03
36.64	2.64	5.44	0.12	0.04	90.08	36.53	36.63	-0.03
36.83	2.83	5.45	0.11	0.05	89.93	36.74	36.84	-0.03
37.03	3.03	5.43	0.11	0.04	89.85	36.95	37.05	-0.03
37.22	3.22	5.45	0.11	0.06	89.90	37.16	37.26	-0.03
37.42	3.42	5.43	0.11	0.06	90.16	37.37	37.47	-0.03
37.61	3.61	5.45	0.11	0.04	90.10	37.58	37.68	-0.03
37.81	3.81	5.44	0.11	0.05	90.06	37.79	37.89	-0.02
38.00	4.00	5.44	0.12	0.06	90.21	38.00	38.10	-0.03

MIQC-60WD

20 MHz to 60 MHz





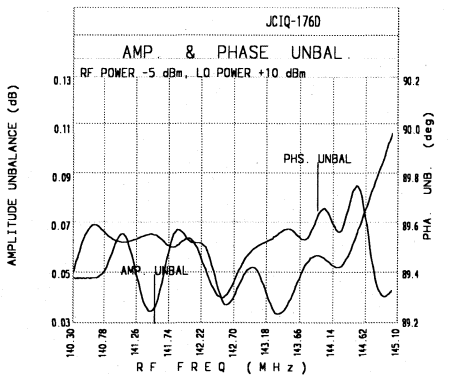
FREQUENCY		CONVERSION LOSS		AMP UNBAL	PHASE (I&Q)	FREQUENCY		DC OFFSET
RF (MHz)	I&Q (MHz)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$ (dB)	$\bar{X}$ (deg.)	LO (MHz)	RF (MHz)	$\bar{X}$ (mV)
40.30	0.30	5.28	0.05	0.09	87.71	20.00	20.10	0.01
40.55	0.55	5.25	0.05	0.10	87.81	22.11	22.21	0.01
40.79	0.79	5.23	0.05	0.08	87.98	24.21	24.31	0.02
41.04	1.04	5.23	0.05	0.08	87.85	26.32	26.42	0.03
41.29	1.29	5.22	0.05	0.11	87.95	28.42	28.52	0.03
41.54	1.54	5.22	0.05	0.10	87.87	30.53	30.63	0.03
41.78	1.78	5.23	0.05	0.10	87.80	32.63	32.73	0.03
42.03	2.03	5.30	0.05	0.11	87.72	34.74	34.84	0.03
42.28	2.28	5.28	0.05	0.10	87.85	36.84	36.94	0.04
42.53	2.53	5.28	0.05	0.06	87.84	38.95	39.05	0.04
42.77	2.77	5.30	0.05	0.08	87.81	41.05	41.15	0.05
43.02	3.02	5.30	0.05	0.06	87.99	43.16	43.26	0.05
43.27	3.27	5.29	0.05	0.08	87.90	45.26	45.36	0.05
43.52	3.52	5.29	0.05	0.06	87.97	47.37	47.47	0.05
43.76	3.76	5.29	0.05	0.08	87.89	49.47	49.57	0.05
44.01	4.01	5.28	0.05	0.08	88.14	51.58	51.68	0.05
44.26	4.26	5.28	0.05	0.11	88.02	53.68	53.78	0.05
44.51	4.51	5.28	0.05	0.12	87.98	55.79	55.89	0.06
44.75	4.75	5.26	0.05	0.11	88.01	57.89	57.99	0.06
45.00	5.00	5.27	0.05	0.12	87.89	60.00	60.10	0.06

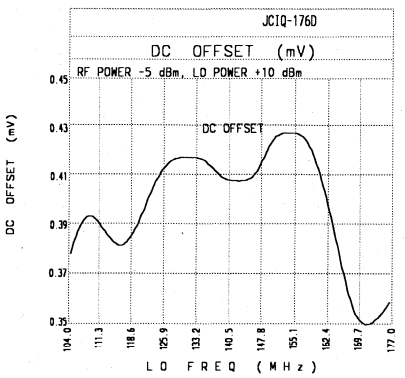
good amplitude and phase unbalance

I&Q Demodulator

50 ohms
104 MHz to 176 MH

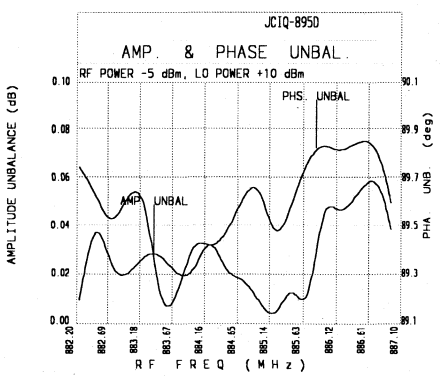
JCIQ-176D

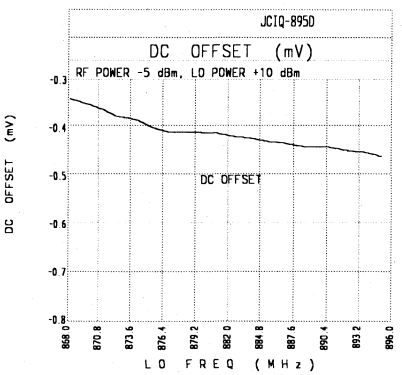




FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	AMP UNBAL. $\bar{X}$	PHASE (I&Q) $\bar{X}$	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET $\bar{X}$ (mV)
140.30	0.30	6.38	0.05	0.05	89.45	104.00	104.10	0.07
140.55	0.55	6.42	0.06	0.04	89.55	107.79	107.89	0.08
140.79	0.79	6.42	0.05	0.06	89.60	111.58	111.68	0.08
141.04	1.04	6.41	0.06	0.07	89.51	115.37	115.47	0.07
141.29	1.29	6.40	0.05	0.04	89.50	119.16	119.26	0.08
141.54	1.54	6.39	0.05	0.04	89.57	122.95	123.05	0.09
141.78	1.78	6.39	0.05	0.07	89.52	126.74	126.84	0.10
142.03	2.03	6.37	0.05	0.05	89.67	130.53	130.63	0.10
142.28	2.28	6.37	0.05	0.09	89.47	134.32	134.42	0.09
142.53	2.53	6.37	0.05	0.05	89.43	138.11	138.21	0.09
142.77	2.77	6.39	0.05	0.06	89.44	141.89	141.99	0.08
143.02	3.02	6.36	0.05	0.05	89.58	145.68	145.78	0.09
143.27	3.27	6.37	0.05	0.04	89.52	149.47	149.57	0.11
143.52	3.52	6.37	0.05	0.05	89.62	153.26	153.36	0.11
143.76	3.76	6.38	0.05	0.06	89.52	157.05	157.15	0.11
144.01	4.01	6.37	0.05	0.05	89.70	160.84	160.94	0.09
144.26	4.26	6.40	0.05	0.07	89.59	164.63	164.73	0.07
144.51	4.51	6.41	0.05	0.08	89.76	168.42	168.52	0.05
144.75	4.75	6.39	0.05	0.10	89.35	172.21	172.31	0.05
145.00	5.00	6.41	0.05	0.09	89.28	176.00	176.10	0.06

JCIQ-895D





868 MHz to 895 MH

FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	AMP UNBAL. $\bar{X}$	PHASE (I&Q) $\bar{X}$	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET $\bar{X}$ (mV)
882.30	0.30	8.52	0.24	0.09	89.96	868.00	868.10	-0.36
882.55	0.55	8.55	0.24	0.09	90.00	869.42	869.52	-0.37
882.79	0.79	8.55	0.24	0.09	89.82	870.84	870.94	-0.37
883.04	1.04	8.54	0.23	0.09	89.95	872.26	872.36	-0.38
883.29	1.29	8.56	0.24	0.11	90.02	873.68	873.78	-0.38
883.54	1.54	8.54	0.24	0.10	89.73	875.11	875.21	-0.39
883.78	1.78	8.53	0.24	0.09	89.71	876.53	876.63	-0.39
884.03	2.03	8.52	0.24	0.08	89.92	877.95	878.05	-0.39
884.28	2.28	8.53	0.24	0.09	89.75	879.37	879.47	-0.39
884.53	2.53	8.53	0.24	0.08	89.79	880.79	880.89	-0.38
884.77	2.77	8.54	0.24	0.10	89.88	882.21	882.31	-0.39
885.02	3.02	8.54	0.24	0.08	89.95	883.63	883.73	-0.39
885.27	3.27	8.55	0.24	0.08	89.65	885.05	885.15	-0.39
885.52	3.52	8.55	0.24	0.10	89.83	886.47	886.57	-0.39
885.76	3.76	8.56	0.24	0.08	89.92	887.89	887.99	-0.39
886.01	4.01	8.51	0.23	0.09	89.91	889.32	889.42	-0.39
886.26	4.26	8.55	0.24	0.09	90.14	890.74	890.84	-0.39
886.51	4.51	8.55	0.24	0.10	89.91	892.16	892.26	-0.39
886.75	4.75	8.53	0.24	0.10	90.08	893.58	893.68	-0.39
887.00	5.00	8.55	0.24	0.08	89.81	895.00	895.10	-0.39

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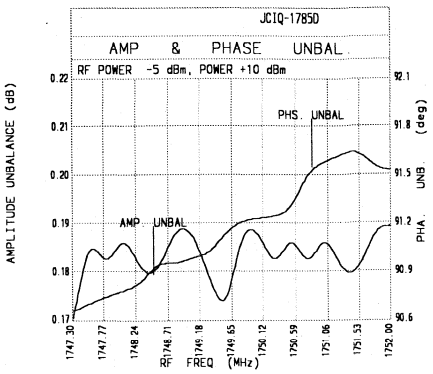
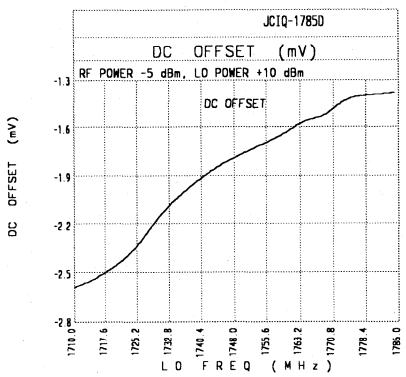
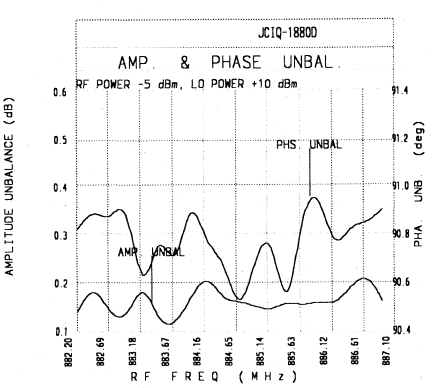
JCIQ-1785D

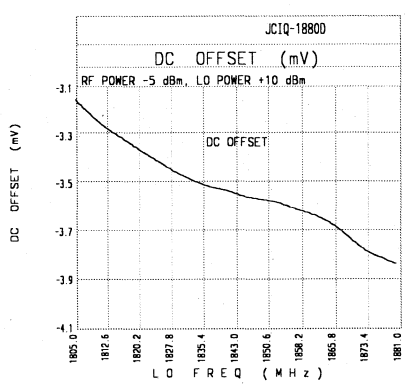




FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	AMP UNBAL. $\bar{X}$	PHASE (I&Q) $\bar{X}$	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET $\bar{X}$ (mV)
1747.30	0.30	7.66	0.13	0.17	90.67	1710.00	1710.10	2.18
1747.55	0.55	7.61	0.13	0.19	90.72	1713.95	1714.05	2.24
1747.79	0.79	7.61	0.13	0.18	90.76	1717.89	1717.99	2.29
1748.04	1.04	7.60	0.13	0.19	90.80	1721.84	1721.94	2.32
1748.29	1.29	7.60	0.15	0.18	90.84	1725.79	1725.89	2.33
1748.54	1.54	7.59	0.15	0.18	90.99	1729.74	1729.84	2.32
1748.78	1.78	7.57	0.14	0.19	90.96	1733.68	1733.78	2.33
1749.03	2.03	7.56	0.13	0.19	91.01	1737.63	1737.73	2.36
1749.28	2.28	7.58	0.14	0.18	91.02	1741.58	1741.68	2.40
1749.53	2.53	7.58	0.13	0.17	91.16	1745.53	1745.63	2.44
1749.77	2.77	7.56	0.14	0.19	91.24	1749.47	1749.57	2.49
1750.02	3.02	7.58	0.15	0.19	91.25	1753.42	1753.52	2.54
1750.27	3.27	7.56	0.14	0.18	91.26	1757.37	1757.47	2.58
1750.52	3.52	7.56	0.13	0.19	91.30	1761.32	1761.42	2.60
1750.76	3.76	7.59	0.14	0.18	91.55	1765.26	1765.36	2.62
1751.01	4.01	7.58	0.14	0.19	91.60	1769.21	1769.31	2.67
1751.26	4.26	7.56	0.15	0.18	91.65	1773.16	1773.26	2.67
1751.51	4.51	7.53	0.14	0.18	91.68	1777.11	1777.21	2.74
1751.75	4.75	7.53	0.14	0.19	91.56	1781.05	1781.15	2.82
1752.00	5.00	7.54	0.14	0.19	91.55	1785.00	1785.10	2.89

JCIQ-1880D





1805 - 1880 MHz

FREQUENCY RF (MHz)	FREQUENCY I&Q (MHz)	CONVERSION LOSS $\bar{X}$ (dB)	CONVERSION LOSS σ (dB)	AMP UNBAL. $\bar{X}$	PHASE (I&Q) $\bar{X}$	FREQUENCY LO (MHz)	FREQUENCY RF (MHz)	DC OFFSET $\bar{X}$ (mV)
1842.30	0.30	7.42	0.08	0.23	90.94	1805.00	1805.10	-2.82
1842.55	0.55	7.40	0.07	0.26	90.91	1808.95	1809.05	-2.89
1842.79	0.79	7.37	0.07	0.25	90.81	1812.89	1812.99	-2.95
1843.04	1.04	7.36	0.08	0.23	90.66	1816.84	1816.94	-3.02
1843.29	1.29	7.36	0.07	0.27	90.55	1820.79	1820.89	-3.08
1843.54	1.54	7.37	0.07	0.21	90.79	1824.74	1824.84	-3.14
1843.78	1.78	7.37	0.07	0.22	90.67	1828.68	1828.78	-3.19
1844.03	2.03	7.38	0.08	0.26	90.78	1832.63	1832.73	-3.23
1844.28	2.28	7.36	0.08	0.26	90.81	1836.58	1836.68	-3.26
1844.53	2.53	7.38	0.08	0.24	90.64	1840.53	1840.63	-3.29
1844.77	2.77	7.38	0.08	0.24	90.43	1844.47	1844.57	-3.31
1845.02	3.02	7.36	0.09	0.22	90.77	1848.42	1848.52	-3.34
1845.27	3.27	7.38	0.08	0.22	90.63	1852.37	1852.47	-3.37
1845.52	3.52	7.38	0.07	0.24	90.54	1856.32	1856.42	-3.40
1845.76	3.76	7.37	0.07	0.23	90.81	1860.26	1860.36	-3.45
1846.01	4.01	7.39	0.07	0.25	90.79	1864.21	1864.31	-3.50
1846.26	4.26	7.37	0.07	0.25	90.77	1868.16	1868.26	-3.56
1846.51	4.51	7.37	0.08	0.27	90.81	1872.11	1872.21	-3.62
1846.75	4.75	7.38	0.08	0.27	90.86	1876.05	1876.15	-3.66
1847.00	5.00	7.37	0.08	0.26	90.94	1880.00	1880.10	-3.68

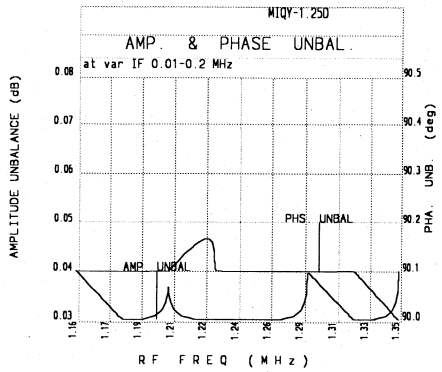
good amplitude and phase unbalance

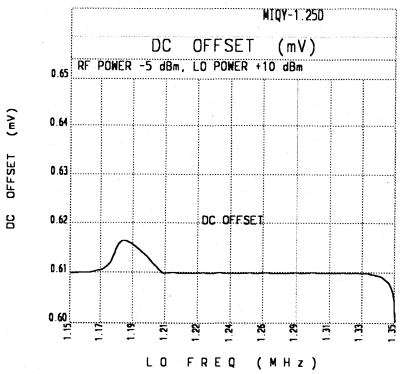
I&Q Demodulator

50 ohms

MIQY-1.25D

1.15 MHz to 1.35 MHz





FREQUENCY		CONVERSION LOSS		AMP UNBAL.	PHASE (I&Q)	FREQUENCY		DC OFFSET
RF (MHz)	I&Q (MHz)	$\bar{X}$ (dB)	σ (dB)	$\bar{X}$	$\bar{X}$	LO (MHz)	RF (MHz)	$\bar{X}$ (mV)
1.16	0.01	5.07	0.04	0.08	90.22	1.15	1.16	0.70
1.17	0.02	5.07	0.04	0.08	90.22	1.16	1.17	0.70
1.18	0.03	5.07	0.05	0.07	90.22	1.17	1.18	0.70
1.19	0.04	5.07	0.03	0.07	90.18	1.18	1.19	0.70
1.20	0.05	4.97	0.03	0.08	90.20	1.19	1.20	0.70
1.21	0.06	5.02	0.02	0.08	90.20	1.20	1.21	0.70
1.22	0.07	4.99	0.03	0.08	90.22	1.21	1.22	0.70
1.23	0.08	4.92	0.04	0.08	90.20	1.22	1.23	0.70
1.24	0.09	4.93	0.01	0.08	90.22	1.23	1.24	0.70
1.25	0.10	4.99	0.03	0.08	90.18	1.24	1.25	0.69
1.26	0.11	5.01	0.03	0.08	90.18	1.26	1.27	0.69
1.27	0.12	4.94	0.04	0.08	90.20	1.27	1.28	0.69
1.28	0.13	4.99	0.04	0.08	90.20	1.28	1.29	0.69
1.29	0.14	4.99	0.04	0.09	90.18	1.29	1.30	0.69
1.30	0.15	4.97	0.03	0.08	90.20	1.30	1.31	0.69
1.31	0.16	4.94	0.03	0.08	90.18	1.31	1.32	0.69
1.32	0.17	4.98	0.05	0.08	90.20	1.32	1.33	0.69
1.33	0.18	4.95	0.04	0.08	90.18	1.33	1.34	0.69
1.34	0.19	5.00	0.05	0.08	90.14	1.34	1.35	0.69
1.35	0.20	4.96	0.05	0.09	90.12	1.35	1.36	0.68

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Mini-Circuits

SECTION 12

PHASE DETECTORS AND PHASE SHIFTERS

contents of this section

technical
introduction, definition of items, questions 12-2

product specifications
phase shifter 12-3
phase detectors 1MHz to 400 MHz 12-4

computer data and curves
CAPD information. . . . . 12-5 thru 12-6

phase detectors

Mini-Circuits high efficiency phase detectors are the only units in the world offering a figure-of-merit greater than 125.

The figure-of-merit M or efficiency of a phase detector can be defined as the ratio of maximum DC output voltage (in mV) divided by the RF power (in dBm). The maximum DC output from these units is 1000 mV with +7 dBm applied to the LO and RF ports. Thus, its figure-of-merit M is 143, which indicates a highly efficient phase detector. DC offset is typically 400 microvolts. For comparison, a double-balanced mixer used as a phase detector of offers 350 mV DC output with the same LO and RF inputs for a figure-of-merit M of 50. So when your system requires a high output phase detector, specify Mini-Circuits' phase detectors, available in a wide variety of package styles.

modern definition

phase detector

Provides a DC output voltage proportional to the difference in phase between two RF input signals. A double-balanced mixer can perform as a phase detector when the LO and RF signal inputs are at the same frequency.

dc offset

The small amount of voltage present at the output when there should actually be zero voltage, such as when only one input is present, or when the two RF input signals are 90° out of phase. This offset voltage is due to slight mismatches in the diodes and/or imperfect balance in the transformer windings.

maximum dc output

from a phase detector occurs when the RF and LO signals are in phase or 180 degrees out-of-phase.

figure-of-merit, M

A method for defining the efficiency of a phase detector. It is the ratio of maximum DC output voltage, in mV, divided by the RF power in dBm.

frequency range spec

Refers to the frequency range of operation of the phase detector, such that the figure of merit decreases to 75 percent of its mid-band value.

scale factor

The phase detector output measured in mV per degree in the approximate linear range of operation, 0 to 57.3°, or 1 radian.

most often asked questions

Q. *Can you explain, briefly, how a DBM works as a phase detector?*

A. When a DBM is used as a phase detector, this is merely a special case of mixing action where the LO and RF signals are at the same frequency. Now, let's look at the mixer equation:

$$\text{IF output} = A_1 \cos[(\omega_{LO} - \omega_{RF})t - (\phi_{LO} - \phi_{RF})] + A_2 \cos[(\omega_{LO} - \omega_{RF})t - (\phi_{LO} - \phi_{RF})] + [\text{higher order frequency terms}]$$

In a phase detector application, $\omega_{LO} = \omega_{RF}$; therefore in the first term, $\omega_{LO} - \omega_{RF} = 0$ and thus the IF output is only a function of $A_1 \cos(\phi_{RF} - \phi_{LO}) + A_2 \cos(2\omega t) +$ higher frequency terms. With proper filtering, the $2\omega t$ terms and higher can be eiliminated so the IF ouput is equal to $A_1 \cos(\phi_{RF} - \phi_{LO})$.

Specifications of a DBM that are important in a phase detector application include:
(1) DC offset, (2) maximum DC output, (3) isolation between ports, (4) polarity of output voltage, (5) frequency response, (6) temperature variation of DC offset.

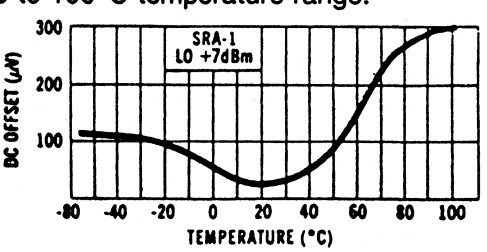
Q. *How is DC offset affected by temperature?*

A. If only one input is present, say LO, there should be zero output. However, due to slight mismatch in the diodes and imperfect balance in the transformer windings, a small DC voltage will appear at the IF output. This is called the DC offset voltage.

The value of the DC offset varies with temperature. Over a wide temperature range, say from −55 to +100°C, the unbalance of the mixer diodes will have a major influence on the DC offset with only a slight contribution from the transformer.

An effective technique to minimize DC offset variation with temperature is to use diodes whose characteristics track with temperature. This can be accomplished by using diodes manufactured from the same wafer in the same production lot. At Mini-Circuits, this selection technique is used exclusively in the production of mixers. Also Mini-Circuits employs specially-designed winding machines so that the assembled transformers have well-matched windings.

The net result—Mini-Circuits offers ultra-low DC offset characteristics; less than 300 to 400 μV over a −55 to 100°C temperature range.



DC Offset Temperature Characteristics

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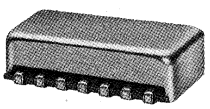
PHASE SHIFTER

Mini-Circuits®

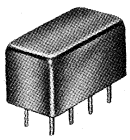
Plug-In & Surface Mount❑

180° VOLTAGE VARIABLE 13 to 446 MHz

SURFACE MOUNT



JSPHS



SPH

	MODEL NO.	FREQUENCY MHz	PHASE RANGE (DEGREES)	INSERTION LOSS (dB) Typ.	INSERTION LOSS (dB) Max.	CONTROL VOLTAGE (V)	CONTROL BANDWIDTH Typ.	VSWR Typ.	VSWR Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
NEW	JSPHS-446	366-446	180	1.2	2.5	0-12	DC-50 KHz	1.2	1.7	see below	BK276	jb	32.95
NEW	SPH-16	13-16	180	1.2	2.5	0-7	DC-50 KHz	1.2	1.7		A01	jh	29.95

features

- JSPHS, J-lead surface mount
- SPH, plug-in hermetically sealed
- good vswr, 20% bandwidth
- low voltage bias control, JSPHS, 10V, SPH, 7V
- low insertion loss, 1.2 dB typ.

JSPHS-446

CONTROL VOLTAGE (V)	PHASE SHIFT* (Deg.) 366 MHz	406 MHz	446 MHz	VSWR 366 MHz	406 MHz	446 MHz	INSERTION LOSS (dB) 366 MHz	406 MHz	446 MHz
0.5	0.05	0.03	0.01	1.17	1.09	1.37	1.10	1.02	1.10
1	7.65	5.43	4.14	1.21	1.06	1.34	1.17	1.04	1.08
3	57.73	41.01	29.01	1.44	1.19	1.16	1.67	1.37	1.22
5	137.57	112.81	84.75	1.38	1.44	1.32	1.68	1.84	1.70
7	186.22	174.91	151.47	1.10	1.21	1.29	1.17	1.49	1.79
9	205.93	203.06	189.91	1.10	1.22	1.25	1.02	1.25	1.52
10	211.22	210.59	200.96	1.12	1.25	1.29	0.99	1.19	1.44

*Normalized at control voltage=0.5V

NOTES:

❑ Non-hermetic

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. Max. RF input power; +20 dBm
   1b. Max. control voltage: 20V

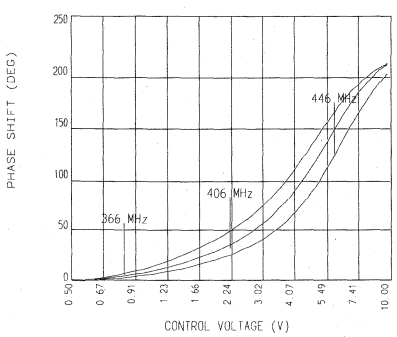
pin connections

see case style outline drawings

PORT	jb	jh
IN	14	1
OUT	8	7
BIAS	1,7	4,6
GND	all other pins	all other pins

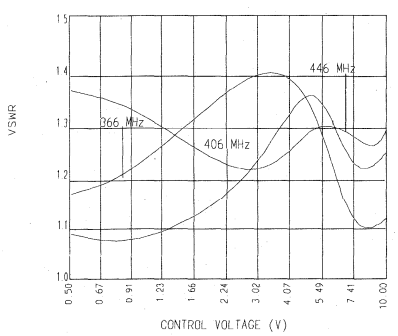
JSPHS-446

PHASE SHIFT



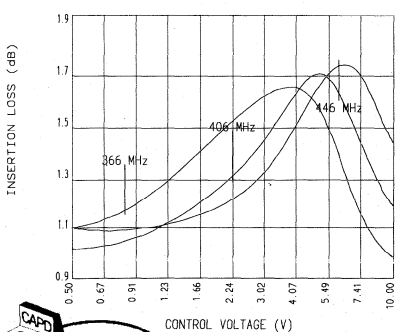
JSPHS-446

VSWR



JSPHS-446

INSERTION LOSS



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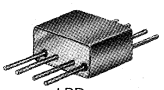
PHASE DETECTORS

Surface Mount❑ Plug-In & Coaxial

HIGH OUTPUT *1000 mV DC output, 1 to 400 MHz*

SURFACE MOUNT

SYPD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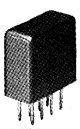
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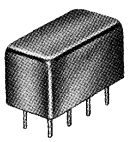
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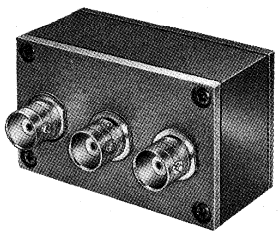
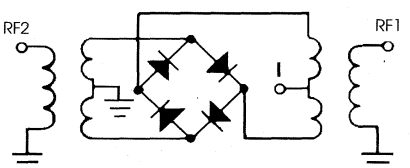

ZRPD

MODEL NO.	FREQUENCY MHz RF1 RF2	I	POWER IN RF1 RF2 (dBm)	SCALE FACTOR mV/degree	IMPEDANCE (ohms) OUTPUT LOAD I	ISOLATION (dB) RF1-RF2 Min.	OUTPUT POLARITY RF1/RF2 in-phase	DC OUTPUT (mV) MAX. Typ.	Min.	OFFSET Typ.	Max.	FIGURE-OF-MERIT M Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
SYPD-1	1-100	DC-50	7	8	500	40	neg.	1000	750	0.2	1	143	12-5	TTT167	ec	14.95
SYPD-2	10-200	DC-50	7	8	500	40	neg.	1000	750	0.3	1	143	12-6	TTT167	ec	18.95
LPD-1	1-100	DC-50	7	8	500	40	neg.	1000	750	0.2	1	143	12-5	BB48	eb	26.45
MPD-1	1-100	DC-50	7	8	500	40	neg.	1000	750	0.2	1	143	12-5	A11	ea	21.45
MPD-2	10-200	DC-50	7	8	500	40	neg.	1000	750	0.3	1	143	12-6	A11	ea	24.95
MPD-21	50-400	DC-50	7	7	500	40*	neg.	800	600	0.5	1	120	12-5	A11	ea	26.95
RPD-1	1-100	DC-50	7	8	500	40	neg.	1000	750	0.2	1	143	12-5	A01	ea	18.45
RPD-2	5-150	DC-50	7	8	500	40	neg.	1000	750	0.3	1	143	12-6	A01	ea	20.95
ZRPD-1	1-100	DC-50	7	8	500	40	neg.	1000	750	0.2	1	143	12-5	M22	gg	57.95



NSN GUIDE

MCL NO.	NSN
MPD-1	6625-01-294-7152
MPD-21	5895-01-389-3572
RPD-1	5895-01-250-8525

NOTES:

❑ Non-hermetic
* 30 dB from 200 to 400 MHz
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF Input power, 50mW
1b. Peak IF current, 20mA

pin connections

see case style outline drawings for pin locations

PORT	ea	eb	ec	gg
RF REF (RF2)	8	8	2	1
RF IN (RF1)	1	5	1	3
DC OUT (I)	3,4	4	3	2
GND EXT.	2,5,6,7	1,2,3,6,7	4,5,6	—
CASE GND	2	1,2,3,6,7	—	—

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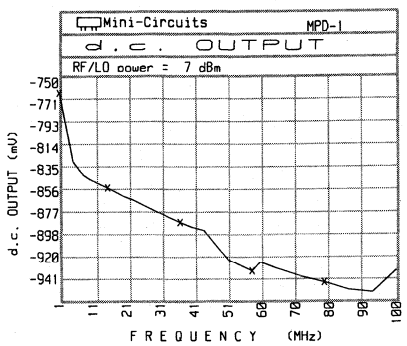
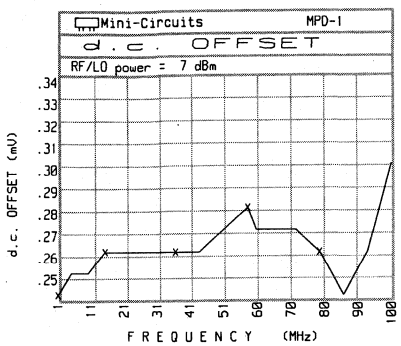
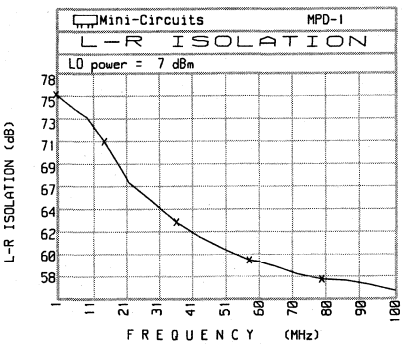
LPD-1, MPD-1, RPD-1, ZRDP-1, SYPD-1

1 to 100 MHz



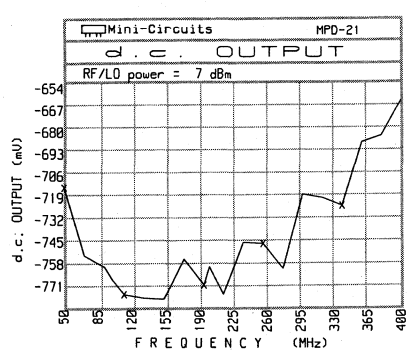


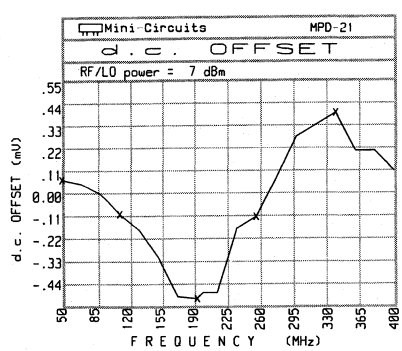


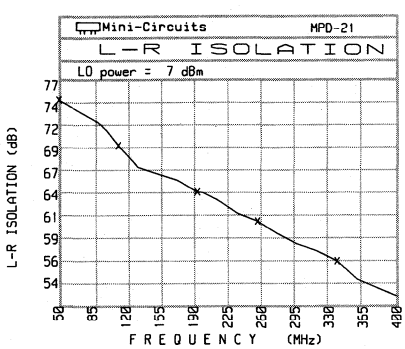
FREQUENCY	DC OUTPUT		DC OFFSET		L-R ISOLATION
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$
(MHz)	(mV)	(mV)	(mV)	(mV)	(dB)
1.000	-769.98	14.85	0.10	0.16	76.12
5.000	-830.34	8.90	0.11	0.18	75.09
8.071	-840.24	14.44	0.11	0.18	74.07
10.000	-843.71	14.61	0.10	0.18	73.19
15.143	-851.12	17.01	0.11	0.19	70.19
20.000	-859.20	18.91	0.11	0.19	68.10
22.214	-861.26	20.52	0.10	0.20	67.28
29.286	-872.02	22.55	0.11	0.21	65.14
36.357	-881.57	24.77	0.11	0.22	63.29
40.000	-886.86	25.39	0.12	0.23	62.38
43.429	-889.93	26.41	0.12	0.23	61.76
50.500	-917.82	25.99	0.14	0.25	60.51
57.571	-927.50	28.69	0.15	0.27	59.35
60.000	-917.14	33.08	0.15	0.26	59.18
64.643	-920.62	38.60	0.15	0.27	58.73
71.714	-925.22	45.18	0.17	0.31	57.82
78.786	-928.03	51.83	0.18	0.31	57.35
85.857	-932.34	57.31	0.17	0.31	57.15
92.929	-932.98	60.65	0.18	0.38	56.93
100.000	-909.17	74.27	0.23	0.43	56.36

MPD-21

50 to 400 MHz







FREQUENCY	DC OUTPUT		DC OFFSET		L-R ISOLATION
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$
(MHz)	(mV)	(mV)	(mV)	(mV)	(dB)
50.000	-709.82	3.59	0.08	0.04	70.65
70.588	-749.08	3.90	0.05	0.06	67.43
91.176	-754.30	4.74	-0.01	0.08	66.33
100.000	-761.44	5.14	-0.05	0.08	65.36
111.765	-768.79	5.90	-0.11	0.09	64.25
132.353	-768.89	7.05	-0.20	0.10	61.88
152.941	-767.63	8.30	-0.34	0.11	61.49
173.529	-742.21	9.53	-0.48	0.14	60.94
194.118	-755.32	11.20	-0.45	0.18	60.49
200.000	-744.32	11.29	-0.41	0.18	60.16
214.706	-758.79	12.19	-0.39	0.23	59.51
235.294	-727.66	13.02	-0.08	0.17	57.81
255.882	-725.26	15.07	-0.03	0.18	57.03
276.471	-736.71	17.30	0.14	0.15	55.98
297.059	-692.38	18.31	0.27	0.09	54.45
317.647	-691.52	20.64	0.31	0.11	53.62
338.235	-694.23	21.94	0.34	0.14	52.91
358.824	-656.91	21.62	0.19	0.10	52.02
379.412	-652.04	21.74	0.19	0.12	51.31
400.000	-632.47	20.37	0.11	0.09	50.99

highest figure of merit

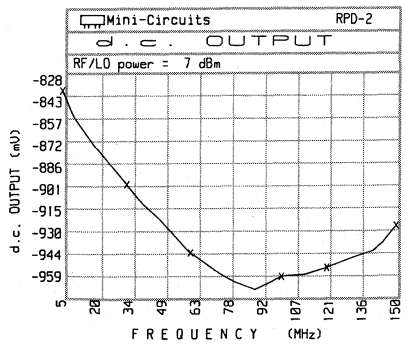
Phase Detectors

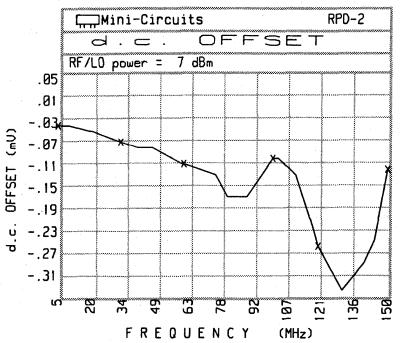
50 ohms

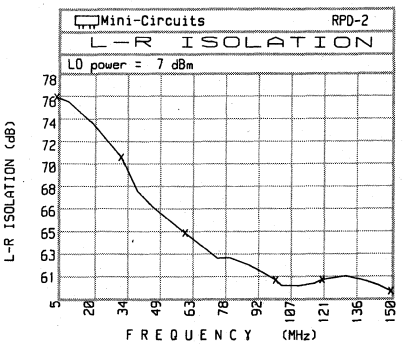
1000 mV DC output, +7 dBm RF

RPD-2

5 to 150 MHz



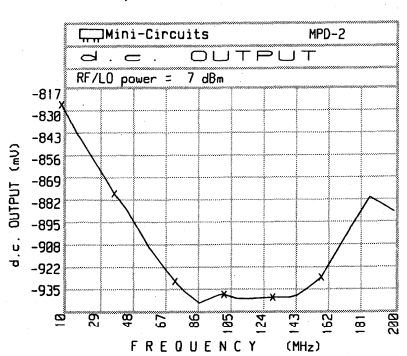


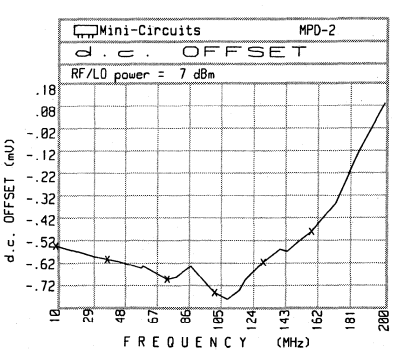


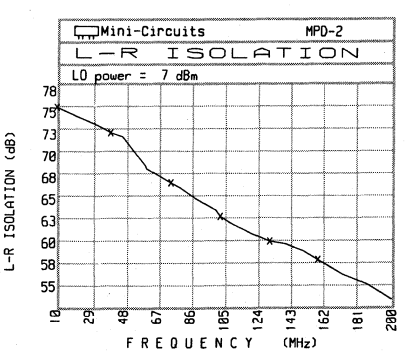
FREQUENCY	DC OUTPUT		DC OFFSET		L-R ISOLATION
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$
(MHz)	(mV)	(mV)	(mV)	(mV)	(dB)
5.000	-833.63	2.72	-0.01	0.26	75.70
10.000	-852.76	1.95	-0.01	0.27	75.30
18.929	-873.33	1.77	-0.02	0.26	73.81
20.000	-875.10	1.78	-0.02	0.26	73.45
32.857	-900.53	2.55	-0.05	0.24	69.84
40.000	-914.52	3.03	-0.07	0.24	67.79
46.786	-924.59	3.49	-0.08	0.23	66.39
60.000	-949.07	4.67	-0.13	0.23	64.23
60.714	-949.90	4.72	-0.13	0.23	63.98
74.643	-968.41	6.47	-0.18	0.22	62.11
80.000	-973.90	7.19	-0.21	0.22	61.80
88.571	-981.00	8.49	-0.28	0.23	61.68
100.000	-974.94	9.96	-0.28	0.26	60.73
102.500	-974.94	10.38	-0.28	0.27	60.33
110.000	-976.18	11.49	-0.27	0.25	59.71
116.429	-975.23	12.62	-0.30	0.23	59.57
120.000	-975.00	13.37	-0.33	0.22	59.53
130.357	-973.76	16.20	-0.41	0.19	59.73
140.000	-973.73	19.18	-0.45	0.22	59.76
144.286	-971.46	20.99	-0.47	0.25	59.67
150.000	-964.95	23.54	-0.42	0.33	59.40

MPD-2, SYPD-2

10 to 200 MHz







FREQUENCY	DC OUTPUT		DC OFFSET		L-R ISOLATION
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$
(MHz)	(mV)	(mV)	(mV)	(mV)	(dB)
10.000	-832.85	8.84	-0.20	0.31	73.96
20.000	-852.33	8.56	-0.21	0.32	71.39
32.857	-873.37	8.31	-0.22	0.33	68.61
40.000	-885.64	8.09	-0.23	0.33	67.41
46.786	-894.39	7.95	-0.23	0.33	66.22
60.714	-917.70	7.62	-0.22	0.35	64.00
74.643	-935.82	7.73	-0.25	0.37	61.81
80.000	-941.09	7.83	-0.24	0.37	61.28
88.571	-947.91	8.28	-0.23	0.38	60.45
100.000	-941.46	8.44	-0.28	0.40	59.49
110.000	-942.62	8.94	-0.29	0.41	58.55
120.000	-940.69	9.51	-0.22	0.40	57.75
130.357	-938.41	10.59	-0.19	0.39	57.17
140.000	-936.70	11.75	-0.16	0.37	56.90
144.286	-934.52	12.34	-0.17	0.36	56.82
150.000	-929.14	12.91	-0.13	0.38	56.68
158.214	-919.94	13.74	-0.08	0.40	56.42
172.143	-890.67	15.14	0.06	0.41	55.90
186.071	-863.24	17.28	0.28	0.31	55.11
200.000	-867.58	20.41	0.44	0.24	54.28

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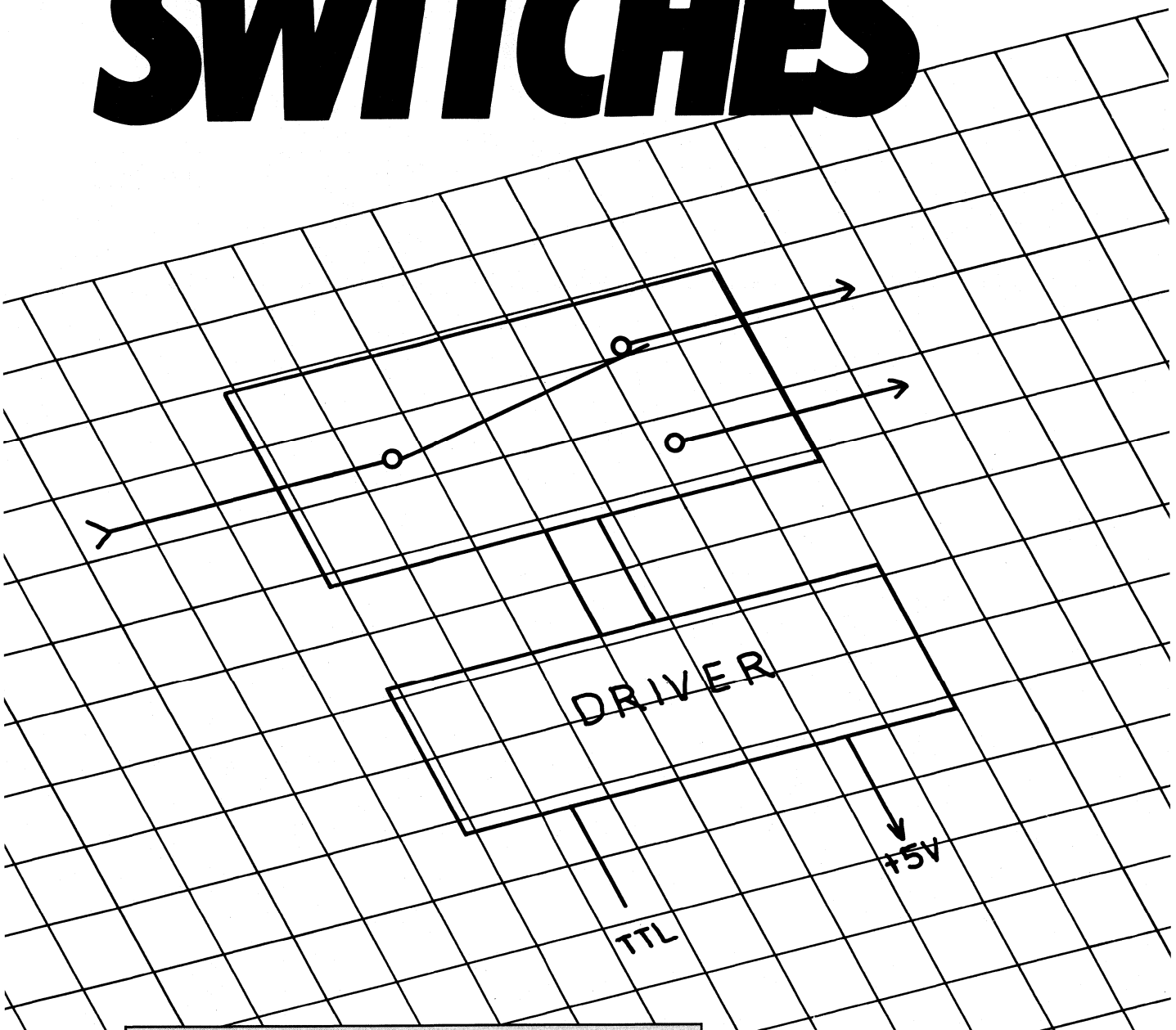
SECTION 13

SWITCHES



contents of this section

product specifications

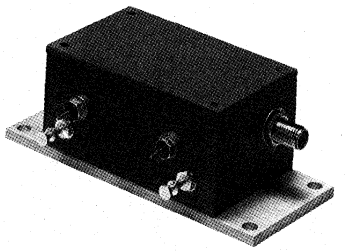
pin diode switches 13-2, 13-3
GaAs switches surface mount 13-4
GaAs switches coaxial 13-5
SPST, SPDT & transfer, surface mount 13-6, 13-7

computer data and curves

CAPD information . . . . . 13-12 thru 13-18

SPDT/SP4T TTL Drivers 10 to 3000 MHz

TOSW



ZSDR

MODEL NO.	TYPE	FREQUENCY MHz $f_L - f_U$	INSERTION LOSS dB low-band lw Typ.	lw Max.	upper band U Typ.	U Max.	IN-OUT ISOLATION, dB frequency band L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
TOSW-230	SPDT	10-3000	1.3	1.9	1.8	2.7	60	40	40	28	35	22	13-12	QQ96	ee	49.95
TOSW-425	SP4T	10-2500	1.1	1.7	1.5	2.5	60	40	40	30	35	22	13-12	QQ96	ed	69.95
Δ ZSDR-230	SPDT	10-3000	1.3	1.9	1.8	2.7	60	40	40	28	35	22	13-12	CCC127	-	89.95
Δ ZSDR-425	SP4T	10-2500	1.1	1.7	1.5	2.5	60	40	40	30	35	22	13-12	GGG126	-	109.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
lw = low band (f_L to f_U/2)

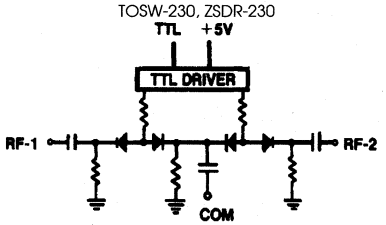
ADDITIONAL SPECIFICATIONS

VSWR ("ON" STATE): 1.3 TYP., 1.9 MAX.
SWITCHING TIME (μSEC): 2.0 TYP., 4.0 MAX.
SUPPLIED VOLTAGE: +5V

TTL INPUT HIGH THRESHOLD 2 VOLTS MIN.
TTL INPUT LOW THRESHOLD 0.8 VOLTS MAX.

control logic

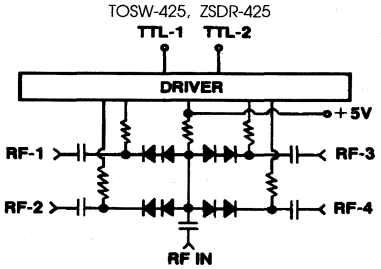
TOSW-230, ZSDR-230



TTL LOGIC		
TTL 1:	RF-1/OFF	RF-2/ON
TTL 0:	RF-1/ON	RF-2/OFF

control logic

TOSW-425, ZSDR-425



TTL LOGIC	TTL-1	TTL-2
RF-1	1	0
RF-2	1	1
RF-3	0	1
RF-4	0	0

NOTES:

** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.
Δ Available only with SMA connectors.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum RF power and control current

Models	Power, dBm L	M	U	Control Current (mA)
(all)				
TOSW	+20	+28	+30	10
ZSDR	+20	+28	+30	10
PSW	+20	+20	+20	5
ZMSW	+20	+20	+20	5

2. 1 dB Compression point: all models

Frequency, MHz	RF Power, dBm
10 to 100	+6 increase to +19 dBm
above 100	+19 min.

pin and coaxial connections

see case style outline drawings

PORT	ed	ee
RF IN	8	8
RF OUT 1	4	5
RF OUT 2	6	11
RF OUT 3	10	—
RF OUT 4	12	—
TTL-1	2	3
TTL-2	3	—
+5V	1	1
-5V	—	—
GND EXT.	5,7,9,11	2,4,6,7,9, 10,12
CASE GND	5,7,9,11	2,4,6,7,9, 10,12

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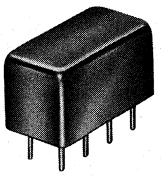
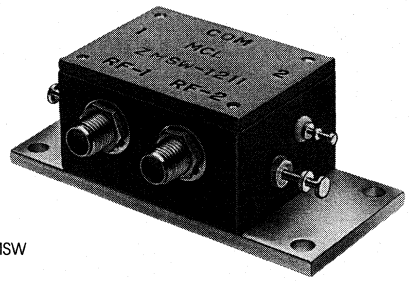
SPST/SPDT 10 to 2500 MHz



PSW



ZMSW

MODEL NO.	TYPE	FREQUENCY MHz	INSERTION LOSS dB				IN-OUT ISOLATION, dB						CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	connection	PRICE $
			low-band lw		upper band U		frequency band L		M		U					
		f_L - f_U	Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Page	Note B		Qty. (1-9)
PSW-1211	SPDT	10-2500	1.1	1.7	1.7	2.7	50	40	35	28	28	22	13-13	A06	ep	32.95
ZMSW-1111	SPST	10-2500	1.1	1.7	1.7	2.7	50	45	35	28	28	22	13-13	JJ77	eq	69.95
ZMSW-1211	SPDT	10-2500	1.1	1.7	1.7	2.7	50	45	35	28	28	22	13-13	JJ77	er	69.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
lw = low band (f_L to f_U/2)

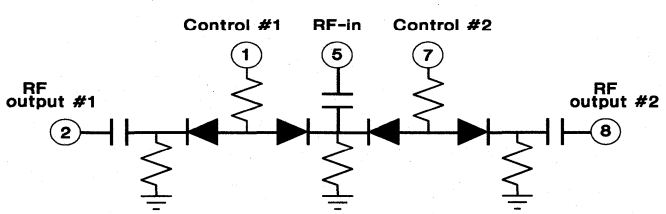
U = upper range (f_U/2 to f_U)

ADDITIONAL SPECIFICATIONS:

VSWR 1.7 max. ("on" state)
Switching time: 4μ sec. max.
Rise time: 2μ sec typical
Control voltage +5V on condition, 0V off condition
1 dB compression for all pin diode switches from 10 to 100 MHz
increase from 6 to 19 dBm. Above 100 MHz, 19 dBm min.

control logic

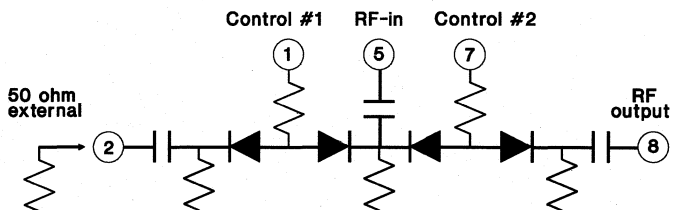
PSW-1211, ZMSW-12111



	LOGIC Control #1 (pin 1)	Control#2 (pin 7)	RF 2 (pin 8)	RF 1 (pin 2)
State 1:	0V	+5V	ON	OFF
State 2:	+5V	0V	OFF	ON

control logic

PSW-1211 as absorptive SPST



	LOGIC Control #1 (pin 1)	Control#2 (pin 7)	RF 2 (pin 8)
State 1:	0V	+5V	ON
State 2:	+5V	0V	OFF(50Ω)

pin and coaxial connections

see case style outline drawings

PORT	ep(SPST)	ep(SPDT)	eq	er
RF IN	5	5	com	com
RF OUT 1	8	2	—	RF-1
RF OUT 2	—	8	RF-1	RF-2
CONTROL 1	1	1	—	1
CONTROL 2	7	7	2	2
50-OHM TERM.	2	—	1	—
GND EXT.	3,4,6	3,4,6	—	—
CASE GND	3,6	3,6	—	—

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SP4T WITH TTL Drivers DC to 3 GHz

GSWA

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	°IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
GSWA-4-30DR	DC-3	●		1.25	1.8	2.0	3.0	2.75	3.9	22	—	28	—	28	—	50	40	37	32	31	26	3-17	AN213	hb	19.95

A = DC to 500MHz B = 500MHz to 2000MHz C = 2000MHz to 3000MHz

features

- excellent repeatability, specification limits 4.5σ typical from mean.
- high isolation, 80 dB typical at 5 MHz.
- low video break thru, 30 mVP-P typical.
- very fast switching, 3 nsec typical (SPDT).
- low DC power consumption, 120mW typical.

pin and coaxial connections

see case style outline drawings for pin locations

PORT	eg	ej	em	hb
RF IN	3	S	1	1
RF OUT 1	2	3	2	25
RF OUT 2	1	2	—	21
RF OUT 3	—	—	—	9
RF OUT 4	—	—	—	5
CONTROL 1	—	4	S	15,16,13,14
CONTROL 2	—	1	3	—
TTL-1	4			
TTL-2	—			
+5V	+5 VDC			12
-5V	-5 VDC			18
NOT USED				—
GND EXT.				all other pins

control logic, all models

Model Series	Control Ports 1	2	3	4	RF outputs 1	2	3	4
GSWA	Low	High	High	High	On	Off	Off	Off
	High	Low	High	High	Off	On	Off	Off
	High	High	Low	High	Off	Off	On	Off
	High	High	High	Low	Off	Off	Off	On
ZFSW, ZFSWA	-v	0	—	—	On	Off	—	—
	0	-v	—	—	Off	On	—	—
ZFSWHA	-v	0	—	—	On	—	—	—
	0	-v	—	—	Off	—	—	—
ZYSW, ZYSWA	Low	—	—	—	On	Off	—	—
	High	—	—	—	Off	On	—	—

NOTES:

** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.

△ Available with SMA connectors
Moisture Resistance of models on this page is not guaranteed.

❑ Non-hermetic

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum RF power ratings.

Models	Power, dBm DC-100	100-500	500-2000	2000-3000	3000-5000
GSWA-4-30DR					
Steady state control:	+20	+24	+30	+30	—
As modulator:	+8	+14	+20	+20	—
ZFSW-2-46	+24	+27	+30	+30	+30
ZFSWA-2-46	+24	+24	+27	+27	+27
ZYSWA-2-50DR	+22	+22	+22	+24	+24
ZYSWA-2-50DR	+20	+20	+20	+20	+20
ZFSWHA-120					
Steady state control:	+23	+30	+33	—	—
As modulator:	+14.5	+20	+27	—	—

* In modulator service, unrestricted switching is permitted with RF applied

2. For reflective switches ZFSW, ZYSW models, OFF state of RF output is low impedance.

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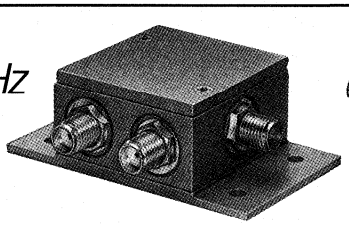
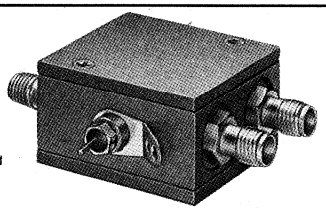
SPDT With/ Without TTL Drivers DC to 5 GHz



ZFSWA
ZFSW

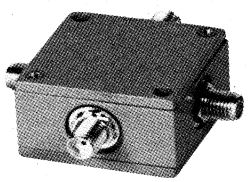


ZYSWA
ZYSW

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	⊙IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
△ ZFSW-2-46	DC-4.6		●	0.9	1.1	1.0	1.3	1.3	1.7	10	—	17	—	27	—	60	50	45	40	30	23	13-15	G144	ej	79.95
△ ZFSWA-2-46	DC-4.6	●		0.8	1.1	0.9	1.3	1.5	2.6	10	—	17	—	27	—	60	45	50	40	30	25	13-15	G144	ej	89.95
△ ZYSW-2-50DR	DC-5		●	0.9	1.5	1.3	1.7	1.4	2.1	20	15	20	19	24.0	20	50	41	40	32	28	22	13-14	ZZ121	eg	59.95
△ ZYSWA-2-50DR	DC-5	●		1.1	1.5	1.4	1.9	1.9	2.7	18	13	20	17	22.5	20	42	38	31	27	20	19	13-14	ZZ121	eg	69.95

ZFSW, ZFSWA: A = DC to 200MHz B = 200MHz to 1000MHz C = 1000MHz to 4600MHz
ZYSW, ZYSWA: A = DC to 500MHz B = 500MHz to 2000MHz C = 2000MHz to 5000MHz

SPST High Isolation DC to 2 GHz



ZFSWHA

MODEL NO.	FREQ. GHz	ABSORPTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
△ ZFSWHA-1-20	DC-2.0	●	0.8	1.2	1.3	1.7	19	26	75	60	65	58	13-11	J17	em	74.95

A = DC to 200MHz B = 200MHz to 2000MHz

additional specifications, all models

Model Series	ZFSW, ZFSWA	ZFSWHA	ZYSW, ZYSWA	GSWA	YSW, YSWA
Control Voltage Low Threshold, max. High Threshold, min.	-8/0 for compression spec, -8 to -5/0 for all other specs		0/5.5, max. 0.8 2.0	0/ 5.5 0.8 3.5	0/ 5.5 0.8 2.0
Control Current, mA	2.5 typ. at -8V	0.2 max to -8V	High V: 2 typ., 5 max. Low V:0.2 max.	High V: 0.2 max Low V: 0.02 max	High V: 2 typ., 5 max. Low V: 0.2 max.
Positive Supply V.	none	none	5±0.5	+5±0.5	+5±0.5
Negative Supply V.	none	none	-5±0.5	-5±0.25	-5±0.5
VSWR	1.3 typ.	DC-0.2GHz / 0.2-2GHz ON, all ports 1.25 max / 1.5 max OFF, Input 1.25 max. / 1.5 max. OFF, Output 1.4 max. / 1.5 max.	1.4 typ., 2.0 max.	1.28 typ., ON 1.24 typ., OFF DC-2GHz	1.4 typ., 2.0 max.
Rise/ Fall time (10% - 90%), ns Switching time, 50% of Control to 90% RF (Turn-on), ns 10% RF (Turn-off), ns	2 typ.	3 typ., 5 max. 7 typ., 10 max. 3 typ., 10 max.	1.5 typ., 3 max. 3 typ., 5 max.	25 typ. 45 typ.	1.5 typ., 3 max. 3 typ., 5 max.
**Video Leakage, mVp-p 0/-5V Control	30 typ.	30 typ., 50 max.	30 typ.	30 typ.	30 typ.
Temperature, °C	operating storage	-55 to 100 -55 to 150	-55 to 85 -55 to 100	-30 to 85 -55 to 100	-55 to 85 -55 to 100
MTBF, hrs @85°C case				30X10⁶	30X10⁶

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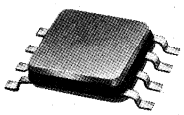
SWITCHES GaAs

SPDT DC to 4.6 GHz



KSW
*KSWA
*KSWHA

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	C Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
KSW-2-46	DC-4.6		●	0.9	1.1	1.0	1.3	1.3	1.7	10	17	27	60	50	45	40	30	23	13-15	XX112	eh	36.95
* KSWA-2-46	DC-4.6	●	●	0.8	1.1	0.9	1.3	1.5	2.6	10	17	27	60	45	50	40	30	25	13-15	XX112	eh	58.95

A = DC to 200MHz B = 200MHz to 1000MHz C = 1000MHz to 4600MHz

SPST DC to 2 GHz High Isolation

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
* KSWHA-1-20	DC-2.0	●		0.8	1.2	1.3	1.7	19	26	75	60	65	58	13-11	XX112	ek	34.95

A = DC to 200MHz B = 200MHz to 2000MHz

additional specifications

Model Series	KSW	KSWA	KSWHA	MSW	MSWA	MSWT
Control Voltage	-8/0 for compression spec, -8 to -5/0 for all other specs					
Control Current, mA	2.5 typ. at -8V		0.2 max to -8V	0.2 max to -8V, 0.02 max at 0 to -0.2V		
VSWR	1.3 typ.		ON, all ports: DC-0.2GHz 1.25 max, 0.2-2GHz 1.5 max OFF, Input: 1.25 max., 1.5 max. OFF, Output: 1.4 max., 1.5 max.	DC-1GHz: 1.2 typ. 1-2GHz: 1.4 typ.	DC-0.1GHz: 1.2 0.1-0.5GHz: 1.25 0.5-1GHz: 1.4 1-2GHz: 1.4 typ.	DC-0.1GHz: 1.2 0.1-0.5GHz: 1.65 0.5-1GHz: 1.8 1-2GHz: 1.9 max
Rise/ Fall time (10% - 90%), ns	2 typ.		3 typ., 5 max.	2 typ.	3 typ.	2 typ.
Switching time, 50% of Control to						
90% RF (Turn-on), ns			7 typ., 10 max.	4 typ.	5.5 typ.	4 typ.
10% RF (Turn-off), ns			3 typ., 10 max.	4 typ.	3 typ.	4 typ.
**Video Leakage, mVp-p 0/-5V Control	30 typ.		30 typ., 50 max.	15 typ.	8 typ.	15 typ.
Temperature, °C operating	-55 to 100			-40 to 85		
storage	-55 to 150			-55 to 100		
MTBF, hrs @100°C case	7X10⁶	11X10⁶				

NOTES:

* KSWA and KSWHA models are hermetically sealed.

** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings for KSW, KSWA models:
   1a. RF power input, +30 dBm except below 500 MHz +27 dBm;
   1b. Control voltage -10 V maximum.

2. Absolute maximum power, voltage & current ratings: MSW, MSWA MSWT models:

2a. RF power input, (25°C)		DC-100	100-500	500-2000	MHz
MSW-2-20:	Steady state 0/-8V control,	+23	+27	+31	dBm
	As modulator	+11	+17	+21	dBm
MSWA-2-20:	Steady state 0/-8V control,	+24	+27	+33	dBm
	As modulator	+12	+17	+23	dBm
MSWT-4-20:	Steady state 0/-8V control	+24	+27	+33	dBm
	modulator application	+12	+17	+23	dBm

2b. Control current, 500µA (Occurs at -9V to -12V typical)

3. Absolute maximum power, voltage and current ratings for KSWHA-1-20:

3a. RF power input, (Above 20°C derate power linearly to zero at 150°C.)

	DC-20	20-500	500-2000	MHz
Steady state 0/-8V control,	+23	+30	+33	dBm
As modulator *	+14.5	+20	+27	dBm

* In modulator service, unrestricted switching is permitted with RF applied

3b. Control current, 500µA (Occurs at -9V to -12V typical)

4. For reflective switches, KSW, MSW models, OFF state of RF output is low impedance.

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KSWA-2-46	5985-01-369-4224

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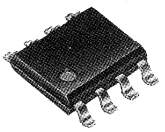
SPDT DC to 2 GHz



MSW
MSWA
MSWT

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	D Typ.	D Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	C Typ.	D Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	D Typ.	D Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (10)
MSW-2-20	DC-2.0		●	0.30	0.6	0.4	0.7	0.50	1.0	0.75	1.3	22	23	24	25	55	50	43	36	34	28	24	20	13-18	XX211	et	2.95
MSWA-2-20	DC-2.0	●		0.65	0.9	0.9	1.2	0.95	1.3	1.20	1.5	20	24	27	29	60	50	45	37	40	32	30	25	13-17	XX211	es	3.45

A=DC to 100MHz B=100MHz to 500MHz C=500MHz to 1000MHz D=1000MHz to 2000MHz

TRANSFER DC to 2 GHz Low Video Leakage

		path	INSERTION LOSS, dB A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	D Typ.	D Max.	1dB COMPRESSION, dBm A Typ.	B Typ.	C Typ.	D Typ.	ISOLATION, dB A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	D Typ.	D Min.	CAPD DATA Page	CASE STYLE Note B	connection	PRICE $ Qty. (10)
MSWT-4-20	DC-2.0	Tx-J1/J2	0.9	1.2	1.1	1.5	1.25	1.8	1.45	2.2	18	25	28	29	51	44	34	27	26	21	19	15				
		J1/J2-Rx	1.1	1.4	1.3	1.7	1.5	2.0	1.6	2.2	16	18	20	22	52	46	37	31	29	24	21	17	13-18	XX211	eu	3.95
		Tx-Rx													60	53	41	36	34	27	28	21				

A=DC to 100MHz B=100MHz to 500MHz C=500MHz to 1000MHz D=1000MHz to 2000MHz

control logic

Model Series	Control Ports 1	2	3	4	RF outputs 1	2
KSW, KSWA MSW, MSWA	-v 0	0 -v	— —	— —	On Off	Off On
KSWHA	-v 0	0 -v	— —	— —	On Off	— —
MSWT					"On" Path (other paths are "OFF")	
	0	-v	-v	-v	Tx-J2	
	-v	0	-v	-v	Tx-J1	
	-v	-v	0	-v	Rx-J1	
	-v	-v	-v	0	Rx-J2	
	0	-v	0	-v	Tx-J2 & Rx-J1	
	-v	0	-v	0	Tx-J1 & Rx-J2	

pin connections

see case style outline drawings

PORT	eh	ek	es	et
RF IN	2	1	2	1
RF OUT 1	5	5	8	6
RF OUT 2	8		5	3
CONTROL 1	3	2	3	5
CONTROL 2	1	3	1	4
GND EXT.	4,6,7	4,6,7,8	4,6,7	2,7,8

PORT	eu
Tx	2
Rx	6
J1	4
J2	8
CONTROL 1	1
CONTROL 2	3
CONTROL 3	5
CONTROL 4	7

Application Note for Model MSWT-4-20 Transmit-Receive Switch:

The functional schematic diagram for a diversity application of the switch is shown in Figure 1, with the required external components including 4 independent drivers at the control ports. When operation as a transfer switch is desired only 2 drivers are needed, one connected to the V1 and V3 ports together, and the other connected to the V2 and V4 ports. In either case, two DC return paths are needed for the control voltages, represented by the ground symbols in the diagram. These returns must be via oppositely situated RF ports (Tx and Rx or J1 and J2), and can be furnished incidentally by the user's RF terminating devices themselves. However, if those devices are AC-coupled (that is, they contain DC blocking capacitors), then the shunt resistors shown in the diagram are needed. The resistors should be installed either at the Tx and Rx ports (connection shown as solid), or at J1 and J2 (shown dotted), with equal effect. If one external RF device has a DC return to ground, for example, then only one resistor is needed; it must be installed at the opposite RF port of the switch. The resistance of each of the external DC returns should be 20K ohms or less, for proper ON/OFF FETs.

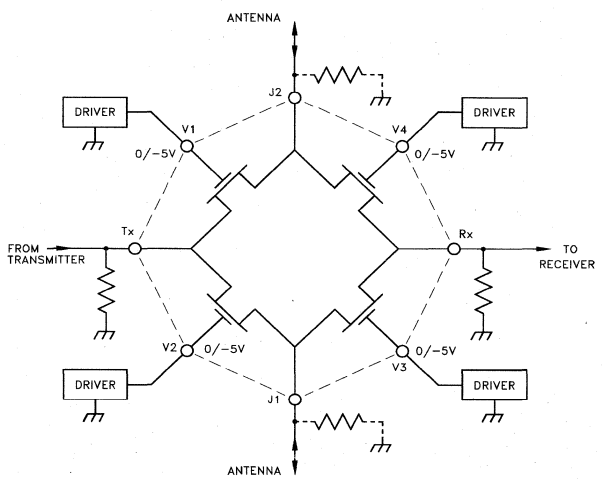
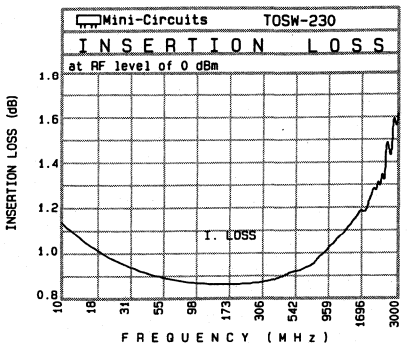


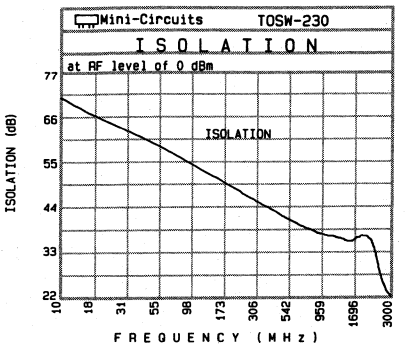
Figure 1. FUNCTIONAL SCHEMATIC DIAGRAM (Transmit-Receive application)

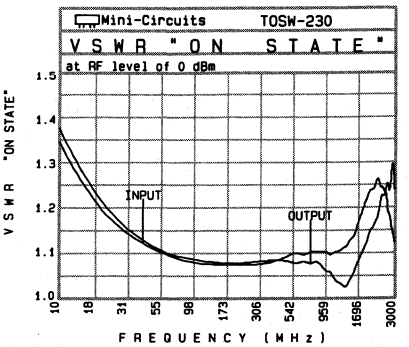
pin diode

Switches, with TTL driver

TOSW-230, ZSDR-230 — SPDT — 10 to 3000 MHz

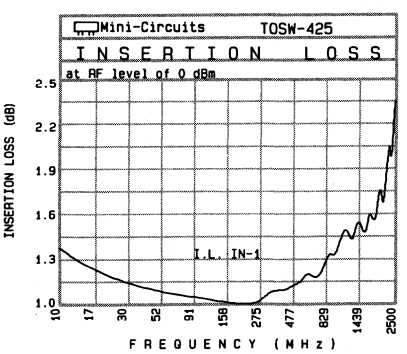


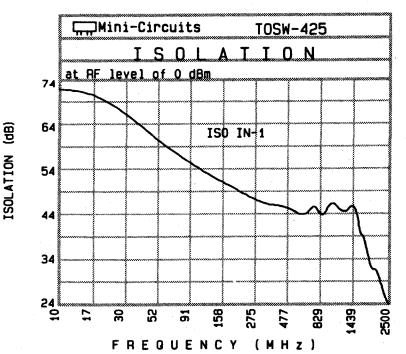


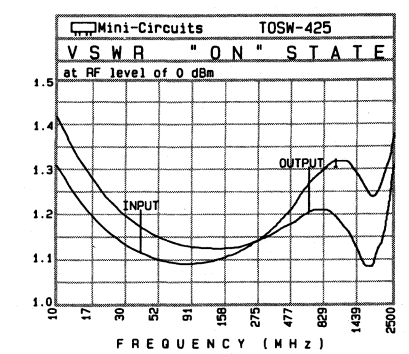


FREQ. (MHz)	ON INSERTION LOSS (dB) (TTL LOW @ 0V) IN-OUT		AMP. UNBAL.		OFF ISOLATION (dB) (TTL HIGH @ 5V) IN-OUT		DELTA		VSWR IN	VSWR OUT (RF 1) ON	VSWR OUT (RF 1) OFF
	x̄	σ	x̄	σ	x̄	σ	x̄	σ	x̄	x̄	x̄
10.000	1.18	0.04	0.03	0.02	74.26	1.60	1.14	0.39	1.37	1.41	31.26
20.000	1.06	0.05	0.05	0.05	69.20	1.46	1.45	1.51	1.20	1.22	30.31
50.000	0.92	0.03	0.02	0.01	61.84	1.14	1.60	1.01	1.12	1.12	30.07
100.000	0.88	0.03	0.02	0.01	55.48	0.61	0.75	0.63	1.09	1.10	30.07
200.000	0.88	0.02	0.02	0.01	49.81	0.72	0.64	0.70	1.09	1.09	30.49
500.000	0.94	0.02	0.02	0.01	42.32	0.56	0.53	0.77	1.11	1.11	29.97
552.910	0.94	0.02	0.01	0.01	41.56	0.50	0.61	0.74	1.12	1.10	28.88
792.000	1.02	0.01	0.01	0.01	39.41	0.46	0.68	0.76	1.13	1.12	26.27
1000.000	1.06	0.01	0.01	0.01	37.86	0.40	0.67	0.71	1.12	1.10	24.84
1102.820	1.10	0.01	0.01	0.01	37.96	0.40	0.70	0.73	1.12	1.08	22.83
1341.910	1.16	0.01	0.02	0.01	37.13	0.42	0.94	0.69	1.12	1.06	21.66
1509.270	1.19	0.02	0.02	0.01	36.81	0.45	0.96	0.75	1.14	1.07	20.69
1652.730	1.21	0.01	0.02	0.01	37.32	0.53	0.89	0.79	1.17	1.09	19.92
1891.820	1.27	0.02	0.02	0.02	37.64	0.67	1.82	0.71	1.23	1.14	19.28
2130.910	1.38	0.02	0.02	0.03	38.60	1.13	0.82	0.94	1.27	1.20	24.87
2370.000	1.31	0.02	0.03	0.03	36.48	3.02	2.00	1.04	1.31	1.31	19.46
2609.090	1.50	0.04	0.06	0.03	30.37	2.46	0.49	0.56	1.34	1.37	11.80
2848.180	1.63	0.06	0.04	0.02	27.51	2.19	0.30	0.21	1.28	1.41	10.49
2919.910	1.56	0.04	0.03	0.02	26.87	2.12	0.56	0.28	1.27	1.41	9.46
3000.000	1.58	0.04	0.05	0.03	26.08	2.02	0.86	0.48	1.24	1.35	11.35

TOSW-425, ZSDR-425 — SP4T — 10 to 2500 MHz







FREQ. (MHz)	ON INSERTION LOSS (dB) (TTL-1 HIGH @ 5V, TTL-2 LOW @ 0V) IN-OUT		AMP. UNBAL.		OFF ISOLATION (dB) (TTL-1 LOW @ 0V, TTL-2 HIGH @ 5V) IN-OUT		DELTA		VSWR IN	VSWR OUT (RF 1) ON	VSWR OUT (RF 1) OFF
	x̄	σ	x̄	σ	x̄	σ	x̄	σ	x̄	x̄	x̄
10.000	1.22	0.16	0.18	0.15	74.41	4.10	9.64	5.24	1.35	1.40	27.25
20.000	1.06	0.12	0.15	0.12	70.64	2.69	8.25	4.56	1.19	1.22	27.08
50.000	0.97	0.09	0.13	0.09	61.72	2.10	8.97	7.88	1.11	1.13	27.42
100.000	0.94	0.09	0.12	0.09	56.09	1.46	6.48	2.94	1.10	1.11	26.82
200.000	0.90	0.08	0.12	0.08	49.80	1.51	6.32	3.03	1.13	1.12	26.58
408.400	1.01	0.07	0.11	0.07	45.66	1.36	5.61	1.32	1.21	1.18	26.03
500.000	1.06	0.08	0.12	0.09	44.93	1.43	5.49	1.62	1.25	1.20	24.98
669.850	1.10	0.07	0.12	0.07	44.06	1.59	5.94	1.86	1.30	1.24	24.36
856.600	1.30	0.07	0.13	0.08	43.15	1.93	6.13	2.01	1.35	1.25	22.45
1000.000	1.39	0.05	0.11	0.07	44.52	3.69	8.35	2.97	1.37	1.24	20.59
1118.050	1.48	0.05	0.13	0.07	42.72	2.91	8.56	3.40	1.37	1.23	19.44
1250.000	1.37	0.06	0.13	0.06	42.75	2.61	10.05	4.95	1.36	1.22	19.15
1391.950	1.51	0.09	0.16	0.07	44.07	3.21	10.73	3.71	1.34	1.20	18.57
1578.700	1.47	0.05	0.15	0.05	40.41	2.62	9.61	3.27	1.31	1.16	17.15
1777.900	1.52	0.05	0.17	0.05	37.07	2.87	9.43	3.26	1.30	1.14	16.04
2002.000	1.66	0.12	0.20	0.08	34.27	3.55	9.08	1.82	1.30	1.16	13.88
2176.300	1.81	0.09	0.20	0.08	30.64	3.24	7.16	1.46	1.30	1.21	12.25
2363.050	1.82	0.07	0.19	0.04	26.86	2.95	5.63	1.07	1.28	1.28	9.41
2437.750	2.08	0.14	0.24	0.05	25.66	2.78	5.42	1.03	1.29	1.30	7.81
2500.000	2.14	0.16	0.25	0.05	25.03	2.28	5.15	1.27	1.30	1.31	7.10

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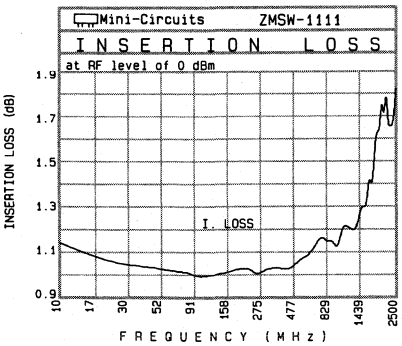
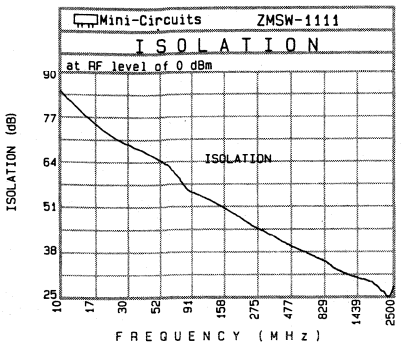
Mini-Circuits

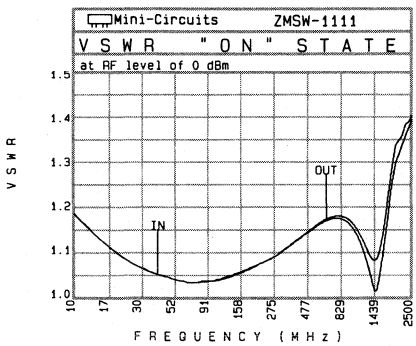
PSW-1111, ZMSW-1111

SPST

10 to 2500 MHz





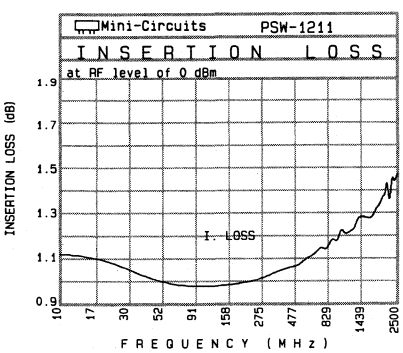


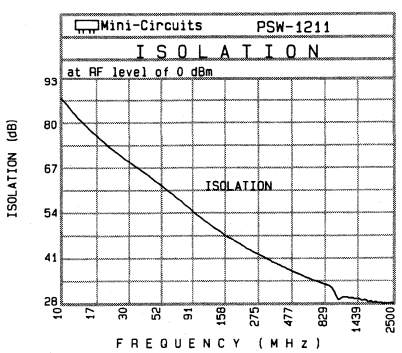
FREQ. (MHz)	ON (ctrl1 @ 5V) IN-OUT		OFF (ctrl1 @ 0V) IN-OUT		VSWR IN	VSWR OUT ON	VSWR OUT OFF
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$
10.000	1.29	0.11	76.25	6.59	1.20	1.21	30.07
22.450	1.19	0.10	70.93	4.23	1.10	1.10	30.07
97.150	1.07	0.07	58.52	1.61	1.05	1.05	27.77
159.400	1.08	0.05	52.73	1.00	1.07	1.07	25.87
377.275	1.09	0.06	43.44	0.67	1.13	1.14	19.20
520.450	1.14	0.05	40.30	0.80	1.17	1.17	15.71
595.150	1.16	0.06	39.39	0.70	1.18	1.19	14.22
813.025	1.21	0.06	36.87	0.68	1.20	1.20	11.58
1037.125	1.29	0.06	34.02	0.70	1.17	1.18	10.27
1180.300	1.30	0.06	32.88	0.61	1.13	1.15	10.35
1248.775	1.26	0.06	32.28	0.66	1.10	1.13	10.47
1255.000	1.27	0.06	32.32	0.69	1.10	1.13	10.50
1472.875	1.34	0.05	31.11	0.62	1.04	1.10	12.99
1696.975	1.43	0.07	30.68	0.62	1.12	1.17	23.96
1840.150	1.63	0.09	29.53	0.60	1.19	1.24	76.42
1914.850	1.61	0.08	29.66	0.67	1.22	1.28	429.47
2132.725	1.79	0.09	28.33	0.92	1.28	1.34	42.78
2350.600	1.67	0.07	26.88	1.15	1.36	1.37	205.26
2425.300	1.71	0.07	27.69	1.12	1.38	1.39	152.56
2500.000	1.79	0.09	28.69	1.09	1.40	1.40	62.42

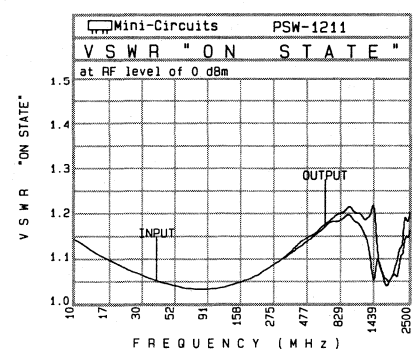
PSW-1211, ZMSW-1211

SPDT

10 to 2500 MHz





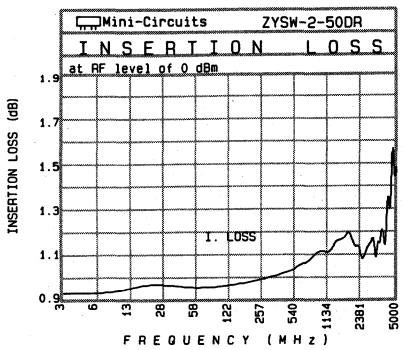


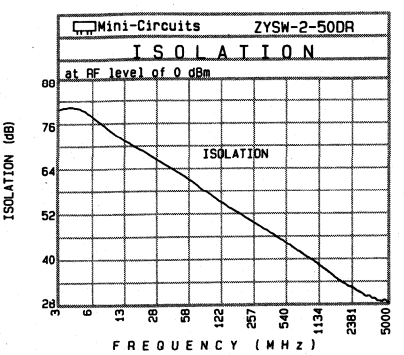
FREQ. (MHz)	ON (ctrl1 @ 5V) IN-OUT		AMP. UNBAL.		OFF (ctrl1 @ 0V) IN-OUT		DELTA		VSWR IN	VSWR OUT (RF 1) ON	VSWR OUT (RF 1) OFF
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$
10.000	1.29	0.19	0.13	0.12	88.14	5.32	5.52	5.48	1.20	1.20	27.17
20.000	1.22	0.14	0.09	0.06	80.95	3.49	5.99	5.45	1.12	1.12	25.49
50.000	1.10	0.10	0.07	0.06	66.03	2.18	0.79	0.77	1.06	1.06	26.18
100.000	1.07	0.09	0.07	0.06	56.13	2.48	0.63	1.00	1.05	1.04	24.91
200.000	1.08	0.09	0.06	0.05	47.23	1.83	0.65	0.71	1.07	1.07	24.71
409.450	1.15	0.08	0.07	0.05	40.05	1.43	0.45	0.39	1.15	1.15	23.36
500.000	1.16	0.08	0.06	0.04	38.02	1.28	0.50	0.28	1.17	1.18	22.80
672.450	1.22	0.08	0.06	0.04	35.50	1.05	0.49	0.36	1.21	1.22	21.45
863.730	1.29	0.08	0.06	0.04	33.51	0.92	0.71	0.29	1.23	1.24	19.28
1000.000	1.32	0.07	0.05	0.03	29.59	0.41	3.76	0.96	1.23	1.24	19.05
1126.730	1.30	0.08	0.06	0.05	30.50	0.46	2.81	0.52	1.22	1.25	17.59
1246.270	1.30	0.07	0.07	0.06	30.00	0.41	3.80	0.53	1.19	1.24	17.26
1389.730	1.67	0.09	0.41	0.09	29.58	0.43	1.32	1.45	1.08	1.28	15.74
1581.000	1.35	0.07	0.05	0.04	29.04	0.47	0.58	0.46	1.12	1.13	14.86
1772.270	1.39	0.08	0.05	0.05	27.59	0.59	1.64	0.77	1.08	1.09	13.60
1987.450	1.43	0.07	0.05	0.04	27.44	0.74	2.62	0.92	1.09	1.11	12.58
2178.730	1.42	0.08	0.06	0.04	27.34	0.87	3.10	1.03	1.12	1.14	14.41
2370.000	1.51	0.09	0.08	0.05	26.88	1.06	3.36	1.25	1.16	1.19	12.24
2441.730	1.51	0.08	0.07	0.04	27.35	1.15	3.49	1.39	1.16	1.20	10.69
2500.000	1.56	0.09	0.08	0.06	26.81	1.21	3.44	1.50	1.17	1.21	11.44

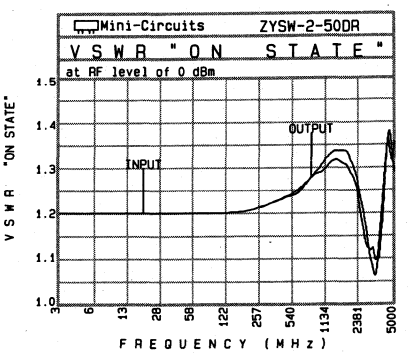
GaAs <5 nsec

SPDT Switches, with TTL driver

YSW-2-50DR, ZYSW-2-50DR, VSW-2-50DR reflective DC to 5 GHz

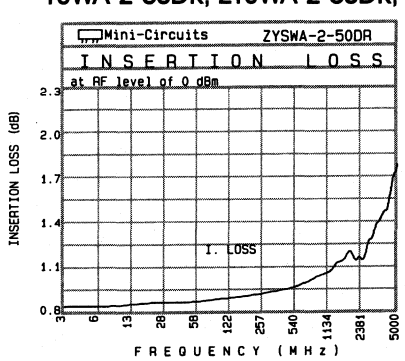


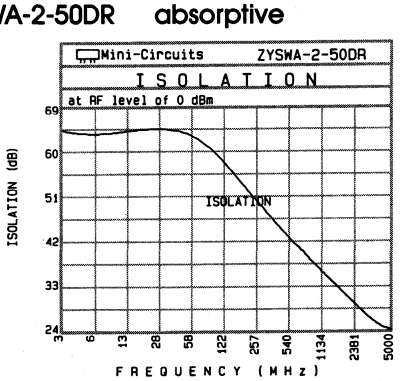


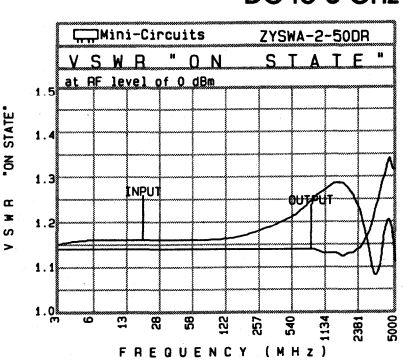


FREQ. (MHz)	ON (TTL LOW @ 0V) INSERTION LOSS (dB) IN-OUT		AMP. UNBAL.		OFF (TTL HIGH @ 5V) ISOLATION (dB) IN-OUT		DELTA		VSWR IN	VSWR OUT (RF 1) ON	VSWR OUT (RF 1) OFF
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$
3.000	0.93	0.03	0.01	0.00	82.19	2.73	4.56	2.14	1.20	1.21	5.09
5.000	0.93	0.03	0.01	0.01	81.63	2.81	2.23	1.14	1.21	1.21	5.07
10.000	0.93	0.02	0.01	0.01	75.09	1.32	1.62	0.75	1.21	1.21	5.08
20.000	0.98	0.03	0.05	0.04	69.97	0.76	1.59	1.48	1.21	1.21	5.06
50.000	0.94	0.03	0.01	0.01	63.18	0.95	1.77	0.64	1.20	1.20	5.04
100.000	0.96	0.03	0.01	0.00	57.83	0.41	0.52	0.21	1.20	1.20	5.00
200.000	0.98	0.03	0.01	0.00	52.68	0.23	0.35	0.28	1.20	1.20	4.97
500.000	1.03	0.03	0.00	0.00	45.93	0.26	0.34	0.16	1.23	1.24	4.90
1000.000	1.11	0.03	0.01	0.01	40.28	0.28	0.34	0.14	1.29	1.29	5.01
1150.640	1.11	0.02	0.01	0.01	38.91	0.25	0.37	0.13	1.31	1.31	5.07
1724.450	1.24	0.01	0.03	0.02	34.88	0.27	0.32	0.09	1.33	1.33	5.43
2441.730	1.11	0.01	0.01	0.01	32.17	0.39	0.21	0.13	1.26	1.26	6.07
2561.270	1.17	0.03	0.02	0.02	31.99	0.39	0.14	0.12	1.24	1.23	6.23
2848.180	1.18	0.02	0.01	0.01	31.20	0.40	0.13	0.07	1.20	1.19	5.96
3135.090	1.19	0.09	0.04	0.04	30.98	0.42	0.15	0.17	1.14	1.13	6.12
3708.910	1.22	0.03	0.06	0.02	30.08	0.46	0.38	0.38	1.16	1.13	6.11
4282.730	1.38	0.10	0.11	0.02	28.98	0.46	0.82	0.28	1.33	1.32	6.05
4713.090	1.45	0.04	0.05	0.04	29.12	0.35	0.88	0.29	1.37	1.34	5.07
4856.550	1.51	0.04	0.06	0.04	28.90	0.33	0.84	0.25	1.36	1.39	5.02
5000.000	1.54	0.04	0.06	0.04	28.56	0.30	0.87	0.28	1.35	1.40	4.92

YSWA-2-50DR, ZYSWA-2-50DR, VSWA-2-50DR absorptive DC to 5 GHz







FREQ. (MHz)	ON (TTL LOW @ 0V) INSERTION LOSS (dB) IN-OUT		AMP. UNBAL.		OFF (TTL HIGH @ 5V) ISOLATION (dB) IN-OUT		DELTA		VSWR IN	VSWR OUT (RF 1) ON	VSWR OUT (RF 1) OFF
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	$\bar{x}$	$\bar{x}$
3.000	0.84	0.01	0.01	0.01	65.32	0.46	0.44	0.35	1.16	1.16	1.17
5.000	0.83	0.01	0.01	0.01	65.59	1.00	0.97	0.43	1.17	1.16	1.17
10.000	0.83	0.02	0.01	0.01	65.42	0.63	0.56	0.20	1.17	1.16	1.17
20.000	0.89	0.04	0.02	0.02	66.30	0.68	0.76	0.63	1.17	1.16	1.17
50.000	0.85	0.01	0.01	0.01	65.63	1.12	1.37	0.50	1.17	1.16	1.18
100.000	0.87	0.02	0.01	0.01	61.02	0.81	1.22	1.06	1.17	1.16	1.18
200.000	0.89	0.02	0.01	0.01	53.60	0.42	0.37	0.32	1.18	1.16	1.18
500.000	0.95	0.02	0.00	0.01	43.89	0.27	0.52	0.15	1.22	1.16	1.20
1000.000	1.05	0.02	0.01	0.01	37.39	0.23	0.62	0.12	1.28	1.15	1.23
1150.640	1.05	0.02	0.01	0.01	36.05	0.25	0.62	0.11	1.29	1.15	1.24
1724.450	1.22	0.02	0.04	0.02	32.34	0.30	0.73	0.08	1.29	1.14	1.26
2000.000	1.13	0.01	0.01	0.01	30.92	0.28	0.76	0.06	1.27	1.13	1.25
2441.730	1.17	0.01	0.01	0.01	29.06	0.27	0.69	0.11	1.22	1.15	1.22
2561.270	1.25	0.03	0.02	0.01	28.66	0.27	0.62	0.15	1.20	1.15	1.22
3135.090	1.42	0.05	0.06	0.00	26.96	0.30	0.23	0.14	1.11	1.21	1.15
3708.910	1.48	0.04	0.06	0.02	25.86	0.28	0.33	0.18	1.14	1.27	1.16
4282.730	1.58	0.06	0.12	0.04	25.02	0.36	0.41	0.23	1.23	1.33	1.24
4713.090	1.73	0.05	0.02	0.01	24.78	0.31	0.62	0.26	1.21	1.33	1.24
4856.550	1.80	0.05	0.03	0.02	24.69	0.32	0.65	0.26	1.18	1.34	1.25
5000.000	1.80	0.06	0.04	0.02	24.46	0.30	0.58	0.26	1.15	1.34	1.26

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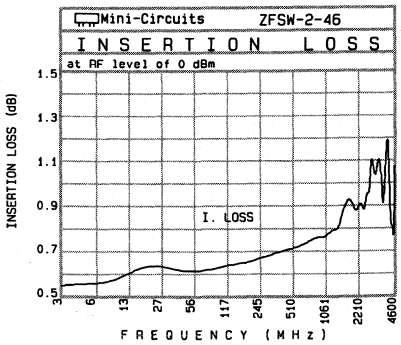
50 ohms
without driver

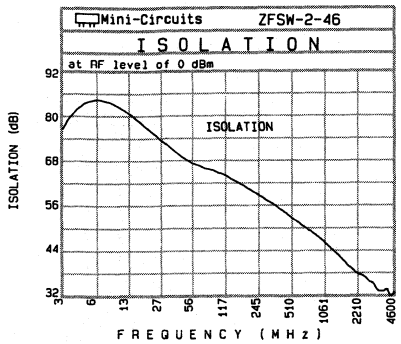
Mini-Circuits

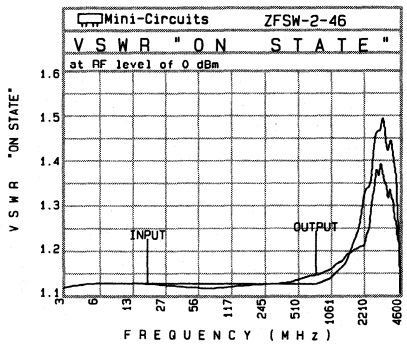
KSW-2-46, ZFSW-2-46

reflective

DC to 4.6 GHz





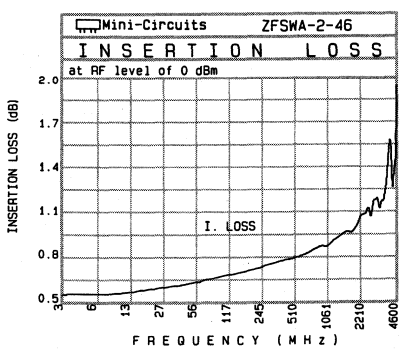


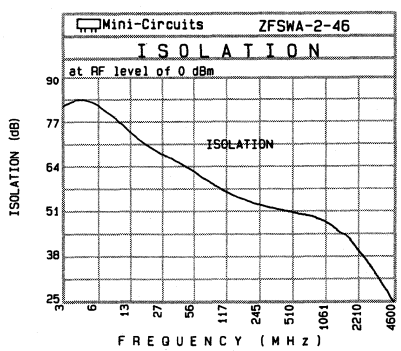
FREQ. (MHz)	ON INSERTION LOSS (dB) (ctrl1 @ -8V, ctrl2 @ 0V) IN-OUT		AMP. UNBAL.		OFF ISOLATION (dB) (ctrl1 @ 0V, ctrl2 @ -8V) IN-OUT		DELTA		VSWR IN	VSWR OUT (PORT 1) ON	VSWR OUT (PORT 1) OFF
	x̄	σ	x̄	σ	x̄	σ	x̄	σ	x̄	x̄	x̄
3.000	0.54	0.04	0.00	0.01	83.44	4.68	4.17	4.43	1.12	1.12	16.46
5.000	0.54	0.04	0.00	0.01	83.46	2.97	4.24	2.92	1.12	1.12	16.21
10.000	0.54	0.04	0.00	0.01	81.44	2.66	3.62	2.10	1.12	1.12	16.21
20.000	0.61	0.06	0.02	0.01	76.29	2.13	3.54	2.62	1.12	1.12	16.04
50.000	0.59	0.04	0.02	0.01	69.27	0.92	2.97	0.57	1.12	1.12	15.37
100.000	0.62	0.04	0.01	0.01	66.59	1.42	1.47	1.27	1.12	1.12	14.63
200.000	0.65	0.04	0.02	0.01	61.43	0.74	0.97	0.52	1.12	1.12	14.00
500.000	0.70	0.04	0.02	0.01	53.61	0.93	0.41	0.55	1.13	1.13	12.83
911.550	0.75	0.04	0.01	0.01	47.64	0.59	0.37	0.25	1.14	1.15	11.86
1000.000	0.76	0.04	0.02	0.01	46.91	0.61	0.22	0.15	1.14	1.16	11.79
1581.000	0.92	0.05	0.01	0.02	41.27	0.47	0.12	0.08	1.22	1.20	11.85
2107.000	0.92	0.06	0.02	0.01	37.77	0.41	0.13	0.06	1.36	1.21	11.91
2370.000	0.88	0.06	0.02	0.02	37.33	0.42	0.21	0.11	1.37	1.26	9.64
2489.550	1.01	0.07	0.03	0.03	36.86	0.43	0.22	0.13	1.41	1.34	9.98
2752.550	1.17	0.09	0.03	0.03	35.65	0.39	0.29	0.16	1.51	1.42	9.70
3278.550	1.15	0.11	0.03	0.01	33.10	0.42	0.49	0.41	1.53	1.39	13.14
3804.550	1.16	0.08	0.05	0.05	33.46	0.37	0.50	0.31	1.50	1.35	13.37
4330.550	0.87	0.05	0.05	0.01	31.99	0.42	0.36	0.34	1.31	1.24	15.41
4474.000	0.70	0.04	0.07	0.02	32.16	0.40	0.35	0.34	1.23	1.23	17.84
4600.000	1.08	0.04	0.05	0.02	32.78	0.42	0.47	0.33	1.13	1.16	14.40

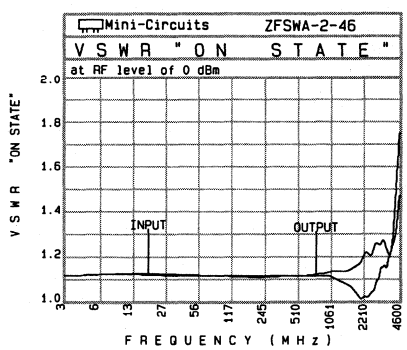
KSWA-2-46, ZFSWA-2-46

absorptive

DC to 4.6 GHz







FREQ. (MHz)	ON INSERTION LOSS (dB) (ctrl1 @ -8V, ctrl2 @ 0V) IN-OUT		AMP. UNBAL.		OFF ISOLATION (dB) (ctrl1 @ 0V, ctrl2 @ -8V) IN-OUT		DELTA		VSWR IN	VSWR OUT (PORT 1) ON	VSWR OUT (PORT 1) OFF
	x̄	σ	x̄	σ	x̄	σ	x̄	σ	x̄	x̄	x̄
3.000	0.55	0.01	0.01	0.01	82.53	2.67	6.52	3.36	1.12	1.12	1.02
5.000	0.55	0.02	0.00	0.00	85.42	4.39	5.34	3.44	1.12	1.12	1.02
10.000	0.55	0.02	0.00	0.01	84.71	7.84	7.47	5.66	1.13	1.13	1.02
20.000	0.63	0.04	0.03	0.02	74.57	2.52	2.12	1.67	1.13	1.12	1.02
50.000	0.62	0.02	0.01	0.01	64.87	0.76	3.54	0.53	1.12	1.12	1.02
100.000	0.67	0.02	0.02	0.01	58.56	0.45	3.09	0.42	1.12	1.12	1.02
200.000	0.72	0.02	0.02	0.01	54.29	0.36	3.05	0.27	1.12	1.11	1.02
500.000	0.80	0.02	0.03	0.01	51.52	0.42	2.31	0.41	1.13	1.12	1.02
911.550	0.90	0.02	0.02	0.02	48.87	1.18	0.79	0.41	1.16	1.11	1.04
1000.000	0.90	0.03	0.03	0.02	48.56	1.23	0.63	0.38	1.17	1.10	1.05
1581.000	1.01	0.04	0.02	0.02	44.26	1.63	1.16	0.32	1.20	1.04	1.11
2107.000	1.10	0.03	0.02	0.02	39.70	1.28	0.84	0.43	1.30	1.09	1.14
2370.000	1.15	0.05	0.03	0.03	37.89	1.12	0.73	0.47	1.31	1.11	1.15
2489.550	1.26	0.06	0.03	0.03	37.25	0.97	0.65	0.57	1.32	1.14	1.17
2752.550	1.32	0.07	0.04	0.03	35.59	0.62	0.67	0.50	1.41	1.22	1.23
3278.550	1.26	0.04	0.05	0.03	31.74	1.06	0.54	0.53	1.44	1.35	1.29
3804.550	1.63	0.09	0.10	0.07	28.75	0.72	0.42	0.61	1.39	1.41	1.38
4330.550	1.52	0.06	0.10	0.04	25.75	0.41	0.71	0.70	1.49	1.78	1.65
4474.000	1.47	0.09	0.11	0.06	25.51	0.36	0.78	0.73	1.57	1.94	1.73
4600.000	1.98	0.06	0.09	0.05	25.42	0.32	0.84	0.83	1.55	1.87	1.67

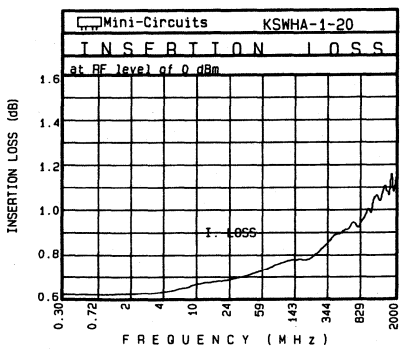
GaAs <5 nsec

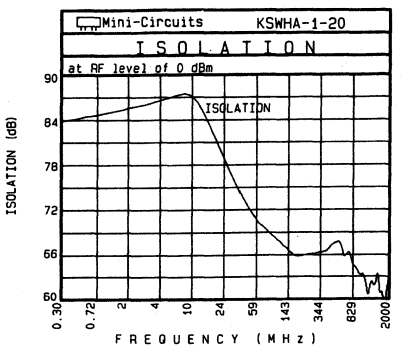
SPST Switches

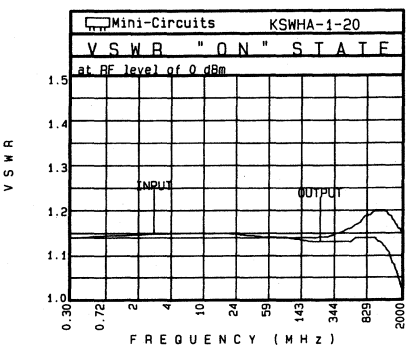
Mini-Circuits

50 ohms

KSWHA-1-20, ZFSWHA-1-20 | absorptive | DC to 2.0 GHz







FREQ. (MHz)	ON INSERTION LOSS (dB) (ctrl1 @ -8V, ctrl2 @ 0V) IN-OUT		OFF ISOLATION (dB) (ctrl1 @ 0V, ctrl2 @ -8V) IN-OUT		VSWR IN	VSWR OUT ON	VSWR OUT OFF
	x̄	σ	x̄	σ	x̄	x̄	x̄
0.300	0.62	0.01	90.61	3.68	1.15	1.15	1.03
5.299	0.63	0.01	85.48	6.29	1.16	1.15	1.03
10.298	0.69	0.01	83.23	4.25	1.16	1.15	1.03
100.285	0.79	0.01	67.92	1.22	1.15	1.15	1.03
280.258	0.85	0.01	66.96	1.83	1.15	1.14	1.03
390.241	0.92	0.00	67.09	1.35	1.15	1.14	1.03
445.233	0.90	0.01	67.05	1.41	1.16	1.15	1.03
610.208	0.96	0.01	65.89	1.85	1.16	1.15	1.04
780.183	0.99	0.01	64.48	1.97	1.17	1.16	1.05
890.166	1.02	0.01	63.58	2.32	1.18	1.16	1.06
945.158	1.04	0.01	63.07	2.05	1.18	1.16	1.07
1000.150	0.99	0.00	62.55	1.47	1.18	1.15	1.08
1165.125	1.09	0.02	61.49	2.35	1.18	1.15	1.09
1335.100	1.11	0.02	61.45	1.70	1.17	1.14	1.12
1445.083	1.14	0.02	61.66	1.64	1.16	1.13	1.13
1500.075	1.09	0.02	62.32	2.10	1.16	1.12	1.14
1665.050	1.17	0.01	60.72	1.78	1.15	1.10	1.17
1835.025	1.13	0.01	60.34	0.70	1.14	1.07	1.20
1945.008	1.22	0.03	60.54	1.60	1.13	1.06	1.22
2000.000	1.17	0.01	61.08	1.47	1.13	1.05	1.23

In Stock...Immediate Delivery

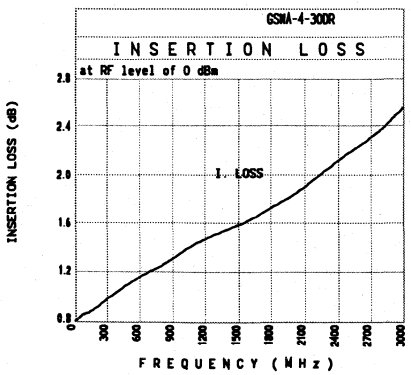
GaAs<5 nsec

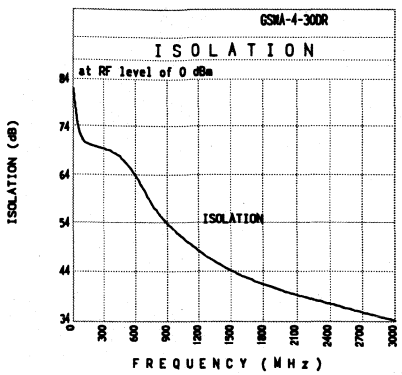
SPDT Switches, with TTL driver

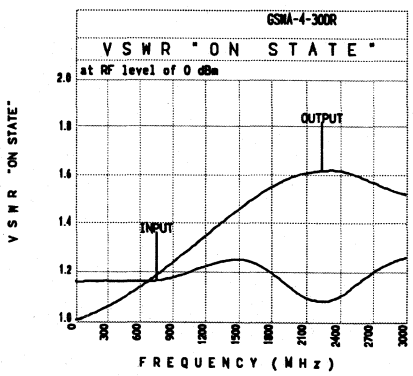
GSWA-4-30DR

SP4T

DC to 3 GHz





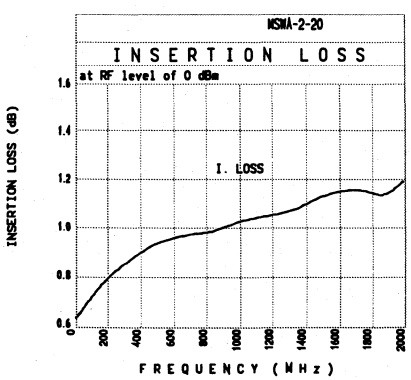


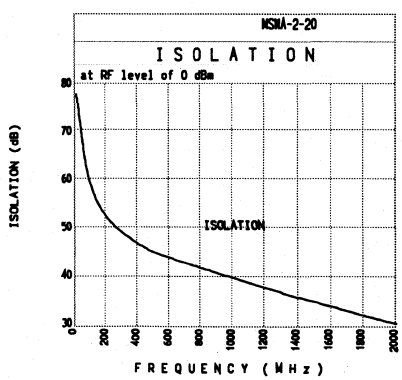
FREQ. (MHz)	ON INSERTION LOSS (dB) (TTL$_1$ LOW@ 0V, TTL$_2$ HIGH@5V) (TTL$_3$ HIGH@ 5V, TTL$_4$ HIGH@5V) $\bar{X}$	σ	AMP. UNBAL $\bar{X}$	σ	OFF ISOLATION (dB) (TTL$_1$ HIGH@ 5V, TTL$_2$ LOW@ 0V) (TTL$_3$ HIGH@ 5V, TTL$_4$ HIGH@ 5V) $\bar{X}$	σ	VSWR IN $\bar{X}$	VSWR ON $\bar{X}$	VSWR OUT (RF 1) OFF $\bar{X}$
10.00	0.81	0.01	0.06	0.04	82.84	1.79	1.17	1.01	1.18
19.97	0.82	0.01	0.06	0.04	80.28	1.37	1.17	1.01	1.17
39.92	0.83	0.02	0.07	0.04	75.87	0.88	1.17	1.01	1.17
79.82	0.87	0.02	0.08	0.04	72.20	1.84	1.17	1.02	1.17
149.65	0.88	0.06	0.08	0.04	71.06	1.69	1.17	1.03	1.18
289.30	0.99	0.07	0.07	0.05	70.57	2.94	1.17	1.06	1.18
498.77	1.13	0.05	0.06	0.05	68.65	3.42	1.17	1.11	1.18
698.27	1.23	0.03	0.05	0.05	60.29	0.39	1.17	1.18	1.17
837.92	1.29	0.06	0.06	0.05	55.76	0.65	1.18	1.23	1.17
997.52	1.41	0.07	0.05	0.06	52.35	0.31	1.20	1.29	1.16
1246.90	1.53	0.04	0.04	0.07	47.90	0.13	1.24	1.38	1.17
1496.27	1.61	0.05	0.01	0.04	44.74	0.34	1.27	1.47	1.20
1665.85	1.69	0.07	0.06	0.03	43.04	0.66	1.25	1.53	1.21
1935.17	1.83	0.04	0.09	0.04	40.91	0.37	1.16	1.60	1.21
2074.82	1.91	0.10	0.12	0.06	39.91	0.15	1.10	1.62	1.20
2344.15	2.11	0.06	0.18	0.05	38.26	0.10	1.08	1.64	1.20
2503.75	2.22	0.08	0.20	0.06	37.34	0.23	1.14	1.63	1.21
2763.10	2.37	0.10	0.24	0.08	35.76	0.15	1.23	1.57	1.28
2902.75	2.50	0.05	0.31	0.06	35.04	0.27	1.26	1.54	1.31
3002.50	2.59	1.54	0.35	0.14	34.46	0.15	1.27	1.53	1.34

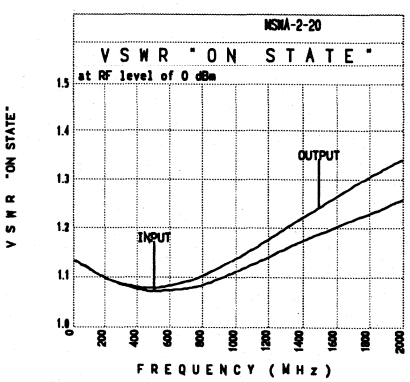
MSWA-2-20

without TTL driver

DC to 2.0 GHz





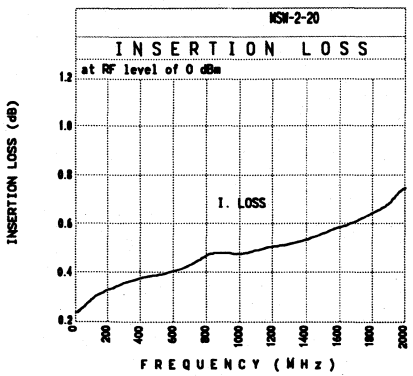


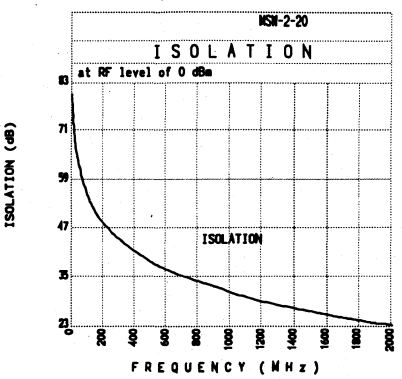
FREQ. (MHz)	ON INSERTION LOSS (dB) (CTRL$_1$ @ -8V, CTRL$_2$ @ 0V) $\bar{X}$	σ	AMP. UNBAL $\bar{X}$	σ	OFF ISOLATION (dB) (CTRL$_1$ @ 0V, CTRL$_2$ @ -8V) $\bar{X}$	σ	VSWR IN $\bar{X}$	VSWR ON $\bar{X}$	VSWR OUT (RF 1) OFF $\bar{X}$
10.00	0.64	0.01	0.00	0.02	78.59	1.40	1.14	1.14	1.01
17.47	0.64	0.02	0.00	0.02	76.90	1.20	1.14	1.14	1.01
39.90	0.66	0.02	0.00	0.02	70.66	0.59	1.14	1.14	1.02
62.32	0.68	0.02	0.00	0.02	64.78	0.25	1.13	1.13	1.02
77.27	0.70	0.02	0.00	0.02	62.02	0.20	1.13	1.13	1.02
114.65	0.73	0.06	0.00	0.02	57.36	0.20	1.12	1.12	1.02
219.30	0.82	0.06	0.00	0.02	51.14	0.20	1.10	1.10	1.03
421.12	0.92	0.02	0.00	0.02	46.47	0.22	1.08	1.08	1.06
525.77	0.96	0.02	0.00	0.02	45.07	0.25	1.08	1.08	1.08
736.07	0.99	0.01	0.01	0.02	42.82	0.27	1.08	1.10	1.12
832.25	0.99	0.03	0.01	0.02	41.86	0.28	1.09	1.11	1.14
996.70	1.04	0.02	0.01	0.02	40.17	0.29	1.12	1.14	1.17
1146.20	1.06	0.01	0.01	0.01	38.62	0.28	1.14	1.17	1.21
1348.02	1.08	0.04	0.02	0.01	36.61	0.26	1.17	1.22	1.26
1497.52	1.15	0.03	0.03	0.01	35.17	0.25	1.19	1.25	1.30
1759.15	1.18	0.03	0.04	0.00	32.75	0.23	1.23	1.31	1.38
1863.80	1.13	0.03	0.03	0.01	31.81	0.22	1.24	1.32	1.41
1968.45	1.18	0.02	0.04	0.01	30.98	0.22	1.26	1.34	1.44
1998.35	1.21	0.02	0.04	0.02	30.78	0.22	1.26	1.35	1.45
2073.10	1.23	0.70	0.05	0.03	30.18	0.22	1.28	1.36	1.48

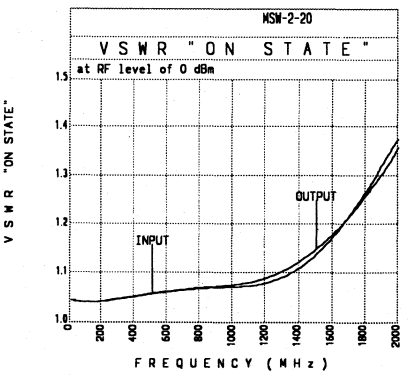
MSW-2-20

without TTL driver

DC to 2.0 GHz



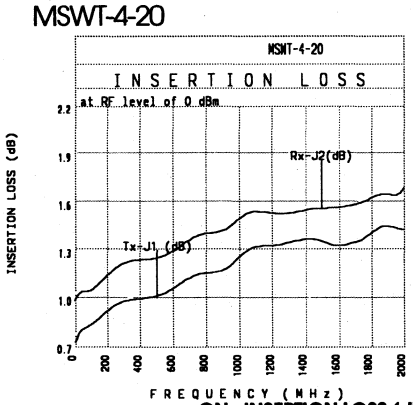


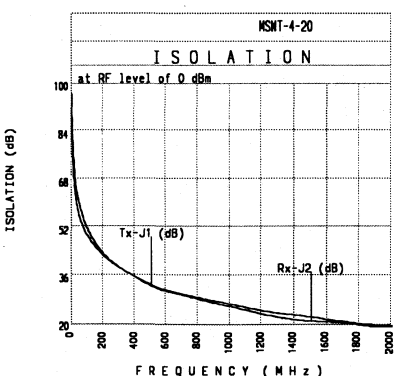


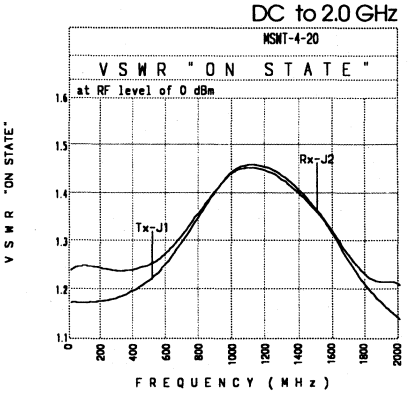
FREQ. (MHz)	ON INSERTION LOSS (dB) (CTRL1 @ -8V) IN-OUT X̄	σ	AMP. UNBAL X̄	σ	OFF ISOLATION (dB) (CTRL1 @ 0V) IN-OUT X̄	σ	VSWR IN X̄	ON X̄	OUT (RF 1) OFF X̄
1.00	0.25	0.00	0.01	0.01	80.61	2.40	1.05	1.05	1.05
15.99	0.25	0.01	0.00	0.01	72.05	0.66	1.05	1.05	1.05
23.49	0.26	0.01	0.01	0.00	67.53	1.14	1.05	1.05	1.05
53.48	0.27	0.00	0.01	0.00	61.77	0.91	1.05	1.04	1.05
98.46	0.31	0.01	0.03	0.01	54.45	0.63	1.04	1.04	1.05
210.93	0.35	0.01	0.03	0.01	46.92	0.43	1.04	1.05	1.06
413.36	0.40	0.02	0.01	0.00	41.26	0.42	1.06	1.06	1.08
518.32	0.40	0.02	0.01	0.02	38.51	0.24	1.06	1.06	1.09
728.25	0.45	0.02	0.06	0.02	35.06	0.35	1.07	1.07	1.09
825.72	0.51	0.03	0.12	0.01	33.99	0.36	1.07	1.07	1.09
998.16	0.48	0.02	0.18	0.01	31.58	0.44	1.08	1.08	1.07
1140.62	0.52	0.03	0.18	0.01	29.73	0.45	1.08	1.08	1.04
1343.05	0.53	0.02	0.20	0.01	27.93	0.39	1.10	1.11	1.01
1552.98	0.59	0.01	0.24	0.02	26.40	0.31	1.16	1.17	1.07
1657.94	0.61	0.01	0.24	0.01	25.46	0.34	1.20	1.20	1.11
1755.41	0.64	0.02	0.25	0.03	24.84	0.31	1.25	1.24	1.15
1860.38	0.68	0.02	0.26	0.03	24.05	0.31	1.30	1.29	1.20
1897.86	0.69	0.02	0.24	0.03	23.79	0.27	1.33	1.31	1.21
1965.34	0.75	0.03	0.26	0.04	23.68	0.29	1.36	1.34	1.24
2002.83	0.76	0.02	0.27	0.03	23.33	0.28	1.38	1.36	1.26

MSWT-4-20

DC to 2.0 GHz







FREQ. (MHz)	ON INSERTION LOSS (dB) (CTRL1 @ -8V, CTRL2 @ 0V) (CTRL3 @ -8V, CTRL4 @ 0V) Tx-J1 X̄	σ	Rx-J2 X̄	σ	AMP. UNBAL X̄	σ	OFF ISOLATION (dB) (CTRL1 @ 0V, CTRL2 @ -8V) (CTRL3 @ 0V, CTRL4 @ -8V) Tx-J1 X̄	σ	Rx-J2 X̄	σ	VSWR ON Tx-J1 X̄	Rx-J2 X̄
1.00	0.77	0.01	1.03	0.02	0.27	0.03	98.89	2.58	92.52	7.65	1.18	1.25
8.49	0.77	0.01	1.04	0.02	0.27	0.03	81.64	2.04	73.58	0.79	1.18	1.25
23.49	0.82	0.01	1.07	0.02	0.25	0.02	68.21	1.03	64.25	0.16	1.18	1.25
38.48	0.84	0.02	1.08	0.01	0.24	0.01	64.34	0.08	59.52	0.25	1.18	1.26
60.98	0.86	0.04	1.09	0.01	0.23	0.00	58.77	0.40	55.31	0.17	1.18	1.26
98.46	0.87	0.01	1.08	0.02	0.21	0.02	52.85	0.01	50.90	0.08	1.18	1.26
210.93	0.98	0.01	1.20	0.02	0.22	0.03	43.69	0.14	43.46	0.31	1.19	1.25
308.39	1.04	0.03	1.29	0.01	0.25	0.01	40.09	0.12	40.27	0.05	1.19	1.24
503.33	1.04	0.04	1.28	0.02	0.25	0.01	34.58	0.17	34.09	0.32	1.23	1.26
623.29	1.12	0.03	1.35	0.02	0.25	0.02	32.82	0.07	32.54	0.08	1.28	1.30
750.75	1.21	0.04	1.46	0.02	0.25	0.02	31.17	0.06	30.89	0.08	1.34	1.35
930.69	1.19	0.03	1.44	0.02	0.28	0.02	29.33	0.09	28.45	0.21	1.44	1.44
1035.65	1.38	0.03	1.62	0.02	0.26	0.03	28.25	0.16	27.42	0.11	1.47	1.47
1245.58	1.36	0.03	1.55	0.02	0.22	0.05	25.64	0.15	24.47	0.09	1.47	1.46
1448.01	1.44	0.02	1.61	0.01	0.24	0.05	24.70	0.15	22.92	0.24	1.40	1.39
1552.98	1.35	0.01	1.60	0.02	0.28	0.02	23.72	0.06	22.75	0.12	1.35	1.35
1755.41	1.39	0.03	1.63	0.02	0.24	0.03	22.32	0.11	22.09	0.15	1.25	1.23
1860.38	1.51	0.02	1.71	0.02	0.22	0.02	21.60	0.13	20.95	0.12	1.22	1.19
1965.34	1.47	0.04	1.67	0.01	0.20	0.06	21.50	0.19	20.84	0.12	1.23	1.16

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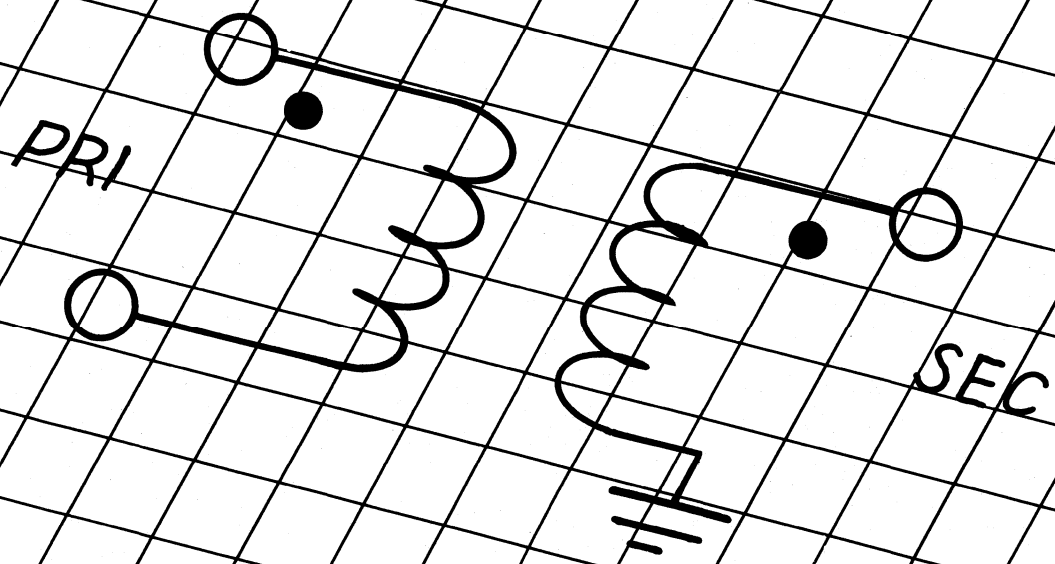
RF TRANSFORMERS



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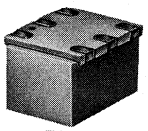
4kHz to 1500 MHz surface mount 14-2, 14-3
4kHz to 800 MHz plug-in 14-4, 14-5
5kHz to 800 MHz plug-in coaxial 14-6

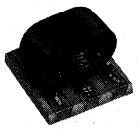
computer data and curves
CAPD information . . . . . 14-8 thru 14-24

RF TRANSFORMERS WIDEBAND 12.5 to 1800 Ω

4 kHz to 1500 MHz

T-KK81
TT-KK81


TX


TC

		MODEL NO.	Ω RATIO	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
A*		T1-1T-KK81	1	.05-200	.05-200	.08-150	.2-80	14-8	KK81	ev	4.45
		T1-6T-KK81	1	.015-300	.015-300	.021-150	.03-50	14-8	KK81	ev	6.95
		T2-1T-KK81	2	.07-200	.07-200	.1-100	.5-50	14-8	KK81	ev	4.95
		T2.5-6T-KK81	2.5	.01-100	.01-100	.02-50	.50-20	14-8	KK81	ev	4.95
		T3-1T-KK81	3	.05-250	.05-200	.1-200	.5-70	14-8	KK81	ev	4.95
		T4-1-KK81	4	.2-350	.2-350	.35-300	2-100	14-9	KK81	ev	3.25
		T4-6T-KK81	4	.02-250	.02-250	.05-150	0.1-100	14-9	KK81	ev	5.65
		T5-1T-KK81	5	.3-300	.3-300	.6-200	5-100	14-9	KK81	ev	4.95
		T8-1T-KK81	8	.3-140	.3-140	.7-90	1-60	14-9	KK81	ev	7.95
		T13-1T-KK81	13	.3-120	.3-120	.7-80	5-20	14-9	KK81	ev	4.95
		T16-6T-KK81	16	.03-75	.03-75	.06-30	.1-20	14-10	KK81	ev	5.65
		T4-1H-KK81	4	10-350	10-350	15-300	25-200	14-10	KK81	ev	5.95
		TX16-R3T	16	40-300	40-300	60-220	70-150	14-24	TT240	ev	4.95
		TC4-1W	4	3-800	3-800	5-400	10-100	14-24	AT224	ha	4.95
		TC4-14	4	200-1400	200-1400	300-1300	800-1100	14-24	AT224	gs	5.45
		TC8-1	8	2-500	2-500	5-400	10-100	14-24	AT224	gs	5.45
B*	✣	TT1-6-KK81	1	.004-300	.004-300	.02-200	.1-50	14-12	KK81	ex	6.95
		TT1.5-1-KK81	1.5	.075-500	.075-500	.2-100	1-50	14-12	KK81	ex	5.95
		TT2.5-6-KK81	2.5	.01-50	.01-50	.025-25	.05-10	14-12	KK81	ex	6.45
		TT4-1-KK81	3	.05-200	.05-200	.2-50	1-30	14-12	KK81	ex	5.95
		TT4-1A-KK81	4	0.1-300	0.1-300	0.2-250	0.3-180	14-12	KK81	ex	6.95
		TT16-1-KK81	16	0.1-45	0.1-45	0.14-35	1-20	14-13	KK81	ex	9.95
		TT25-1-KK81	25	.02-30	.02-30	.05-20	.1-10	14-13	KK81	ex	9.95
C		T1-1-KK81	1	.15-400	.15-400	.35-200	2-50	14-14	KK81	ez	3.25
		T1.18-3-KK81	1.18	0.01-250	0.01-250	0.02-200	0.03-50	14-14	KK81	ez	5.65
		T1-6-KK81	1	.01-150	.01-150	.02-100	.05-50	14-14	KK81	ez	5.65
		T1.5-1-KK81	1.5	.1-300	.1-300	.2-150	.5-80	14-14	KK81	ez	4.45
		T1.5-6-KK81	1.5	.02-100	.02-100	.05-50	0.1-25	14-14	KK81	ez	5.65
		T2-1-2W-KK81	2	5-120	—	—	5-120	-	KK81	ez	5.95
		T2.5-6-KK81	2.5	.01-100	.01-100	.02-50	.05-20	14-15	KK81	ez	4.45
		T4-1-2W-KK81	4	10-250	—	—	10-250	-	KK81	ez	5.95
		T4-6-KK81	4	.02-200	.02-200	.05-150	.1-100	14-15	KK81	ez	5.65
		T9-1-KK81	9	.15-200	.15-200	.3-150	2-40	14-15	KK81	ez	3.95
		T16-1-KK81	16	.3-120	.3-120	.7-80	5-20	14-15	KK81	ez	4.45
		T36-1-KK81	36	.03-20	.03-20	.05-10	.1-5	14-15	KK81	ez	6.95
		T1-1H-KK81	1	8-300	8-300	10-200	25-100	14-16	KK81	ez	5.95
		T9-1H-KK81	9	2-90	2-90	3-75	6-50	14-16	KK81	ez	6.45
		T16-1H-KK81	16	7-85	7-85	10-65	15-40	14-16	KK81	ez	6.45
		TC1-1	1	1.5-500	1.5-500	2.5-400	5-350	14-23	AT224	hd	4.95
	★	TC1-15	1	800-1500	—	350-1500	800-1500	14-23	AT224	gw	4.95
		TX1-1	1	0.3-400	0.3-400	0.6-200	2-50	14-14	TT240	ez	3.50
		TX1-R5	1	0.8-500	0.8-500	1.2-350	3.2-180	14-23	TT240	ez	3.75
		TX1.5-1	1.5	0.25-300	0.25-300	0.3-150	0.5-80	14-14	TT240	ez	4.70
		TX16-1	16	0.4-120	0.4-120	0.7-80	5-20	14-15	TT240	ez	4.70

NSN GUIDE

MCL NO.	NSN
T1-1-KK81	5950-01-347-0310
T2-1T-KK81	5950-01-347-0311

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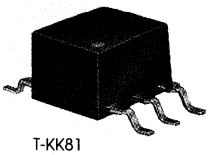
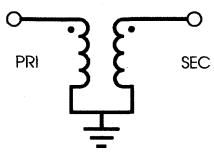
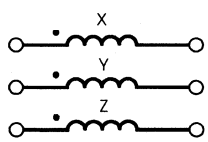


T-KK81
TT-KK81

		MODEL NO.	Ω RATIO	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
D		T2-1-KK81	2	.050-600	.050-600	.1-400	.5-200	14-19	KK81	fd	3.95
		T3-1-KK81	3	.5-800	.5-800	2-400	—	14-19	KK81	fd	4.45
		T4-2-KK81	4	.2-600	.2-600	.5-500	2-250	14-19	KK81	fd	3.95
		T8-1-KK81	8	.15-250	.15-250	.25-200	2-100	14-19	KK81	fd	3.95
		T14-1-KK81	14	.2-150	.2-150	.5-100	2-50	14-19	KK81	fd	4.95
F		T-622-KK81	1:1:1	0.1-200	0.1-200	0.5-100	5-80	14-22	KK81	ff	3.25
		T-626-KK81	1:1:1	0.01-10	0.01-10	0.02-5	.04-2	14-22	KK81	ff	3.95
		T2-613-1-KK81	1:1:2	0.07-200	0.07-200	0.1-100	0.5-50	14-22	KK81	fg	1.95

NOTES:

* FOR A AND B CONFIGURATIONS:
Typical Amplitude Unbalance: 0.1 dB over 1 dB frequency range; 0.5 dB over entire frequency range.
Typical Phase Unbalance: 1.0° over 1 dB frequency range; 5.0° over entire frequency range.

✲ Insertion loss referenced to mid-band loss.

✣ Insertion loss is specified with input at pin 4 and output at pin1 with pins 6 & 3 grounded and pins 2 & 5 open.

★ Not DC isolated, insertion loss is measured with input at pin 1, output at pin 6, and pin 3, 4 are grounded.

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute power, voltage and current ratings:
   1a. RF input power: For T2-1-2W and T4-1-2W, 2 Watt;
   All other models 0.25 Watt
   1b. DC current, 30mA

2. For TC, T,TT, TH and TX series, operating temperature range is -20°C to +85°C.

pin connections

see case style outline drawings

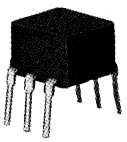
PORT	ev	ex	ez	fd	ff	fg	gs	gw	ha	hd
PRIMARY DOT	4	4	4	6	X1 Y2 Z3	X1 Y5 Z3	6	1	6	6
PRIMARY	6	6	6	3	X6 Y5 Z4	X2 Y6 Z4	4	6	4	4
PRIMARY CT	—	5	—	—	—	—	—	—	—	
SECONDARY DOT	3	3	3	1	—	—	3	3	1	1
SECONDARY	1	1	1	3	—	—	1	4	3	3
SECONDARY CT	2	2	—	—	—	—	2	—	2	—
GND EXT.	—	—	—	3	—	—	—	—		—
CASE GND	—	—	—	—	—	—	—	—	—	—
NOT USED	5	—	2,5	2,4,5	—	—	—	—	—	2

RF TRANSFORMERS WIDEBAND

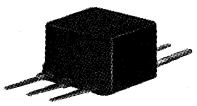
12.5 to 1800 ¢

4 kHz to 800 MHz

Style X65



Standard W38



T, TH, TT

		MODEL NO.	Ω RATIO	FREQUENCY MHz	INSERTION LOSS ✲ 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
A*		T1-1T	1	.05-200	.05-200	.08-150	.2-80	14-8	▽	ev	4.45
		T1-6T	1	.015-300	.015-300	.021-150	.03-50	14-8	▽	ev	6.95
		T2-1T	2	.07-200	.07-200	.1-100	.5-50	14-8	▽	ev	4.95
		T2.5-6T	2.5	.01-100	.01-100	.02-50	.50-20	14-8	▽	ev	4.95
		T3-1T	3	.05-250	.05-200	.1-200	.5-70	14-8	▽	ev	4.95
		T4-1	4	.2-350	.2-350	.35-300	2-100	14-9	▽	ev	3.25
		T4-6T	4	.02-250	.02-250	.05-150	0.1-100	14-9	▽	ev	5.65
		T5-1T	5	.3-300	.3-300	.6-200	5-100	14-9	▽	ev	4.95
		T8-1T	8	.3-140	.3-140	.7-90	1-60	14-9	▽	ev	7.95
		T13-1T	13	.3-120	.3-120	.7-80	5-20	14-9	▽	ev	4.95
		T16-6T	16	.03-75	.03-75	.06-30	.1-20	14-10	▽	ev	5.65
		T4-1H	4	10-350	10-350	15-300	25-200	14-10	▽	ev	5.95
		TMO1-1T	1	.05-200	.05-200	.08-150	.2-80	14-10	A11	ew	7.95
		TMO2-1T	2	.07-200	.07-200	.1-100	.5-50	14-10	A11	ew	8.45
		TMO2.5-6T	2.5	.01-100	.01-100	.02-50	.05-20	14-10	A03	ew	8.45
		TMO3-1T	3	.05-250	.05-250	.1-200	.5-70	14-11	A03	ew	7.95
		TMO4-1	4	.2-350	.2-350	.35-300	2-100	14-11	A11	ew	6.25
		TMO5-1T	5	.3-300	.3-300	.6-200	5-100	14-11	A11	ew	8.45
		TMO13-1T	13	.3-120	.3-120	.7-80	5-20	14-11	A11	ew	8.45
B*	✣	TT1-6	1	.004-300	.004-300	.02-200	.1-50	14-12	▽	ex	6.95
		TT1.5-1	1.5	.075-500	.075-500	.2-100	1-50	14-12	▽	ex	5.95
		TT2.5-6	2.5	.01-50	.01-50	.025-25	.05-10	14-12	▽	ex	6.45
		TT4-1	3	.05-200	.05-200	.2-50	1-30	14-12	▽	ex	5.95
		TT4-1A	4	0.1-300	0.1-300	0.2-250	0.3-180	14-12	▽	ex	6.95
		TT16-1	16	0.1-45	0.1-45	0.14-35	1-20	14-13	▽	ex	9.95
		TT25-1	25	.02-30	.02-30	.05-20	.1-10	14-13	▽	ex	9.95
		TTMO25-1	25	.02-30	.02-30	.05-20	.1-10	14-13	A03	ey	11.95
		TTMO1-1	1	.005-100	.005-100	.01-75	.05-40	14-13	A03	ey	11.45
		TTMO4-1A	4	0.1-300	0.1-300	0.2-250	0.3-180	14-13	A03	ey	13.95

PRI SEC

PRI SEC

NOTES:

* FOR A AND B CONFIGURATIONS:
Typical Amplitude Unbalance: 0.1 dB over 1 dB frequency range; 0.5 dB over entire frequency range.
Typical Phase Unbalance: 1.0° over 1 dB frequency range; 5.0° over entire frequency range.

▽ Two case styles available: Plug-in case style X65; Radial lead case style W38.

✲ Insertion loss referenced to mid-band loss

✣ Insertion loss is specified with input at pin 4 and output at pin1 with pins 6 & 3 grounded and pins 2 & 5 open.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute power, voltage and current ratings:
   1a. RF input power: For T2-1-2W and T4-1-2W, 2 Watt;
   All other models 0.25 Watt
   1b. DC current, 30mA

2. For T,TT, and TH series, operating temperature range is -20°C to +85°C.

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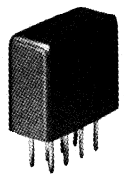
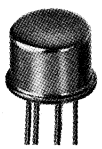
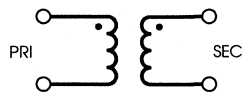


TMO, TTMO



TO

C



MODEL NO.	Ω RATIO	FREQUENCY MHz	INSERTION LOSS ✲ 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
T1-1	1	.15-400	.15-400	.35-200	2-50	14-14	▽	ez	3.25
T1.18-3	1.18	0.01-250	0.01-250	0.02-200	0.03-50	14-14	▽	ez	5.65
T1-6	1	.01-150	.01-150	.02-100	.05-50	14-14	▽	ez	5.65
T1.5-1	1.5	.1-300	.1-300	.2-150	.5-80	14-14	▽	ez	4.45
T1.5-6	1.5	.02-100	.02-100	.05-50	0.1-25	14-14	▽	ez	5.65
T2-1-2W	2	5-120	—	—	5-120	14-23	▽	ez	5.95
T2.5-6	2.5	.01-100	.01-100	.02-50	.05-20	14-15	▽	ez	4.45
T4-1-2W	4	10-250	—	—	10-250	14-23	▽	ez	5.95
T4-6	4	.02-200	.02-200	.05-150	.1-100	14-15	▽	ez	5.65
T9-1	9	.15-200	.15-200	.3-150	2-40	14-15	▽	ez	3.95
T16-1	16	.3-120	.3-120	.7-80	5-20	14-15	▽	ez	4.45
T36-1	36	.03-20	.03-20	.05-10	.1-5	14-15	▽	ez	6.95
TO-75	1	10-500	—	10-500	40-250	14-16	PP94	fa	6.95
T1-1H	1	8-300	8-300	10-200	25-100	14-16	▽	ez	5.95
T9-1H	9	2-90	2-90	3-75	6-50	14-16	▽	ez	6.45
T16-1H	16	7-85	7-85	10-65	15-40	14-16	▽	ez	6.45
TMO1-02	1	1-800	1-800	2-500	—	14-16	A11	fc	9.45
TMO1-1	1	.15-400	.15-400	.35-200	2-50	14-17	A11	fb	6.25
TMO1.5-1	1.5	.1-300	.1-300	.2-150	.5-80	14-17	A11	fb	8.45
TMO2.5-6	2.5	.01-100	.01-100	.02-50	.05-20	14-17	A03	fb	7.95
TMO4-6	4	.02-200	.02-200	.05-150	.1-100	14-17	A03	fb	7.95
TMO6-1	6	.3-200	.3-200	.5-150	5-50	14-17	A11	fb	7.95
TMO9-1	9	.15-200	.15-200	.3-150	2-40	14-18	A11	fb	7.95
TMO16-1	16	.3-120	.3-120	.7-80	5-20	14-18	A11	fb	7.95

NSN GUIDE

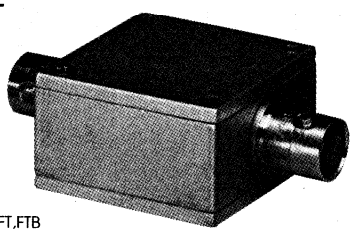
MCL NO.	NSN						
FTB1-1-75	5950-01-132-8034	T4-2	5950-01-361-1794	T4-1H-X65	5950-01-328-8975	TMO4-2	5950-01-091-3553
FTB1-6	5950-01-225-8773	T9-1	5950-01-105-8153	TT1-6-X65	5950-01-272-2298	TMO4-6	5950-01-132-8102
FT1.5-1	5950-01-325-4686	T16-1	5950-01-094-7439	TT4-1A	5950-01-331-7777	TMO5-1T	5950-01-183-0779
T1-1	5950-01-128-3745	T16-1-X65	5950-01-272-2297	TMO1-1	5950-01-213-3735	TMO6-1	5950-01-364-7803
T1-1-X65	5950-01-327-5916	T1-1T	5950-01-153-0668	TMO1-1T	5950-01-326-2772	TMO9-1	5950-01-141-0174
T1-1H	5950-01-409-2785	T1-1T-X65	5950-01-340-7040	TMO2-1	5950-01-183 6414	TMO-13-1T	5950-01-168-7512
T2-1	5950-01-106-1218	T_{1}^{1}-6T	5950-01-258-2173	TMO2.5-6	5950-01-215-4038	TMO16-1	5950-01-138-4593
T4-1	5950-01-024-7626	T3-1T	5950-01-153-0298	TMO2.5-6T	5950-01-215-8697	TTMO25-1	5950-01-415-7145
T4-1-X65	5950-01-349-3181	T16-6T	5950-01-336-0939	TMO3-1T	5950-01-168-7512		

pin connections

see case style outline drawings

PORT	ev	ew	ex	ey	ez	fa	fb	fc
PRIMARY DOT	4	1	4	1	4	1	1	1
PRIMARY	6	5	6	5	6	2	5	3
PRIMARY CT	—	—	5	3	—	—	—	—
SECONDARY DOT	3	2	3	2	3	4	2	2
SECONDARY	1	6	1	6	1	3	6	4
SECONDARY CT	2	4	2	4	—	—	—	—
CASE EXT.	—	—	—	—	—	—	—	—
CASE GND	—	7,8	—	7,8	—	—	7,8	7,8
NOT USED	5	3	—	—	2,5	—	3,4	5,6

5 kHz to 800 MHz

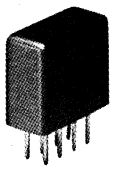


FT,FTB

Style X65

Standard W38

T,TH,TT



TMO

	MODEL NO.	Ω RATIO	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
D	T2-1	2	.050-600	.050-600	.1-400	.5-200	14-19	▽	fd	3.95
	T3-1	3	.5-800	.5-800	2-400	—	14-19	▽	fd	4.45
	T4-2	4	.2-600	.2-600	.5-500	2-250	14-19	▽	fd	3.95
	T8-1	8	.15-250	.15-250	.25-200	2-100	14-19	▽	fd	3.95
	T14-1	14	.2-150	.2-150	.5-100	2-50	14-19	▽	fd	4.95
	TMO2-1	2	.050-600	.050-600	.1-400	.5-200	14-20	A11	fe	7.95
	TMO3-1	3	.5-800	.5-800	2-400	—	14-20	A11	fe	8.45
	TMO4-2	4	.2-600	.2-600	.5-500	2-250	14-20	A11	fe	7.95
	TMO8-1	8	.15-250	.15-250	.25-200	2-100	14-20	A11	fe	7.95
	TMO14-1	14	.2-150	.2-150	.5-100	2-50	14-20	A11	fe	8.45
	FT1.22-1	1.22	.005-100	.005-100	.01-50	.05-25	14-21	H16	—	35.95
	FT1.5-1	1.5	.1-400	.1-400	.5-200	1-100	14-21	H16	—	35.95
E	FTB1-1	1	.2-500	.2-500	.5-300	1-100	14-18	H16	—	36.95
	FTB1-6	1	.01-125	.01-125	.05-50	.1-25	14-18	H16	—	36.95
	■ FTB1-1-75	1	.5-500	.5-500	5-300	10-100	14-18	H16	—	36.95
F	T-622	1:1:1	0.1-200	0.1-200	0.5-100	5-80	14-22	▽	ff	3.25
	T-626	1:1:1	0.01-10	0.01-10	0.02-5	.04-2	14-22	▽	ff	3.95
	T2-613-1	1:1:2	0.07-200	0 07-200	0.1-100	0.5-50	14-22	▽	fg	1.95

NOTES:

* For functional configuration please see schematic drawings A and C on previous pages.

▽ Two case styles available: Plug-in case style X65; Radial lead case style W38.

✲ Insertion loss referenced to mid-band loss

★ Not DC isolated, insertion loss is measured with input at pin 1, output at pin 6, and pin 3, 4 are grounded.

■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, MIL and TX description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute power, voltage and current ratings:
   1a. RF input power: All models 0.25 Watt
   1b. DC current, 30mA

2. For TC, T, TT and TH series, operating temperature range is -20°C to +85°C.

pin connections

see case style outline drawing

PORT	fd	fe	ff	fg
PRIMARY DOT	6	1	X1 Y2 Z3	X1 Y5 Z3
PRIMARY	3	6	X6 Y5 Z4	X2 Y6 Z4
PRIMARY CT	—	—	—	—
SECONDARY DOT	1	2	—	—
SECONDARY	3	6	—	—
SECONDARY CT	—	—	—	—
CASE EXT.	3	6	—	—
CASE GND	—	7,8	—	—
NOT USED	2,4,5	3,4,5	—	—

Mini-Circuits

SPECIFICATIONS CHECKLIST

Transformers

If your particular requirements are not met with a Mini-Circuits catalog item, please complete the check list below and mail, phone, or fax it to Mini-Circuits, Applications Engineering.

Please indicate: Critical Parameter ✔✔
Important Parameter ✔

Application: ☐ Industrial/Commercial
☐ Military ☐ Space

Electrical:

Frequency range _____ MHz
Schematic ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F
Impedence
Primary ____ ohms, Secondary ____ ohms
VSWR or return loss (dB)
Primary _____ Secondary _____
Bandwidth
1 dB _____ MHz to _____ MHz
2 dB _____ MHz to _____ MHz
3 dB _____ MHz to _____ MHz
Amplitude unbalance _____ dB
Phase unbalance _____ deg.
DC current through windings
Primary _____ mA, Secondary _____ mA
Through center tap?
Primary ☐ Yes ☐ No Secondary ☐ Yes ☐ No
Insulation Resistance
Primary to secondary _____ ohms
Dielectric withstanding voltage _____ V.
☐ DC ☐ AC
Operating temperature _____ °C

Schematic

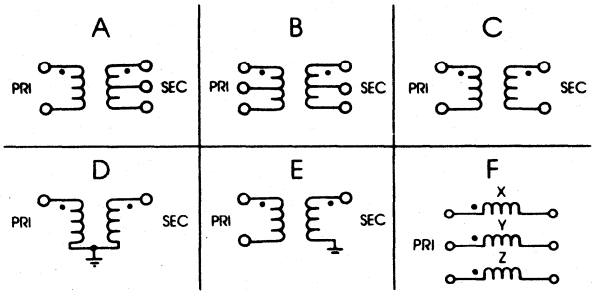


Diagram of application:

Mechanical:

Standard case style _____ *(for outline drawings see Table of Contents. Non-standard case, complete list below).*

Special Requirements: _____

_____

PC Board Mounting

☐ Plug-in ☐ Flat pack
☐ Surface-mount

Coaxial Connector
(Specify connector for input & output separately)

☐ BNC ☐ TNC ☐ Isolated female BNC
☐ SMA ☐ Type N ☐ Other

Name _____ Title _____

Company _____ Dept. _____

Company address _____

Phone _____ Fax _____

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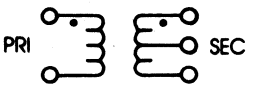
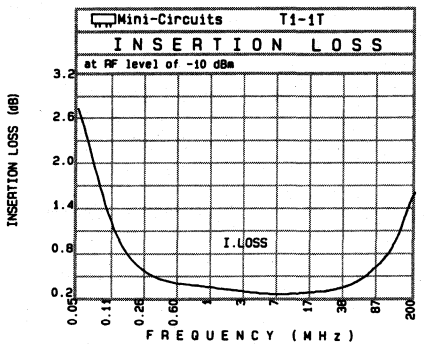
RF Transformers

Configuration A



T1-1T

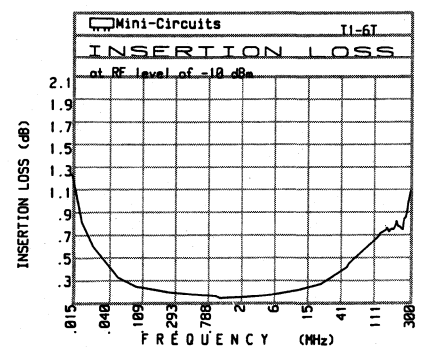
.05 TO 200 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.050	2.78	1.64
0.080	1.18	4.39
0.200	0.52	9.45
0.501	0.38	16.31
0.995	0.36	19.67
80.000	0.64	9.96
99.326	0.76	8.80
150.000	1.23	5.83
192.510	1.60	4.60
200.000	1.63	4.55

T1-6T

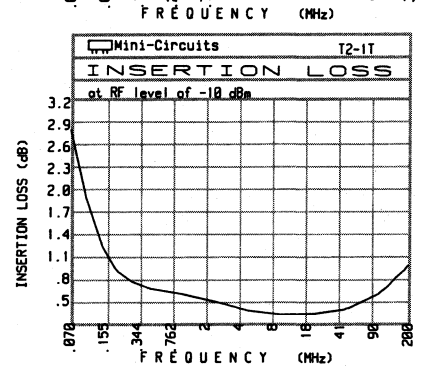
0.015 TO 300 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.015	1.24	11.77
.125	.21	26.45
1.153	.12	37.26
47.474	.40	19.27
111.989	.66	14.92
147.833	.74	14.64
175.753	.75	15.08
209.750	.77	16.64
250.250	.84	20.06
300.000	1.09	26.64

T2-1T

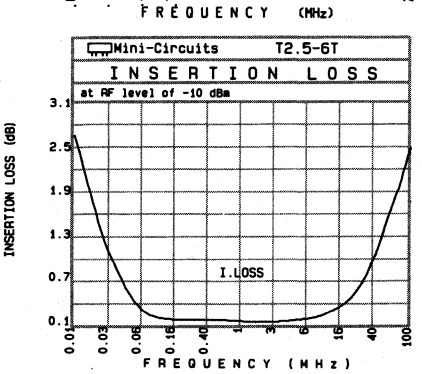
.07 TO 200 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.070	2.88	6.15
.201	.99	12.88
1.007	.64	17.80
10.025	.37	20.78
45.277	.44	19.59
108.526	.69	14.56
125.317	.76	13.17
142.439	.84	11.75
173.682	.95	9.47
200.000	1.04	7.77

T2.5-6T

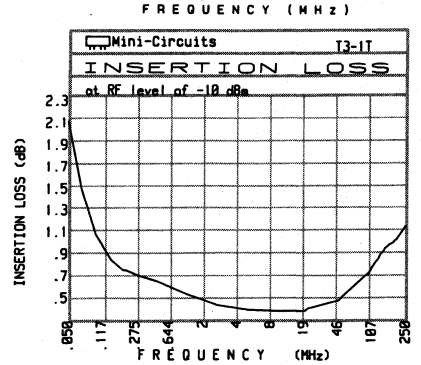
.01 TO 100 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	2.71	1.70
0.020	1.14	4.46
0.050	0.31	10.63
0.099	0.18	16.39
0.500	0.18	26.01
20.000	0.48	10.09
50.000	1.47	4.52
53.667	1.60	4.19
95.264	2.52	2.82
100.000	2.55	2.87

T3-1T

.05 TO 250 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.050	2.16	6.33
.201	.80	15.33
.468	.70	18.27
10.025	.43	24.05
45.277	.52	21.10
108.526	.83	13.49
125.317	.90	11.82
149.288	1.00	9.69
173.682	1.04	8.00
250.000	1.20	5.00

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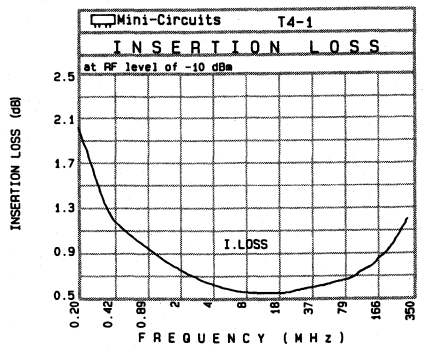
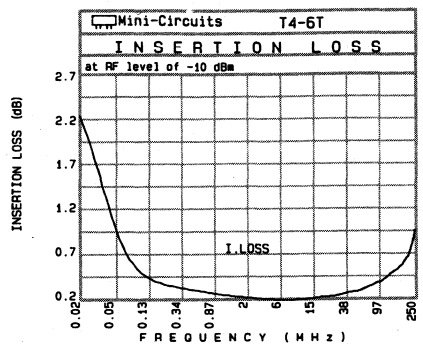


T4-1

.2 TO 350 MHz

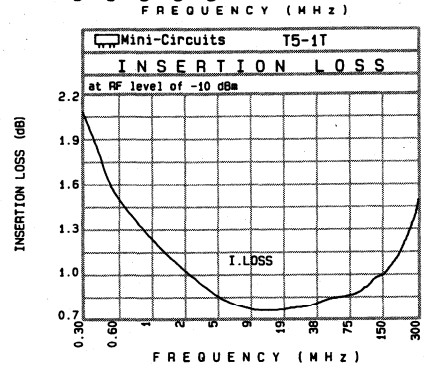
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.200	2.06	3.31
0.350	1.33	7.01
0.500	1.13	9.36
1.000	0.92	12.67
2.000	0.72	15.24
5.000	0.59	17.34
100.000	0.73	15.07
175.100	0.91	12.93
300.000	1.23	12.36
350.000	1.34	13.08



T4-6T

.02 TO 250 MHz

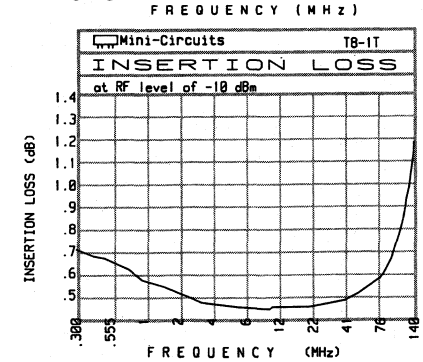
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.020	2.30	3.08
0.050	0.89	5.47
0.100	0.48	9.35
0.200	0.36	15.86
0.500	0.31	20.74
1.000	0.26	23.39
100.000	0.42	14.83
125.010	0.50	14.73
150.000	0.55	15.23
250.000	0.99	15.91



T5-1T

.3 TO 300 MHz

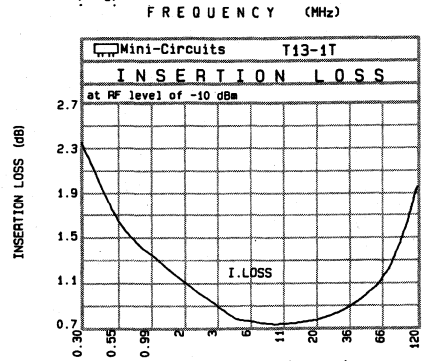
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.300	2.12	4.31
0.500	1.65	7.08
0.600	1.53	7.92
1.000	1.31	9.74
2.000	1.05	11.22
5.000	0.81	14.48
100.000	0.93	15.65
144.980	1.01	15.62
200.000	1.14	15.49
300.000	1.52	13.11



T8-1T

.3 TO 140 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.300	.66	15.02
.784	.57	16.74
2.874	.42	18.05
10.535	.40	17.12
49.743	.46	8.63
81.069	.56	5.31
97.981	.67	4.11
114.257	.80	3.35
126.986	.94	2.87
140.000	1.15	2.40



T13-1T

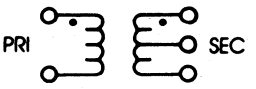
.3 TO 120 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.300	2.39	3.34
0.501	1.75	5.79
0.700	1.53	7.36
2.010	1.04	11.63
5.000	0.78	16.07
20.000	0.78	14.77
57.878	1.09	8.61
80.000	1.36	6.71
114.770	1.96	4.44
120.000	2.00	4.34

wideband

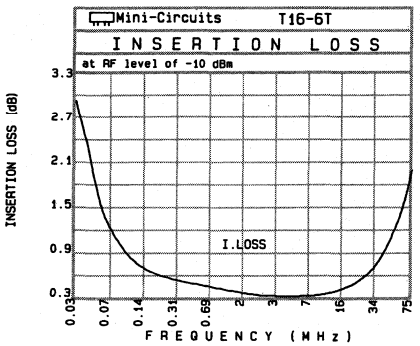
RF Transformers

Configuration A



T16-6T

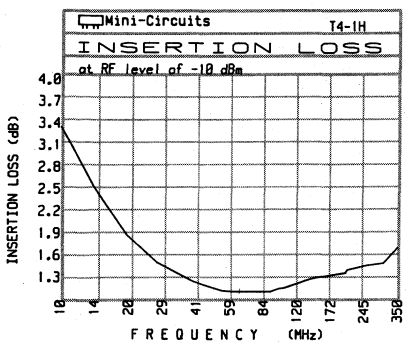
.03 TO 75 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.030	2.98	1.55
0.050	1.66	3.37
0.060	1.33	4.30
0.100	0.78	7.70
0.201	0.56	12.89
20.000	0.49	11.81
30.000	0.70	8.64
38.744	0.90	6.92
72.335	1.93	3.49
75.000	2.03	3.32

T4-1H

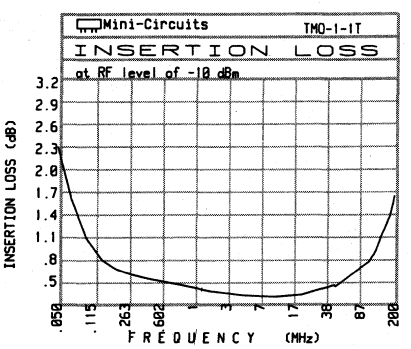
10 TO 350 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
10.000	3.33	4.05
20.000	1.85	8.95
40.311	1.22	16.05
54.149	1.10	18.56
90.756	1.09	15.02
99.524	1.13	13.84
138.711	1.26	9.87
200.594	1.34	6.03
250.289	1.44	4.15
350.000	1.68	2.29

TMO-1-1T

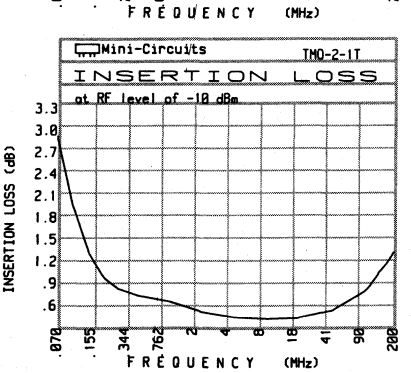
.05 TO 200 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.050	2.30	5.27
.149	.76	12.39
.468	.51	19.78
4.663	.29	27.23
45.277	.43	18.89
100.506	.72	12.67
125.317	.88	10.94
142.439	1.06	9.93
173.682	1.32	8.40
200.000	1.64	7.32

TMO-2-1T

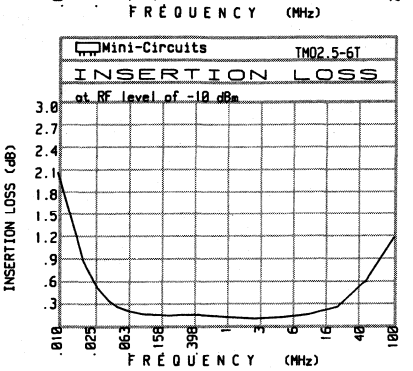
.07 TO 200 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.070	2.89	4.80
.201	.99	11.79
1.007	.62	18.05
10.025	.39	20.81
45.277	.50	20.35
108.526	.80	17.28
125.317	.91	16.24
142.439	1.02	15.20
173.682	1.16	13.29
200.000	1.30	11.75

TMO2.5-6T

.01 TO 100 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.010	2.16	6.47
.030	.56	14.16
.047	.34	17.71
.101	.21	24.25
.201	.19	29.71
.468	.20	34.17
2.168	.15	33.65
20.125	.30	21.48
45.277	.65	14.84
100.000	1.25	7.02

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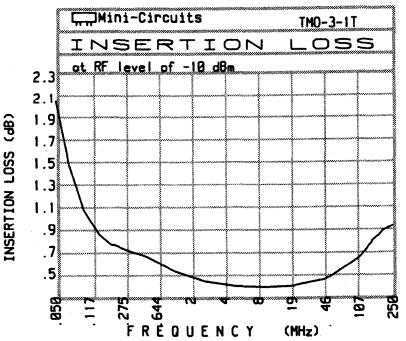
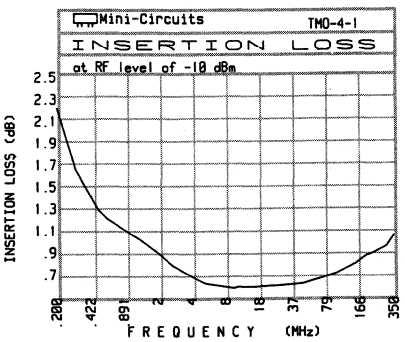


TMO-3-1T

.05 TO 250 MHz

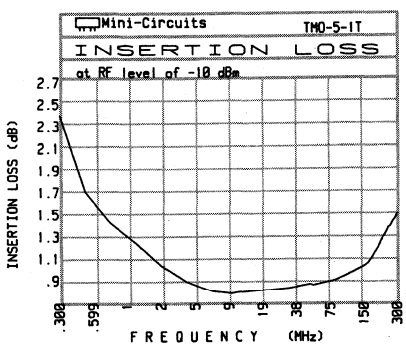
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.050	2.12	6.80
.201	.81	15.48
.468	.71	18.20
10.025	.43	23.28
45.277	.50	21.93
108.526	.70	15.96
125.317	.76	14.37
149.288	.85	12.26
173.682	.89	10.40
250.000	.98	7.10



TMO-4-1

.2 TO 350 MHz

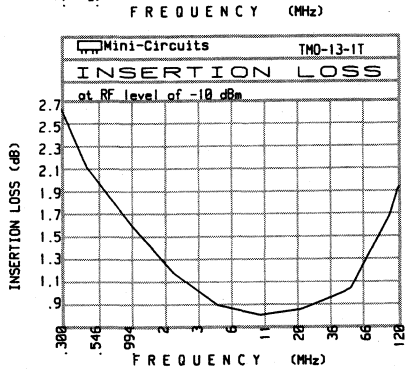
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.200	2.20	7.00
.610	1.19	13.99
1.266	1.00	16.82
5.034	.61	22.86
10.039	.56	24.46
22.534	.58	22.32
45.833	.60	17.98
100.873	.70	11.84
193.382	.86	6.33
350.000	1.04	2.27



TMO-5-1T

.3 TO 300 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.300	2.36	7.17
1.420	1.21	13.79
6.716	.76	17.23
18.929	.77	16.75
53.348	.82	13.20
150.356	.99	6.60
188.201	1.11	5.13
223.677	1.26	4.13
261.289	1.36	3.25
300.000	1.47	2.63



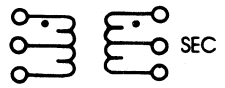
TMO-13-1T

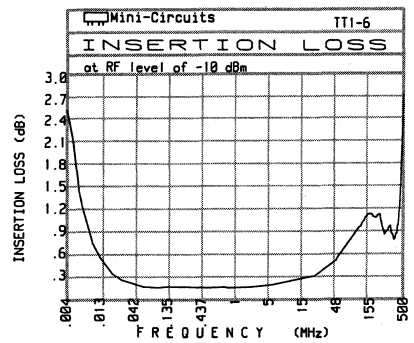
.3 TO 120 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.300	2.63	6.95
1.007	1.59	11.16
2.168	1.14	13.24
10.025	.76	14.21
20.125	.81	11.28
45.277	.97	6.32
46.549	.98	6.21
100.506	1.65	2.51
108.526	1.77	2.25
120.000	1.92	1.97

RF Transformers

Configuration B

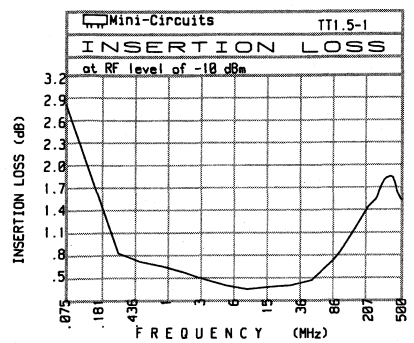




TT1-6

.004 to 500 MHz

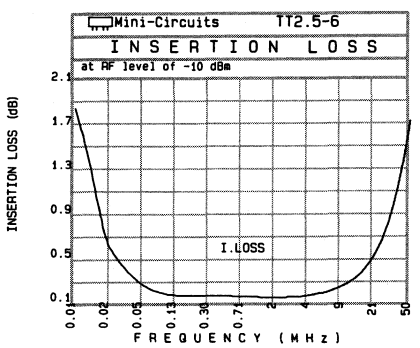
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.004	2.53	4.71
.020	.29	15.34
1.153	.10	37.84
100.858	.89	10.71
151.507	1.10	9.32
200.000	1.08	9.41
280.250	.87	12.74
350.000	.81	24.39
430.250	1.11	11.24
500.000	2.74	6.16



TT1.5-1

.075 to 500 MHz

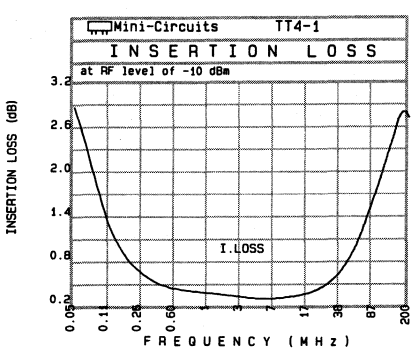
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.075	2.88	4.70
.913	.67	19.36
4.936	.41	23.51
19.837	.40	23.36
81.211	.75	16.19
201.509	1.47	8.72
297.468	1.80	5.38
351.506	1.89	4.13
439.125	1.70	2.79
500.000	1.57	2.35



TT2.5-6

.01 to 50 MHz

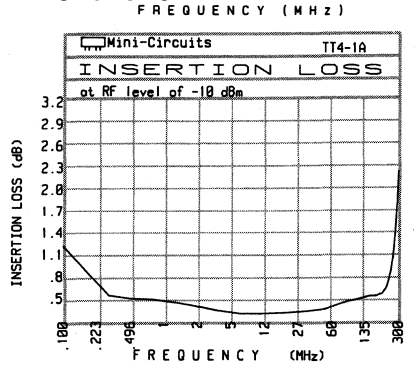
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	1.85	2.83
0.020	0.74	6.20
0.025	0.52	7.77
0.050	0.22	12.98
0.100	0.15	19.05
10.000	0.26	14.59
25.000	0.67	8.03
25.890	0.71	7.73
48.082	1.65	3.91
50.000	1.74	3.73



TT4-1

.05 to 200 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.050	2.88	1.46
0.100	1.29	4.13
0.200	0.58	8.81
0.501	0.39	15.77
1.000	0.36	19.03
30.000	0.51	11.31
50.000	0.91	7.28
100.860	1.96	3.92
195.150	2.78	3.87
200.000	2.76	4.08



TT4-1A

0.1 to 300 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	1.17	10.70
.846	.44	23.68
4.001	.29	30.12
18.929	.26	27.31
53.348	.32	17.29
99.339	.43	10.23
175.639	.49	3.69
223.677	.60	1.96
261.289	.99	1.36
300.000	2.21	1.09

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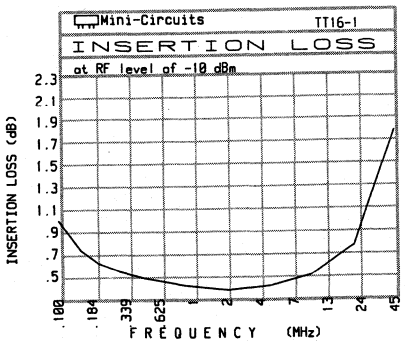
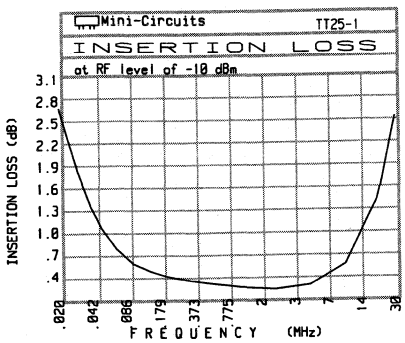


TT16-1

0.1 to 45 MHz

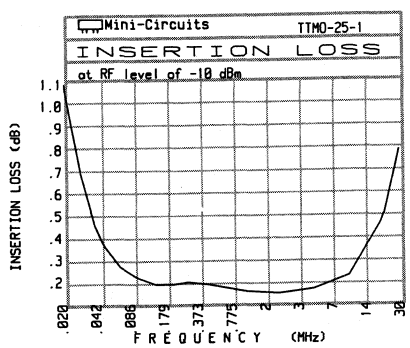
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	1.03	11.30
.149	.76	14.27
.217	.63	17.22
.299	.57	19.65
.468	.51	23.01
2.168	.40	33.97
4.663	.44	46.27
10.025	.54	25.12
21.543	.80	10.53
45.000	1.84	2.08



TT25-1

.02 to 30 MHz

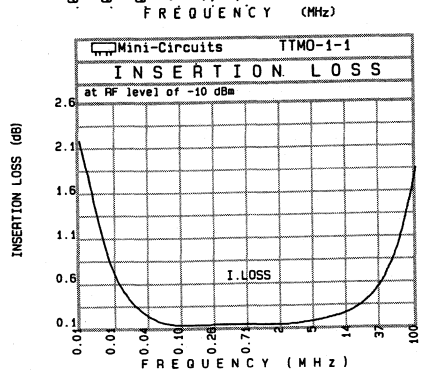
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.020	2.72	6.13
.030	1.86	7.95
.047	1.18	10.45
.069	.80	13.16
.149	.48	19.05
.299	.37	25.11
1.007	.27	28.34
4.663	.30	12.69
20.125	1.46	2.94
30.000	2.60	2.00



TTMO-25-1

.02 to 30 MHz

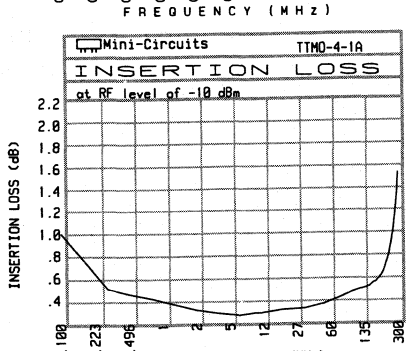
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.020	1.15	6.87
.030	.69	8.06
.047	.39	8.87
.069	.27	9.34
.149	.19	9.76
.299	.20	9.91
1.007	.16	9.66
4.663	.17	9.20
20.125	.47	6.09
30.000	.80	4.20



TTMO-1-1

.005 to 100 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.005	2.20	2.65
0.010	0.84	6.23
0.020	0.30	11.73
0.050	0.11	21.19
0.101	0.10	33.49
1.000	0.11	35.59
40.000	0.65	9.49
49.699	0.83	7.84
75.000	1.38	4.96
100.000	1.87	3.51



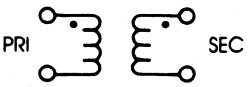
TTMO-4-1A

0.1 to 300 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	1.00	10.00
.846	.41	24.31
4.001	.28	32.42
18.929	.31	32.56
53.348	.37	22.30
99.339	.47	14.66
175.639	.56	6.89
223.677	.73	4.12
261.289	1.00	2.74
300.000	1.56	1.90

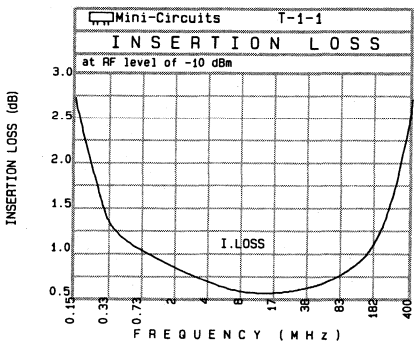
RF Transformers

Configuration C



T-1-1

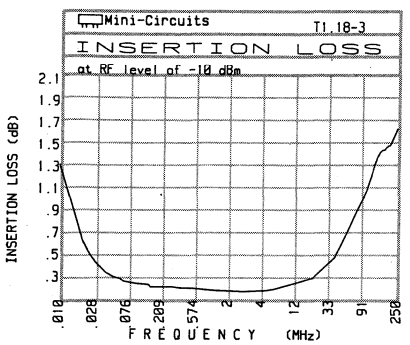
.15 to 400 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.150	2.75	1.98
0.200	2.10	3.10
0.300	1.44	9.92
0.350	1.29	11.10
1.001	0.92	16.82
2.000	0.75	19.24
50.000	0.64	20.06
191.320	1.23	10.15
200.000	1.26	9.90
400.000	2.75	4.79

T1.18-3

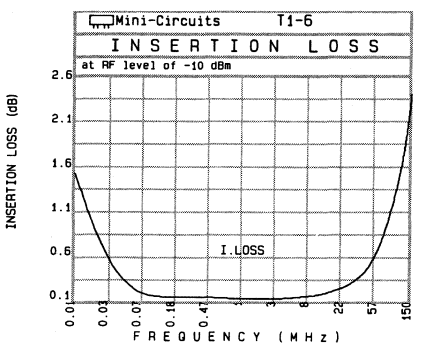
0.01 to 250 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.010	1.28	9.92
.040	.30	19.95
.101	.20	26.49
.401	.16	31.57
5.014	.14	28.04
20.125	.25	21.52
74.289	.86	11.69
128.742	1.30	6.88
169.296	1.42	4.22
250.000	1.62	1.40

T1-6

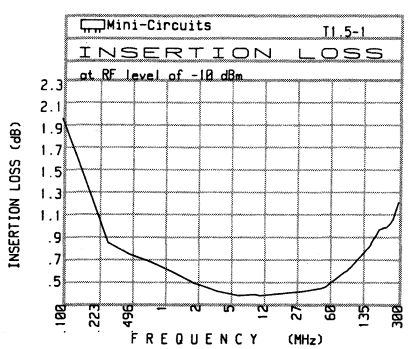
.01 to 150 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	1.53	3.51
0.020	0.58	7.36
0.050	0.18	14.35
0.099	0.13	20.32
0.198	0.13	26.00
50.000	0.54	9.38
76.890	0.97	6.19
100.000	1.37	4.61
143.590	2.26	2.79
150.000	2.43	2.57

T1.5-1

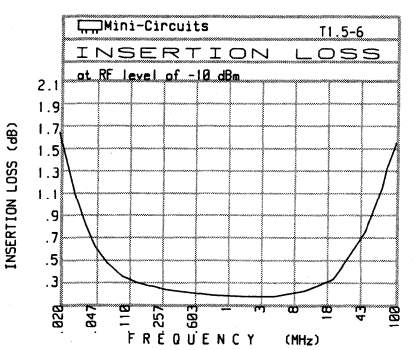
.1 to 300 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	1.96	6.70
.846	.64	19.19
4.001	.38	23.71
18.929	.36	24.68
53.348	.42	22.20
99.339	.61	18.74
175.639	.89	14.16
223.677	.96	11.88
261.289	1.03	10.26
300.000	1.19	8.75

T1.5-6

.02 to 100 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.020	1.66	10.04
.040	.79	14.25
.050	.61	15.84
.149	.28	24.00
.299	.22	28.68
1.007	.17	33.51
10.025	.21	25.00
45.277	.73	13.42
50.365	.83	12.65
100.000	1.57	6.99

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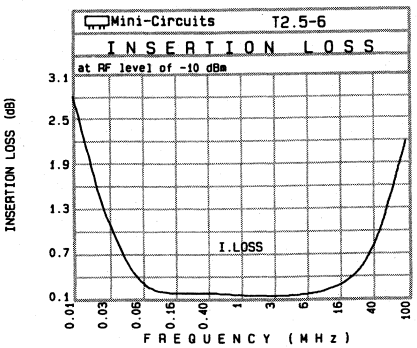
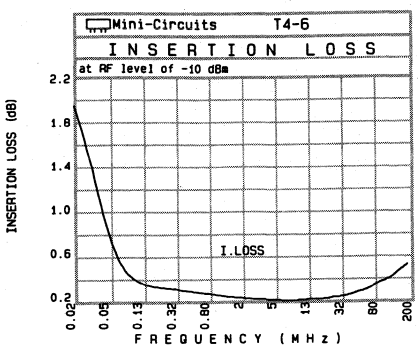


T2.5-6

.01 to 100 MHz

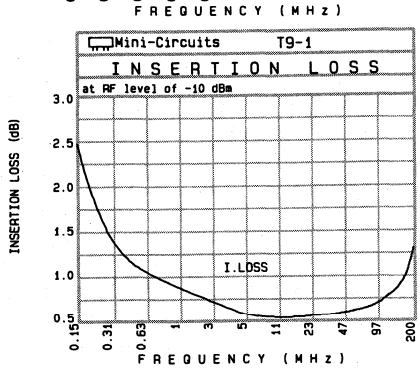
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	2.90	1.61
0.020	1.26	4.15
0.050	0.35	10.11
0.099	0.20	15.86
0.198	0.19	21.42
20.000	0.40	11.56
50.000	1.18	5.42
53.667	1.30	5.02
95.264	2.30	3.06
100.000	2.38	3.00



T4-6

.02 to 200 MHz

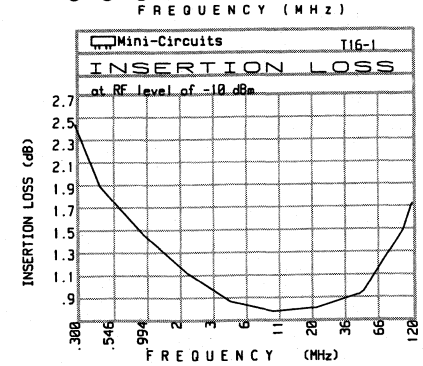
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.020	1.99	2.65
0.050	0.61	7.84
0.100	0.35	13.54
0.199	0.32	18.56
0.501	0.28	23.01
100.000	0.39	16.74
106.420	0.40	16.67
150.000	0.49	16.25
190.300	0.54	21.29
200.000	0.57	25.21



T9-1

.02 to 200 MHz

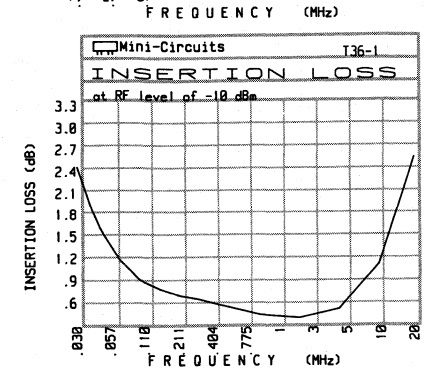
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.150	2.54	2.35
0.199	1.95	3.59
0.300	1.40	6.00
0.998	0.95	11.90
2.000	0.77	14.45
40.000	0.60	17.64
100.860	0.74	14.07
150.000	0.95	10.48
190.300	1.23	8.18
200.000	1.34	7.50



T16-1

.3 to 120 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.300	2.48	6.85
1.007	1.48	13.30
2.168	1.13	16.98
10.025	.78	16.23
20.125	.81	10.21
45.277	.93	4.59
46.549	.93	4.49
100.506	1.51	1.58
108.526	1.62	1.41
120.000	1.76	1.24



T36-1

.03 to 20 MHz

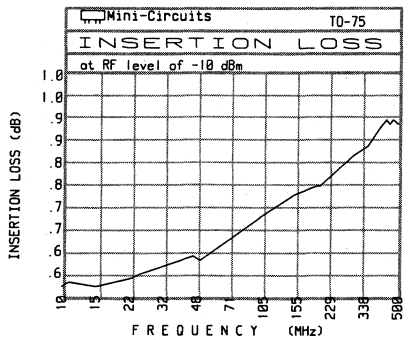
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.030	2.44	6.98
.047	1.60	9.75
.050	1.50	10.28
.101	.89	15.22
.201	.69	19.88
.217	.67	20.32
.468	.55	24.87
2.168	.38	16.92
4.663	.50	10.04
20.000	2.58	1.81

RF Transformers

Configuration C

TO-75

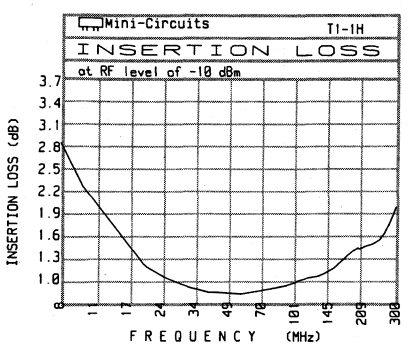
10 to 500 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
10.000	.53	24.68
14.893	.53	25.54
24.869	.56	26.08
49.595	.59	26.40
100.873	.69	25.11
193.382	.76	22.22
298.431	.83	19.48
401.160	.89	17.42
451.552	.90	16.74
500.000	.90	16.24

T1-1H

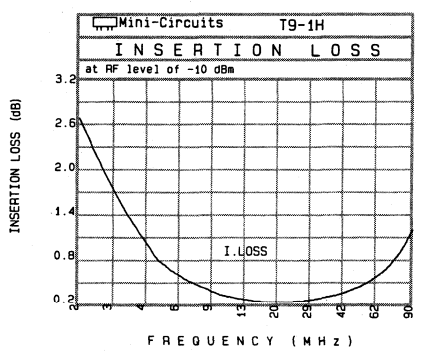
8 to 300 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
8.000	2.89	3.88
20.410	1.19	9.28
44.500	.85	13.20
81.000	.91	14.00
105.090	1.01	13.59
154.000	1.18	12.25
190.500	1.42	11.04
214.590	1.48	10.32
263.500	1.65	8.87
300.000	2.02	7.84

T9-1H

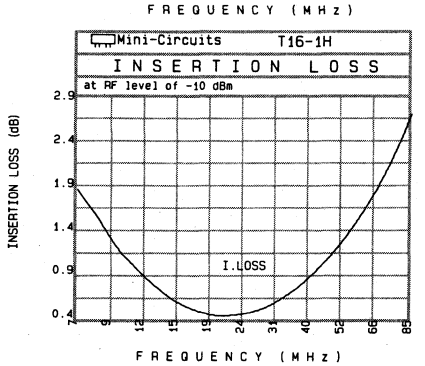
2 to 90 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
2.000	2.72	1.84
3.000	1.56	3.66
4.783	0.83	6.45
6.000	0.62	8.05
19.913	0.23	32.98
45.945	0.40	12.78
50.000	0.44	11.83
75.000	0.84	7.53
87.330	1.14	6.02
90.000	1.21	5.74

T16-1H

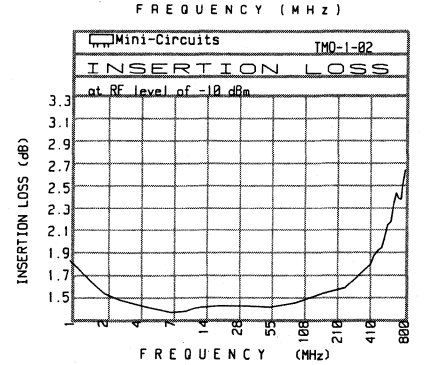
7 to 85 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
7.000	1.87	3.19
10.000	1.09	5.78
14.110	0.62	10.41
15.000	0.57	11.67
40.000	0.88	7.47
42.328	0.95	6.90
65.000	1.85	3.53
70.622	2.09	3.09
82.506	2.62	2.36
85.000	2.74	2.25

TMO-1-02

1 to 800 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
1.000	1.80	12.31
2.726	1.44	15.92
7.429	1.33	17.22
19.913	1.39	17.37
89.604	1.42	17.23
403.203	1.77	12.96
501.042	1.92	11.59
602.156	2.16	10.32
699.887	2.38	9.22
800.000	2.64	8.24

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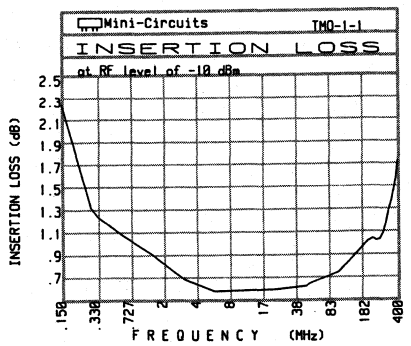
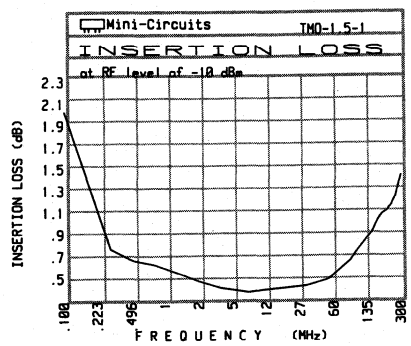


TMO-1-1

15 to 400 MHz

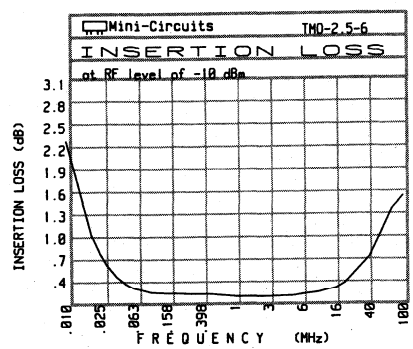
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.150	2.31	6.40
.616	1.13	14.47
2.645	.73	20.39
11.153	.63	24.24
49.640	.69	22.54
198.326	1.08	14.12
241.721	1.08	12.56
279.134	1.14	11.40
340.211	1.43	9.80
400.000	1.80	8.46



TMO-1.5-1

1 to 300 MHz

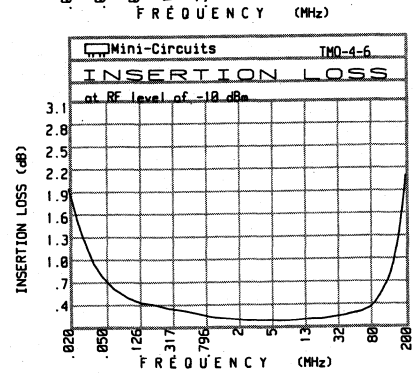
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	2.00	7.10
.846	.60	15.20
4.001	.39	20.76
11.275	.37	22.45
49.788	.46	17.20
150.356	.90	9.84
188.201	1.06	8.59
223.677	1.12	7.77
261.289	1.22	7.17
300.000	1.42	6.79



TMO-2.5-6

.01 to 100 MHz

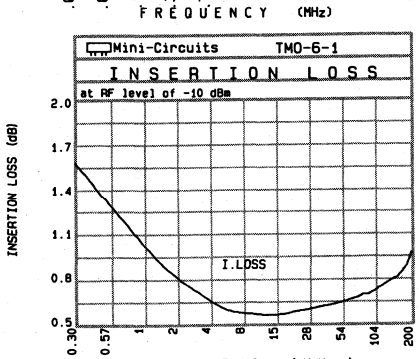
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.010	2.29	5.62
.030	.61	12.84
.063	.28	18.83
.149	.21	26.07
.299	.20	31.31
1.007	.17	33.88
6.247	.20	27.27
20.125	.36	19.19
59.626	1.14	9.98
100.000	1.55	5.13



TMO-4-6

.02 to 200 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.020	2.02	7.83
.050	.82	13.85
.149	.46	21.21
.401	.37	25.45
5.014	.23	34.23
20.125	.25	29.15
74.289	.40	16.60
119.220	.75	11.27
160.523	1.33	7.63
200.000	2.19	4.98



TMO-6-1

.3 to 200 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.300	1.62	6.65
0.500	1.37	8.91
1.000	1.06	11.59
2.003	0.79	14.70
5.000	0.61	18.64
50.000	0.66	18.68
100.070	0.74	17.44
150.000	0.83	14.84
194.740	0.98	12.66
200.000	1.00	12.04

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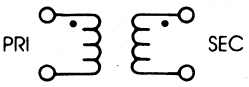
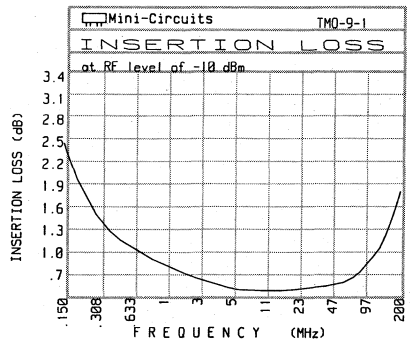
wideband

RF Transformers

Configuration C

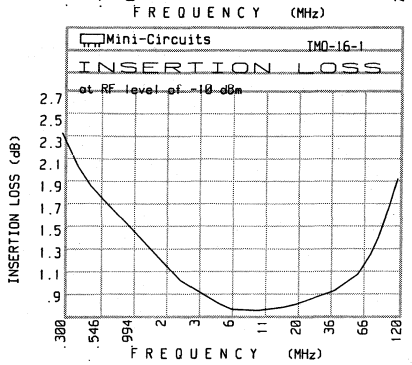




TMO-9-1

.15 to 200 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.150	2.49	7.48
.299	1.53	12.47
1.007	.92	19.11
6.247	.51	24.11
20.125	.51	13.21
74.289	.68	3.93
111.200	.95	2.35
139.015	1.17	1.74
169.296	1.50	1.34
200.000	1.84	1.09



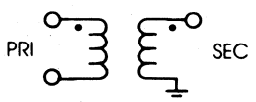
TMO-16-1

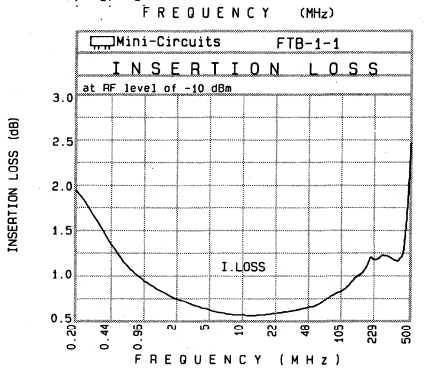
.3 to 120 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.300	2.37	7.37
.502	1.89	10.14
2.516	1.03	17.74
6.247	.77	21.40
15.711	.79	14.20
20.125	.82	12.18
40.312	.95	6.96
74.289	1.27	3.41
100.506	1.67	2.28
120.000	1.96	1.78

Configuration E

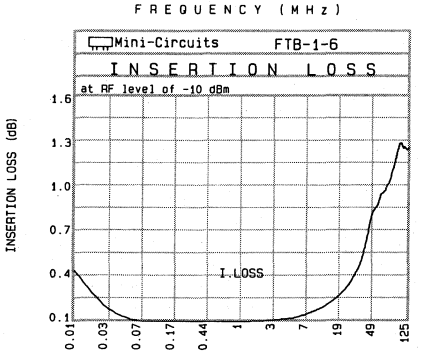
balance to unbalance





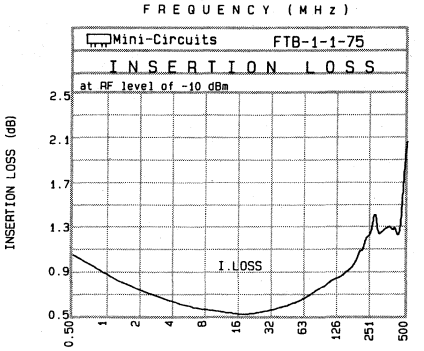
FTB-1-1, .2 to 500 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.200	2.00	6.79
0.500	1.19	13.47
1.000	0.94	16.19
2.000	0.75	18.70
5.000	0.61	22.34
10.000	0.58	23.84
100.000	0.86	17.64
241.480	1.23	11.38
300.000	1.26	10.05
500.000	2.53	6.59



FTB-1-6, .01 to 125 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	0.45	9.03
0.020	0.19	14.65
0.050	0.10	22.68
0.100	0.10	29.17
0.199	0.10	34.28
25.000	0.38	12.89
50.000	0.89	8.56
62.669	0.97	7.71
118.440	1.28	6.04
125.000	1.29	6.02



FTB-1-1-75, .5 to 500 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.500	1.08	8.63
1.000	0.88	11.46
2.000	0.74	13.95
5.000	0.60	17.18
10.000	0.57	18.35
20.000	0.55	18.21
100.000	0.84	13.46
242.190	1.29	9.95
300.000	1.34	10.43
500.000	2.12	9.11

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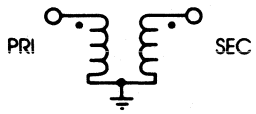
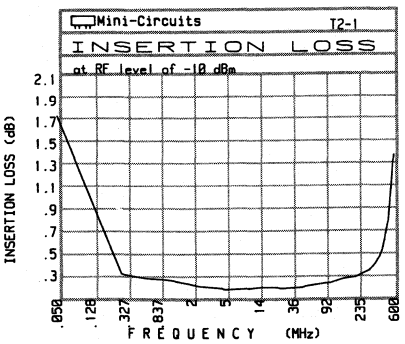
Configuration D

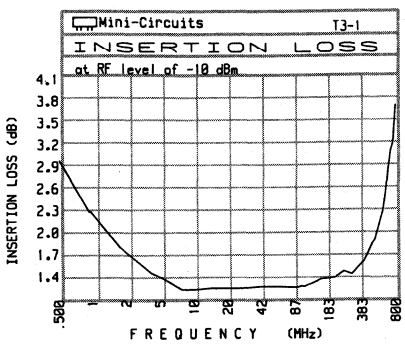


Mini-Circuits



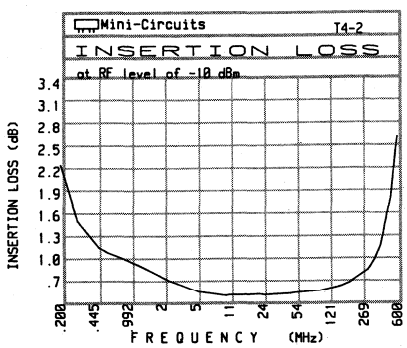
T2-1 .050 to 600 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.050	1.72	7.90
.999	.23	21.60
2.575	.17	22.56
10.863	.15	22.77
24.869	.15	21.86
100.873	.20	15.04
201.162	.25	9.94
434.088	.51	4.99
498.347	.73	4.46
600.000	1.36	3.99



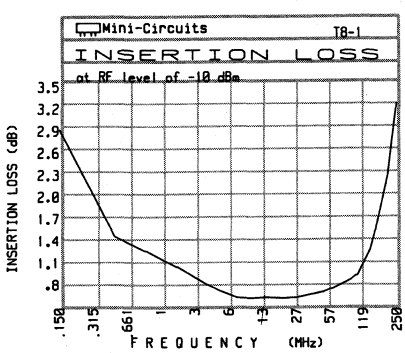
T3-1 .5 to 800 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.500	2.94	7.21
1.994	1.73	10.66
9.923	1.18	12.30
50.297	1.22	11.12
99.524	1.23	8.97
200.594	1.34	5.44
348.840	1.49	2.96
523.423	1.95	1.94
677.637	2.84	1.72
800.000	3.70	1.83



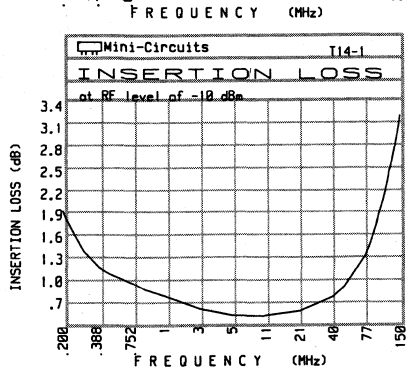
T4-2 .2 to 600 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.200	2.30	6.00
.999	.99	12.85
2.575	.72	13.02
10.863	.52	12.53
24.869	.52	12.18
100.873	.59	8.39
201.162	.72	4.85
434.088	1.40	2.06
498.347	1.79	1.85
600.000	2.68	1.66



T8-1 .15 to 250 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.150	2.88	5.70
1.008	1.23	14.01
1.994	1.01	15.74
7.252	.60	19.04
20.000	.59	15.65
40.311	.65	10.88
60.485	.72	8.00
105.186	.90	4.54
149.332	1.40	2.92
250.000	3.25	1.41



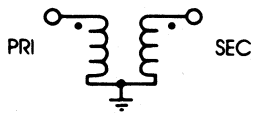
T14-1 .2 to 150 MHz

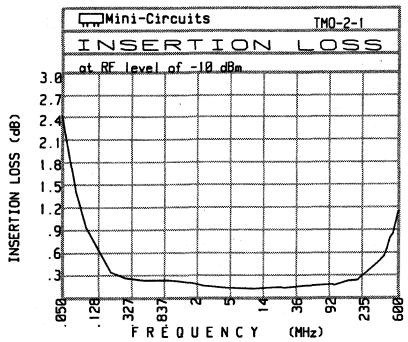
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.200	1.96	8.58
.405	1.20	12.75
1.484	.81	16.38
10.088	.54	13.93
39.401	.80	4.69
86.706	1.63	1.60
104.956	2.08	1.21
118.907	2.44	1.01
138.493	2.95	.83
150.000	3.28	.76

wideband

RF Transformers

Configuration D

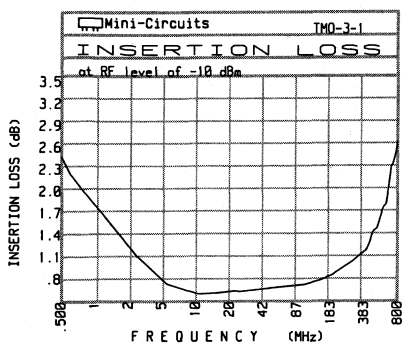




TMO-2-1

.050 to 600 MHz

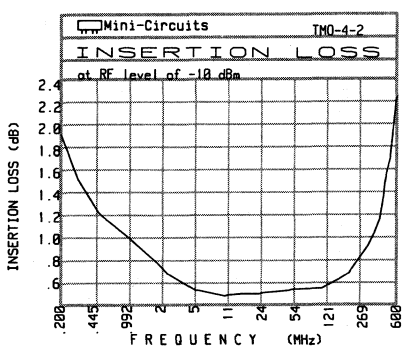
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.050	2.50	6.00
.300	.28	17.65
1.266	.24	21.54
5.341	.15	23.03
22.534	.16	23.09
49.595	.18	21.63
193.382	.26	13.91
401.160	.59	8.29
498.347	.88	6.75
600.000	1.20	5.65



TMO-3-1

.5 to 800 MHz

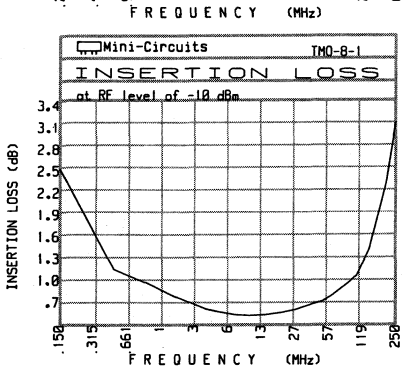
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.500	2.52	7.01
1.992	1.37	10.31
10.039	.65	12.79
24.869	.68	12.70
100.873	.77	11.07
298.431	1.09	6.42
451.552	1.44	4.22
549.992	1.70	3.32
656.812	2.10	2.68
800.000	2.73	2.18



TMO-4-2

.2 to 600 MHz

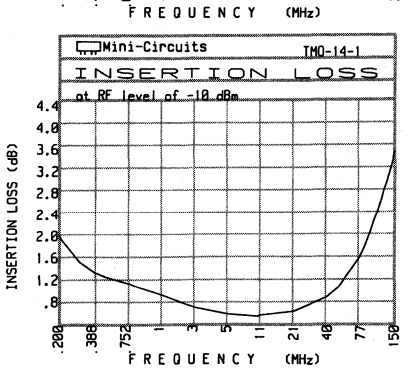
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.200	2.00	7.70
.999	1.07	15.63
2.575	.74	19.54
10.863	.55	24.29
24.869	.57	19.63
100.873	.61	8.87
201.162	.78	4.44
434.088	1.43	1.73
498.347	1.75	1.54
600.000	2.35	1.35



TMO-8-1

.15 to 250 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.150	2.50	5.90
1.008	.95	15.49
1.994	.75	17.53
7.252	.51	18.62
20.000	.54	12.81
40.311	.66	7.84
60.485	.77	5.23
105.186	1.04	2.68
149.332	1.58	1.66
250.000	3.15	.90



TMO-14-1

.2 to 150 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.200	2.06	7.95
.405	1.37	11.80
1.484	.97	15.30
10.088	.58	16.70
39.401	.93	8.24
86.706	1.95	3.61
104.956	2.45	2.81
118.907	2.83	2.38
138.493	3.30	1.93
150.000	3.60	1.73

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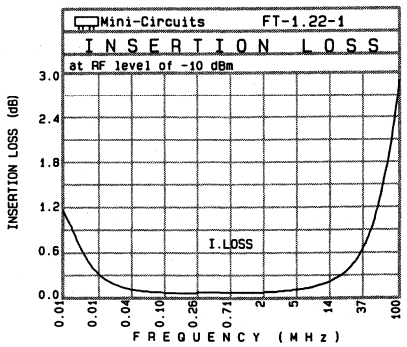
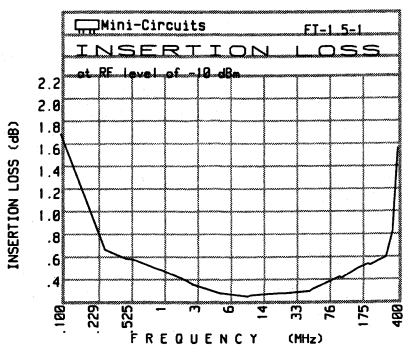


FT-1.22-1

.005 to 100 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.005	1.20	4.31
0.010	0.42	8.44
0.020	0.16	13.97
0.050	0.09	21.75
0.100	0.08	27.89
25.000	0.46	10.22
46.536	1.03	5.94
50.000	1.14	5.51
95.614	2.76	4.00
100.000	2.99	4.74



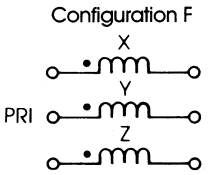
FT-1.5-1

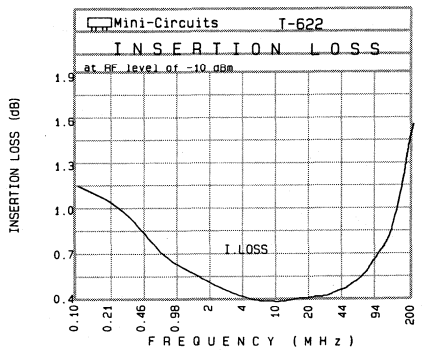
.1 to 400 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.100	1.79	7.10
.610	.65	18.61
1.266	.55	20.63
5.034	.35	24.38
10.863	.33	25.10
22.534	.35	24.87
49.595	.39	22.83
149.648	.58	15.96
201.162	.61	13.38
400.000	1.67	6.07

RF Transformers

Configuration F

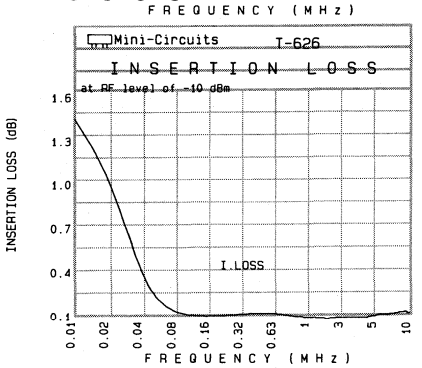




T-622

0.1 to 200 MHz

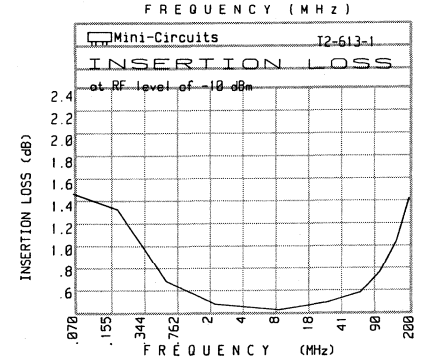
FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.100	1.19	7.87
0.500	0.70	17.40
1.100	0.64	20.99
2.099	0.50	24.10
5.000	0.42	26.99
80.000	0.69	14.78
93.054	0.76	13.92
100.000	0.78	13.50
193.000	1.58	8.19
200.000	1.62	8.08



T-626

0.01 to 10 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.010	1.48	6.06
0.035	0.41	12.04
0.110	0.13	24.10
0.200	0.14	30.00
0.400	0.15	33.34
2.000	0.12	33.19
4.680	0.14	29.13
5.000	0.14	28.47
9.675	0.16	25.30
10.000	0.16	24.75



T2-613-1

0.07 to 200 MHz

FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
.070	1.48	8.88
.200	1.34	15.76
.633	.68	20.56
2.000	.47	25.22
9.199	.42	27.19
29.090	.49	23.67
63.246	.58	18.52
100.238	.77	15.39
149.063	1.06	13.44
200.000	1.45	13.77

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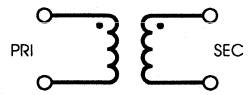
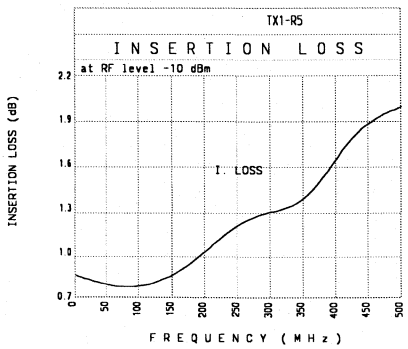
Configuration C



Mini-Circuits®

TX1-R5

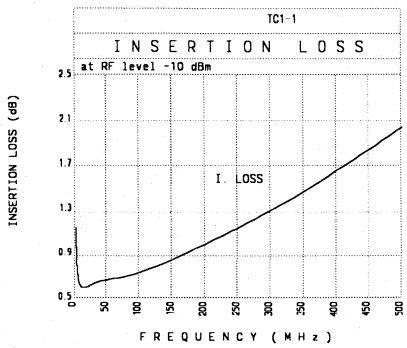
0.8 to 500 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
0.80	0.87	11.84
1.20	0.87	13.26
2.20	0.87	15.37
3.20	0.86	16.68
91.60	0.74	14.38
180.00	0.92	10.21
265.00	1.32	7.79
350.00	1.28	6.22
425.00	1.87	5.32
500.00	2.01	4.63

TC1-1

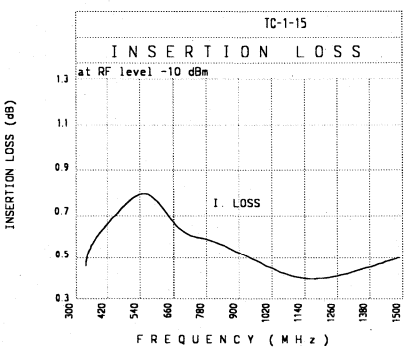
1.5 to 500 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
1.51	1.15	13.64
2.49	0.91	13.85
4.35	0.72	13.75
6.87	0.62	13.76
16.75	0.60	13.91
40.86	0.69	14.35
99.67	0.71	14.31
243.10	1.13	12.92
353.08	1.47	11.62
502.30	2.06	10.10

TC1-15

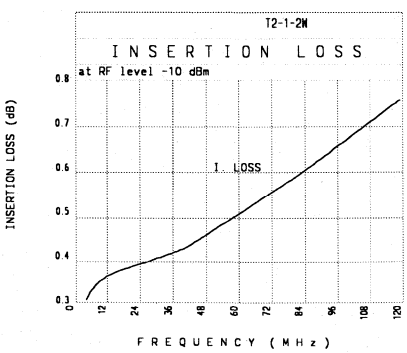
350 to 1500 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
350.00	0.46	8.47
360.00	0.56	8.38
470.00	0.71	7.92
580.00	0.86	7.58
690.00	0.59	8.03
800.00	0.60	8.62
975.00	0.48	11.81
1150.00	0.38	19.36
1325.00	0.43	29.22
1500.00	0.50	30.48

T2-1-2W

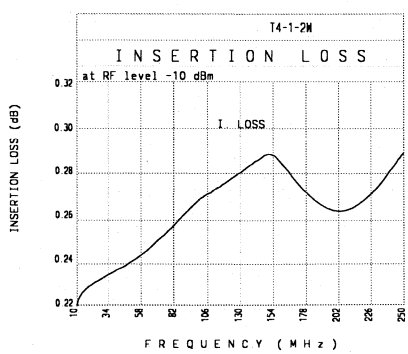
5 to 120 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
5.00	0.31	19.10
10.00	0.36	22.35
25.00	0.39	21.22
40.00	0.42	18.88
45.00	0.44	18.17
62.50	0.51	16.00
80.00	0.58	14.23
85.00	0.60	13.79
102.50	0.68	12.41
120.00	0.76	11.27

T4-1-2W

10 to 250 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
10.00	0.22	24.71
15.00	0.23	25.82
57.50	0.24	22.20
100.00	0.27	18.49
105.00	0.27	18.13
127.50	0.28	16.70
150.00	0.29	15.49
155.00	0.29	15.24
202.50	0.25	13.26
250.00	0.29	11.73

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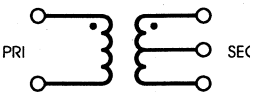
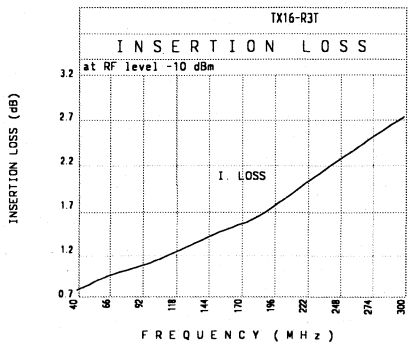
wideband
RF Transformers

Configuration A



TX16-R3T

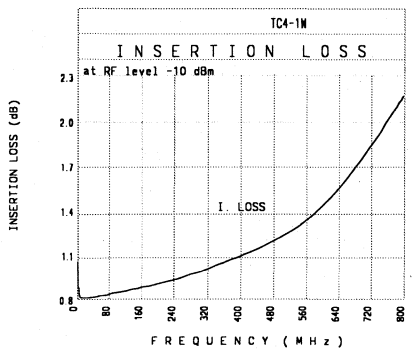
40 to 300 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
40.0	0.78	10.69
45.0	0.81	12.21
60.0	0.91	15.24
65.0	0.94	15.89
70.0	0.96	16.23
110.0	1.13	12.90
150.0	1.44	9.60
185.0	1.58	7.74
220.0	2.00	6.29
300.0	2.74	4.30

TC4-1W

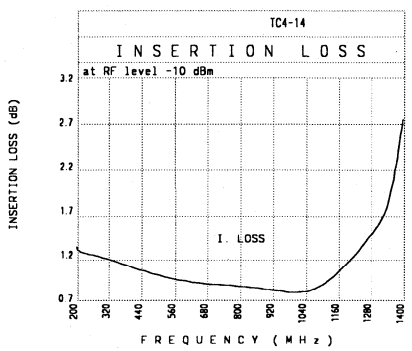
3 to 800 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
3.00	1.09	11.58
4.00	0.98	12.35
5.00	0.93	13.11
7.50	0.86	14.21
10.00	0.83	14.49
100.00	0.88	15.77
250.00	0.96	16.17
400.00	1.13	16.72
600.00	1.36	15.59
800.00	2.21	9.07

TC4-14

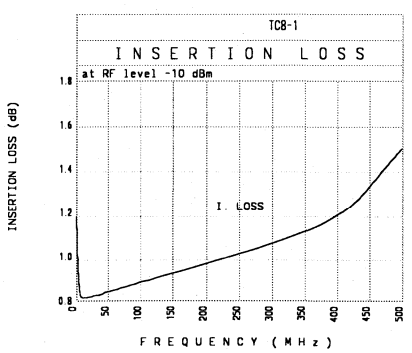
200 to 1400 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
200.00	1.33	6.74
210.00	1.26	6.88
300.00	1.22	8.07
550.00	0.92	9.54
800.00	0.88	10.68
950.00	0.82	13.05
1100.00	0.77	21.93
1300.00	1.53	10.04
1350.00	1.77	7.15
1400.00	2.77	5.05

TC8-1

2 to 500 MHz



FREQ. (MHz)	I. LOSS (dB)	INPUT R. LOSS (dB)
2.0	1.20	10.65
3.0	1.03	12.20
5.0	0.90	14.01
7.5	0.84	15.09
10.0	0.82	15.64
55.0	0.86	15.88
100.0	0.90	15.29
400.0	1.15	9.68
450.0	1.34	9.15
500.0	1.51	8.67

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Mini-Circuits

SECTION 15

OSCILLATORS VCO's

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GLOSSARY OF VCO TERMS

VOLTAGE CONTROLLED OSCILLATOR (VCO):
This is an oscillator designed so the output frequency can be changed by applying a voltage to its control port or tuning port.

FREQUENCY TUNING CHARACTERISTIC:
Frequency versus tuning voltage performance for a given VCO. This is usually graphed as frequency vs. voltage.

FREQUENCY VS. TEMPERATURE:
Variation of frequency with temperature at a fixed tuning voltage.

MONOTONIC TUNING:
This refers to the fact that for a given frequency voltage characteristic, the frequency is single valued at a given voltage, and vise versa. Refer to Q&A's for further details.

TUNING SENSITIVITY:
This is the slope of the tuning characteristic and is expressed as frequency change per unit voltage change (MHz/V, etc.).

TUNING LINEARITY:
The deviation of the frequency versus tuning voltage characteristic from a best-fit straight line.

TUNING NON-LINEARITY:
The extent to which the tuning voltage characteristic falls outside the best fit straight line.

TUNING OR MODULATION, AND DELTA MODULATION SENSITIVITY:
The slope of the tuning voltage characteristic at a given tuning voltage is the tuning or modulation sensitivity. The difference in modulation sensitivity at two operating tuning voltages is the delta modulation sensitivity. (For additional information, see the Q&A section).

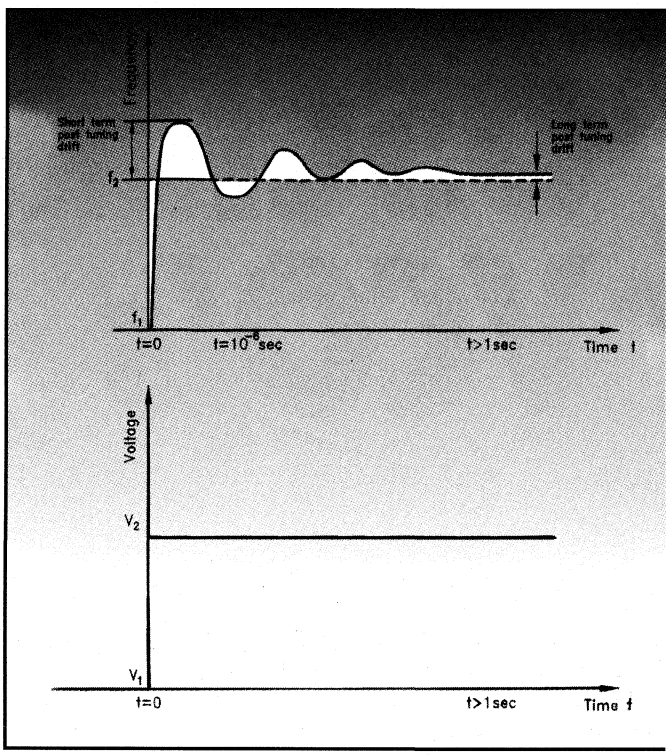
TUNING SPEED (OR RESPONSE TIME):
This is the time required for the output frequency to settle to within 90 percent of its final value after applying a step change in frequency. The settling time or tuning speed is related to the tuning or modulation bandwidth.

VCO INPUT CAPACITANCE:
The total equivalent capacitance seen at the tuning port of the VCO. This parameter is a function of the amplitude and frequency of the test signal at the tuning port.

MODULATION OR TUNING BANDWIDTH:
The modulating frequency at which the frequency deviation decreases to .707 of its dc value. This is usually a function of the modulating source impedance, which is typically 50 ohms.

POST TUNING DRIFT:
The application of a step voltage causes the VCO to change its frequency from an initial f_1 value to a final f_2 value. The frequency f_2 will settle to a stabilized value after some time. Post tuning drift is the frequency error compared to a final stabilized value at a specified time after the application of a step voltage. Expressed as frequency error in Hz, kHz, etc. as illustrated in Figure 1.

Figure 1



Post tuning drift illustration

FREQUENCY DRIFT WITH TEMPERATURE:
This is the frequency drift of the VCO with temperature at fixed tuning voltage, and may be expressed as a relativ percentage change per unit temperature, or as a frequenc change per unit temperature.

FREQUENCY PUSHING:
The changing of output frequency corresponding to a give change in the supply voltage at a fixed tuning voltag (expressed in MHz per volt).

FREQUENCY PULLING:
Frequency variation caused by changes due to the outpu load. Usually specified at a load return loss of 12dB an all possible phases.

OUTPUT POWER:
The fundamental sinusoidal frequency output of the oscillat measured into a 50 ohm load.

OUTPUT POWER VARIATION:
The maximum to minimum power variation (expressed i dB) observed over the specified frequency range in a 5 ohm system at a given temperature.

OUTPUT POWER FLATNESS:
Variation of the output power from the average output powe expressed in dB.

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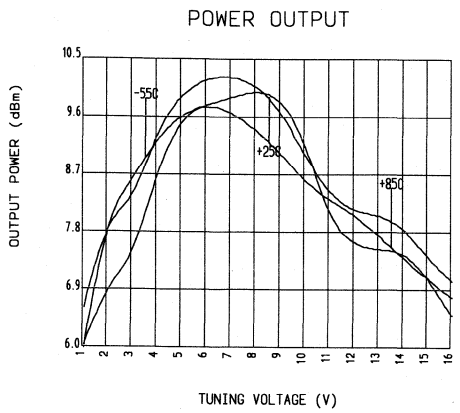
)UTPUT POWER CHANGE WITH TEMPERATURE:

'he change in the output power over the temperature range ɜxample using Mini-Circuits Models POS-765 or JTOS-765 is hown in Figure 2).

Figure 2



⁄ARMONIC CONTENT OR SUPPRESSION:

⁄armonics levels are measured relative to the fundamental ;ignal and expressed in dB referenced to the carrier (dBc).

;PURIOUS RESPONSES OR NON-HARMONIC ;PURIOUS CONTENT:

;purious frequencies are unwanted and non-harmonically 'elated signals present at the oscillator output. Spurious 'esponse is usually expressed in terms of dBc.

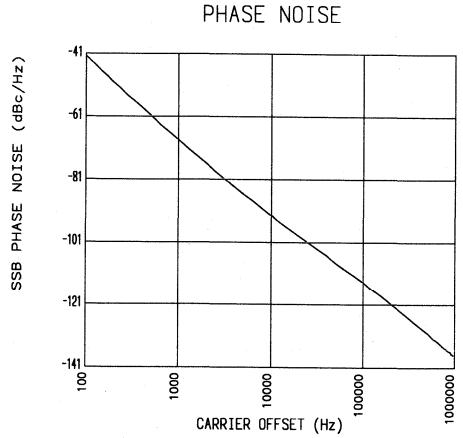
;SB PHASE NOISE:

;ingle side band phase noise in 1Hz bandwidth is measured 'elative to the carrier power at a given offset from the carrier requency and is expressed as dBc/Hz, as illustrated in ⁄igure 3 (Mini-Circuits models POS-1025 or JTOS-1025). ⁄or more information see Application Note 2.

⁄LICKER NOISE:

)ne of the sources of noise associated with solid state devices, the amplitude of which varies inversely with frequency. t is also referred to as 1/f noise.

Figure 3



RESIDUAL FM:

This is another form of specifying the frequency stability of a signal source. It is the total rms frequency deviation Δf_{rms} within a given bandwidth: f_a to f_b. The bandwidth is usually specified between 50Hz to 3kHz. Expressed mathematically, we have

$$\Delta f_{rms} = \sqrt{2\int_{f_a}^{f_b} S_c(f) f^2 \delta f}$$

as referred to in Application Note 2.

Q OR QUALITY FACTOR:

A figure of merit often used in describing the sharpness of a tuned circuit response. A high Q circuit has a sharper response, and vice versa.

VARACTOR DIODE:

A diode operated in a reverse biased condition providing a junction capacitance that is a function of the applied reverse bias voltage.

PHASE LOCKED LOOP (PLL):

A feedback circuit in which the VCO frequency and phase is locked to the frequency and phase of a stable reference signal.

FREQUENCY SYNTHESIZER:

A system that generates any one of equally spaced frequencies within a given band, referenced to a stable frequency.

PHASE DETECTOR:

A circuit which compares two coherent RF signals and generates a DC output voltage that is a function of the difference between the phase of two signals.

PHASE DETECTOR GAIN:

This is a constant for a given device, and measured in volts per radian.

BODE PLOT OR BODE DIAGRAM:

A method of describing the transfer characteristic of a circuit or system where the logarithm of the gain function and phase shift is plotted to a logarithmic base of frequency.

UNITY GAIN:

The gain at which the magnitude of the open loop gain is equal to 1 (or 0dB).

UNITY GAIN FREQUENCY:

The frequency at which the magnitude of the open loop gain crosses the 0dB point.

LOOP FILTER:

The loop filter is generally a low pass filter which filters the output of the phase detector and determines the noise characteristics of the VCO. If the phase detector generates a current output, then the loop filter will integrate the output signal from the phase detector into a DC voltage to drive the VCO to a specific frequency. The loop filter may take different forms, such as lag/lead network, etc.

UNDERSTANDING VCO CONCEPTS

OSCILLATOR FUNDAMENTALS

An oscillator circuit can be modeled as shown in Figure 1 as the combination of an amplifier with gain A(jω) and a frequency dependent feedback loop H(jω) = βA. The general expression is

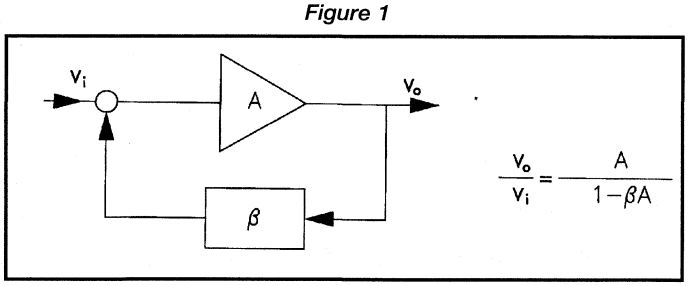
$$\frac{V_O}{V_i} = \frac{A}{(1-\beta A)}$$

which states that the system will oscillate, provided βA = 1. At the frequency of oscillation, the total phase shift around the loop must be 360 degrees, and the magnitude of the open loop gain must be unity. The common emitter circuit provides 180 degree phase shift. If the circuit is used with feedback from collector to base, the feedback circuit must provide additional 180 degree phase shift. If a common base circuit is used, there is no phase shift between the emitter and collector signals, the feedback circuit must provide either 0 degree or full 360 degree phase shift.

Although the model shown in Figure 1 can be used to analyze and determine the necessary and sufficient conditions for oscillation, it is easier to use the model shown in Figure 2 where the analysis is performed in terms of a negative resistance concept. This is based on the concept that a tuned circuit, once excited, will oscillate continuously if there is no resistive element present to dissipate the energy. It is the function of the amplifier to generate the negative resistance or maintain oscillation by supplying an amount of energy equal to that dissipated.The selection of the circuit topology is dictated by several factors:

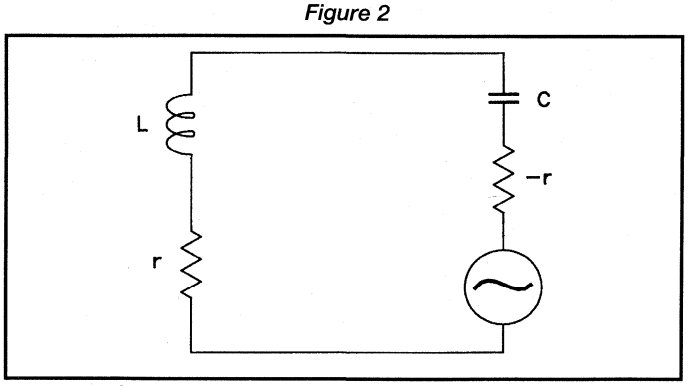
(a) Frequency of oscillation
(b) Tuning range
(c) Choice of transistor, and
(d) Type of resonator.

Figure 1



An oscillator may be modeled as the combination of an amplifier and a feedback loop

Figure 2

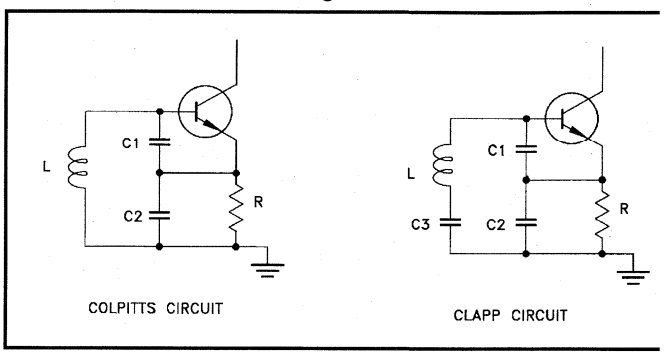


An oscillator may be modeled using a negative resistance concept

EXAMPLES OF OSCILLATOR DESIGN

A bipolar transistor with capacitances between the base a emitter, and the emitter and ground, can be used to genera a negative resistance. Examples of these circuits are shown Figure 3.

Figure 3



Form of oscillator circuit discussed (RF equivalent)

An inductive resonator may be used in any parallel resona oscillator circuit such as Colpitts or Clapp. The resonat operates at a point where it resonates with the loa capacitance. The circuit of Figure 3 is preferred for hig stability oscillator circuits because of the ease with whi the resonator may be isolated from the load.

Consider the circuit shown in Figure 4(a). The design equatio are derived below by replacing the circuit by its equivale circuit. This is illustrated in Figure 4(b).

The input impedance seen to the right of the dotted line Figure 4(b) is given by

$$V = \frac{i}{j\omega C_1} + \frac{i + g_m V_{be}}{j\omega C_2}$$

where $V_{be} = \frac{i}{j\omega C_1}$

$$\frac{V}{i} = \frac{1}{j\omega C_1} + \frac{1}{j\omega C_2} - \frac{g_m}{\omega^2 C_1 C_2}$$

The quantity $(g_m/\omega^2 C1.C2)$ is negative indicating a negati resistance component and therefore in order to mainta oscillations we must have

$$r < \frac{g_m}{\omega^2 C_1 C_2}$$

where r is the series resistance of the resonator.

The frequency of oscillation is given by

$$(\omega^2)L = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

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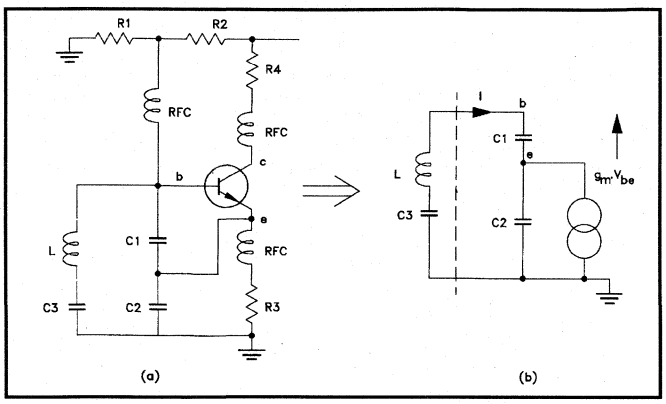
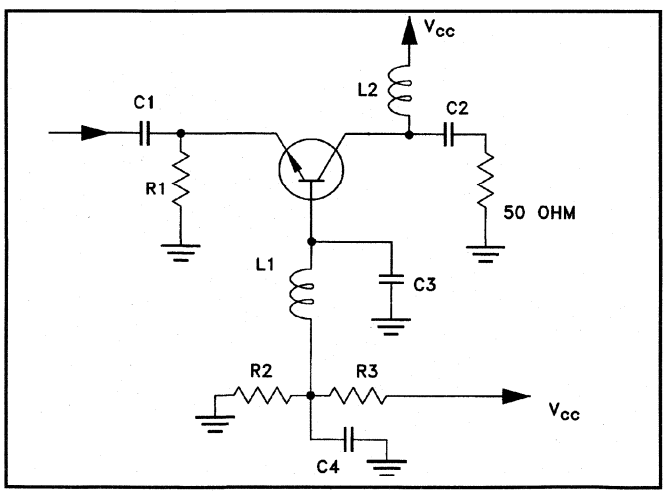
The ratio C_1/C_2 is selected to be greater than 1 so that the circuit has sufficient loop gain for start up condition at the lowest operating temperature. A VCO is obtained by replacing a fixed capacitor such as C3 with a varactor. The bipolar transistor with an inductive reactance between the base and the ground can also generate a negative resistance (See Figure 5). This topology is preferred at higher frequencies. The oscillator is obtained by adding a tank circuit as shown in Figure 6.

Figure 4(a) and 4(b)



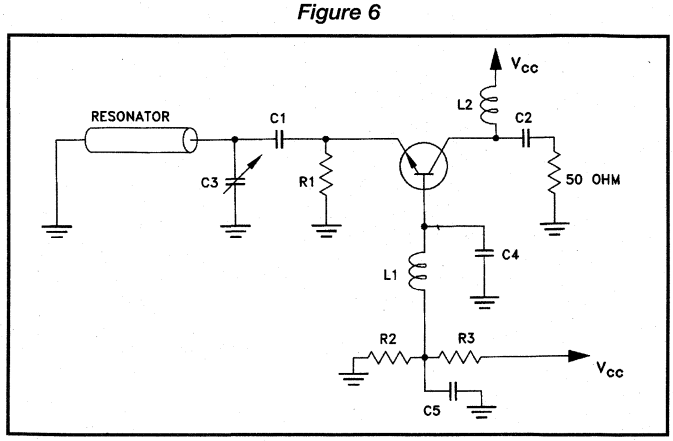
Oscillator design evaluation for CLAPP circuit

Figure 5



Common base circuit configured for generating negative resistance

Figure 6



Common base circuit configured as an oscillator

TUNING SENSITIVITY CHARACTERISTICS

There are two basic types of varactors: Abrupt and Hyperabrupt. The abrupt tuning diodes will provide a very high Q and will also operate over a very wide tuning voltage range (0 to 60 V). The abrupt tuning diode provides the best phase noise performance because of its high quality factor.

The hyperabrupt tuning diodes, because of their linear voltage vs. capacitance characteristic, will provide a much more linear tuning characteristic than the abrupt diodes. These are the best choice for wide band tuning VCO's. An octave tuning range can be covered in less than 20 V tuning range. Their disadvantage is that they have a much lower Q and therefore provide a phase noise characteristic higher than that provided by the abrupt diodes.

For a varactor diode, the capacitance is related to the bias voltage by the following equation:

$$C = \frac{A}{(V_R + \phi)^n} \qquad \text{.....(1)}$$

where A is a constant, V_R is the applied reverse bias voltage, and ϕ is the built-in potential which is 0.7 for silicon diodes, and 1.2 V for Gallium Arsenide diodes. For the analysis that follows, we may write

$$C = \frac{A}{V^n} \qquad \text{..... (2)}$$

where A is the capacitance of the diode when V is one volt and n is a number between 0.3 and 0.6, but can be as high as two for an abrupt junction. The tank circuit of a typical VCO has a parallel tuned circuit consisting of an inductance L, a fixed capacitance C_f, and a varactor diode C. The frequency of oscillation can be written as

$$\frac{1}{\omega^2} = L(C_f + AV^{-n}) \qquad \text{..... (3)}$$

Let ω_o be the angular frequency of the unmodulated carrier and V_o and C_o be the corresponding values of V and C. Then from Equation (3) we have

$$L = \frac{1}{\omega_o^2 (C_f + C_o)} \qquad \text{.....(4)}$$

If V_o is modulated by a small voltage δV, the carrier will be deviated by a small frequency $\delta\omega$.

$$(\omega_o + \delta\omega)^{-2} = L\,[C_f + A(V_o + \delta V)^{-n}]$$

Substituting for L and rearranging, we have

$$\left(1 + \frac{\delta\omega}{\omega_o}\right)^{-2} = \frac{C_f + C_o\left(1 + \frac{\delta V}{V_o}\right)^{-n}}{C_f + C_o}$$

The oscillator tuning sensitivity K can therefore be written as

$$K_1 = \frac{d\omega}{dv} = \frac{n\omega_o}{2V_o}\left(\frac{C_o}{C_f + C_o}\right)$$

The units of K_1 is rad/sec/volt.

VCO PHASE NOISE

CHARACTERIZING PHASE NOISE

The term phase noise is widely used for describing short term random frequency fluctuations of a signal. Frequency stability is a measure of the degree to which an oscillator maintains the same value of frequency over a given time. This may be specified in a number of ways. Three commonly used terms for describing frequency stability are used here. An ideal sine wave oscillator may be described by

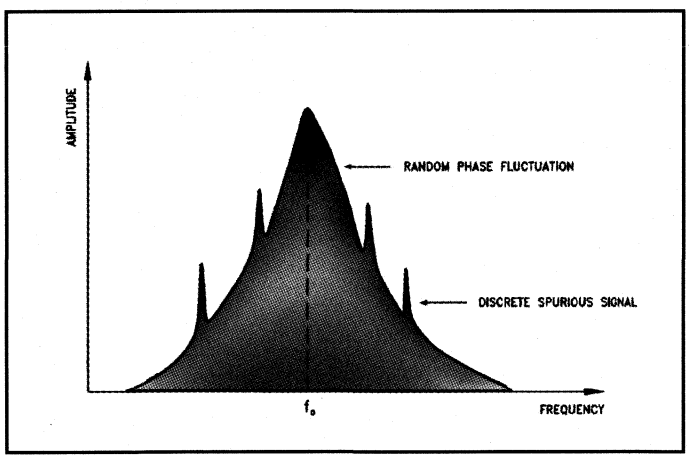
$$V(t) = V_o \mathrm{Sin} 2\pi f t$$

Here, V_o is the nominal amplitude of the signal, and f is the nominal frequency of oscillation. The instantaneous output of an oscillator may be represented by

$$V(t) = V_o \{1 + A(t)\} \mathrm{Sin} \{2\pi f t + \phi(t)\}$$

where A(t) and $\phi(t)$ represent the amplitude and phase fluctuations of the signal respectively. The phase term may be random or discrete and could be seen on the spectrum analyzer. As shown in Figure 1 there are two types of fluctuating phase terms. The first, the discrete signals called spurious, appear as distinct components in the spectral density plot. The second term, random in nature, appears as random phase fluctuations and is commonly called phase noise.

Figure 1



Spectrum analyzer display of phase noise

The source of phase noise in an oscillator is due to thermal and flicker or 1/f noise. Most oscillators operate in saturation. The AM noise component is usually 20dB lower than the phase noise component. In the discussion that follows, we will assume that A(t)<<1.

Many methods are used to characterize phase noise of an oscillator. Essentially, all methods measure the frequency or phase deviation of the source under test in either frequency or time domain. Since frequency and phase are related to each other, all these terms are also related. One of the mos common fundamental descriptions of phase noise is the on sided spectral density of phase fluctuations per uni bandwidth. The term spectral density describes th energy distributions as a continuous function expressed in units of energy per unit bandwidth. Th phase noise of an oscillator is best described in th frequency domain where the spectral density is characterize by measuring the noise sidebands on either side c the output signal center frequency. Single sideban phase noise is specified in dBc/Hz at a given frequenc offset from the carrier. The frequency domain informatio about phase or frequency is contained in the powe spectral density $S_{D\phi}(f)$ of the phase or in the powe spectral density $S_{Df}(f)$ of the frequency. Here, f refers t the modulation frequency or offset frequency associate with the noise-like variations in $\phi(t)$.

Peak phase modulation $D\phi$ and peak frequency modulatio Df are related as follows:

$$D\phi_{peak} = \frac{(Df_{peak})}{f}$$

In terms of rms values, we have

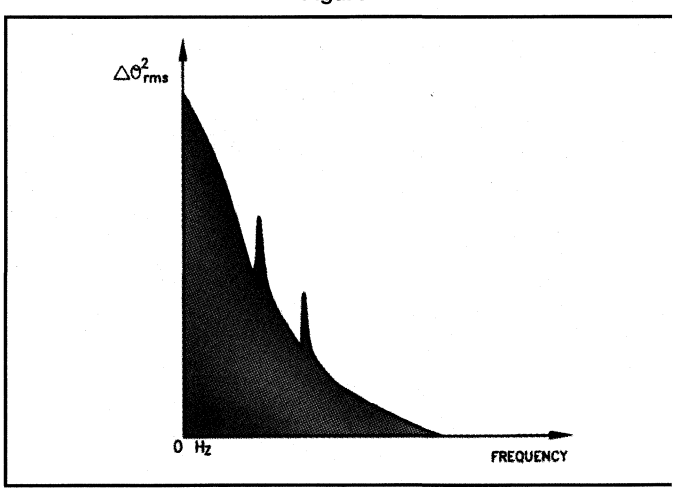
$$D\phi_{rms} = \frac{(Df_{rms})}{f}$$

The one sided spectral distribution of the phase fluctuation per Hz bandwidth is $S_{D\phi}(f)$

$$S_{D\phi}(f) = \frac{(D\phi_{rms})^2}{BW}$$

Here, BW is the bandwidth of $D\phi_{rms}$ measurement. The units c $S_{D\phi}(f)$ are radian^2 Hz^{-1} bandwidth or dB relative to 1 rad^2 Hz bandwidth. The term $S_{D\phi}(f)$ is often referred to as the spectra density and describes the energy distribution as a continuou function, expressed in units of energy per Hz bandwidth. Thi is illustrated in Figure 2.

Figure 2



One sided representation of phase noise spectral density of signal

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Similarly, one sided spectral distribution of the frequency uctuations per Hz bandwidth is $S_{Df}(f)$ where

$$S_{Df}(f) = \frac{(Df_{rms})^2}{BW}$$

Here, BW is the bandwidth of Df_{rms} measurement. The units of $S_{Df}(f)$ are (rad sec-1)2 Hz-1 bandwidth. It is also common to characterize the noise performance of a signal as the ratio of he sideband power associated with phase fluctuations to the carrier power level. If the measure is denoted by S_C

$$S_C(f) = \frac{\text{Power density in one sideband per Hz bandwidth at an offset frequency f away from the carrier}}{\text{Total signal power}}$$

For small phase fluctuations, we can write

$$S_C(f) = \left(\frac{b}{2}\right)^2$$

Here, b is the modulation index by analogy to modulation theory.

$$S_C(f) = \left(\frac{Df_{peak}}{2f}\right)^2$$

$$= \frac{(Df_{rms})^2}{2f^2}$$

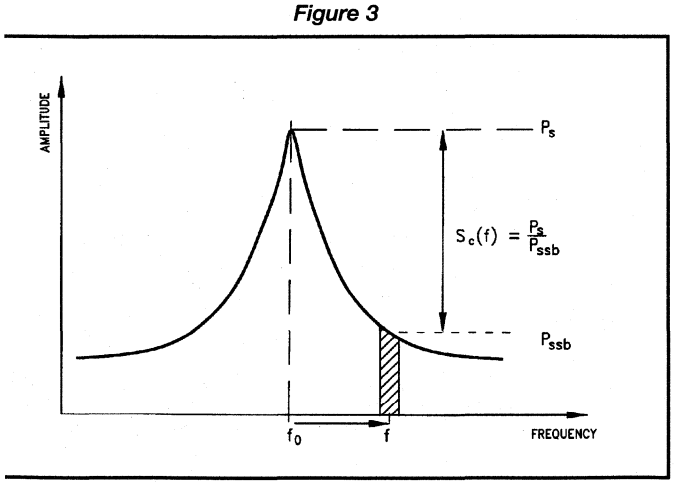
$$S_C(f) = 1/2\,(S_{Dq}(f))$$

$S_C(f)$ is often expressed in decibels relative to the carrier per Hz dBc/Hz) and is related to the power spectrum observed on a spectrum analyzer. The National Bureau of Standards defines Single Side Band Phase Noise as the ratio of power in one phase modulation sideband per Hertz bandwidth, at an offset Hertz away from the carrier, to the total signal power. Here, f s the offset frequency from the carrier.

$$S_C(f) = \frac{P_s}{P_{ssb}}$$

where P_s is the carrier power and P_{ssb} is the sideband power n one Hz bandwidth at an offset frequency of f from the center. This is illustrated in Figure 3.

Figure 3



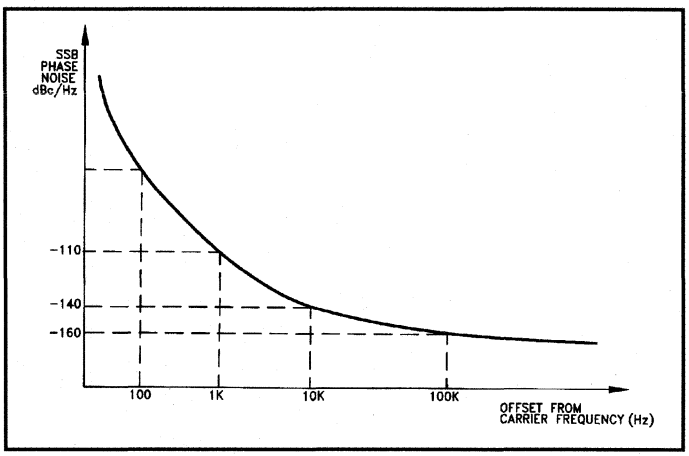
Single sideband phase noise to carrier ratio

The Single Sideband Phase Noise is usually given logarithmically, that is:

$$S_C(f) \text{ in dB} = 10 \times \log[S_C(f)]$$

This is shown in Figure 4 as a spectral density plot of the phase modulation sidebands in the frequency domain. It is expressed in dB relative to the carrier per Hz bandwidth.

Figure 4



Single sideband phase noise representation

The phase noise generated by a VCO is determined by:

(a). Q factor of the resonator.
(b). Q of the varactor diode.
(c). the active device used for the oscillating transistor.
(d). power supply noise.
(e). external tuning voltage supply noise.

The noise contribution made by (d) and (e) can be minimized by careful choice of the power supplies (see Application Note 3). The phase noise of the VCO is therefore determined primarily by the overall Q of the circuit. In order to design a circuit with high Q, the tuning bandwidth must be made small. Therefore a VCO designed for low phase noise performance will have a smaller tuning range.

WAYS TO MINIMIZE NOISE

The following steps are recommended for obtaining the best overall performance from Mini-Circuits VCO's.

1. Power Supply (V_{cc}) and tuning voltage (V_{tune}) returns must be connected to the printed circuit board ground plane. VCO ground plane must be the same as that of the printed circuit board and therefore all VCO ground pins must be soldered direct to the printed circuit board ground plane.

2. Adequate RF grounding is required. Several chip decoupling capacitors must be provided between the V_{cc} supply and ground.

3. Good, low noise power supplies must be used. Ideally, DC batteries for both supply (V_{cc}) and tuning (V tune) voltages will provide the best overall performance.

4. Output must be correctly terminated with a good load impedance. It is also a good practice to use a resistive pad between the VCO and the external load.

5. Connections to the tuning port must be as short as possible and must be well screened, shielded, and decoupled to prevent the VCO from being modulated by external noise sources. A low noise power supply must be used for tuning voltage (V_{tune}) supply.

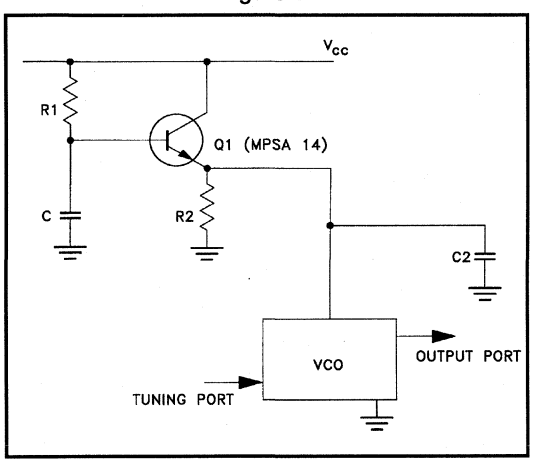
REDUCING POWER SUPPLY NOISE IN VCO'S

AP NOTE 3

PRACTICAL TECHNIQUES

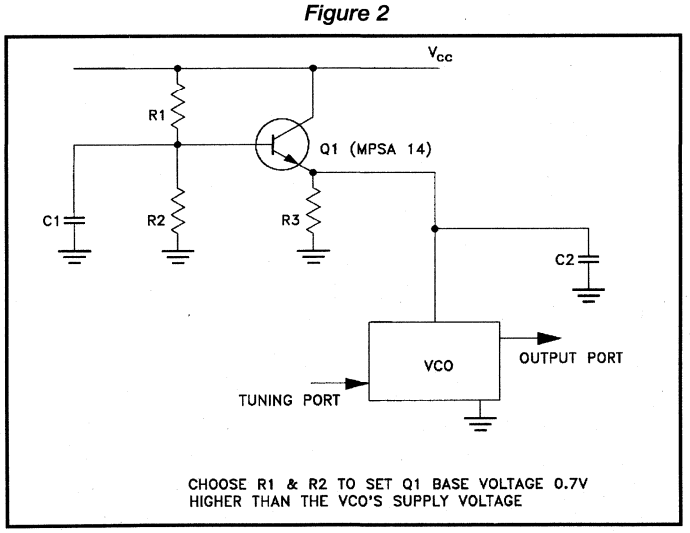
It is always a good design philosophy to provide RF bypassing of power and dc control lines to the VCO. This is indeed the case when the VCO is located some distance away from the power supply. RF chokes and good bypassing capacitors of approximately 1000 pf to 0.1 μF is recommended at the DC supply lines. This will minimize the possibility of feedback between stages in a complex subsystem. Improved bypassing may be provided by incorporating an active filter circuit shown in figures 1 and 2.

Figure 1



Active bias circuit for improved power line filtering

Figure 2



Active bias circuit for providing more flexibility in setting V_{CC} for a given VCO

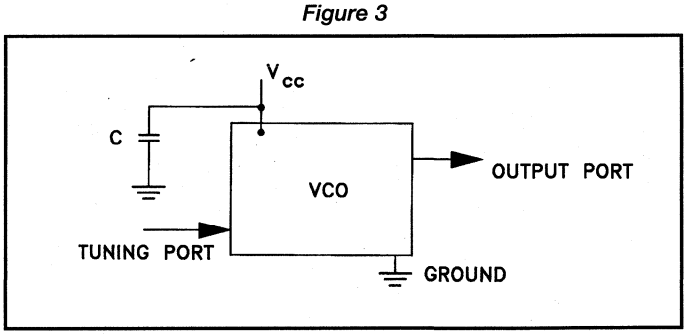
This type of RF bypassing is recommended for applications requiring a high level of noise suppression for externally generated noise signals. In most cases, the performance of the circuit in Figure 1, which is current biased, will be adequate and will have the advantage of better low frequency bypassing performance for a given value of base capacitor, fewer components, and lower power consumption.

It is only necessary to use the circuit in Figure 2 when the higher isolation offered by a larger V_{CC} is required. The circuit in Figure 2 is voltage biased. In this case, the circuit in Figure 2 offers a more stable operating point.

Noisy power supplies may cause additional noise. Power supply induced noise may be seen at offsets from 20Hz to 1MHz from the carrier. If the VCO is powered from a regulated power supply, the regulator noise will increase depending upon the external load current drawn from the regulator. The phase noise performance of the VCO may degrade depending upon the type of regulator used, and also upon the load current drawn from the regulator. To improve the phase noise performance of the VCO under external load conditions, one or more of the following steps may be taken:

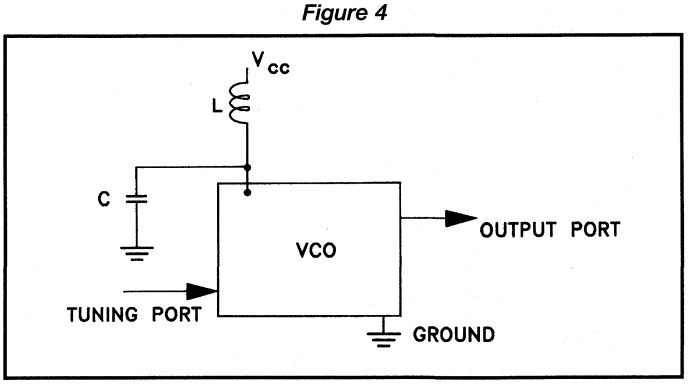
1. Place a low ESR electrolytic capacitor of about 10 μF on the V_{CC} line (See Figure 3).
2. In addition to the 10 μF capacitor mentioned in number 1 above, the decoupling of the V_{CC} line can be enhanced further by including a choke about 10 μH in series with the V_{CC} (See Figure 4).
3. Provide an active bypassing as shown in Figure 1 or 2.

Figure 3



Typical connection diagram. Power supply decoupling provides improved noise

Figure 4



Typical connection diagram. Additional RF decoupling provided by LC type filter improves power line filtering.

SYNTHESIZER DESIGN

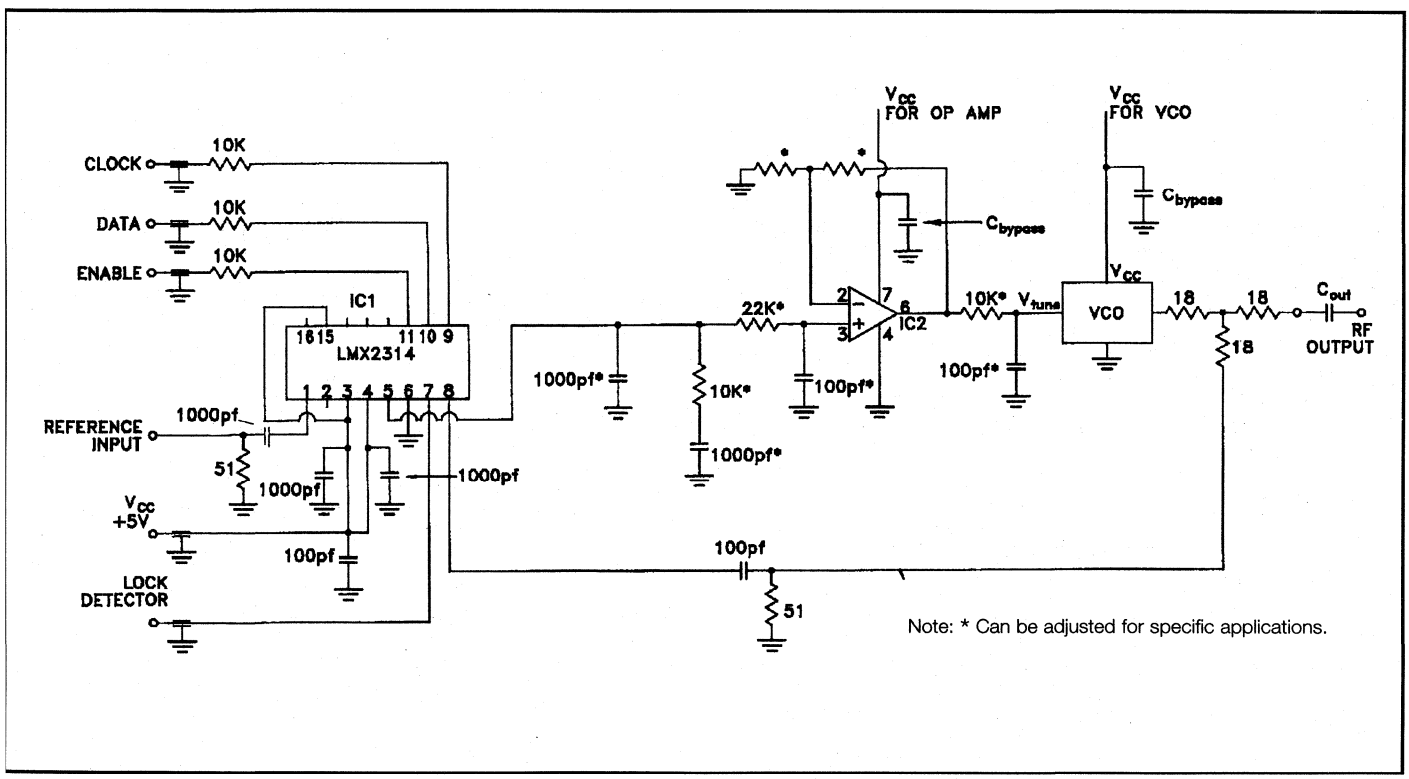
The following section describes the design features of a synthesizer using Mini-Circuits VCO's together with an integrated serial synthesizer and a passive loop filter. It is ideal for use in portable applications where high performance, low power consumption, and small size is required.

The design example covered here is an 800 to 900MHz synthesizer in 100kHz steps with a minimum output power of 10mW across the band. Mini-Circuits model POS-1060, a low noise voltage controlled oscillator that operates over the range of 750 to 1060MHz, is used. Frequency synthesis is by using National Semiconductor™ integrated circuit type LMX2314. Any similar integrated synthesizer chip may also be used. Figure 1 shows a block diagram of the synthesizer. A sample of the VCO output drives a divide by 64 prescalar which in turn drives a programmable counter. The output of the programmable counter drives the phase detector. The reference signal to the phase detector is obtained by dividing the reference signal by R. The reference signal is provided by an external 5MHz crystal oscillator. The output of the phase detector is a series of pulses corresponding to the frequency difference between the VCO and the reference.

The current pulses are filtered, amplified, and applied to the VCO control port to reduce the phase error, and therefore to achieve a phase lock. When there is a phase error between the reference and the VCO, the dc error signal from the phase detector is amplified, filtered, and applied to the control port of the VCO until the phase error reduces to zero.

The IC2 shown is a high input impedance operational amplifier that interfaces with any VCO whether wide band or narrow band. It is, however, optional and may be omitted if a narrow band VCO is used. Here, the tuning range needed for frequency coverage is less than the supply voltage used for the synthesizer circuit. For example, when the LMX2324 is operated with a +5V supply, the available tuning range for the VCO is less than 5V without the operational amplifier. The tuning range may be increased with the use of an operational amplifier, as shown. Mini-Circuits offers a wide variety of voltage controlled oscillators, including 5V units, that can be used for synthesizer applications. For special requirements, customers may complete the "VCO Check List" (consult table of contents), and mail or fax it to Mini-Circuits applications department for a fast, courteous, and knowledgeable response.

Figure 1



Detailed schematic of the synthesizer discussed

PHASE LOCKED LOOP FUNDAMENTALS

The basic form of a phase locked loop (PLL) consists of a voltage controlled oscillator (VCO), a phase detector (PD), and a filter. In its more general form (Figure 1), the PLL may also contain a mixer and a digital divider. In the steady state, the frequency of the VCO is given by the expression:

$$f_o = f_m \pm Nf_r \qquad \text{.....(1)}$$

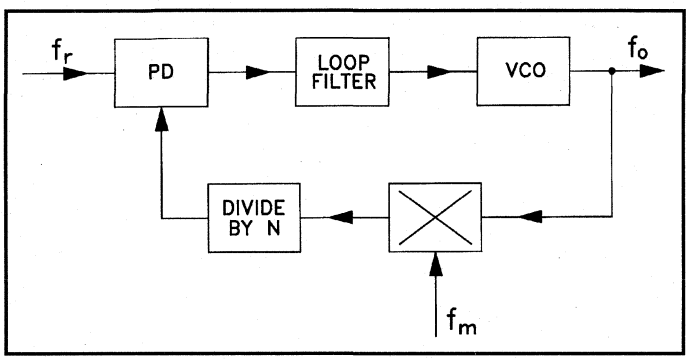
The frequency of the VCO may be controlled by several methods, including the following:

(i) By varying N with both f_r and f_m constant.

(ii) By varying f_m and N with f_r constant.

(iii) By varying f_m and f_r with N constant.

Figure 1



Basic form of phase lock loop

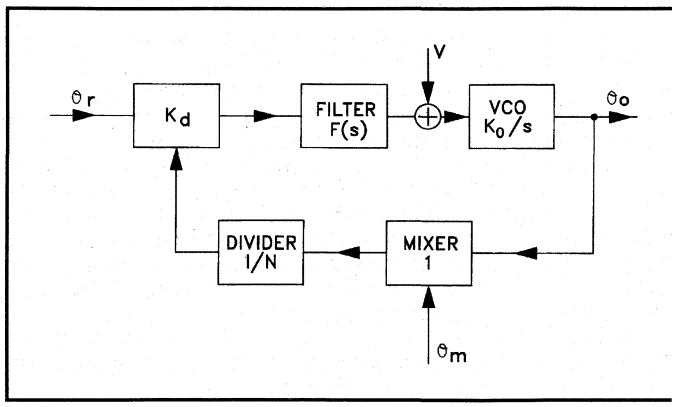
It is helpful to consider the PLL in terms of phase rather than frequency. This is done by replacing f_o, f_m, and f_r by θ_o, θ_m, and θ_r respectively. Table 1 shows the transfer functions of the various loop elements with this change made, and Figure 2 shows the circuit.

Table 1

Element	Transfer Function	Remarks
VCO	K_o/s	K_o is the slope of the oscillator frequency to voltage characteristic in rads per sec. per volt.
MIXER	1	Change of output phase equals change of input phase.
DIVIDER	1/N	N is division ratio.
PHASE DETECTOR	K_d	K_d is slope of phase detector voltage to phase characteristic in volts/radians.
FILTER	F(s)	Transfer function depends on the type of filter used.

Transfer functions of phase locked loop components

Figure 2



Equivalent circuit of PLL

The transfer function, H(s), of a single feedback loop shown i Figure 2 is given by:

$$H(s) = \frac{\text{Forward Gain}}{1 + \text{Loop Gain}} \qquad \text{.....(2)}$$

The phase of the VCO can be controlled as follows:

(i) By changing the phase, θ_m of the mixing frequenc

(ii) By changing the phase, θ_r of the reference frequency

(iii) By changing voltage V at the modulation port.

Where V is the voltage input at the modulation port.

Taking these in turn, and making use of equation 2, we hav the following equations:

$$H_1(s) = \frac{\theta_o}{V} = \frac{K_o}{s+K\,F(s)} \qquad \text{.....(3)}$$

$$H_2(s) = \frac{\theta_o}{\theta_m} = \frac{KF(s)}{s+KF(s)} \qquad \text{.....(4)}$$

$$H_3(s) = \frac{\theta_o}{\theta_r} = \frac{NKF(s)}{s+KF(s)} \qquad \text{.....(5)}$$

$$\text{where } K = \frac{K_d K_o}{N}$$

and s is a complex variable used in Laplace transform and equal to jω.

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ıe loop filter F(s) may take one of the following forms:

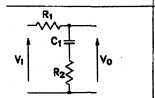
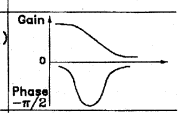
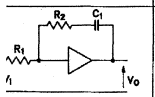
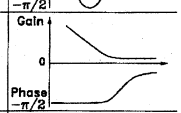
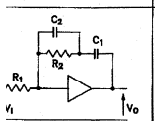
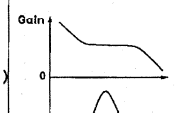
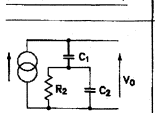
(i) A lag/lead network

(ii) An integrator combined with a lead network

(iii) An integrator combined with a lead/lag network

ıese three forms, together with their transfer functions and ɔde Diagrams, are summarized in Table 2.

Table 2

Element	Type	Transfer function	Time constants	
	lag/lead	$\frac{1+sT_2}{1+sT_1}$	$T_1=C_1(R_1+R_2)$ $T_2=C_1R_2$	
	Integrator & lead	$\frac{1+sT_2}{sT_1}$	$T_1=C_1R_1$ $T_2=C_1R_2$	
	Integrator & lead/lag (phase comparator gives a voltage output)	$\frac{1}{sT_1}\ \frac{1+sT_2}{1+sT_3}$	$T_1=C_1R_1$ $T_2=R_2(C_1+C_2)$	
	integrator & lead/lag (phase comparator gives a current output)	$\frac{1}{sC_1}\ \frac{1+sT_2}{1+sT_3}$	$T_3=C_2R_2$	

Transfer functions and bode diagram of various filter networks

ɔm Figure 2, it can be seen that the open loop gain is given y:

$$G_{OL}(s) = \frac{KF(s)}{s} \qquad \text{.....(6)}$$

ıe open loop gains for the three filters shown in Table 2 are ɜ follows:

(i) Lag/Lead filter

$$G_{OL}(s) = \frac{K(1+sT_2)}{s(1+sT_1)} \qquad \text{.....(7)}$$

(ii) Integrator plus lead

$$G_{OL}(s) = \frac{K}{s^2T_1}(1+sT_2) \qquad \text{.....(8)}$$

(iii) Integrator plus lead/lag (voltage type phase detector).

$$G_{OL}(s) = \frac{K(1+sT_2)}{s^2T_1(1+sT_3)} \qquad \text{.....(9)}$$

ıe terms K/s (equation 7) and K/s^2T_1 (equations 8 and 9) may ɐ expressed, in the frequency plane, by gain lines having ɔpes of -20dB/decade and -40dB/decade respectively, as ıown in Figure 3.

Three very important points should be observed from the graphs:

(i) The K/ω graph has unity gain at ω=K

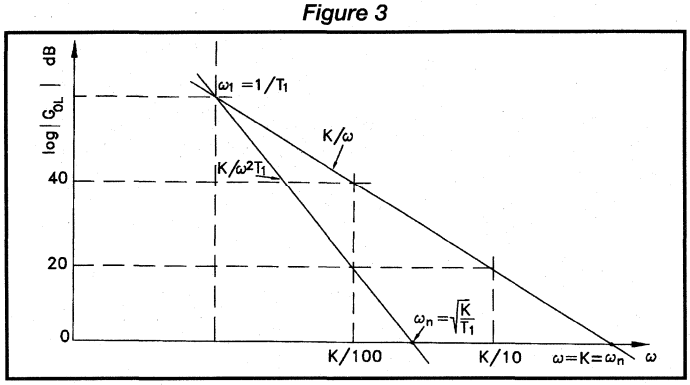
(ii) The K/ω^2T_1 graph has unity gain at $\omega=\sqrt{K/T_1}$, and

(iii) The two graphs meet at $\omega_1 = \frac{1}{T_1}$

Figures 4, 5, and 6 show the effects on the open loop gain of the three filters given in Table 2.

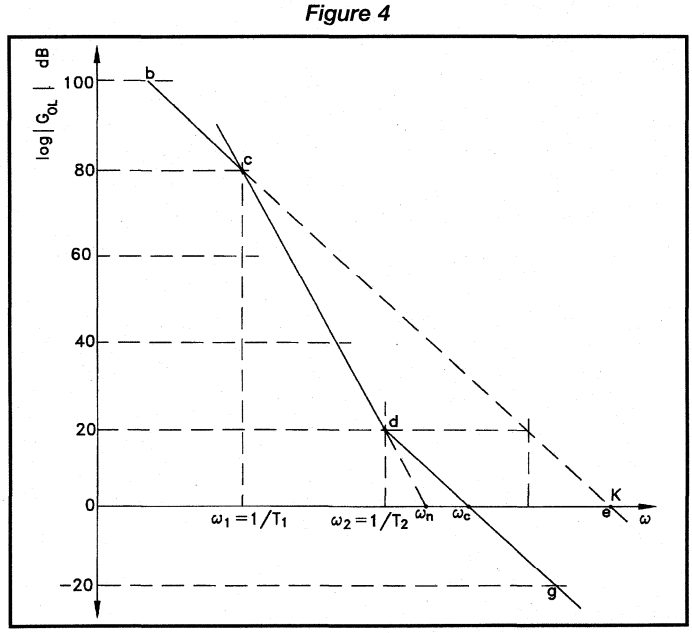
(i) Figure 4 shows the response when the lag/lead network is used. In the regions bc and dg, the gain is falling at 20dB/decade. In the region cd, the gain is falling at 40dB/decade.

Figure 3



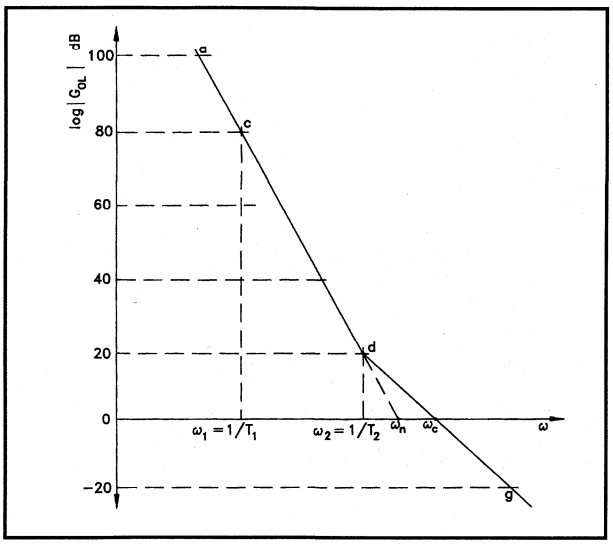
Gain VS. frequency graphs of K/ω and K/ω^2T_1

Figure 4



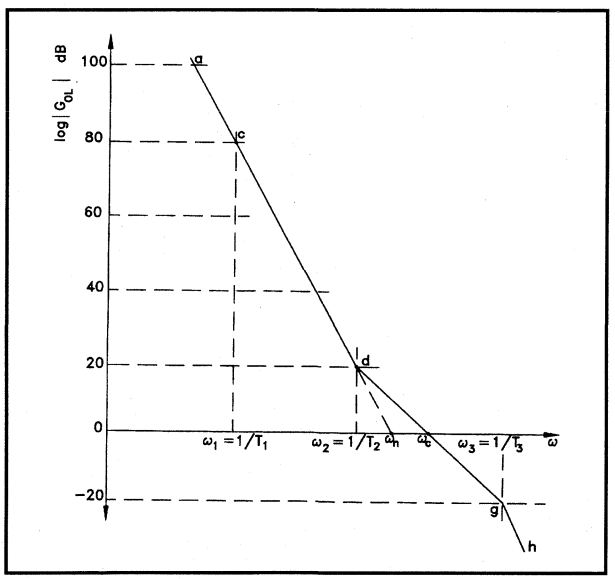
Effects of open loop gain of the lag/lead network

Figure 5



(ii) Figure 5 shows the response when the integrator plus lead network is used. In the region acd, the gain is falling at 40dB/decade.

Figure 6



(iii) Figure 6 shows the response when the integrator plus lead/lag network is used. In the region gh, the gain is falling at 40dB/decade. In the region dg, the gain is falling at 20dB/decade. From the foregoing, it is clear that:

$$\omega_n^2 = \frac{K}{T_1} \qquad \text{.....(10)}$$

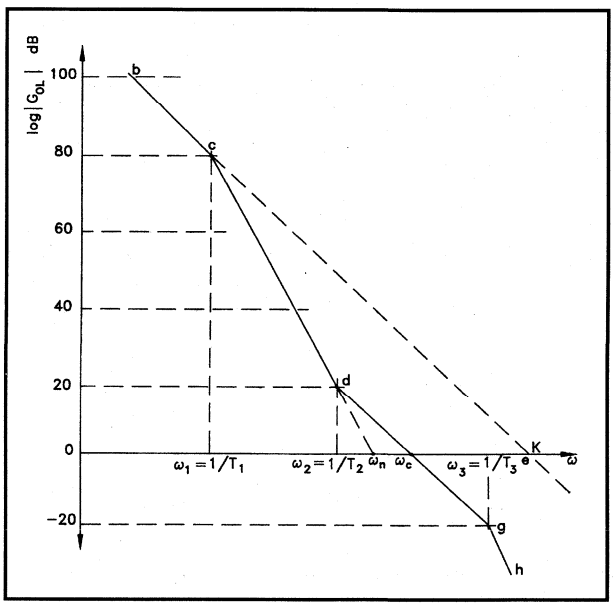
$$\omega_n^2 = \frac{\omega_c}{T_2} \qquad \text{.....(11)}$$

$$\omega_c = \frac{KT_2}{T_1} \qquad \text{.....(12)}$$

(For voltage type phase detector)

The choice of the phase detector is determined primarily by th application. For receiver applications where low noise signal level are encountered, double balanced mixers are used as phas detectors. For synthesizer applications, a digital type phas detector is preferred. This type of phase detector produces current output. The transfer function, K_d, has units of amps/rac The line bcdgh in Figure 7 represents the response for thi phase detector/filter combination.

Figure 7



Effects of open loop gain of the integrator and lead/lag network with a current type phase detector

If the phase detector is not ideal but has a leakage resistanc R_L, then it can be shown that $T_1=R_LC_1$ and the open loop unit gain frequency (point e on Figure 7) is given by $K^1 = KR_L$. Fo an ideal phase detector there will be no leakage, and hence $\omega_1 \rightarrow 0$ and $K^1 \rightarrow \infty$.

From the foregoing it should be clear that both ω_c and ω_n ca be redefined in terms of C_1:

$$\omega_n^2 = \frac{K}{C_1} \qquad \text{.....(10a)}$$

$$\omega_n^2 = \frac{\omega_c}{T_2} \qquad \text{.....(11)}$$

$$\omega_c = \frac{KT_2}{C_1} \qquad \text{.....(12a)}$$

One effect of adding a filter is to reduce the open loop unit gain frequency from K(or K^1) to ω_c. Frequencies below ω_c will b called *in-band* and frequencies higher than ω_c will be calle *out-of-band.* The phase locked loop uses its *in-band* gain t enable the VCO to follow that of the reference frequency, an uses its *out-of-band* attenuation to reject unwanted phas components that may be present on the reference signal Consequently, in most applications, the response bcdgh, give by the integrator plus lead/lag network, is preferred.

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A brief analysis of the phase noise performance of the PLL is given here. The noise model is presented in Figure 8 along with the equations 14 through 17.

Equation 17 describes the noise output of the PLL given the noise contribution of the reference source, the phase detector, the loop filter, the VCO, and the feedback divider. The closed loop transfer function of the loop can be shown to be given by:

$$H(s) = \frac{\text{Forward gain}}{1+\text{Loop Gain}}$$

The loop gain G is the product of all the transfer functions, i.e.:

$$G = \frac{K_o K_d F(s)}{Ns} = \frac{K F(s)}{s} \quad \text{.....(13)}$$

$$\text{Where } K = \frac{K_o K_d}{N}$$

For type 2 phase locked loop, the filter consists of an integrator combined either with a lead network or with a lead/lag network.

The reference noise and the divider output noise contribution calculations follow.

The closed loop transfer function from point 1 to 4 in Figure 8 relating oscillator phase θ_{out} to reference θ_r can be shown to be given by:

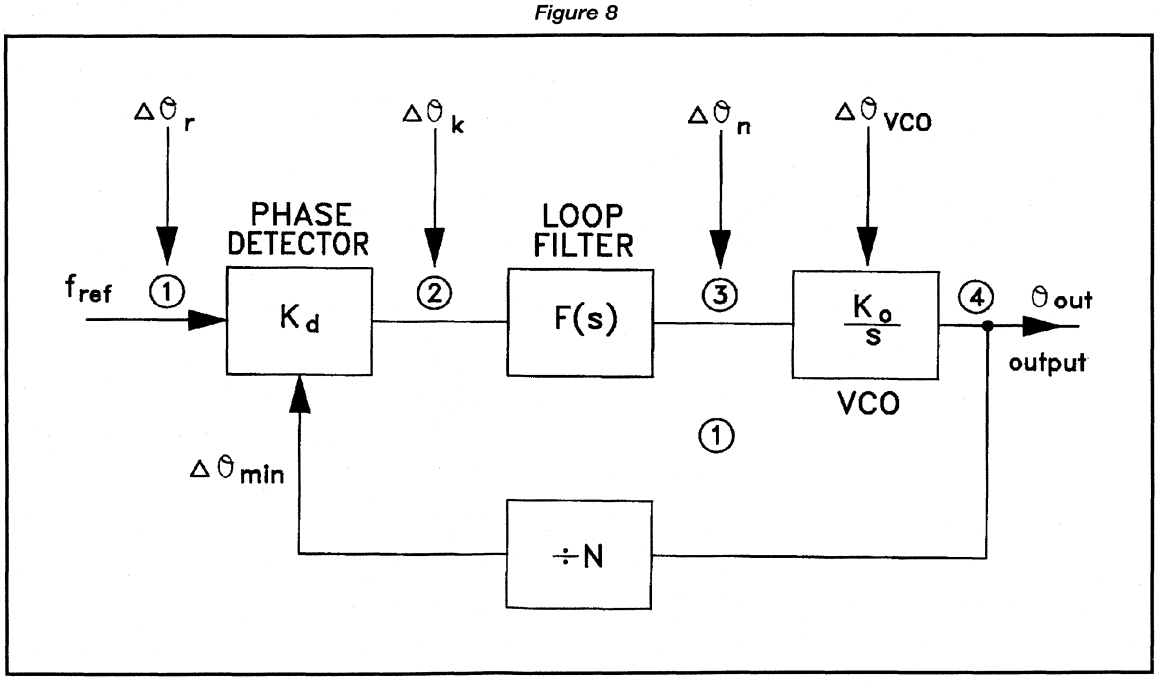
$$\frac{\theta_{out}(s)}{\theta_r(s)} = \frac{N K F(s)}{s + K F(s)}$$

The phase noise contributions of reference and divider noise are therefore given by:

$$\Delta\theta_{out}^2 = \left[\frac{\frac{N}{s}}{1 + K F(s)}\right]^2 \left[\Delta\theta_{ref}^2 + \Delta\theta_{div}^2\right] = x^2 \quad \text{.....(14)}$$

The loop division ratio must therefore be minimized so as to minimize the divider noise contributions.

Figure 8



Phase locked loop noise model

The phase detector also contributes to the output noise. In general, any noise input following the phase detector contributes to the output noise. With reference to Figure 8, the transfer function from point 2 to 4 is:

$$\frac{\Delta\theta_{out}(s)}{\Delta\theta_K(s)} = \frac{\frac{F(s)\ K_o}{s}}{1 + \frac{K_d K_o F(s)}{SN}}$$

$$= \frac{1}{K_d} \bullet \frac{N}{1 + \frac{s}{KF(s)}}$$

Any noise input following the phase detector is therefore inversely proportional to K_d. The noise contribution is then given by:

$$\Delta\theta^2_{out} = \frac{1}{K_d^2}\left[\frac{N}{1 + \frac{s}{K F(s)}}\right]^2 \Delta\theta_K^2 = Y^2 \quad \text{.....(15)}$$

The phase detector gain constant must therefore be maximized so as to minimize the accompanying noise contributions.Outside the loop bandwidth, the noise will be mainly a function of the VCO. With reference to Figure 8, the transfer function from point 3 to 4 is given by:

$$\frac{\Delta\theta_{out}}{\Delta\theta_{VCO}} = \frac{1}{1 + \frac{K F(s)}{s}}$$

When evaluating the output noise spectrum we must take into account the VCO noise and also its sensitivity. The following equation gives all the VCO noise contributions:

$$\Delta\theta^2_{out} = \left[\frac{s}{s + K F(s)}\right]^2 \left[\Delta\theta^2_{VCO} + \frac{K_o^2}{s^2}(\Delta\theta_n)^2\right] = Z^2$$

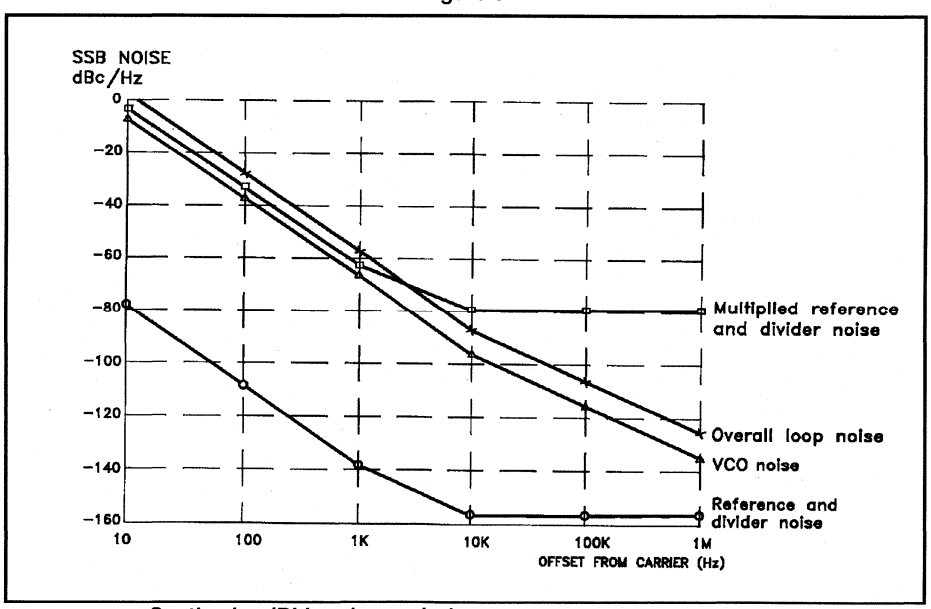
.....(16)

Here K_o is the VCO gain constant and $\Delta\theta_n$ is any noise voltage appearing before the VCO.
The overall phase noise of the the synthesizer may be written as

$$\Delta\theta^2_{out} = X^2 + Y^2 + Z^2 \quad \text{.....(17)}$$

The phase noise combination of the reference oscillator dividers, and the VCO, are shown plotted in Figure 9.
In conclusion, within the loop bandwidth the reference noise will be multiplied by the loop division ratio. Outside the loop bandwidth the reference noise will be attenuated by the loop transfer function. Within the loop bandwidth, the VCO noise will be attenuated. Outside the loop bandwidth, the noise will be the same as that of the free running VCO.

Figure 9



Synthesizer/PLL noise analysis

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VCO TEST METHODS

. HOW TO MEASURE OUTPUT POWER AND FREQUENCY

igure 1 is a block diagram of the setup for this measurement. Vell regulated power supplies are recommended for tuning and V_{CC} supplies. Bias Tee's in the DC and tuning voltage lines help educe the power supply noise. The VCO output A is divided into wo signals B and C. The signals B and C are connected to the pectrum analyzer D and power meter E respectively. Modern pectrum analyzers, such as HP8563E have sufficient accuracy or measuring frequency, and this spectrum analyzer is used for requency measurement. The span and resolution bandwidth is et appropriately for the measurement. The system is calibrated y measuring the insertion loss of the RF path from A to E as a unction of frequency. These insertion loss measurements are ised to compute the actual output power of the VCO. The VCO requency is changed by changing the tuning voltage. For different une voltages the VCO output power is read from the power neter. The frequency is read from the spectrum analyzer using eak search function. A computer attached to the system can be ised to automate the measurements.

2. HOW TO MEASURE TUNING SENSITIVITY AND LINEARITY

Tuning sensitivity is defined as the frequency change per unit volt of tuning voltage. The setup shown in Figure 1 can also be used for this measurement. For different tune voltages, the VCO frequency is read from the spectrum analyzer. The frequency measurements are plotted against the tune voltage. The slope of his characteristic is the tune voltage sensitivity and can be calculated at different tune voltages. The data can also be used to calculate the linearity as defined in Application Note 1. A simple program can automate this measurement.

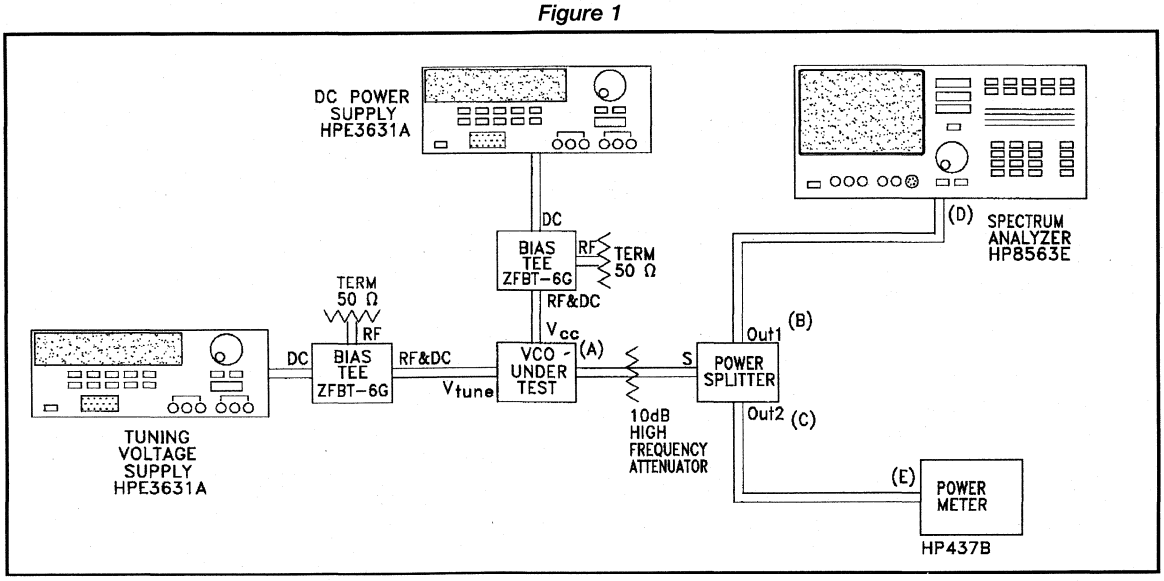
3. HOW TO MEASURE HARMONICS AND SPURIOUS LEVELS

VCO's are normally operated under high nonlinearity, and therefore generate harmonics. The setup shown in Figure 1 can also be used for this measurement. The harmonic level is measured relative to the fundamental signal level. A marker is placed on the fundamental signal and, using delta marker, the harmonic level is measured. For different tune voltages, the harmonic levels are measured relative to the fundamental signal. A simple program can also automate these measurements.

4. HOW TO MEASURE FREQUENCY PUSHING

Frequency pushing is caused by the VCO's sensitivity to supply voltages. Pushing is a measure of the sensitivity of the VCO output frequency to supply voltage and is expressed in MHz/volt. The setup shown in Figure 1 can also be used for this measurement. The supply voltage is set at its nominal setting and the VCO frequency is recorded for different tune voltages. Next, the supply voltage is increased by 1 volt and the VCO frequency is measured for different tune voltages as before. Lastly, the supply voltage is decreased by 1 volt from the nominal, and the frequency is measured for different tune voltages once more. At a given tuning voltage, the frequency change due to 1 volt supply voltage change gives the pushing. It may be different at different tuning voltages. A simple program can also automate these measurements.

Figure 1



VCO test set up

5. HOW TO MEASURE FREQUENCY PULLING

Frequency pulling is a measure of the frequency change due to a non-ideal load. It is measured by noting the frequency change caused by a load having a nominal 12dB return loss with all possible phases. Traditionally used low loss coupler may be avoided if monitoring signal is taken from V_{cc} bias tee. This reduces additional error because of the main line coupler loss. The RF leakage of the VCO to the V_{cc} port is enough to monitor the frequency. Figure 2 shows the setup for this measurement. Pulling may be different over the operating frequency band, and may need to be measured at several points in the operating bandwidth. The spectrum analyzer output frequency is set to the VCO output frequency. The measurements consist of the following steps:

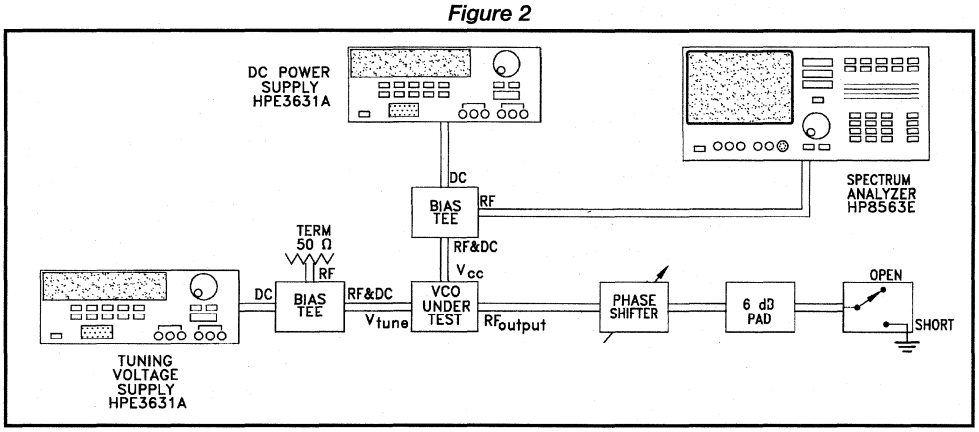
1. Tune phase shifter to get the maximum (or minimum) frequency with short on the end of the output line.
2. Use peak search and normalize marker to zero.
3. Change reflected phase by 180° by switching short to open.
4. Fine tune phase shifter to get to minimum (or maximum).
5. Use peak search and read the frequency pulling value.

In a case where the VCO output frequency is too low, a continuously variable phase shifter cannot be obtained. Only the short-open technique may be used as an approxima method to measure pulling.

6. HOW TO MEASURE MODULATION BANDWIDTH

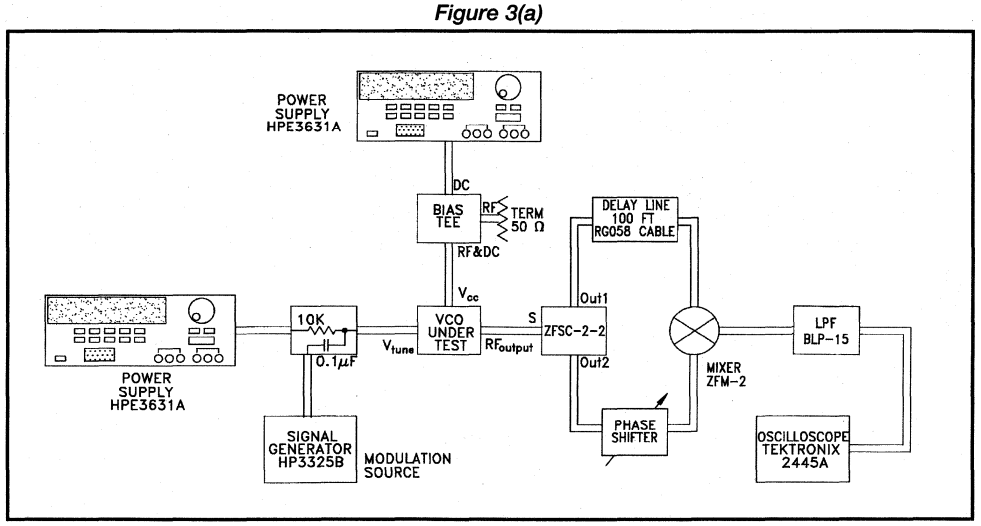
Modulation bandwidth is a measure of tuning port frequenc response. It is measured using the setup shown in Figure 3(a The principle of measurement is by modulating the VCO wi a sine wave, then using a demodulator to demodulate th original modulating signal. If the frequency response of th demodulator is broad enough, this technique is good fo characterizing the frequency response of the modulation por The discriminator is obtained by using standard Mini-Circuit parts as shown in the Figure. The VCO output is divided int two parts using a power splitter. The mixer ZFM-2 acts as phase detector and demodulates the FM modulated signa The output signal is applied to an oscilloscope through low-pass filter (BLP-15). The frequency of the modulating signa keeping the amplitude constant, is varied starting from frequency very close to DC until the oscilloscope displa drops by 3dB, or to 0.707 of its low frequency value. Th frequency is recorded as the 3dB modulation bandwidth. I order to automate this measurement, a low frequency netwo analyzer can be used to replace the modulating source an the oscilloscope. Figure 3(b) shows this setup.

Figure 2



Test set up for measuring VCO pulling performance

Figure 3(a)



Modulation bandwidth set up

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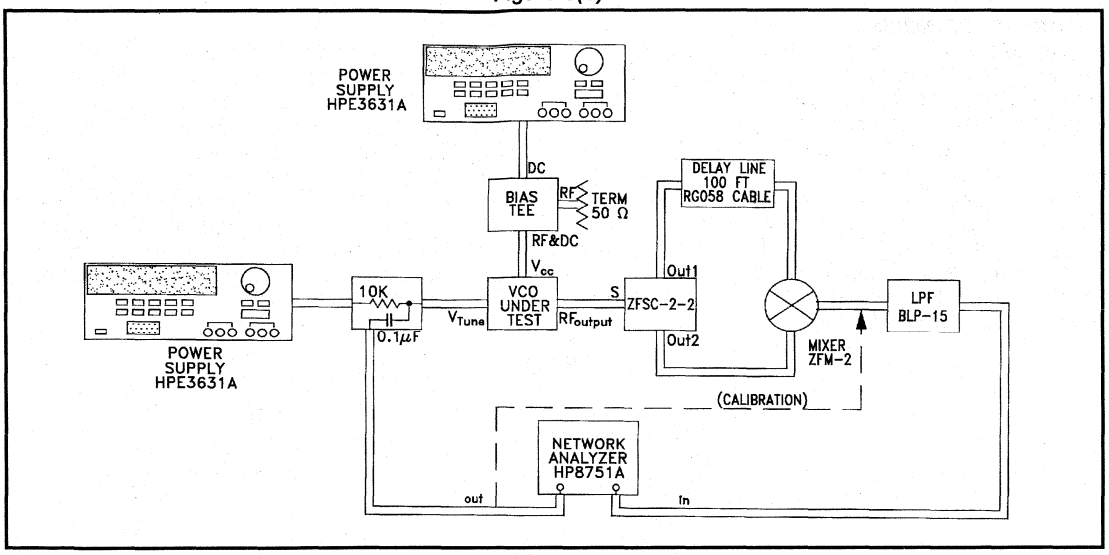
Figure 3(b)



Modulation bandwidth set up using network analyzer

7. MODERN METHOD OF VCO MEASUREMENT

HP has recently introduced a powerful VCO/PLL test system, the HP4352S which is pictured in Figure 4(a). It has built-in low noise power supplies and is available for VCO testing. It measures VCO characteristics such as frequency, tuning linearity, output power, and harmonics as a function of tuning voltage. It can also be used to measure pushing, output power vs. V_{CC}, phase noise at a given offset vs. V_{tune} or V_{CC}, etc. The instrument is user friendly and does not need calibration. A set up using this instrument is illustrated in Figure 4(b).

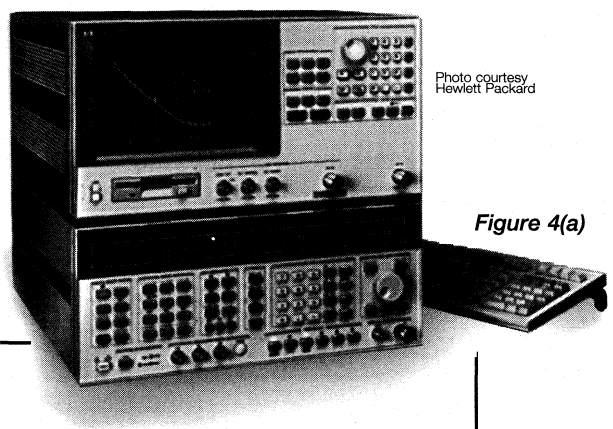
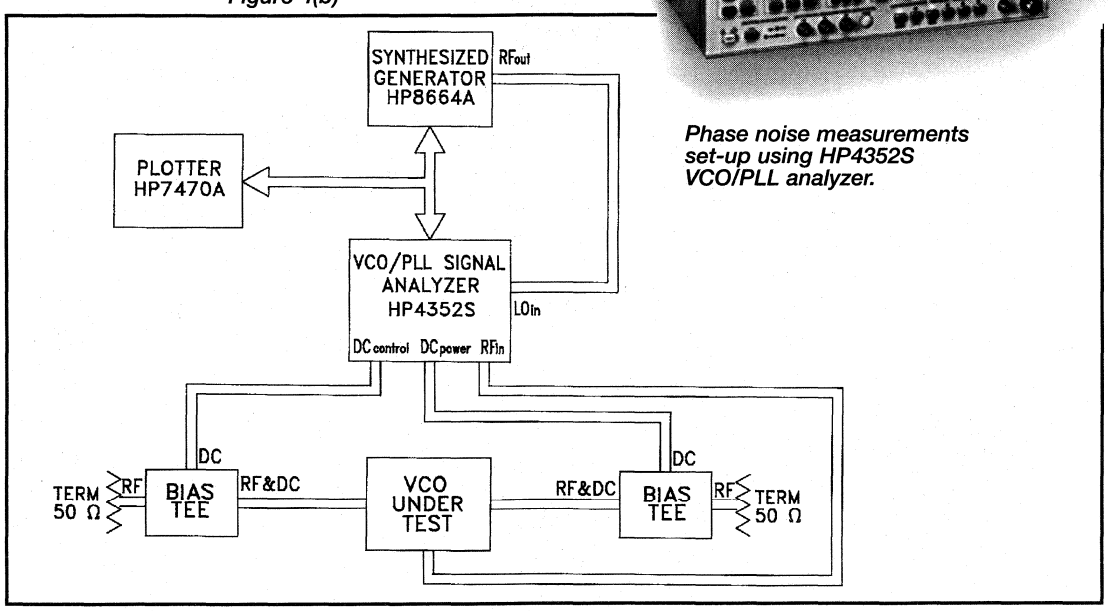


Photo courtesy Hewlett Packard

Figure 4(a)

Phase noise measurements set-up using HP4352S VCO/PLL analyzer.

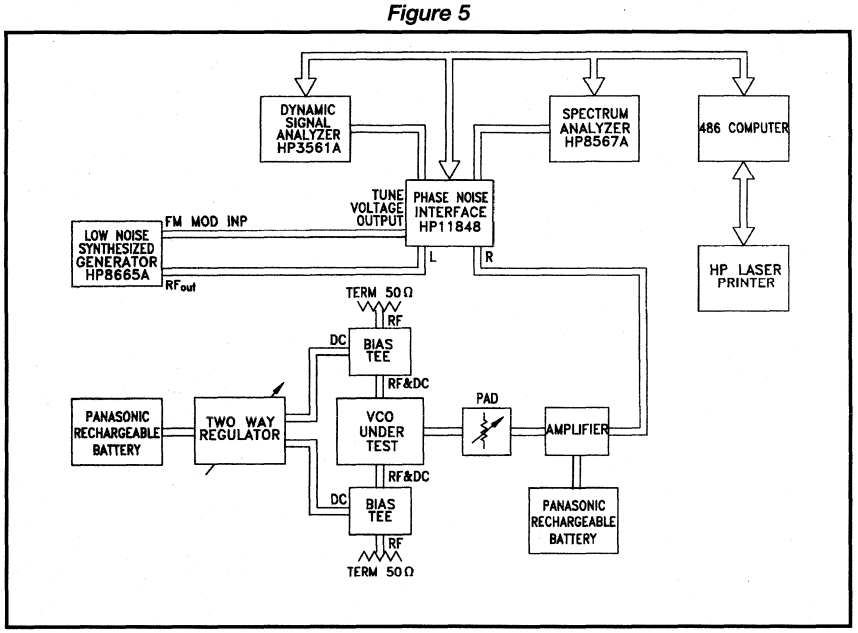
Figure 4(b)



8.HOW TO MEASURE PHASE NOISE

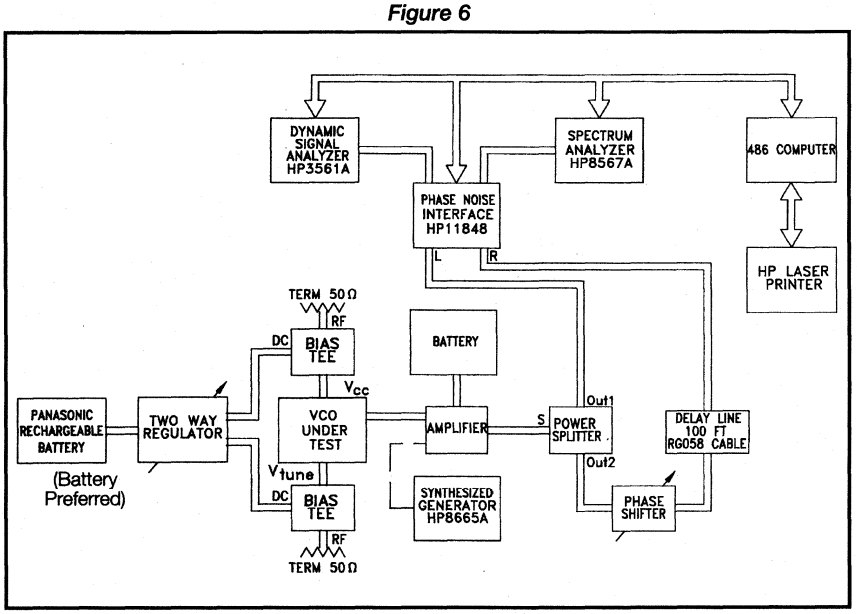
Phase noise represents the short term stability of the oscillator. Refer to Application Note 2 for details. The standard industry method of measuring phase noise is by the use of HP 3048A Phase Noise Analyzer. Depending upon the noise level, either PLL (Figure 5) or discriminator method (Figure 6) should be used. Batteries are used for V_{CC} and tuning voltage. This will minimize noise contribution of DC power supplies. Bias Tee (such as Mini-Circuits ZFBT-6GW) are recommended to get additional clean up of supply noise. In the PLL method, an external low noise reference oscillator is used. Noise floor of the external oscillator should be lower than the oscillator under test. Therefor, this method cannot be used for very low noise measurements, and the discriminator method should be usec instead. The noise floor improvement is a result of elimination o external reference. This method is useful in measuring lowe noise at higher offset frequencies. In general, noise measurements using HP 3048A are complex, and needs a qualified anc trained operator. Luckily, new instruments such as HP4352S (from HP™), and NTS-1000A (from RDL™) simplifies the task. HP 4352S employs PLL method, and therefore has a limited noise floor. However, it still satisfies the requirement for a vast majority of applications. It is also useful in measuring other parameters of the VCO. NTS-1000A uses discriminator method, has a bette noise floor, and is suited for low noise measurements.

Figure 5



General set up for phase noise measurement

Figure 6



Phase noise measurements using discriminator method of HP 3048A set up

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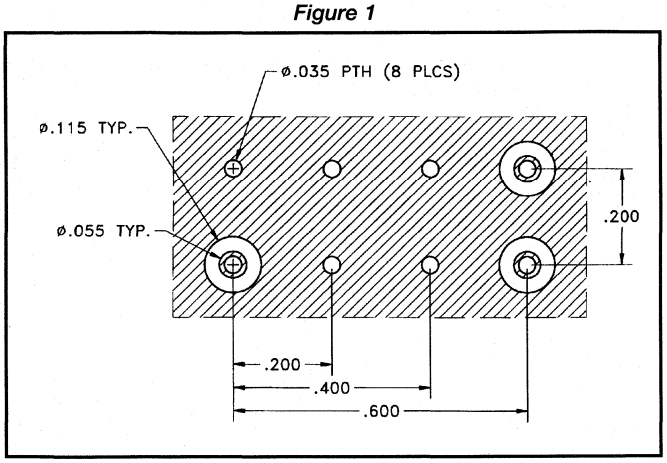
FOOTPRINTS

LAYOUT CONSIDERATIONS TO IMPROVE PERFORMANCE

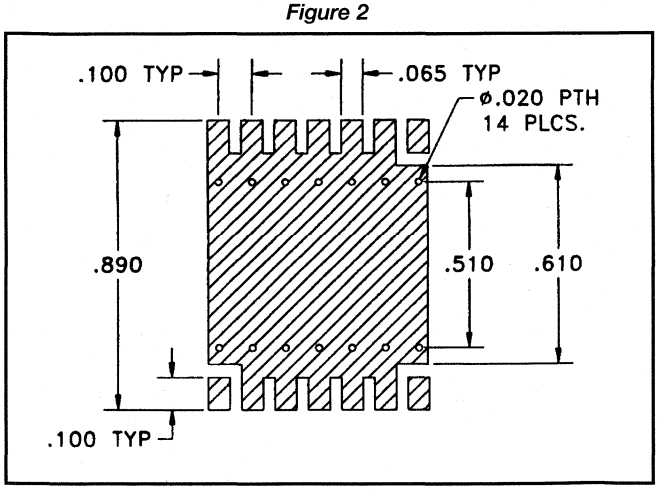
Three basic types of VCO's are manufactured by Mini-Circuits: Plug-in, Surface Mount, and Connectorized versions. To obtain the best overall performance from Mini-Circuits VCO's, good RF practices should be used. A double sided printed circuit board with plated through holes is recommended. For Mini-Circuits VCO's with "Plug-in" case style, the metallization on the top side of the PCB, on which units are mounted, should be left, as far as possible, as a continuous "ground plane" with low impedance (see Figure 1). For Mini-Circuits VCO's with "Surface Mount" case style: the metallization on the bottom side of the PCB, which is opposite to the side the VCO's are mounted, should be left as a continuous "ground plane" with low impedance (see Figures 2 through 4). For both "Plug-in" and "Surface Mount" Mini-Circuits VCO's, the printed conductors which carry RF and microwave signals (output pin of the VCO) should be designed as 50 ohm characteristic impedance microstrip lines where the width of the lines should be calculated in accordance with dielectric constant (ϵ_r) and thickness of PCB substrate. For PCB layouts shown in Figures 1 to 4, recommended PCB material is Taconic™ brand OAK-602-0.022" with 1 ounce copper on each side. Similar material from other vendors can be used. For suggested material and thickness, the line width of the microstrip conductor should be 0.062". If the ground plane needs to be broken, it is important to support each microstrip line with a corresponding ground plane on the opposite side of the board. This ground plane should be at least three times wider than the width of the microstrip line itself. Pin V_{CC} should be decoupled as close as possible to the ground plane. Mini-Circuits can supply CAD drawings of recommended layouts for each model. Consult Mini-Circuits for details.

Figure 1



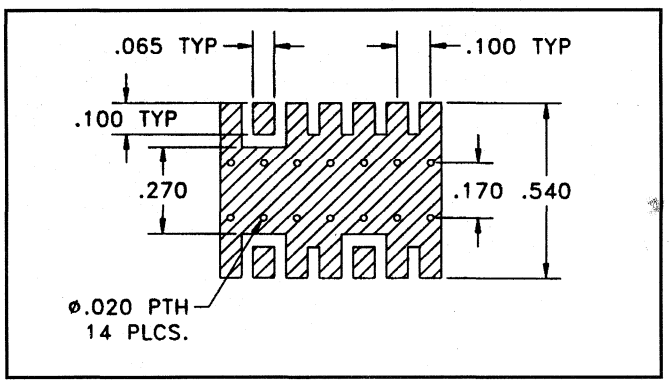
Suggested top side PCB layout for POS models (connection to the VCO on bottom side not shown).

Figure 2



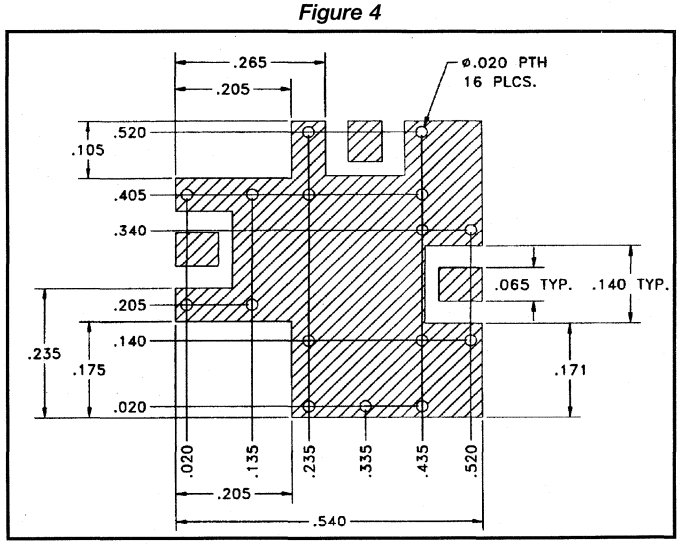
Suggested top side PCB layout for JCOS models (connection to the VCO on top side not shown). Bottom side should be left as a continuos ground plane.

Figure 3



Suggested top side PCB layout for JTOS models (connection to the VCO on top side not shown). Bottom side should be left as a continuos ground plane.

Figure 4



Suggested top side of JROS models (connection to the VCO on top side not shown). Bottom side should be left as a continuous ground plane.

27 Frequently Asked Questions About VCO's

Q. What type of VCO's are available from Mini-Circuits?

A. Mini-Circuits sells fundamental frequency oscillators up to 2GHz and beyond in surface mount (models JTOS and JCOS), plug in (model POS), and connectorized (model ZOS) versions.

Q. Generally, how do I select a VCO for a given application?

A. Narrow band VCO's generally have better phase noise than wide band VCO's. For example, Mini-Circuits narrow band model JCOS-1100LN exhibits a phase noise of -150dBc/Hz at 1MHz offset compared to -136dBc/Hz for the wider band model POS-1025 at the same offset frequency. Application wise, wide tuning VCO's are recommended for electronic counter measures such as radar, surveillance, etc., and narrow band VCO's are used in phase lock applications in receiver and transmitter systems.

Q. Can I use Mini-Circuits VCO's with a lower supply voltage?

A. Yes. Mini-Circuits VCO's can be operated with no damage at a lower voltage however, output power and tuning range may change. Mini-Circuits offers a variety of specialty oscillators designed for use with a lower supply voltage. Please consult factory with your specific requirements.

Q. Is there a delay from the time the supply voltage is applied to the VCO, and the time when the VCO actually starts to oscillate?

A. Yes, however the delay time is infinitesimally small. Mini-Circuits VCO's have a very fast response time to the supply voltage. For Mini-Circuits VCO model POS-535, the switching delay time is about 130 nS (typ.). Consult factory for further details.

Q. Do Mini-Circuits VCO's oscillate at 0 tuning voltage?

A. Yes. All Mini-Circuits VCO's are designed to work at a tuning voltage of 0 volts. Some oscillators may have lower output power at 0 tuning voltage.

Q. When the supply voltage to the VCO changes, what parameters are affected and how?

A. Both frequency and output power will change. Frequenc change is characterized by pushing and is expressed in MH per volt change. If the supply voltage is too low compared t the specified voltage, it may adversely affect the oscillatio characteristics, and may even stop oscillating. If the suppl voltage goes too high, power dissipation in the transistor will increase and will decrease the reliability of the unit.

Q. When the VCO is switched between two control voltages, how long does the VCO take to move from one frequency to another and settle?

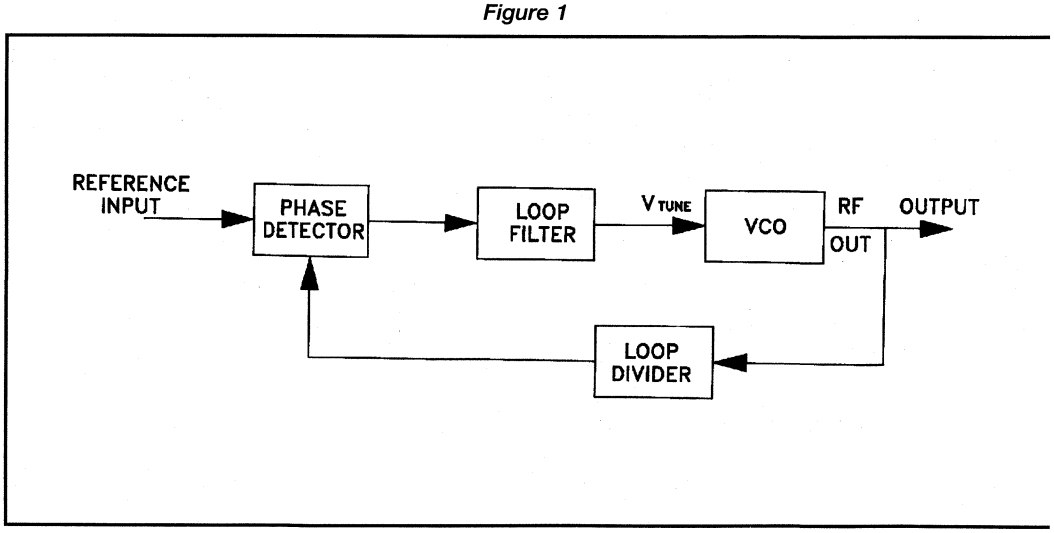
A. Settling time is a function of the modulation bandwidth Most Mini-Circuits VCO's exhibit a modulation bandwidth c greater than 90kHz unless otherwise specified. This correspond to a settling time of the order of 0.01 millisecond.

Q. How does the VCO phase noise affect the overall noise of a Phase Locked Loop (PLL) system?

A. A conventional PLL is shown in Figure 1, and consists of a VCO phase locked to a stable frequency reference (refer t Application Note 5 for fundamentals of phase locked loops) The loop phase detector generates a dc signal to keep th VCO under lock. The reference signal is usually derived from a crystal controlled oscillator. The phase noise of crystal oscillator are generally good, but the frequency of oscillation is usuall limited to about 200 MHz. In order to obtain a higher frequenc reference, the crystal oscillator output is virtually multiplied. Thi multiplication may be done using a phase locked loop a shown. Here, a VCO operating at a higher frequency is used. I is divided by N for phase locking. With this approach, th reference frequency is effectively multiplied by N an degrades the phase noise by 20logN. In spite of this degradation the close in noise is good, but the far out noise is worse tha that of a free running oscillator such as a fundamental VCO a the multiplied reference oscillators frequency. By proper choic of loop bandwidth of a PLL, the best of the noise of reference an VCO can be obtained. The loop bandwidth determines th

Figure 1

Block diagram of a phase locked loop



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dynamics of the resulting phase locked loop. Below the loop bandwidth, the noise is essentially the same as that of the multiplied reference. Above the loop bandwidth, it is essentially the same as that of the free running VCO.

Q. Can you explain frequency deviation?

A. Frequency deviation is how far the center frequency of the oscillator will change as a function of the control voltage.

Q. What is FM noise or phase noise?

A. FM noise or phase noise refers to the short term random frequency fluctuations of a signal. There is a direct relationship between FM noise and phase noise since frequency deviation is equal to the rate of change of phase deviation (see Application Note 2). Mini-Circuits measures single sideband phase noise for characterizing short term stability of a signal, since small FM deviations are difficult to measure.

Q. What is AM noise and how is it caused?

A. AM refers to the amplitude fluctuations of the signal and is caused by bias current noise fluctuations and supply voltage variations. The AM component caused by collector current noise fluctuations may be approximated as follows. For a collector current of Ic, the shot noise component is 2 qIc where q is the charge on the electron. The percentage of AM due to shot noise component is therefore: $(2(2qI_C).100)/I_C$. For 10 mA of collector current, the percentage of AM is therefore 6.4×10^{-19}, which is -182 dBc below the carrier. The AM noise component is therefore small and can be neglected. The most common source of spurious amplitude modulation is the DC power supply. A 0.1% change in the resonator voltage corresponds to ±0.1% AM on the carrier, which is corresponding to a modulation depth of 0.1/200=0.0005. This is therefore 20 $\log_{10}(0.0005)$=-66dB below the carrier. Thus, supply voltage noise should be kept to a minimum.

Q. What is wide band noise floor?

A. A VCO consists of a tank circuit and a positive feedback amplifier. For offset frequencies greater than the VCO's half bandwidth, $f_o/2Q_L$, the phase noise has no positive feedback and is determined only by the ratio of the oscillator signal level and thermal amplifier noise. If we assume an 18dB gain for the amplifier, and 6dB for the noise figure of the amplifier, the noise of the amplifier at its output is given by:

$$N_o = (-174 + 18 + 6)\ \text{dBm/Hz}$$
$$= -150\ \text{dBm/Hz}$$

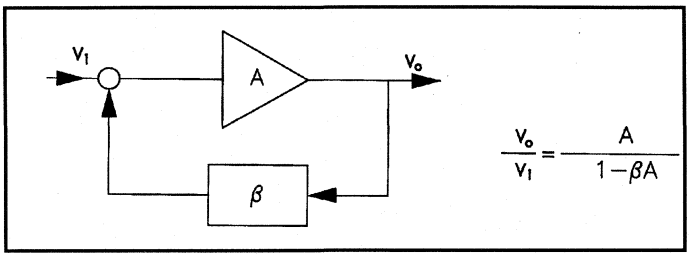
Here, -174dBm/Hz represents the input thermal noise power. To minimize the effect of power supply noise, a low noise power supply should be used. Power supply filtering is discussed in Application Note 3. For an oscillator generating 10mW of power, the carrier to noise ratio is given by:

$$C/N = 10 - (-150)\ \text{dBc/Hz}$$
$$= 160\ \text{dBc/Hz}$$

Q. How can the VCO influence phase noise in a communication system, such as cellular or PCN?

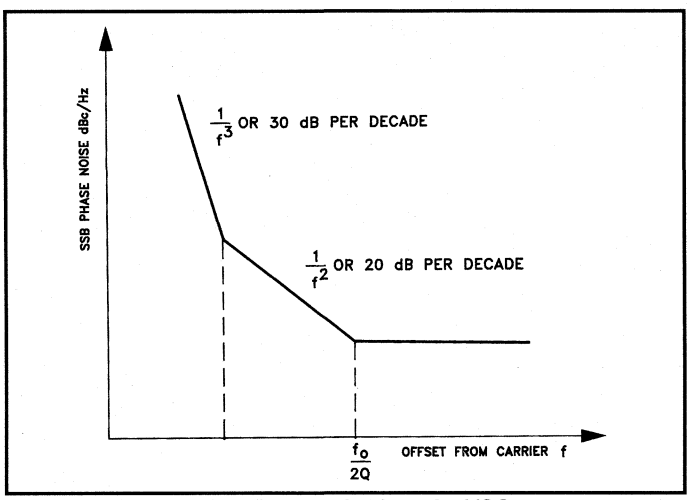
A. A VCO used in a PLL acts as a stable local oscillator. When this is used for down conversion, the phase noise of the VCO and the incoming RF signal are added together with the thermal noise of the mixer resulting in the effective noise of the down converted signal. So, to keep the total noise low, the VCO should have lower phase noise. The noise level that can be tolerated is dictated by system considerations. For low noise VCO's manufactured by Mini-Circuits, the noise is typically -150dBc/Hz to -160dBc/Hz, as exhibited in models JCOS-1100LN and JCOS-1100LN-1 (latter is a non-catalog special) compared to the wide band oscillators, which are typically -136dBc/Hz at 1MHz offset, such as model POS-1025. Mini-Circuits offers a series of low noise VCO's. Refer to catalog or call for details.

Figure 2



An oscillator may be modeled as the combination of an amplifier and a feedback loop

Figure 3



Phase noise characterization of a VCO

Q. How do I minimize phase noise, and would a narrower range VCO, in general, improve the noise characteristics of my system?

A. A VCO may be modeled as a tank circuit and a positive feed back amplifier (Figure 2). The oscillators half bandwidth is $f_o/2Q_L$ where f_o is the center frequency and Q_L is the loaded Q of the tank circuit. For frequencies within the range

$$f_{fl} < f < \frac{f_o}{2Q_L}$$

the phase noise will increase at 20dB per decade where f_{fl} is the frequency at which 1/f flicker noise starts to dominate. For frequencies less than f_{fl}, the phase noise will increase by 30dB per decade. This is illustrated in Figure 3. Close in phase noise is therefore directly related to the Q of the resonant circuit. High Q or cavity type oscillators provide lower close in noise compared to low Q VCO's. Also, lower close in noise can be obtained from silicon transistors. Mini-Circuits uses silicon bipolar transistors for fundamental oscillators. For low noise applications, narrow band VCO's are recommended. Mini-Circuits has designed very low noise VCO's using ceramic resonators. They are models JCOS-820WLN, JCOS-820BLN, and JCOS-1100LN. These VCO's are particularly suitable for applications in wireless products.

27 Frequently Asked Questions About VCO's

Q. What are the benefits of wide band VCO's?

A. Wide band VCO's can be used in a variety of applications. The following list outlines some of the benefits of wide band VCO's.

1. In applications such as radar and electronic counter measures, wide band VCO's provide fast tuning and wide frequency coverage.
2. Fewer VCO's are needed to cover a given frequency range.
3. A standard VCO can be used as a general purpose oscillator for a variety of applications. This can result in cost benefits.
4. Some of the wide band applications can be achieved without resorting to switching VCO's.
5. When frequency pulling is significant enough to shift the VCO outside of its frequency range, a wide band VCO can more easily accommodate the correction to the frequency shift.

Q. What is the best way to specify output power requirements?

A. Output power is usually measured into a 50 ohm load. Output power requirements should be specified in dBm, and tolerances in ±dB.

Q. Can you give me an explanation about tuning slope?

A. This is the slope of the frequency to voltage tuning characteristic at any point and is the same as modulation sensitivity. The slope could be positive or negative. For a positive slope, the output frequency increases as the tuning voltage increases. Similarly for a negative slope, the output frequency decreases as the tuning voltage increases (see Figure 4).

Q. What is monotonic tuning?

A. A monotonic tuning characteristic means that the frequency is single valued at any tuning voltage and that the slope has the same sign across the tuning range. All Mini-Circuits VCO's have a monotonic tuning characteristic and have a positive slope (see Figure 4).

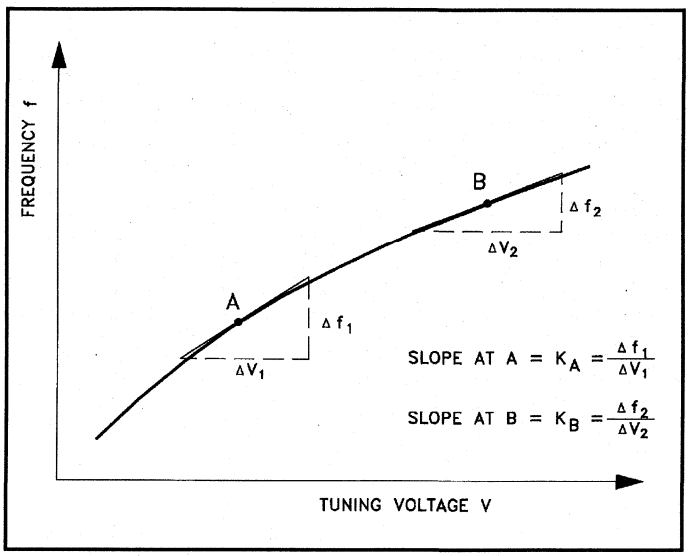
Q. Can you explain tuning linearity and how it is specified?

A. Tuning sensitivity as a function of tuning voltage is a measure of tuning linearity. For any given application, specify the minimum and maximum of the tuning sensitivity (see Figure 5).

Q. How does tuning linearity manifest itself in FM/PM transmitters?

A. In FM/PM transmitters, the information is transmitted by modulating the carrier frequency of the VCO. A modulating signal at the tuning port modulates the VCO and produces modulation sidebands. These sidebands can be seen using a spectrum analyzer. In general, a modulating signal $V_0 Sin(f_m t)$ produces sidebands which are 20 log $(V_0.K/1.414f_m)$ below the carrier. Here, K is the VCO modulation sensitivity. If V_0 and f_m are kept constant, and the VCO frequency is changed over its range from its low value to its high value, or vice versa, the side band level relative to the carrier will change. The relative change of the sideband level gives an indication of how constant K is, which is the modulation sensitivity.

Figure 4



Tuning voltage characteristic of a typical VCO

Q. I notice Mini-Circuits VCO's have lower harmonic content than the competition. What is your secret?

A. All octave band VCO's typically have 8 to 10dB second harmonic suppression. This is not adequate for certain applications. Some Mini-Circuits POS and JTOS models use tracking filters to increase harmonic suppression to typically 20dB or better. Refer to model data sheets to determine the oscillators with higher harmonic suppression.

Q. What is the operating temperature range of Mini-Circuits VCO's?

A. All Mini-Circuits VCO's are designed to operate over the temperature range of -55°C to +85°C.

Q. Are custom VCO's available from Mini-Circuits?

A. Yes. Custom VCO's engineered with specifications different than standard catalog models are available from Mini-Circuits. Such requests can best be communicated by completing the Specification Check List (see Table of Contents) and sending it to Mini-Circuits applications department. Our applications engineers stand ready to knowledgeably respond to your custom VCO requirements. A brief summary of Mini-Circuits application support services and procedures can also be found in this Handbook (see Table of Contents).

Q. Are Mini-Circuits VCO's moisture resistant?

A. POS models are hermetically sealed therefore, no moisture can get in.

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Q. What is modulation bandwidth or video bandwidth?

A. Modulation bandwidth is the modulating frequency at which the frequency deviation decreases to 0.707 of its dc value. The impedance of the driving source which tunes the VCO is usually resistive and the VCO's tuning port is mainly capacitative. The combination acts as a low pass filter. As the modulation frequency increases, the amplitude at the port of this "filter" reduces. Consequently, the frequency deviation of the VCO reduces. The modulation bandwidth can be increased by reducing the time constant associated with the tuning port of the VCO. A high modulation/tuning bandwidth is required for fast tuning VCO's.

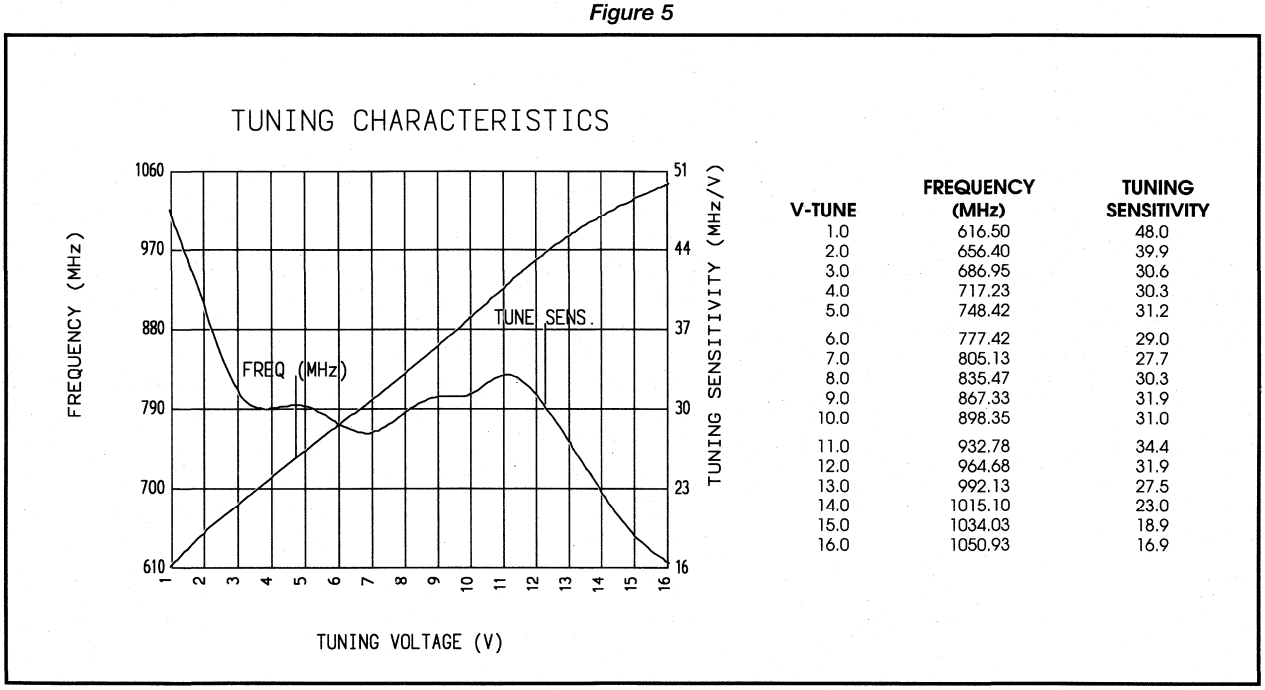
Q. What is the modulation bandwidth of Mini-Circuits VCO's?

A. Most Mini-Circuits VCO's are designed to have a 90kHz modulation bandwidth or higher. For example, in model POS-1060, the modulation bandwidth is 1MHz typical.

Q. I need to ask questions about VCO's, who can I ask?

A. Mini-Circuits applications engineers are prepared to respond to VCO questions and challenges posed by customers, including questions regarding specs, performance, and applications of our products and your designs. Our enormous database is offered at no extra charge to eliminate any need for guesswork. Wherever possible, we will courteously recommend a catalog component or help with a custom solution.

Figure 5

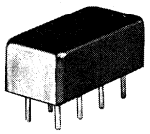


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	616.50	48.0
2.0	656.40	39.9
3.0	686.95	30.6
4.0	717.23	30.3
5.0	748.42	31.2
6.0	777.42	29.0
7.0	805.13	27.7
8.0	835.47	30.3
9.0	867.33	31.9
10.0	898.35	31.0
11.0	932.78	34.4
12.0	964.68	31.9
13.0	992.13	27.5
14.0	1015.10	23.0
15.0	1034.03	18.9
16.0	1050.93	16.9

VOLTAGE CONTROLLED OSCILLATORS

Plug-In

LINEAR TUNING 15 to 2000 MHz



POS

	MODEL NO.	FREQ. MHz Min.	FREQ. MHz Max.	POWER OUTPUT dBm Typ.	TUNE VOLTAGE V Min.	TUNE VOLTAGE V Max.	PHASE NOISE dBc/ Hz SSB @ offset frequencies: Typ. 1 kHz	10 kHz	100 kHz	1 MHz	PULLING MHz pk-pk @12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	HARMONICS dBc Max.	3 dB MOD. BAND-WIDTH kHz Typ.	POWER SUPPLY Voltage V	CURRENT mA Max.	CAPD DATA Page	Case Style Note B	CONNECTION	Price $ Qty (5-49)
NEW	POS-25	15	25	+7	1	11	-105		-125		0.06	0.04	1 - 4	-26	-15	60	12	20	15-30	A06	hx	16.95
	POS-50	25	50	+8.5	1	16	-110		-130		0.06	0.04	2.0 - 2.6	-19	-12	100	12	20	15-31	A06	hx	11.95
	POS-75	37.5	75	+8	1	16	-110		-130		0.15	0.11	3.1 - 3.8	-27	-16	100	12	20	15-31	A06	hx	11.95
	POS-100	50	100	+8.3	1	16	-107		-130		0.6	0.2	4.2 - 4.8	-23	-18	100	12	20	15-32	A06	hx	11.95
	POS-150	75	150	+9.5	1	16	-103		-127		0.8	0.3	5.8 - 6.7	-23	-17	100	12	20	15-33	A06	hx	11.95
	POS-200	100	200	+10	1	16	-102		-122		1.0	0.2	7.1 - 8.6	-24	-20	100	12	20	15-34	A06	hx	11.95
	POS-300	150	280	+10	1	16	-100		-120		1.8	0.3	9.5 - 13	-30	-20	100	12	20	15-35	A06	hx	13.95
	POS-400	200	380	+9.5	1	16	-98		-120		1.8	0.3	13.7 - 16.9	-28	-20	100	12	20	15-36	A06	hx	13.95
	POS-535	300	525	+8.8	1	16	-93		-116		2.0	0.4	10.5 - 24	-26	-20	100	12	20	15-37	A06	hx	13.95
	POS-765	485	765	+9.5	1	16	-85		-108		5.0	0.4	18 - 27	-21	-17	100	12	22	15-38	A06	hx	14.95
NEW	POS-900W	500	900	+7	1	20	-95		-115		2.0	0.3	16 - 40	-26	-20	100	12	25	15-39	A06	hx	16.95
	POS-1025	685	1025	+9	1	16	-84		-104		5.0	0.6	21 - 36	-23	-18	100	12	22	15-40	A06	hx	16.95
NEW	POS-1060	750	1060	+12	1	20	-90		-112		50	3.0	18 - 32	-11	--	1000	8	30	15-41	A06	hx	14.95
NEW	POS-1400	975	1400	+13	1	20	-95		-115		36	1.5	21-43	-11	--	1000	8	30	15-42	A06	hx	14.95
NEW	POS-2000	1370	2000	+10	1	20	-95		-115		28	1.5	30-50	-11	--	1000	8	30	15-43	A06	hx	14.95

features

- Octave bandwidth range (typ.)
- Linear tuning
- Low phase noise, characterized at 10 KHz and 100 KHz offsets
- Excellent harmonic suppression
- Output suitable for LO drive to mixers
- Low power consumption, typically 190 mW (most models)
- Usable with +15V supply for higher power output, typically 2 dB
- Useful in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, wideband frequency synthesizers, test instruments, signal generators and agile communications systems

NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Supply Voltage (V_{cc}) & Tuning Voltage (V_{tune}):

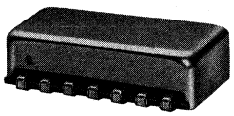
Model	(V_{cc})	(V_{tune})	Model	(V_{cc})	(V_{tune})
POS-25	+15V	+12V	POS-400	+16V	+18V
POS-50	+16V	+17V	POS-535	+16V	+18V
POS-75	+16V	+18V	POS-765	+16V	+18V
POS-100	+16V	+18V	POS-900W	+15V	+25V
POS-200	+16V	+18V	POS-1025	+16V	+18V
POS-150	+16V	+18V	POS-1060	+10V	+22V
POS-200	+16V	+18V	POS-1400	+10V	+22V
POS-300	+16V	+18V	POS-2000	+10V	+22V

2. Operating Temperature: -55°C to +85°C

DESIGNERS KITS AVAILABLE

KIT NO.	NO. of Units in Kit	Description	Price $ per Kit
K-POS1	10	1 ot each: POS-50, 75, 100, 150, 200, 300, 400, 535, 765, 1025	124.95
K-POS2	7	1 of each: POS-50, 100, 200, 400, 535, 765, 1025	79.95
K-POS3	6	2 of each: POS-1060, 1400, 2000	79.95
K-JTOS1	10	1 ot each: JTOS-50, 75, 100, 150, 200, 300, 400, 535, 765, 1025	149.95
K-JTOS2	7	1 of each: JTOS-50, 100, 200, 400, 535, 765, 1025	99.95
K-JTOS3	6	2 of each: JTOS-1300, 1650, 1910	114.95

25 to 3000 MHz



JTOS

MODEL NO.	FREQ. MHz		POWER OUTPUT dBm	TUNE VOLTAGE V		PHASE NOISE dBc/ Hz SSB @ offset frequencies: Typ.				PULLING MHz pk-pk @12 dBr	PUSHING MHz/V	TUNING SENSITIVITY MHz/V	HARMONICS dBc		3 dB MOD. BAND-WIDTH kHz	POWER SUPPLY		CAPD DATA	Case Style	CONNECTION	Price $
						1 kHz	10 kHz	100 kHz	1 MHz							Voltage V	CURRENT mA Max.		Note B		Qty (5-49)
	Min.	Max.	Typ.	Min.	Max.					Typ.	Typ.	Typ.	Typ.	Max.	Typ.			Page			
EW JTOS-50	25	47	+8.5	1	15	-88	-108	-127	-147	0.06	0.04	2.0 - 2.6	-19	-12	50	12	20	15-31	BK377	jc	13.95
EW JTOS-75	37.5	75	+8.0	1	16	-89	-110	-130	-140	0.15	0.11	2.8 - 4.0	-27	-20	125	12	20	15-31	BK377	jc	13.95
EW JTOS-100	50	100	+8.3	1	16	-83	-108	-128	-140	0.6	0.2	3.7 - 4.8	-35	-20	100	12	18	15-32	BK377	jc	13.95
EW JTOS-150	75	150	+9.5	1	16	-82	-106	-127	-147	0.8	0.3	5.8 - 6.7	-23	-17	112	12	20	15-33	BK377	jc	13.95
EW JTOS-200	100	200	+10.0	1	16	-84	-105	-124	-145	1.0	0.2	6 - 10	-25	-20	110	12	20	15-34	BK377	jc	13.95
EW JTOS-300	150	280	+9.0	1	16	-82	-102	-122	-142	1.0	0.2	9 - 14	-28	-20	120	12	20	15-35	BK377	jc	15.95
EW JTOS-400	200	380	+9.0	1	16	-82	-102	-122	-142	1.4	0.4	10.5 - 17.1	-25	-20	130	12	20	15-36	BK377	jc	15.95
EW JTOS-535	300	525	+9.5	1	16	-75	-97	-117	-137	2.0	0.5	10 - 24	-28	-20	115	12	20	15-37	BK377	jc	15.95
EW JTOS-765	485	765	+8.0	1	16	-75	-98	-118	-138	2.0	0.5	20 - 30	-30	-20	100	12	20	15-38	BK377	jc	16.95
EW JTOS-1025	685	1025	+8.6	1	16	-70	-94	-114	-134	5.0	0.6	21 - 36	-28	-20	100	12	22	15-40	BK377	jc	18.95
EW JTOS-1300	900	1300	+7.0	1	20	-70	-95	-115	-135	12	1.0	25 - 45	-28	-17	1000	12	30	15-44	BK377	jc	18.95
EW JTOS-1650	1200	1650	+7.0	1	13	-70	-95	-115	-135	15	1.5	50 - 90	-20	-14	1000	12	30	15-45	BK377	jc	19.95
EW JTOS-1910	1625	1910	+10.0	1	12	-65	-92	-112	-132	40	4.0	30 - 60	-13	-8	1000	12	20	15-46	BK377	jc	19.95
EW JTOS-2000	1370	2000	+12.0	1	22	-70	-95	-115	-135	40	1.5	30-50	-11	-8	1000	8	30	--	BK377	jc	19.95
EW JTOS-3000	2300	3000	+11.0	0.5	10.5	-60	-90	-110	-130	50	5.0	50-150	-22	-12	20000	5	25	--	BK377	jc	20.95

features

- wide frequency range
- linear tuning characteristics
- excellent harmonic suppression
- low phase noise

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Supply Voltage (V_{cc}) & Tuning Voltage (V_{tune}):

Model	(V_{cc})	(V_{tune})	Model	(V_{cc})	(V_{tune})
JTOS-50	+16V	+17V	JTOS-765	+16V	+18V
JTOS-75	+16V	+18V	JTOS-1025	+16V	+18V
JTOS-100	+16V	+18V	JTOS-1300	+15V	+22V
JTOS-150	+16V	+18V	JTOS-1650	+15V	+15V
JTOS-200	+16V	+18V	JTOS-1910	+15V	+15V
JTOS-300	+16V	+18V	JTOS-2000	+10V	+25V
JTOS-400	+16V	+18V	JTOS-3000	+5V	+12V
JTOS-535	+16V	+18V			

2. Operating Temperature: -55°C to +85°C.

pin connections

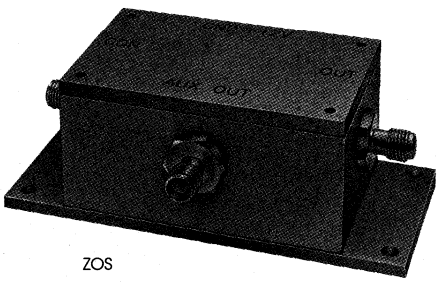
see case style outline drawings

PORT	jc	hx
RF OUT	13	2
V-CC	2	1
V-TUNE	5	8
GND EXT	1,3,4,6,7,8,9, 10,11,12,14	3,4,5,6,7

VOLTAGE CONTROLLED OSCILLATORS

Coaxial

DUAL OUTPUT *25 to 1025 MHz*



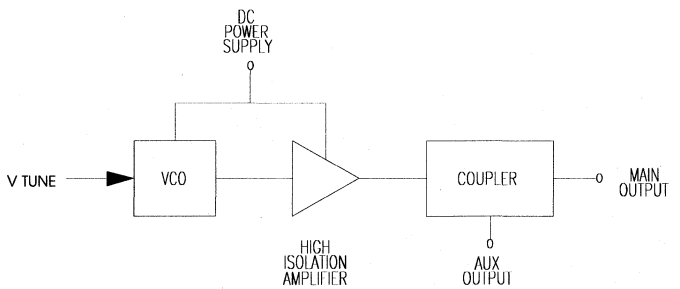
ZOS

MODEL NO.	FREQ. MHz		POWER OUTPUT dBm Typ.		TUNING VOLTAGE V		PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ.			PULLING MHz pk-pk (Open/Short)	PUSHING MHz/V	TUNING SENSITIVITY MHz/V	HARMONICS dBc		POWER SUPPLY VOLTAGE V	POWER SUPPLY CURRENT mA	CAPD DATA	Case Style	Price $
	Min.	Max.	Main.	Aux.	Min.	Max.	10 kHz	100 kHz	1MHz	Typ.	Typ.	Typ.	Typ.	Max.		Max.	Page	Note B	Qty (1-9)
ZOS-50	25	50	+9	-12	1	16	-107	-126	-141	0.012	0.08	2.5	-22	-12	12	140	15-47	BR386	119.95
ZOS-75	37.5	75	+9	-12	1	16	-110	-128	-142	0.016	0.15	3.5	-26	-20	12	140	15-47	BR386	119.95
ZOS-100	50	100	+9	-12	1	16	-111	-131	-143	0.026	0.25	4.5	-29	-20	12	140	15-47	BR386	119.95
ZOS-150	75	150	+9	-12	1	16	-107	-127	-142	0.017	0.39	5.8	-26	-20	12	140	15-47	BR386	119.95
ZOS-200	100	200	+10	-11	1	16	-106	-126	-141	0.015	0.42	7.7	-25	-20	12	140	15-47	BR386	119.95
ZOS-300	150	280	+9	-13	1	16	-103	-123	-142	0.017	0.50	11	-27	-20	12	140	15-47	BR386	119.95
ZOS-400	200	380	+10	-13	1	16	-100	-120	-136	0.021	0.50	15	-24	-18	12	140	15-47	BR386	119.95
ZOS-535	300	525	+9	-13	1	16	-96	-118	-131	0.018	0.50	18	-27	-20	12	140	15-47	BR386	119.95
ZOS-765	485	765	+8.5	-14	1	16	-96	-117	-132	0.033	0.72	22	-27	-17	12	140	15-47	BR386	119.95
ZOS-1025	685	1025	+8	-13	1	16	-92	-112	-136	0.051	1.00	30	-25	-18	12	140	15-47	BR386	119.95

features

- octave bandwidth
- linear tuning
- excellent harmonic suppression
- auxiliary output for frequency monitoring/phase locked loops
- main & auxiliary ports have excellent isolation from main oscillator (50 dB typ.)
- load insensitive
- at 12 dBr, pulling comparable to short term stability

schematic



NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Tuning Voltage 1 to 16V (1 to 15V for ZOS-50 required to cover frequency range.
   1a. Absolute Max. Supply Voltage (V_{cc}): +16V
   1b. Absolute Max. Tuning Voltage (V_{tune}): +18V, (+17V for ZOS-50)
2. 3 dB modulation bandwidth: 100 kHz
3. Operating Temperature: -55°C to +85°C

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LOW NOISE 780 to 1114 MHz

JCOS

MODEL NO.	FREQ. MHz	POWER OUTPUT dBm	TUNING VOLTAGE V		PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ.					PULLING MHz pk-pk @12 dBr	PUSHING MHz/V	TUNING SENSITIVITY MHz/V	HARMONICS dBc		POWER SUPPLY VOLTAGE V	POWER SUPPLY CURRENT mA	CAPD DATA	Case Style	CONNECTION	Price $
	Min. Max.	Typ.	Min.	Max.	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	Typ.	Typ.	Typ.	Typ.	Max.		Max.	Page	Note B		Qty (1-9)
JCOS-820WLN	780-860	+9	0	20	-60	-90	-112	-132	-150	4.5	0.3	8	-13	-8	9	25	15-59	BG419	jd	49.95
JCOS-820BLN	807-832	+3	1	14	-57	-88	-112	-132	-151	0.4	0.4	6	-24	-20	10	25	15-59	BG419	jd	49.95
JCOS-1100LN	1079-1114	+8.5	0	20	-60	-88	-110	-130	-150	7.5	0.5	4.5	-15	-10	8	25	15-59	BG419	jd	49.95

NOTES:

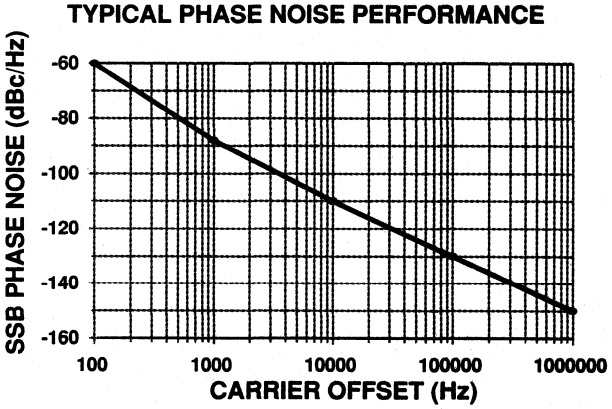
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Ratings:
   1a. Absolute Max. Supply Voltage (V_{cc}): +15V JCOS
   1b. Absolute Max. Tuning Voltage (V_{tune}): +24V JCOS
   1c. Operating Temperature: -55°C to +85°C

pin connections

see case style outline drawings for pin locations

PORT	jd
RF OUT	7
V-CC	8
V-TUNE	1
GND EXT	2,3,4,5,6,9 10,11,12,13,14

TYPICAL PHASE NOISE PERFORMANCE



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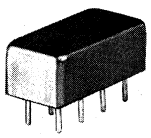
VOLTAGE CONTROLLED OSCILLATORS

Plug-I

5V TUNING FOR PLL IC's 24 to 755 MHz



POS

MODEL NO.	FREQ. MHz Min.	Max.	POWER OUTPUT dBm Typ.	PHASE NOISE, typ. dBc/Hz SSB @offset frequencies: 10 kHz	100 kHz	PULLING MHz pk-pk @ 12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	Max.	POWER SUPPLY VOLTAGE V	CURRENT mA Max.	CAPD DATA Page	Case Style Note B	CONNECTION	Pri Q (5-
NEW POS-50P	24	29	+10	-110	-130	0.06	0.04	2 - 2.5	-18	-12	12	20	15-48	A06	hx	12
NEW POS-75P	35	43	+9	-110	-130	0.15	0.11	2.5 - 4	-25	-20	12	20	15-49	A06	hx	12
NEW POS-100P	48	59	+9	-107	-130	0.6	0.2	3.5 - 5	-30	-18	12	20	15-50	A06	hx	12
NEW POS-150P	72	91	+10	-103	-127	0.8	0.3	6 - 9	-25	-17	12	20	15-51	A06	hx	12
NEW POS-200P	95	120	+10	-102	-122	1.0	0.2	7 - 10	-30	-20	12	20	15-52	A06	hx	12
NEW POS-300P	148	174	+10	-100	-120	1.8	0.3	10 - 14	-27	-20	12	20	15-53	A06	hx	14
NEW POS-400P	194	220	+10.5	-98	-120	1.8	0.3	13 - 18	-25	-20	12	20	15-54	A06	hx	14
NEW POS-535P	278	325	+10	-93	-116	2.0	0.4	17 - 22	-30	-20	12	20	15-55	A06	hx	14
NEW POS-765P	486	510	+9.5	-85	-108	5.0	0.4	20 - 30	-26	-20	12	22	15-56	A06	hx	15
NEW POS-1025P	680	755	+8.5	-84	-104	5.0	0.6	30 - 40	-24	-18	12	22	15-57	A06	hx	17

features

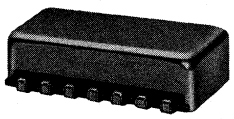
- 5V tuning voltage range, suitable for PLL & synthesizer IC's such as National Semiconductor™, Motorola™, GEC Plessey™, etc.
- Linear tuning
- Low phase noise, characterized at 10 KHz and 100 KHz offsets
- Excellent harmonic suppression
- Output suitable for LO drive to mixers
- Low power consumption, typically 190 mW (most models)
- Usable with +15V supply for higher power output, typically 2 dB
- Useful for PLL synthesizer in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, test instruments, signal generators and agile communications systems

NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Tuning Voltage required to cover frequency range: 0.5 to 5V
   1a. Absolute Max. Supply Voltage (V_{cc}): +16V
   1b. Absolute Max. Tuning Voltage (V_{tune}): +7V
2. 3 dB modulation bandwidth: 50 KHz typ for POS-50P and 100 kHz typ for all others
3. Operating Temperature: -55°C to +85°C

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers/ NORTH AMERICA 800-654-7949 417-335-5935 Fax 417-335-5945 EUROPE 44-1252-835094 Fax 44-1252-837010

24 to 2600 MHz



JTOS

MODEL NO.	FREQ. MHz Min. Max.	POWER OUTPUT dBm Typ.	PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ. 1 kHz	10 kHz	100 kHz	1 MHz	PULLING MHz pk-pk @12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	Max.	3 dB MODULATION BANDWIDTH KHz Typ.	POWER SUPPLY VOLTAGE V	CURRENT mA Max.	CAPD DATA Page	Case Style Note B	CONNECTION	Price $ Qty (5-49)
EW JTOS-50P	24 - 29	+9.5	-88	-108	-127	-147	0.06	0.04	2 - 2.5	-14	-12	50	12	20	15-48	BK377	jc	14.95
EW JTOS-75P	35 - 43	+9	-89	-110	-130	-140	0.15	0.11	2.5 - 4	-25	-20	125	12	20	15-49	BK377	jc	14.95
EW JTOS-100P	48 - 59	+9	-83	-108	-128	-140	0.6	0.2	3.5 - 4	-30	-20	100	12	18	15-50	BK377	jc	14.95
EW JTOS-150P	72 - 91	+9.5	-82	-106	-127	-147	0.8	0.3	6 - 9	-30	-17	112	12	20	15-51	BK377	jc	14.95
EW JTOS-200P	95 - 120	+8.8	-84	-105	-124	-145	1.0	0.2	7 - 10	-30	-20	110	12	20	15-52	BK377	jc	14.95
EW JTOS-300P	148 - 174	+10.0	-82	-102	-122	-142	1.0	0.2	10 - 14	-27	-20	120	12	20	15-53	BK377	jc	16.95
EW JTOS-400P	194 - 220	+11	-82	-102	-122	-142	1.4	0.4	13 - 18	-25	-20	130	12	20	15-54	BK377	jc	16.95
EW JTOS-535P	278 - 325	+9.5	-75	-97	-117	-137	2.0	0.5	17 - 22	-30	-20	115	12	20	15-55	BK377	jc	16.95
EW JTOS-765P	486 - 510	+9.0	-75	-98	-118	-138	2.0	0.5	20 - 30	-30	-20	100	12	20	15-56	BK377	jc	17.95
EW JTOS-1025P	680 - 755	+9.0	-70	-94	-114	-134	5.0	0.6	30 - 40	-27	-20	100	12	22	15-57	BK377	jc	19.95
EW JTOS-3000P	2300-2600	+11	-65	-92	-112	-132	50.0	5.0	120 - 160	-22	-12	20000	5	25	--	BK377	jc	21.95

features

- 5V tuning voltage range, suitable for PLL & synthesizer IC's such as National Semiconductor™, Motorola™, GEC Plessey™, etc.
- Linear tuning
- Excellent harmonic suppression
- Low phase noise
- Useful for PLL synthesizer in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, test instruments, signal generators and agile communications systems

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Tuning Voltage required to cover frequency range: 0.5 to 5V
   1a. Absolute Max. Supply Voltage (V_{cc}): 16V, (7V for JTOS-3000P)
   1b. Absolute Max. Tuning Voltage (V_{tune}): 7V
2. Operating Temperature: -55°C to +85°C

pin connections

see case style outline drawings

PORT	jc	hx
RF OUT	13	2
V-CC	2	1
V-TUNE	5	8
GND EXT	1,3,4,6,7,8,9, 10,11,12,14	3,4,5,6,7

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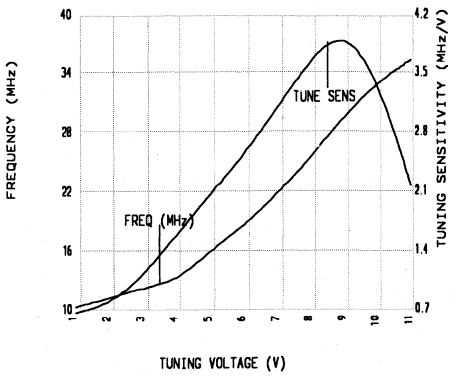
Available Tape & Reel

VOLTAGE CONTROLLED OSCILLATORS

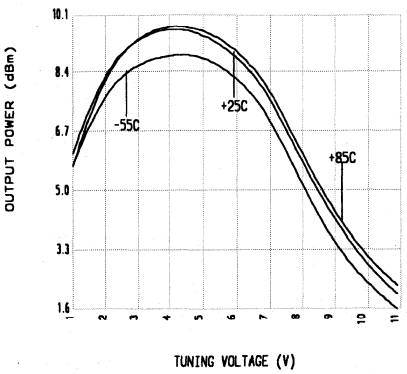
POS-25

15 to 25 MHz

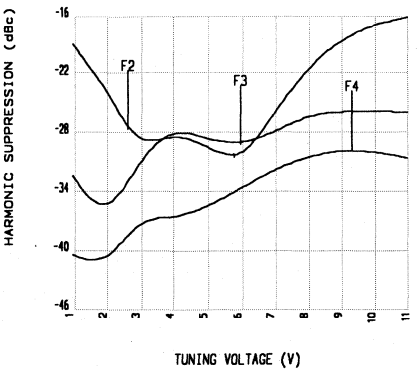
TUNING CHARACTERISTICS



POWER OUTPUT

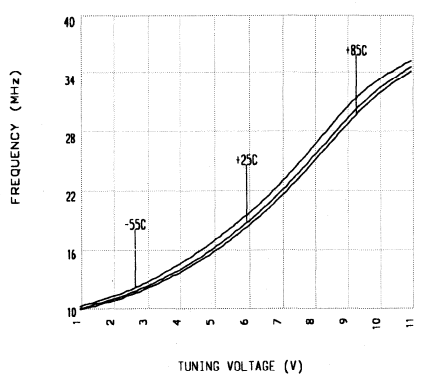


HARMONICS SUPPRESSION

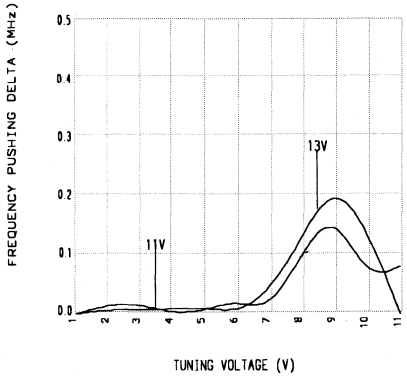


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY	Pout (dBm) -55°C	Pout (dBm) +25°C	Pout (dBm) +85°C	HARMONICS (dBc) F2	HARMONICS (dBc) F3	HARMONICS (dBc) F4
1.0	10.714	0.71	5.86	6.18	5.83	-18.88	-32.27	-40.34
2.0	11.523	0.81	8.04	8.67	8.57	-23.24	-37.04	-41.63
3.0	12.669	1.15	8.77	9.49	9.52	-29.76	-30.70	-36.42
4.0	13.304	1.63	9.01	9.83	9.91	-27.81	-27.25	-36.68
5.0	16.424	2.12	9.01	9.63	9.77	-29.26	-28.58	-35.54
6.0	19.008	2.58	8.45	9.07	9.24	-31.13	-29.18	-33.56
7.0	22.138	3.13	7.43	8.03	8.26	-25.97	-27.89	-31.63
8.0	25.862	3.72	5.46	6.09	6.32	-21.31	-26.08	-30.32
9.0	29.932	4.07	3.69	4.42	4.64	-18.38	-25.78	-29.70
10.0	33.412	3.48	2.45	2.99	3.22	-16.78	-25.79	-29.88
11.0	35.618	2.21	1.67	2.10	2.35	-16.06	-25.86	-30.56

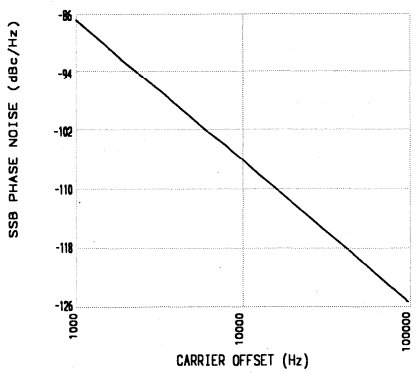
FREQ VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	FREQUENCY(MHz) +25°C	FREQUENCY(MHz) +85°C
1.0	11.10	10.89	10.75
2.0	12.04	11.75	11.59
3.0	13.42	13.01	12.78
4.0	15.34	14.75	14.44
5.0	17.68	16.93	16.56
6.0	20.36	19.55	19.10
7.0	23.51	22.67	22.15
8.0	27.36	26.32	25.75
9.0	31.53	30.25	29.67
10.0	34.59	33.61	33.09
11.0	36.37	35.74	35.30

FREQUENCY PUSHING (MHz)
(REFERRED TO Vcc=12V)

11V	13V
0.00	0.00
0.02	0.01
0.02	0.01
0.00	0.01
0.01	0.01
0.03	0.00
0.00	0.04
0.10	0.13
0.18	0.23
0.06	0.15
0.08	0.00

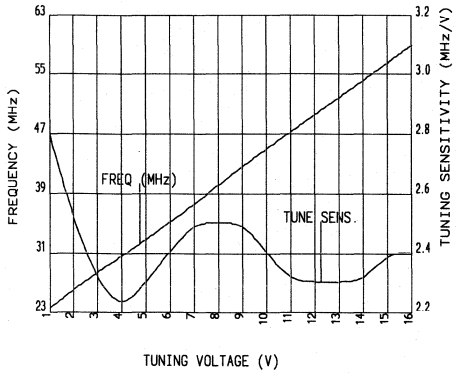
PHASE NOISE

CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-86
10000	-105
100000	-125

POS-50/JTOS-50

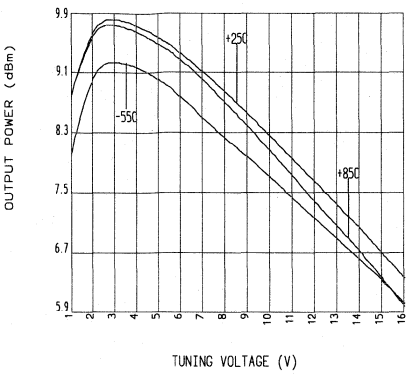
25 to 50 MHz

TUNING CHARACTERISTICS



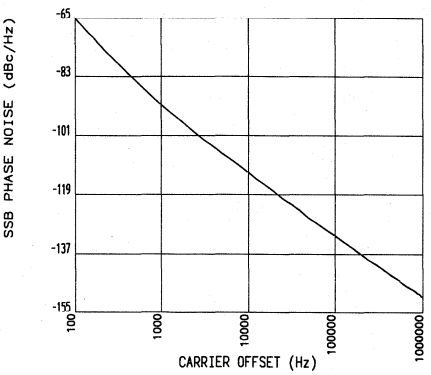
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	23.3	2.8
2.0	25.9	2.5
3.0	28.2	2.3
4.0	30.4	2.2
5.0	32.6	2.3
6.0	35.0	2.4
7.0	37.4	2.5
8.0	40.0	2.5
9.0	42.5	2.5
10.0	44.9	2.4
11.0	47.2	2.3
12.0	49.5	2.3
13.0	51.8	2.3
14.0	54.1	2.3
15.0	56.5	2.4
16.0	58.9	2.4

POWER OUTPUT



Pout (dBm)		
-55°C	+25°C	+85°C
8.06	8.85	8.85
9.26	9.85	9.80
9.31	9.89	9.81
9.23	9.80	9.71
9.06	9.63	9.54
8.82	9.41	9.32
8.53	9.16	9.06
8.25	8.89	8.74
8.00	8.59	8.42
7.73	8.28	8.08
7.44	7.97	7.75
7.16	7.67	7.38
6.89	7.34	7.06
6.62	7.04	6.73
6.33	6.70	6.36
6.02	6.36	5.98

PHASE NOISE

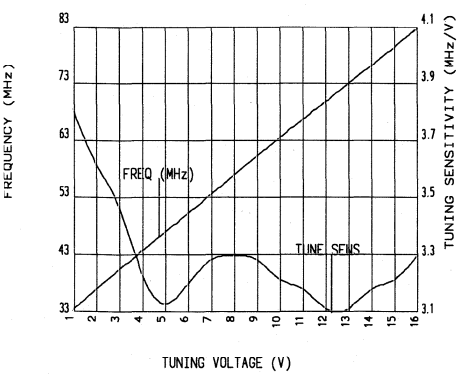


PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-65
1000	-93
10000	-112
100000	-132
1000000	-150

POS-75/JTOS-75

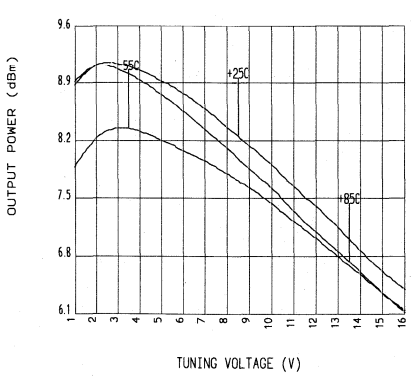
37.5 to 75 MHz

TUNING CHARACTERISTICS



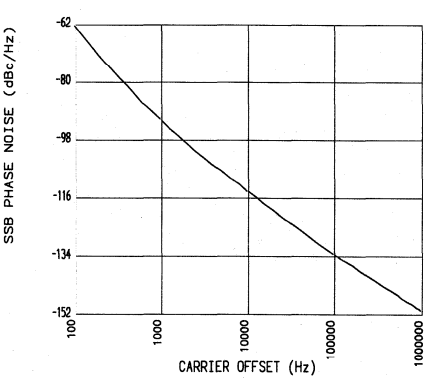
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	33.5	3.8
2.0	37.1	3.6
3.0	40.5	3.5
4.0	43.7	3.2
5.0	46.9	3.1
6.0	50.1	3.2
7.0	53.4	3.3
8.0	56.7	3.3
9.0	60.0	3.3
10.0	63.2	3.2
11.0	66.3	3.2
12.0	69.4	3.1
13.0	72.5	3.1
14.0	75.7	3.2
15.0	79.0	3.2
16.0	82.2	3.3

POWER OUTPUT



Pout (dBm)		
-55°C	+25°C	+85°C
7.88	8.89	8.93
8.29	9.20	9.20
8.40	9.18	9.10
8.35	9.09	8.98
8.23	8.96	8.79
8.10	8.81	8.59
7.98	8.62	8.36
7.82	8.39	8.14
7.65	8.16	7.87
7.46	7.94	7.66
7.23	7.65	7.35
7.04	7.42	7.10
6.80	7.17	6.87
6.59	6.87	6.62
6.36	6.62	6.36
6.15	6.41	6.13

PHASE NOISE



Phase Noise	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-62
1000	-93
10000	-113
100000	-133
1000000	-150

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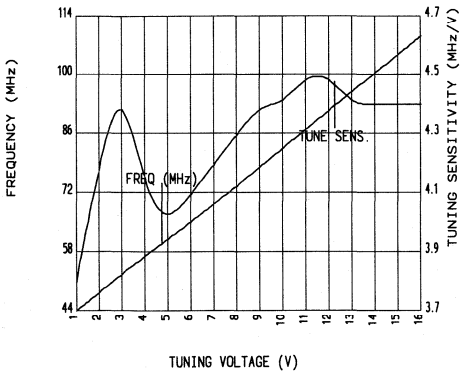
For Custom Versions Of Standard Models Consult Our Applications Dept.

VOLTAGE CONTROLLED OSCILLATORS

POS-100/JTOS-100

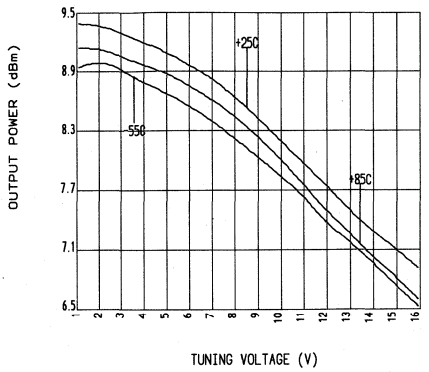
50 to 100 MHz

TUNING CHARACTERISTICS



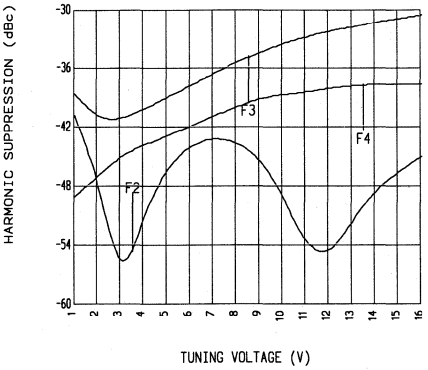
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	44.4	3.8
2.0	48.6	4.2
3.0	53.2	4.5
4.0	57.3	4.1
5.0	61.3	4.0
6.0	65.4	4.1
7.0	69.6	4.2
8.0	73.9	4.3
9.0	78.3	4.4
10.0	82.8	4.4
11.0	87.2	4.5
12.0	91.7	4.5
13.0	96.1	4.4
14.0	100.5	4.4
15.0	104.8	4.4
16.0	109.2	4.4

POWER OUTPUT



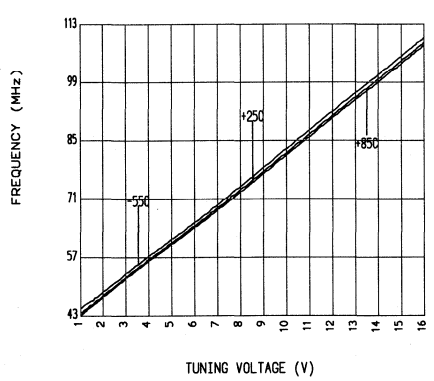
	Pout (dBm)		
	-55°C	+25°C	+85°C
1.0	8.98	9.42	9.17
2.0	9.05	9.40	9.17
3.0	8.95	9.32	9.08
4.0	8.80	9.22	8.99
5.0	8.71	9.12	8.91
6.0	8.57	8.99	8.78
7.0	8.43	8.86	8.64
8.0	8.24	8.67	8.48
9.0	8.06	8.46	8.26
10.0	7.86	8.22	8.04
11.0	7.67	8.00	7.78
12.0	7.38	7.77	7.51
13.0	7.21	7.52	7.30
14.0	6.99	7.31	7.04
15.0	6.76	7.13	6.85
16.0	6.54	6.93	6.61

HARMONICS SUPPRESSION



	Harmonics (dBc)		
	F2	F3	F4
1.0	-40.4	-38.2	-48.7
2.0	-46.4	-40.8	-46.6
3.0	-58.4	-40.9	-44.5
4.0	-50.3	-39.8	-43.4
5.0	-45.6	-38.6	-42.5
6.0	-43.4	-37.4	-41.5
7.0	-42.6	-36.2	-40.5
8.0	-43.1	-35.0	-39.6
9.0	-44.7	-34.1	-38.7
10.0	-48.5	-33.1	-38.3
11.0	-53.8	-32.5	-38.1
12.0	-54.9	-31.8	-37.7
13.0	-51.1	-31.5	-37.4
14.0	-48.0	-30.9	-37.3
15.0	-46.2	-30.6	-37.3
16.0	-44.6	-30.2	-37.3

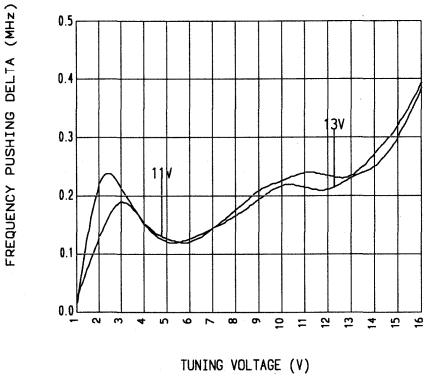
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY(MHz)

V-TUNE	-55°C	+25°C	+85°C
1.0	45.55	44.40	43.93
2.0	49.41	48.60	48.31
3.0	53.98	53.15	52.83
4.0	58.08	57.27	56.90
5.0	62.10	61.31	60.88
6.0	66.20	65.43	64.96
7.0	70.43	69.62	69.13
8.0	74.80	73.93	73.43
9.0	79.26	78.33	77.81
10.0	83.78	82.77	82.25
11.0	88.26	87.23	86.68
12.0	92.73	91.69	91.10
13.0	97.13	96.06	95.46
14.0	101.53	100.45	99.81
15.0	105.98	104.84	104.18
16.0	110.43	109.22	108.55

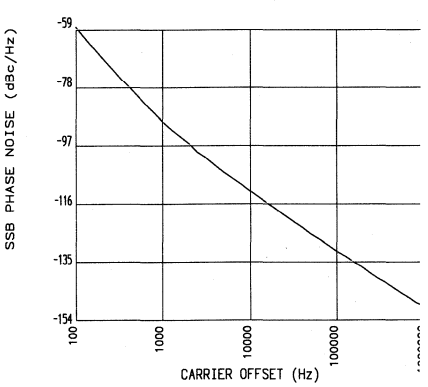
FREQUENCY PUSHING



FREQUENCY PUSHING (MHz)
(REFERRED TO Vcc=12V)

11V	13V
0.02	0.03
0.28	0.14
0.22	0.22
0.15	0.15
0.13	0.12
0.12	0.13
0.15	0.15
0.18	0.17
0.22	0.20
0.23	0.23
0.25	0.22
0.24	0.21
0.23	0.24
0.28	0.25
0.32	0.30
0.40	0.39

PHASE NOISE



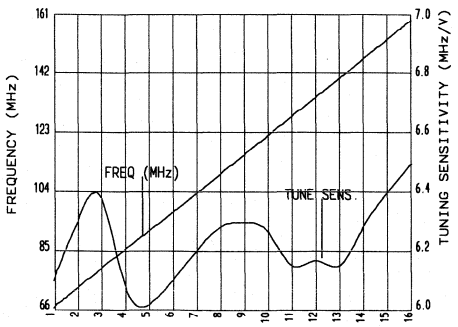
PHASE NOISE

CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-59
1000	-91
10000	-112
100000	-131
1000000	-149

POS-150/JTOS-150

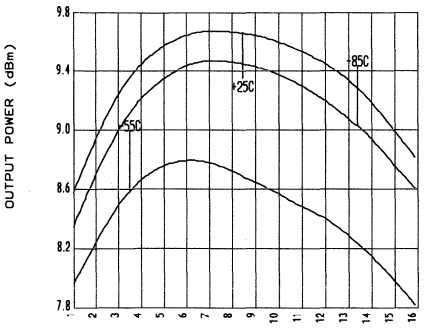
75 to 150 MHz

TUNING CHARACTERISTICS



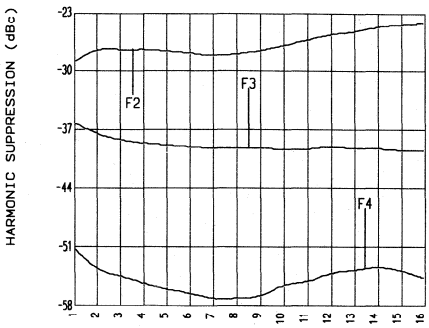
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	66.6	6.1
2.0	72.9	6.3
3.0	79.4	6.5
4.0	85.4	6.0
5.0	91.4	6.0
6.0	97.5	6.1
7.0	103.7	6.2
8.0	110.0	6.3
9.0	116.3	6.3
10.0	122.6	6.3
11.0	128.7	6.1
12.0	134.9	6.2
13.0	141.0	6.1
14.0	147.4	6.3
15.0	153.7	6.4
16.0	160.2	6.5

POWER OUTPUT



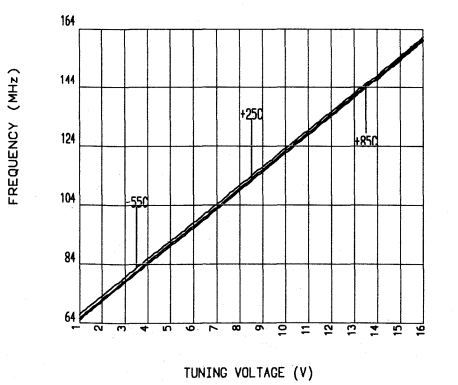
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
1.0	7.98	8.60	8.37
2.0	8.26	8.97	8.73
3.0	8.53	9.28	9.03
4.0	8.69	9.48	9.25
5.0	8.79	9.60	9.37
6.0	8.82	9.67	9.47
7.0	8.81	9.70	9.50
8.0	8.75	9.69	9.49
9.0	8.67	9.67	9.46
10.0	8.60	9.63	9.41
11.0	8.50	9.56	9.33
12.0	8.44	9.49	9.24
13.0	8.32	9.38	9.11
14.0	8.19	9.24	8.99
15.0	8.02	9.04	8.80
16.0	7.84	8.84	8.63

HARMONICS SUPPRESSION



	Harmonics (dBc)		
V-TUNE	F2	F3	F4
1.0	-28.4	-35.8	-50.8
2.0	-26.7	-37.2	-53.5
3.0	-27.1	-37.8	-53.9
4.0	-26.9	-38.2	-54.9
5.0	-27.2	-38.4	-55.5
6.0	-27.4	-38.6	-55.9
7.0	-27.8	-38.8	-56.7
8.0	-27.5	-38.8	-56.5
9.0	-27.2	-38.7	-56.5
10.0	-26.5	-38.9	-54.7
11.0	-25.9	-38.9	-54.8
12.0	-25.1	-38.5	-53.4
13.0	-24.9	-38.8	-53.3
14.0	-24.2	-38.7	-52.7
15.0	-24.0	-39.0	-53.2
16.0	-23.8	-39.0	-54.1

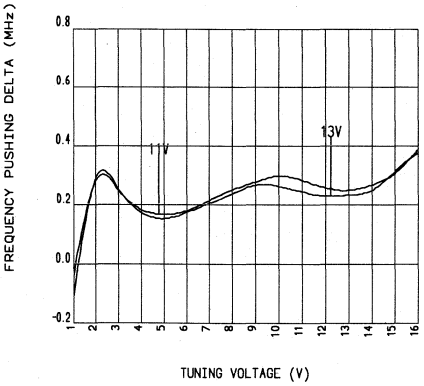
FREQ VARIATION WITH TEMPERATURE



FREQUENCY(MHz)

V-TUNE	-55°C	+25°C	+85°C
1.0	66.63	65.35	64.63
2.0	72.93	71.66	71.18
3.0	79.40	78.21	77.65
4.0	85.40	84.28	83.65
5.0	91.36	90.28	89.62
6.0	97.45	96.38	95.70
7.0	103.66	102.60	101.92
8.0	110.00	108.93	108.25
9.0	116.31	115.30	114.62
10.0	122.58	121.62	120.93
11.0	128.71	127.81	127.16
12.0	134.91	134.06	133.41
13.0	141.03	140.28	139.66
14.0	147.35	146.58	146.00
15.0	153.73	153.01	152.43
16.0	160.21	159.51	158.95

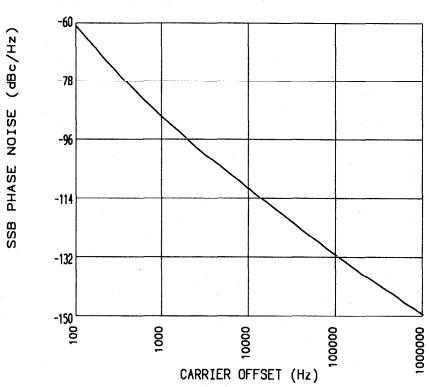
FREQUENCY PUSHING



FREQUENCY PUSHING (MHz)
(REFERRED TO Vcc=12V)

V-TUNE	11V	13V
1.0	-0.04	-0.11
2.0	0.37	0.40
3.0	0.23	0.23
4.0	0.17	0.16
5.0	0.16	0.14
6.0	0.17	0.17
7.0	0.21	0.20
8.0	0.25	0.23
9.0	0.27	0.27
10.0	0.30	0.26
11.0	0.28	0.24
12.0	0.25	0.22
13.0	0.24	0.23
14.0	0.26	0.23
15.0	0.29	0.31
16.0	0.38	0.37

PHASE NOISE



PHASE NOISE

CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-60
1000	-89
10000	-109
100000	-127
1000000	147

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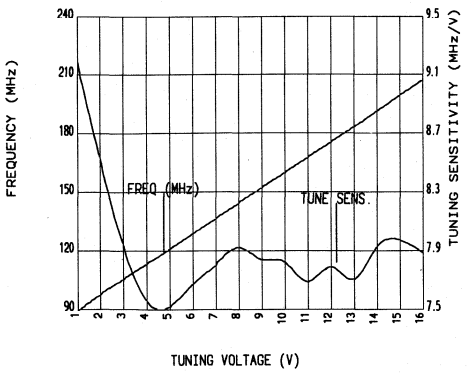
VOLTAGE CONTROLLED OSCILLATORS

POS-200/JTOS-200

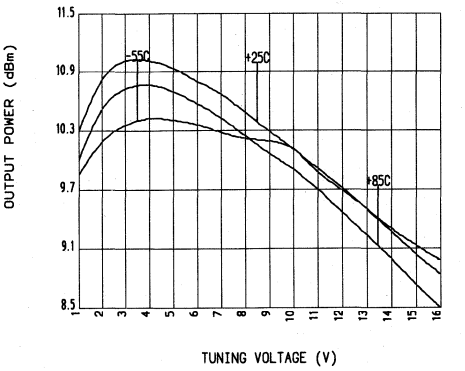
100 to 200 MHz

TUNING CHARACTERISTICS



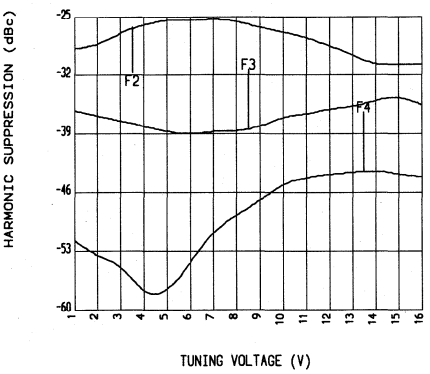
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	90.1	9.2
2.0	98.7	8.5
3.0	106.6	7.9
4.0	114.1	7.5
5.0	121.6	7.5
6.0	129.3	7.7
7.0	137.1	7.8
8.0	145.1	8.0
9.0	153.0	7.8
10.0	160.8	7.9
11.0	168.5	7.6
12.0	176.4	7.9
13.0	184.0	7.6
14.0	192.0	8.0
15.0	200.0	8.0
16.0	207.9	7.9

POWER OUTPUT



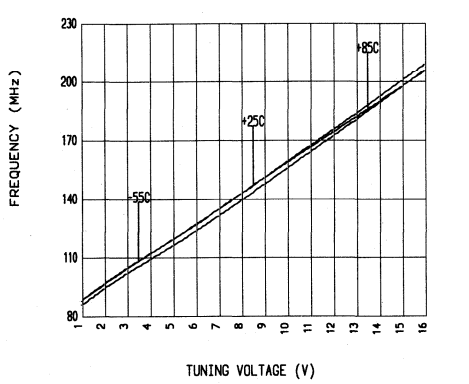
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
1.0	9.87	10.31	10.02
2.0	10.25	10.92	10.61
3.0	10.39	11.06	10.77
4.0	10.47	11.05	10.81
5.0	10.43	10.97	10.73
6.0	10.39	10.82	10.60
7.0	10.30	10.71	10.46
8.0	10.23	10.51	10.27
9.0	10.22	10.31	10.08
10.0	10.17	10.14	9.94
11.0	9.89	9.94	9.73
12.0	9.71	9.73	9.49
13.0	9.54	9.53	9.26
14.0	9.32	9.30	9.03
15.0	9.15	9.06	8.75
16.0	9.00	8.86	8.52

HARMONICS SUPPRESSION



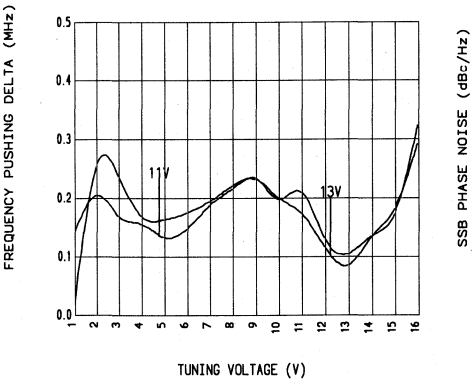
	Harmonics (dBc)		
V-TUNE	F2	F3	F4
1.0	-28.6	-36.0	-51.5
2.0	-28.3	-36.7	-53.5
3.0	-26.7	-37.3	-54.2
4.0	-25.7	-37.9	-58.2
5.0	-25.1	-38.5	-57.9
6.0	-25.3	-38.9	-54.1
7.0	-25.0	-38.4	-50.3
8.0	-25.3	-38.5	-48.5
9.0	-26.1	-38.0	-46.8
10.0	-26.6	-36.7	-44.6
11.0	-27.3	-36.5	-44.0
12.0	-28.3	-35.8	-43.6
13.0	-29.3	-35.6	-43.4
14.0	-30.7	-34.8	-43.1
15.0	-30.4	-34.2	-43.6
16.0	-30.5	-35.3	-43.9

FREQ. VARIATION WITH TEMPERATURE



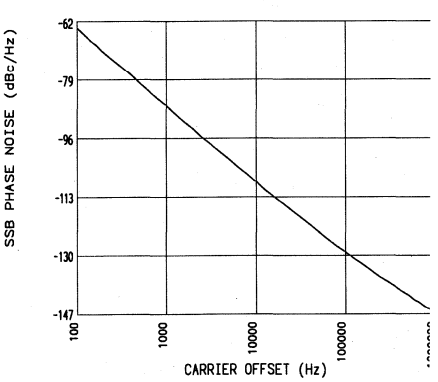
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
1.0	90.26	90.12	87.80
2.0	99.05	98.66	96.63
3.0	106.85	106.58	104.12
4.0	114.18	114.08	111.21
5.0	121.53	121.62	118.38
6.0	129.06	129.30	125.81
7.0	136.93	137.10	133.58
8.0	145.12	145.10	141.55
9.0	153.05	152.95	149.75
10.0	161.31	160.83	157.85
11.0	169.31	168.47	166.06
12.0	177.63	176.36	174.38
13.0	185.60	183.96	182.60
14.0	194.50	191.96	191.25
15.0	202.95	200.00	199.71
16.0	211.21	207.87	208.18

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
V-TUNE	11V	13V
1.0	0.15	0.03
2.0	0.24	0.33
3.0	0.16	0.24
4.0	0.17	0.16
5.0	0.13	0.17
6.0	0.15	0.18
7.0	0.20	0.20
8.0	0.22	0.23
9.0	0.26	0.25
10.0	0.18	0.20
11.0	0.25	0.19
12.0	0.12	0.12
13.0	0.10	0.07
14.0	0.15	0.15
15.0	0.15	0.17
16.0	0.33	0.30

PHASE NOISE

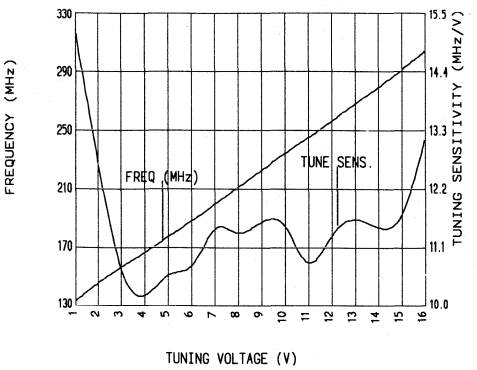


CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-62
1000	-85
10000	-107
100000	-128
1000000	-145

POS-300/JTOS-300

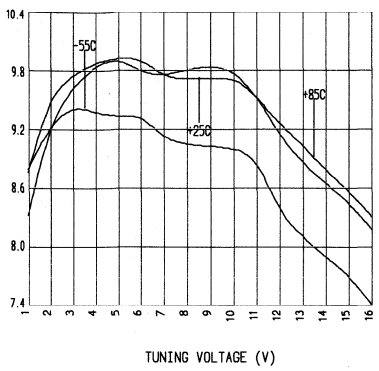
150 to 280 MHz

TUNING CHARACTERISTICS



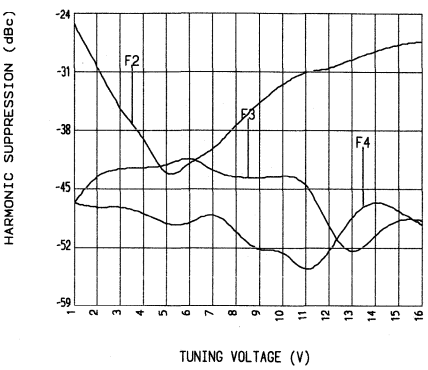
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	136.0	15.2
2.0	148.7	12.7
3.0	159.1	10.4
4.0	169.2	10.1
5.0	180.1	10.8
6.0	190.7	10.6
7.0	202.5	11.8
8.0	213.8	11.3
9.0	225.5	11.7
10.0	237.4	11.8
11.0	247.8	10.5
12.0	259.3	11.5
13.0	271.1	11.8
14.0	282.6	11.5
15.0	294.2	11.5
16.0	307.4	13.2

POWER OUTPUT



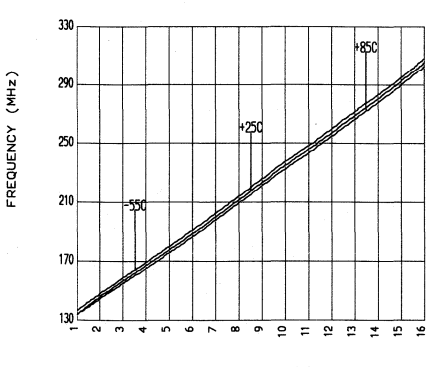
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
1.0	8.84	8.81	8.37
2.0	9.31	9.63	9.34
3.0	9.51	9.82	9.70
4.0	9.43	9.96	9.93
5.0	9.38	9.99	9.99
6.0	9.42	10.00	9.85
7.0	9.15	9.79	9.80
8.0	9.10	9.78	9.88
9.0	9.08	9.79	9.91
10.0	9.06	9.79	9.88
11.0	8.97	9.62	9.58
12.0	8.38	9.18	9.31
13.0	8.14	8.91	9.09
14.0	7.93	8.69	8.83
15.0	7.75	8.50	8.62
16.0	7.44	8.22	8.35

HARMONICS SUPPRESSION



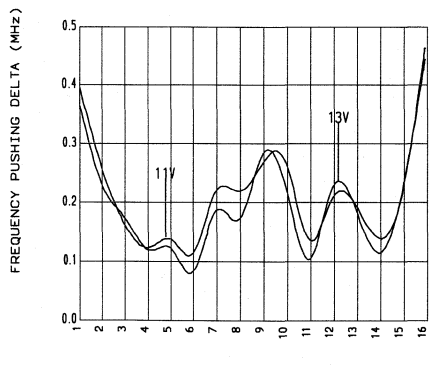
	Harmonics (dBc)		
V-TUNE	F2	F3	F4
1.0	-24.6	-46.3	-46.3
2.0	-29.7	-42.6	-47.0
3.0	-35.4	-42.1	-46.6
4.0	-38.0	-42.0	-47.5
5.0	-44.2	-41.9	-49.0
6.0	-41.2	-40.3	-49.0
7.0	-40.1	-42.6	-46.9
8.0	-36.8	-43.2	-49.8
9.0	-34.1	-43.3	-52.5
10.0	-31.8	-43.0	-51.4
11.0	-30.2	-43.1	-55.4
12.0	-30.2	-49.5	-52.4
13.0	-28.9	-53.2	-47.7
14.0	-27.9	-50.1	-45.6
15.0	-27.0	-48.0	-47.2
16.0	-26.7	-48.4	-48.9

FREQ. VARIATION WITH TEMPERATURE



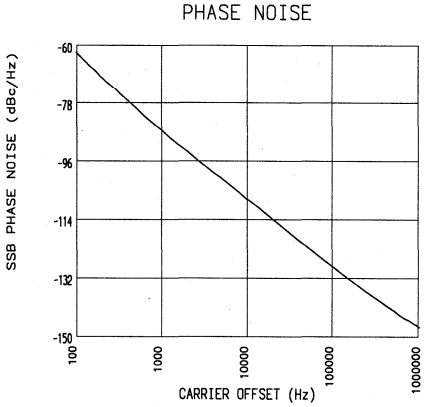
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
1.0	138.58	136.00	135.70
2.0	150.61	148.68	147.15
3.0	161.06	159.08	157.38
4.0	171.65	169.21	167.46
5.0	182.25	180.05	177.96
6.0	193.33	190.70	188.70
7.0	204.78	202.46	200.30
8.0	216.40	213.80	211.48
9.0	227.96	225.50	223.48
10.0	240.03	237.35	234.88
11.0	250.31	247.82	245.40
12.0	261.96	259.30	256.93
13.0	274.03	271.13	268.48
14.0	285.33	282.63	279.91
15.0	296.50	294.15	291.66
16.0	310.38	307.38	304.65

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
V-TUNE	11V	13V
1.0	0.37	0.40
2.0	0.21	0.25
3.0	0.19	0.16
4.0	0.10	0.11
5.0	0.16	0.17
6.0	0.03	0.07
7.0	0.25	0.27
8.0	0.12	0.20
9.0	0.34	0.28
10.0	0.25	0.32
11.0	0.03	0.07
12.0	0.29	0.25
13.0	0.20	0.21
14.0	0.08	0.12
15.0	0.20	0.18
16.0	0.45	0.47

PHASE NOISE



CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-60
1000	-85
10000	-105
100000	-127
1000000	-145

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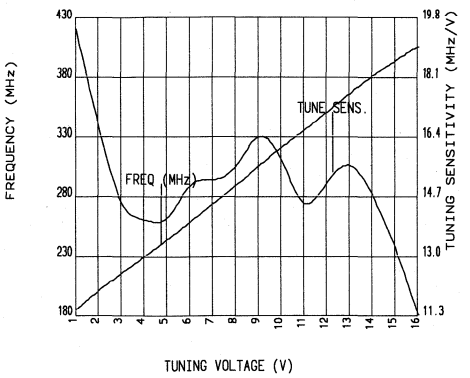
VOLTAGE CONTROLLED OSCILLATORS

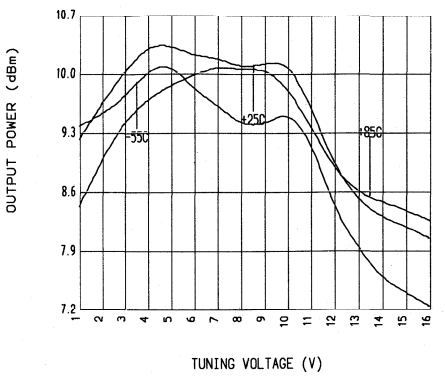
POS-400/JTOS-400

200 to 380 MHz

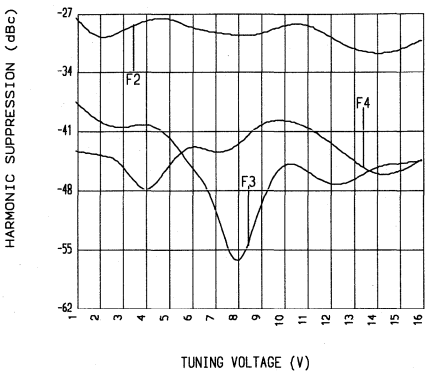
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

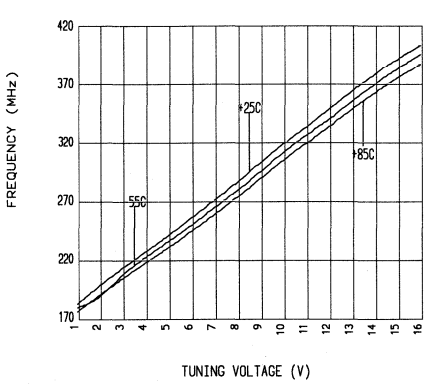


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	184.88	19.5
2.0	201.58	16.7
3.0	215.71	14.1
4.0	229.83	14.1
5.0	243.63	13.8
6.0	258.88	15.3
7.0	273.95	15.1
8.0	289.35	15.4
9.0	306.18	16.8
10.0	322.08	15.9
11.0	336.13	14.0
12.0	351.32	15.2
13.0	367.18	15.9
14.0	382.00	14.8
15.0	395.30	13.3
16.0	406.65	11.3

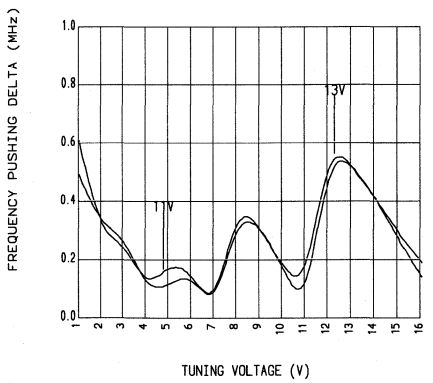
Pout (dBm)		
-55°C	+25°C	+85°C
9.43	9.27	8.47
9.57	9.71	9.06
9.77	10.08	9.49
10.10	10.39	9.75
10.17	10.38	9.91
9.84	10.25	10.03
9.68	10.24	10.14
9.43	10.11	10.09
9.44	10.17	10.12
9.63	10.21	9.89
9.27	9.67	9.42
8.43	8.94	8.91
7.99	8.54	8.63
7.61	8.35	8.53
7.46	8.23	8.43
7.29	8.10	8.31

Harmonics (dBc)		
F2	F3	F4
-27.2	-37.1	-42.9
-30.1	-39.5	-43.3
-28.7	-40.5	-43.8
-27.5	-39.4	-49.1
-27.0	-40.7	-44.4
-28.5	-44.9	-41.8
-28.9	-47.8	-43.3
-29.3	-59.5	-42.7
-29.3	-49.0	-39.5
-28.0	-43.5	-39.1
-27.7	-45.1	-39.9
-29.4	-47.2	-41.8
-30.9	-46.6	-43.9
-31.5	-44.6	-45.9
-31.2	-44.4	-45.5
-29.9	-44.1	-44.0

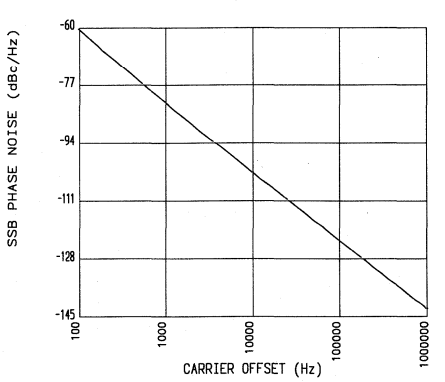
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	+25°C	+85°C
1.0	181.60	184.88	178.08
2.0	189.70	201.58	193.38
3.0	211.25	215.71	207.00
4.0	224.98	229.83	220.17
5.0	238.65	243.63	233.22
6.0	252.53	258.88	247.43
7.0	267.80	273.95	261.75
8.0	282.13	289.35	276.48
9.0	298.35	306.18	292.55
10.0	314.65	322.08	308.05
11.0	329.68	336.13	322.25
12.0	342.40	351.32	336.42
13.0	358.26	367.18	351.48
14.0	373.38	382.00	365.85
15.0	386.98	395.30	378.86
16.0	398.75	406.65	390.35

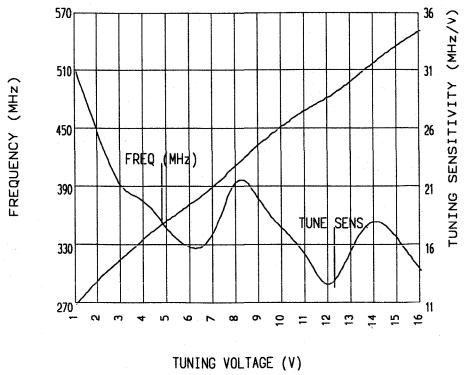
FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.62	0.50
0.28	0.32
0.28	0.30
0.10	0.10
0.20	0.12
0.17	0.17
0.02	0.02
0.41	0.37
0.32	0.33
0.18	0.18
0.10	0.02
0.62	0.58
0.53	0.54
0.42	0.42
0.30	0.28
0.20	0.15

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-60
1000	-82
10000	-102
100000	-122
1000000	-142

POS-535/JTOS-535

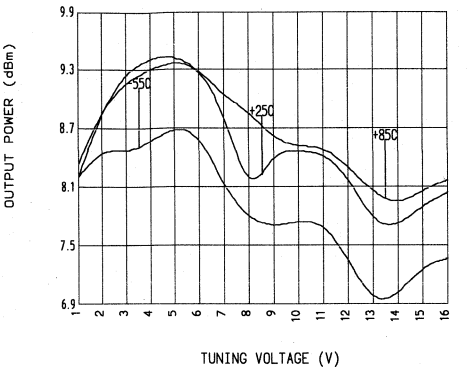
300 to 525 MHz

TUNING CHARACTERISTICS



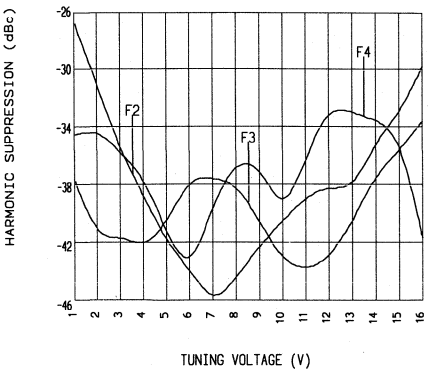
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	278.9	31.5
2.0	304.9	26.0
3.0	325.8	20.9
4.0	346.7	20.9
5.0	364.5	17.8
6.0	380.7	16.2
7.0	397.5	16.8
8.0	421.3	23.9
9.0	441.6	20.3
10.0	459.6	18.0
11.0	476.0	16.3
12.0	487.9	11.9
13.0	504.8	16.8
14.0	524.4	19.6
15.0	541.7	17.3
16.0	556.3	14.6

POWER OUTPUT



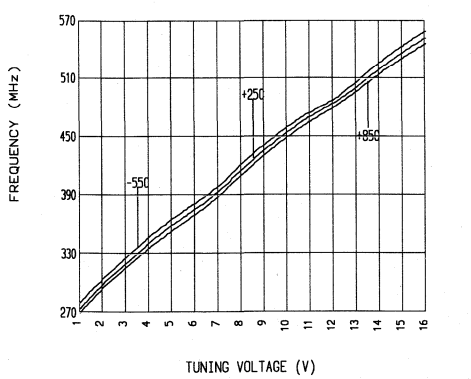
	Pout (dBm)		
	-55°C	+25°C	+85°C
1.0	8.25	8.38	8.25
2.0	8.55	8.95	8.94
3.0	8.49	9.23	9.33
4.0	8.61	9.35	9.47
5.0	8.76	9.43	9.49
6.0	8.70	9.37	9.34
7.0	8.12	8.91	9.07
8.0	7.81	8.00	8.91
9.0	7.73	8.53	8.63
10.0	7.80	8.51	8.55
11.0	7.78	8.49	8.56
12.0	7.40	8.25	8.35
13.0	6.94	7.76	8.08
14.0	7.04	7.73	7.95
15.0	7.34	7.96	8.11
16.0	7.41	8.08	8.21

HARMONICS SUPPRESSION



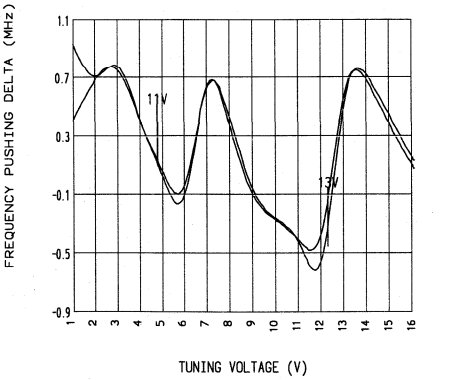
	Harmonics (dBc)		
	F2	F3	F4
1.0	-26.6	-37.3	-34.1
2.0	-30.9	-41.3	-33.7
3.0	-35.3	-40.9	-35.4
4.0	-38.4	-41.9	-37.0
5.0	-41.5	-40.0	-41.0
6.0	-43.3	-36.9	-43.6
7.0	-45.7	-37.1	-38.6
8.0	-43.7	-37.4	-35.8
9.0	-41.6	-40.1	-36.2
10.0	-39.9	-42.7	-39.7
11.0	-38.3	-43.3	-35.7
12.0	-37.6	-42.5	-32.1
13.0	-37.9	-40.0	-32.6
14.0	-34.5	-36.7	-33.1
15.0	-32.7	-35.2	-34.0
16.0	-29.5	-33.2	-41.1

FREQ. VARIATION WITH TEMPERATURE



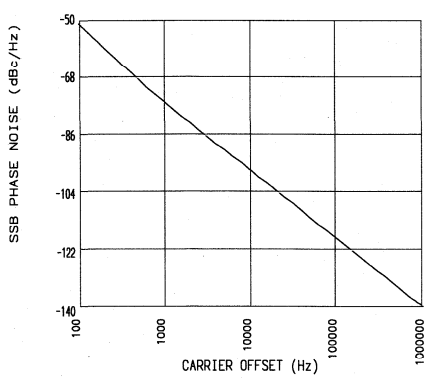
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
1.0	285.03	278.9	274.76
2.0	310.18	304.9	301.16
3.0	331.32	325.8	321.53
4.0	352.76	346.7	341.31
5.0	370.65	364.5	358.75
6.0	386.75	380.7	374.87
7.0	402.92	397.5	393.16
8.0	427.07	421.3	416.08
9.0	446.98	441.6	436.50
10.0	464.80	459.6	454.75
11.0	480.78	476.0	471.03
12.0	490.28	487.9	483.67
13.0	511.07	504.8	500.43
14.0	531.23	524.4	519.33
15.0	548.65	541.7	536.06
16.0	563.30	556.3	550.38

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
	11V	13V
1.0	0.97	0.44
2.0	0.64	0.75
3.0	0.97	0.90
4.0	0.41	0.41
5.0	0.07	0.09
6.0	-0.36	-0.25
7.0	1.04	0.97
8.0	0.35	0.45
9.0	-0.14	-0.12
10.0	-0.23	-0.23
11.0	-0.37	-0.33
12.0	-0.58	-0.87
13.0	0.93	0.92
14.0	0.73	0.77
15.0	0.38	0.45
16.0	0.12	0.17

PHASE NOISE



CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-50
1000	-75
10000	-95
100000	-116
1000000	-137

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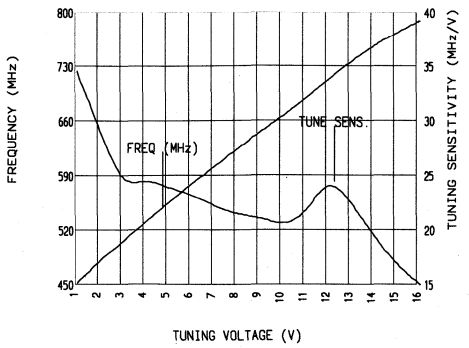
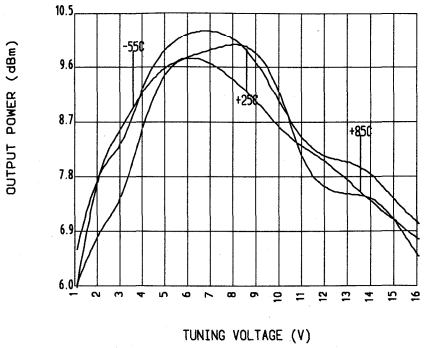
POS-765/JTOS-765

485 to 765 MHz

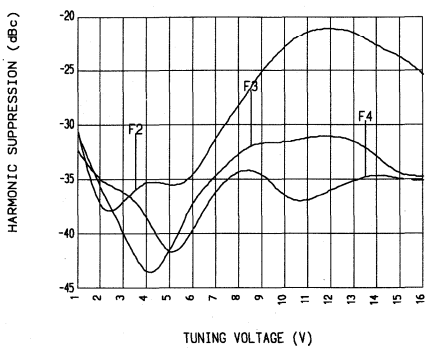
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

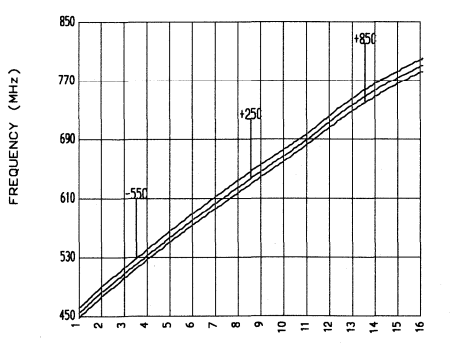


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	458.58	35.0
2.0	488.18	29.6
3.0	512.46	24.3
4.0	537.73	25.3
5.0	562.06	24.3
6.0	585.85	23.8
7.0	608.52	22.7
8.0	630.40	21.9
9.0	652.12	21.7
10.0	672.95	20.8
11.0	694.83	21.9
12.0	720.38	25.5
13.0	743.41	23.0
14.0	763.22	19.8
15.0	780.43	17.2
16.0	795.96	15.5

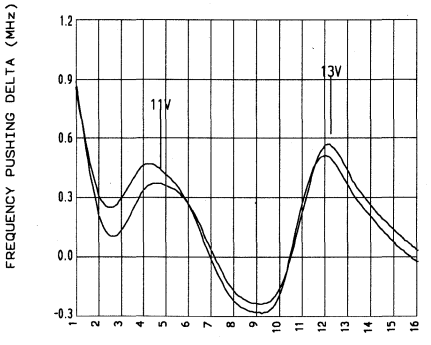
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
1.0	6.03	6.65	6.07
2.0	8.15	8.08	7.02
3.0	8.63	8.25	7.39
4.0	9.31	9.46	8.82
5.0	9.66	9.98	9.64
6.0	9.80	10.21	9.82
7.0	9.91	10.25	9.69
8.0	10.03	10.11	9.41
9.0	9.92	9.71	9.06
10.0	9.24	9.00	8.59
11.0	7.96	8.39	8.31
12.0	7.62	8.13	8.09
13.0	7.54	8.09	7.76
14.0	7.54	7.90	7.41
15.0	7.12	7.42	7.10
16.0	6.53	7.07	6.81

	HARMONICS (dBc)		
V-TUNE	F2	F3	F4
1.0	-30.2	-30.5	-32.0
2.0	-38.7	-35.6	-35.1
3.0	-36.8	-39.5	-35.6
4.0	-34.4	-44.4	-37.8
5.0	-35.5	-41.4	-42.7
6.0	-34.8	-36.3	-39.2
7.0	-30.6	-34.4	-35.5
8.0	-28.0	-32.1	-33.7
9.0	-24.6	-31.2	-33.9
10.0	-22.5	-31.4	-36.6
11.0	-20.9	-30.8	-36.8
12.0	-20.8	-30.7	-35.6
13.0	-21.0	-31.0	-34.8
14.0	-22.6	-32.6	-34.1
15.0	-23.3	-34.4	-34.7
16.0	-25.1	-34.4	-34.8

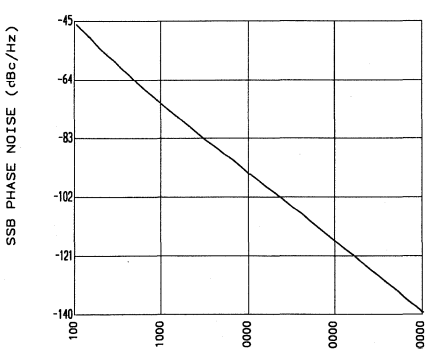
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
1.0	465.25	458.58	452.66
2.0	495.97	488.18	481.77
3.0	520.33	512.46	506.55
4.0	545.93	537.73	531.95
5.0	570.77	562.06	556.06
6.0	594.83	585.85	579.35
7.0	617.68	608.52	601.52
8.0	640.03	630.40	623.18
9.0	661.98	652.12	644.62
10.0	681.98	672.95	665.68
11.0	702.20	694.83	688.36
12.0	728.47	720.38	712.66
13.0	752.52	743.41	734.83
14.0	772.63	763.22	754.73
15.0	789.40	780.43	772.20
16.0	804.72	795.96	787.93

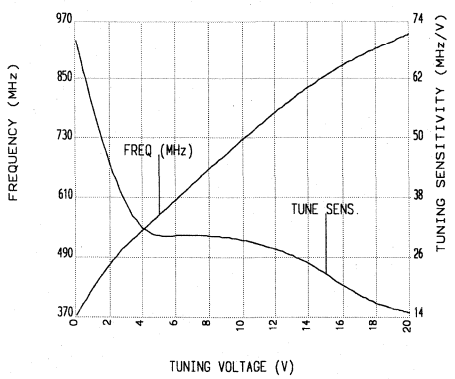
	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
V-TUNE	11V	13V
1.0	0.88	0.92
2.0	0.21	0.10
3.0	0.29	0.10
4.0	0.54	0.41
5.0	0.44	0.39
6.0	0.32	0.32
7.0	-0.02	0.04
8.0	-0.24	-0.19
9.0	-0.27	-0.23
10.0	-0.28	-0.22
11.0	0.36	0.25
12.0	0.62	0.71
13.0	0.36	0.43
14.0	0.22	0.27
15.0	0.08	0.15
16.0	-0.01	0.05

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-46
1000	-74
10000	-95
100000	-117
1000000	-140

POS-900W

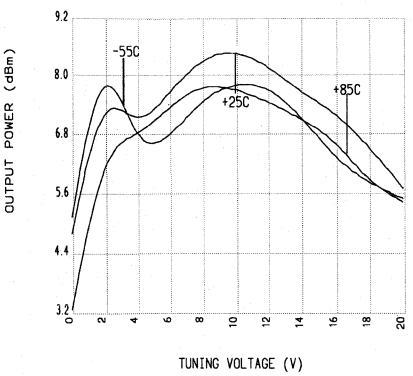
500 to 900 MHz

TUNING CHARACTERISTICS



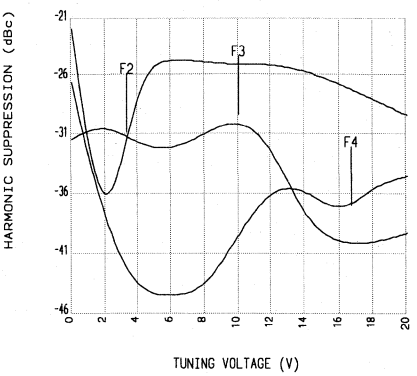
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	372.25	70.29
2.0	485.63	43.09
4.0	547.86	29.77
6.0	609.39	30.79
8.0	670.62	30.60
10.0	731.23	29.94
12.0	788.12	27.86
14.0	839.79	25.17
16.0	883.31	20.36
18.0	917.62	16.44
20.0	948.15	14.94

POWER OUTPUT



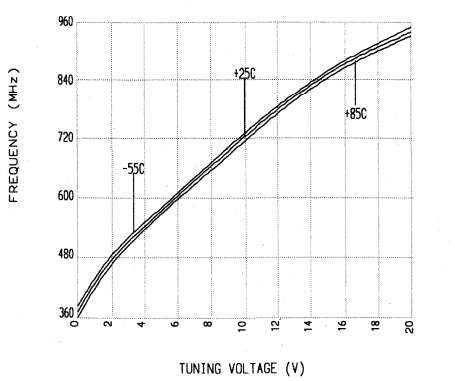
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	5.18	4.84	3.29
2.0	8.84	7.94	6.67
4.0	6.46	6.91	6.81
6.0	6.79	7.76	7.44
8.0	7.60	8.43	7.91
10.0	7.93	8.61	7.80
12.0	7.87	8.26	7.53
14.0	7.21	7.70	7.17
16.0	6.35	7.31	6.75
18.0	5.85	6.61	5.85
20.0	5.55	5.75	5.48

HARMONICS SUPPRESSION



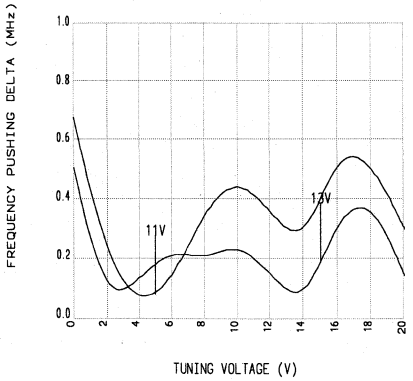
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-21.72	-31.22	-26.39
2.0	-42.06	-29.73	-38.73
4.0	-25.01	-31.68	-44.34
6.0	-24.37	-32.20	-44.53
8.0	-24.61	-30.78	-44.11
10.0	-24.93	-29.26	-39.26
12.0	-24.78	-31.62	-35.12
14.0	-25.39	-38.39	-35.39
16.0	-26.49	-40.16	-37.82
18.0	-27.85	-40.01	-35.01
20.0	-29.15	-39.15	-34.32

FREQ. VARIATION WITH TEMPERATURE



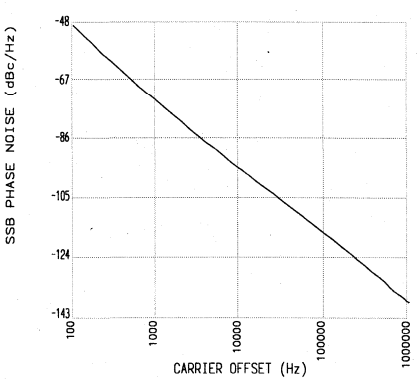
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	383.72	372.25	360.35
2.0	494.94	485.63	475.93
4.0	555.22	547.86	541.43
6.0	615.16	609.39	602.55
8.0	677.59	670.62	662.14
10.0	738.59	731.23	722.04
12.0	794.88	788.12	779.69
14.0	845.79	839.79	832.28
16.0	889.66	883.31	874.86
18.0	925.14	917.62	909.65
20.0	958.19	948.15	940.37

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)		
	11V	13V
0.0	0.69	0.51
2.0	0.20	0.04
4.0	0.03	0.13
6.0	0.12	0.24
8.0	0.37	0.19
10.0	0.49	0.26
12.0	0.36	0.15
14.0	0.23	0.03
16.0	0.58	0.35
18.0	0.54	0.41
20.0	0.30	0.14

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-48
1000	-73
10000	-95
100000	-115
1000000	-138

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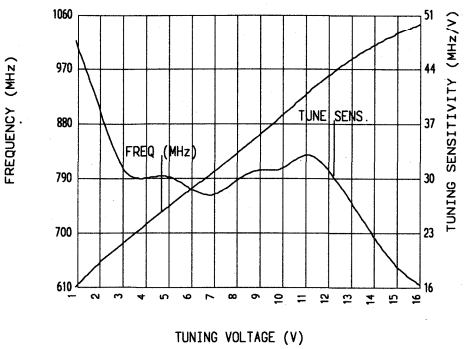
VOLTAGE CONTROLLED OSCILLATORS

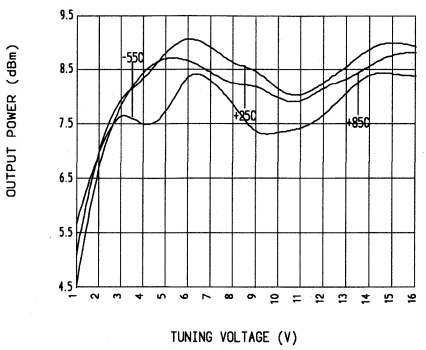
POS-1025/JTOS-1025

685 to 1025 MHz

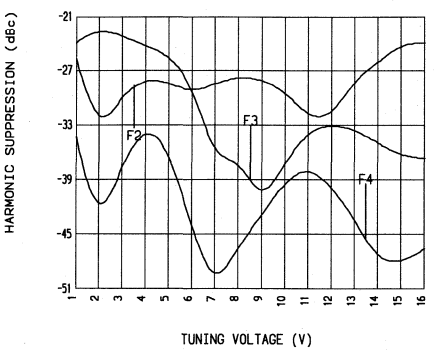
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

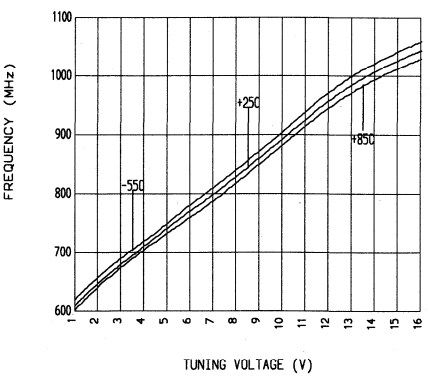


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
1.0	616.50	48.0
2.0	656.40	39.9
3.0	686.95	30.6
4.0	717.23	30.3
5.0	748.42	31.2
6.0	777.42	29.0
7.0	805.13	27.7
8.0	835.47	30.3
9.0	867.33	31.9
10.0	898.35	31.0
11.0	932.78	34.4
12.0	964.68	31.9
13.0	992.13	27.5
14.0	1015.10	23.0
15.0	1034.03	18.9
16.0	1050.93	16.9

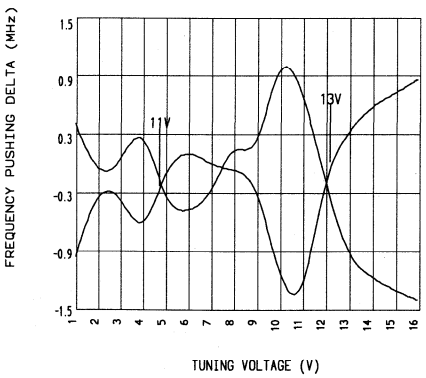
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
1.0	5.72	5.15	4.56
2.0	7.12	7.25	6.98
3.0	7.91	8.11	7.97
4.0	7.45	8.34	8.55
5.0	7.68	8.91	8.81
6.0	8.61	9.19	8.74
7.0	8.39	8.99	8.50
8.0	7.95	8.64	8.27
9.0	7.31	8.58	8.30
10.0	7.42	8.15	8.00
11.0	7.46	8.03	7.92
12.0	7.69	8.32	8.26
13.0	8.15	8.60	8.36
14.0	8.52	8.97	8.63
15.0	8.48	9.09	8.86
16.0	8.44	8.98	8.87

	HARMONICS (dBc)		
V-TUNE	F2	F3	F4
1.0	-25.2	-23.5	-33.8
2.0	-33.6	-21.9	-44.1
3.0	-29.1	-22.8	-36.7
4.0	-27.4	-23.8	-32.4
5.0	-27.9	-24.9	-35.1
6.0	-29.0	-28.0	-43.8
7.0	-28.0	-36.6	-50.7
8.0	-27.2	-36.0	-45.9
9.0	-27.5	-41.3	-42.4
10.0	-28.8	-36.6	-38.7
11.0	-31.8	-33.1	-37.0
12.0	-31.6	-32.4	-39.2
13.0	-27.5	-33.0	-42.8
14.0	-25.7	-34.5	-47.4
15.0	-23.6	-35.9	-47.7
16.0	-23.5	-36.2	-46.1

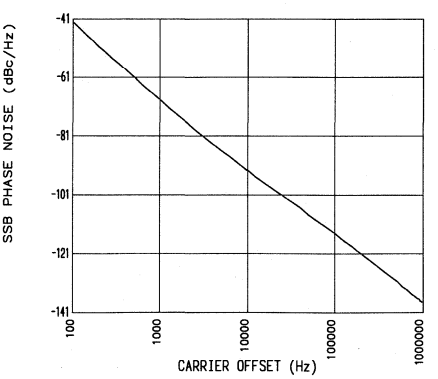
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	+25°C	+85°C
1.0	626.90	616.50	609.08
2.0	667.15	656.40	649.63
3.0	697.26	686.95	681.65
4.0	725.92	717.23	711.85
5.0	755.70	748.42	739.97
6.0	788.73	777.42	766.42
7.0	816.86	805.13	793.90
8.0	846.70	835.47	824.70
9.0	878.96	867.33	856.78
10.0	910.30	898.35	888.22
11.0	946.17	932.78	922.00
12.0	979.23	964.68	952.73
13.0	1007.05	992.13	978.85
14.0	1029.60	1015.10	1001.43
15.0	1048.83	1034.03	1020.18
16.0	1065.93	1050.93	1036.63

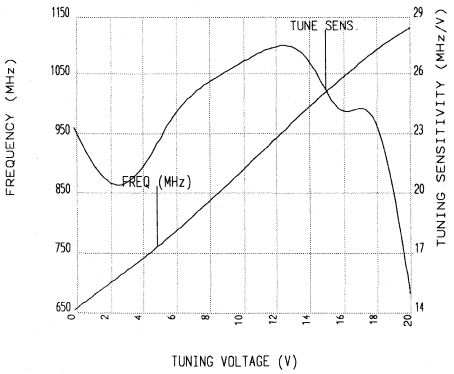
	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
V-TUNE	11V	13V
1.0	0.51	0.87
2.0	-0.07	0.12
3.0	0.08	0.21
4.0	0.60	0.74
5.0	-0.38	-0.08
6.0	-0.42	-0.25
7.0	-0.27	-0.08
8.0	0.38	-0.03
9.0	0.07	0.03
10.0	1.33	1.12
11.0	0.92	1.48
12.0	-0.05	0.00
13.0	-0.90	-0.42
14.0	-1.08	-0.69
15.0	-1.22	-0.82
16.0	-1.32	-0.97

CARRIER OFFSET (Hz)	PHASE NOISE SSB PHASE NOISE (dBc/Hz)
100	-41
1000	-68
10000	-92
100000	-112
1000000	-136

POS-1060

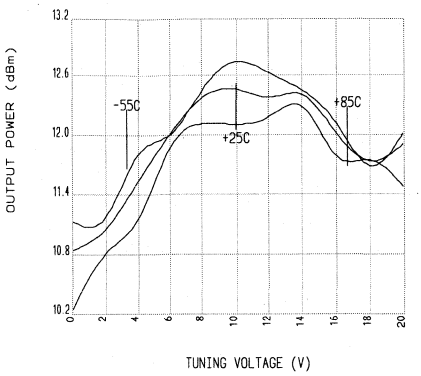
750 to 1060 MHz

TUNING CHARACTERISTICS



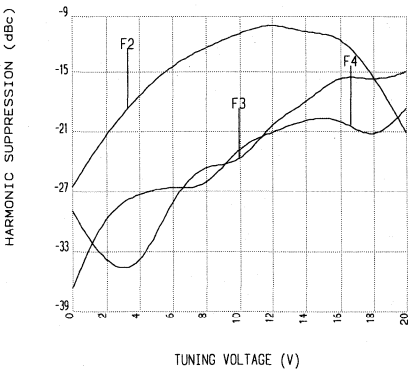
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	653.27	23.35
2.0	696.62	19.99
4.0	736.98	20.73
6.0	783.77	24.32
8.0	834.40	25.69
10.0	887.32	26.61
12.0	941.67	27.64
14.0	997.06	27.49
16.0	1045.32	23.00
18.0	1094.34	25.88
20.0	1129.95	14.94

POWER OUTPUT



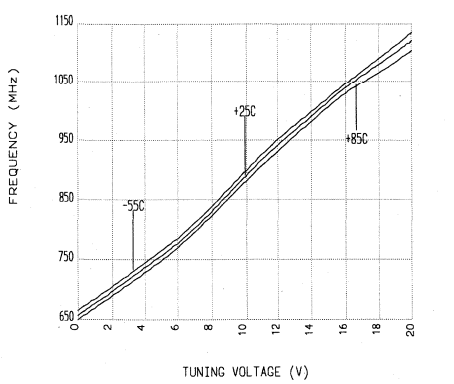
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
0.0	11.14	10.85	10.25
2.0	10.98	10.98	10.90
4.0	12.00	11.56	11.00
6.0	11.90	12.04	12.05
8.0	12.52	12.45	12.15
10.0	12.85	12.52	12.11
12.0	12.63	12.33	12.14
14.0	12.48	12.54	12.51
16.0	12.20	12.00	11.60
18.0	11.49	11.64	11.86
20.0	12.03	11.92	11.49

HARMONICS SUPPRESSION



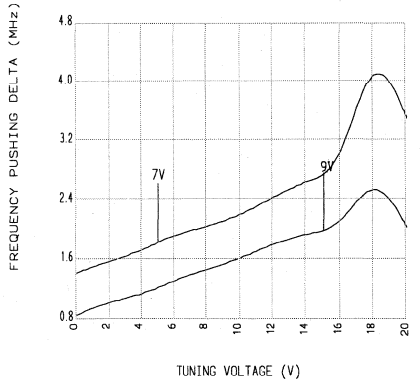
	HARMONICS (dBc)		
V-TUNE	F2	F3	F4
0.0	-26.45	-28.96	-36.75
2.0	-21.14	-34.52	-28.82
4.0	-17.10	-35.34	-27.13
6.0	-13.96	-27.35	-26.30
8.0	-12.30	-23.93	-26.93
10.0	-10.84	-24.58	-22.23
12.0	-9.60	-19.71	-20.91
14.0	-10.84	-17.99	-19.54
16.0	-10.78	-14.74	-19.27
18.0	-14.89	-15.81	-22.11
20.0	-20.96	-14.73	-18.43

FREQ. VARIATION WITH TEMPERATURE



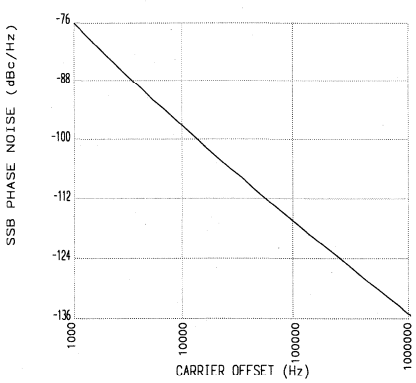
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	667.98	660.15	652.46
2.0	705.71	697.66	690.63
4.0	749.19	741.35	732.14
6.0	786.40	777.56	770.01
8.0	841.58	833.68	826.97
10.0	901.15	893.70	884.16
12.0	959.47	949.31	938.49
14.0	1002.41	994.54	986.85
16.0	1052.01	1046.38	1037.38
18.0	1092.75	1083.05	1067.83
20.0	1138.66	1124.15	1108.01

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc= 8V)	
7V	9V
1.45	0.88
1.60	1.06
1.73	1.14
1.97	1.35
2.04	1.48
2.21	1.63
2.46	1.84
2.69	1.97
2.79	2.02
4.59	2.82
3.52	2.05

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-76
10000	-98
100000	-117
1000000	-135

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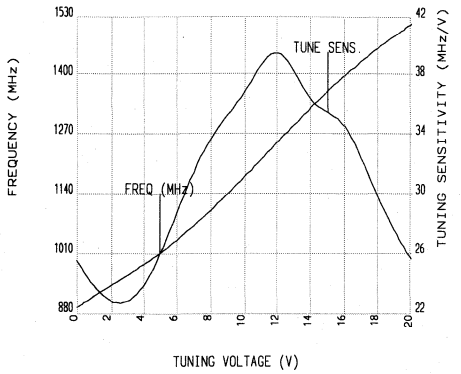
VOLTAGE CONTROLLED OSCILLATORS

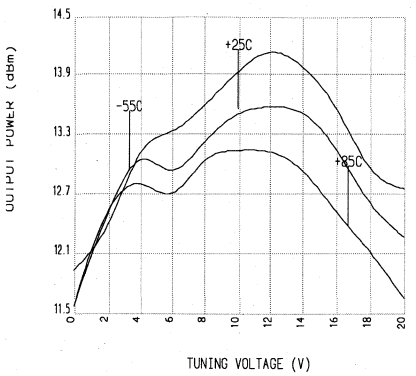
POS-1400

975 to 1400 MHz

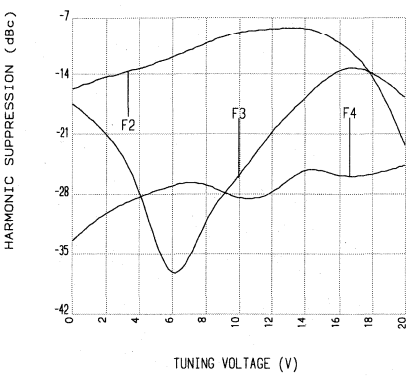
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

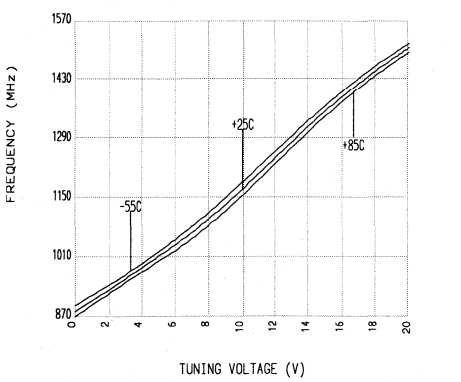


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	889.67	25.5
2.0	937.25	22.08
4.0	982.16	22.93
6.0	1036.71	28.75
8.0	1102.66	34.29
10.0	1174.91	36.29
12.0	1254.48	41.33
14.0	1328.87	35.30
16.0	1400.26	35.67
18.0	1461.24	29.40
20.0	1514.85	25.59

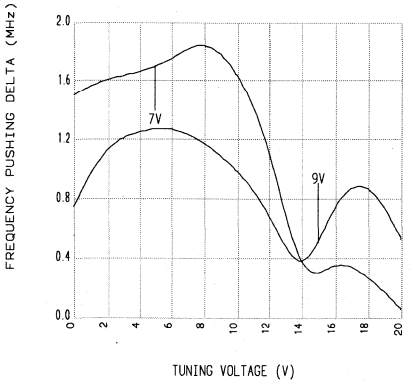
Pout (dBm)		
-55°C	+25°C	+85°C
11.94	11.58	11.58
12.28	12.54	12.66
13.28	13.25	12.92
13.31	12.80	12.57
13.60	13.28	13.15
13.97	13.56	13.15
14.23	13.61	13.17
14.02	13.58	12.98
13.63	13.19	12.51
12.86	12.56	12.14
12.77	12.28	11.66

HARMONICS (dBc)		
F2	F3	F4
-15.25	-17.04	-33.26
-13.76	-20.20	-29.75
-12.89	-25.75	-28.17
-11.50	-41.53	-26.45
-9.88	-29.98	-26.19
-8.29	-25.91	-28.64
-8.11	-20.00	-28.12
-7.57	-16.35	-23.90
-9.49	-12.38	-25.86
-12.67	-12.85	-25.49
-21.92	-16.26	-24.28

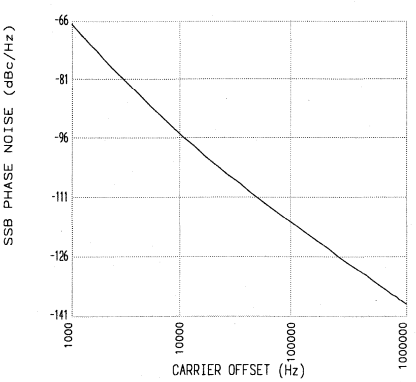
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	+25°C	+85°C
0.0	899.99	886.77	873.63
2.0	948.17	936.19	928.03
4.0	998.45	990.92	981.66
6.0	1056.78	1043.53	1028.83
8.0	1118.07	1103.00	1088.68
10.0	1192.66	1175.97	1160.63
12.0	1267.28	1251.19	1237.87
14.0	1341.63	1328.35	1314.82
16.0	1410.44	1397.85	1386.80
18.0	1472.14	1459.72	1448.22
20.0	1524.12	1514.23	1504.23

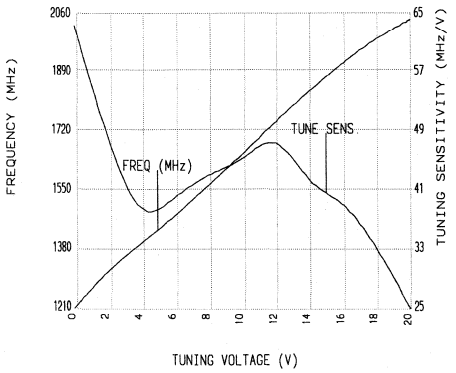
FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=8V)	
7V	9V
1.53	0.77
1.65	1.21
1.67	1.28
1.76	1.31
1.93	1.21
1.71	1.03
1.22	0.75
0.18	0.21
0.43	0.84
0.31	0.99
0.08	0.55

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-66
10000	-96
100000	-117
1000000	-137

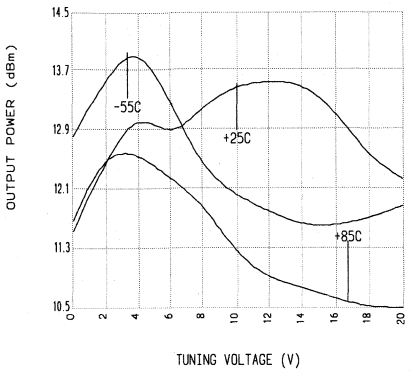
POS-2000

1370 to 2000 MHz

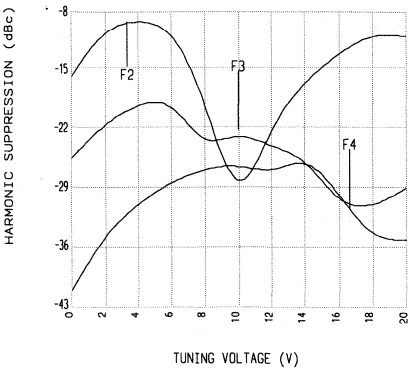
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

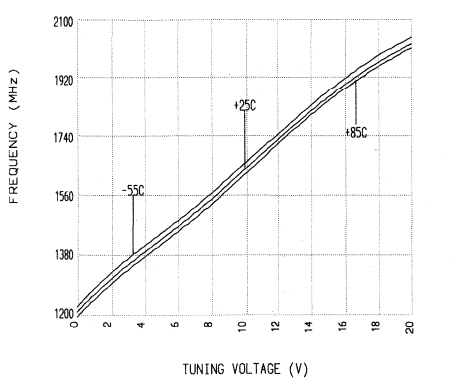


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	1216.48	63.8
2.0	1328.41	48.13
4.0	1404.14	36.26
6.0	1483.17	40.57
8.0	1570.77	43.68
10.0	1658.75	45.03
12.0	1756.84	49.96
14.0	1844.69	41.70
16.0	1925.02	40.23
18.0	1997.81	33.76
20.0	2051.64	25.34

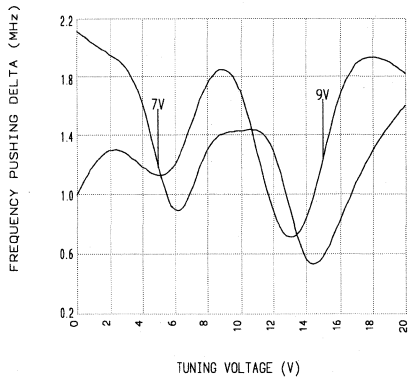
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	12.86	11.58	11.72
2.0	13.66	12.54	12.68
4.0	14.17	13.25	12.65
6.0	13.31	12.80	12.28
8.0	12.40	13.28	11.95
10.0	12.05	13.56	11.24
12.0	11.83	13.61	10.92
14.0	11.64	13.58	10.80
16.0	11.65	13.19	10.65
18.0	11.75	12.56	10.54
20.0	11.92	12.28	10.54

	HARMONICS (dBc)		
	F2	F3	F4
0.0	-15.28	-25.11	-40.78
2.0	-9.36	-20.86	-34.03
4.0	-8.45	-18.61	-30.45
6.0	-9.18	-17.85	-27.85
8.0	-17.67	-24.17	-26.34
10.0	-31.98	-21.82	-25.82
12.0	-20.76	-23.76	-27.09
14.0	-15.87	-24.87	-24.54
16.0	-12.58	-30.75	-29.25
18.0	-10.04	-31.04	-34.87
20.0	-10.50	-28.66	-34.83

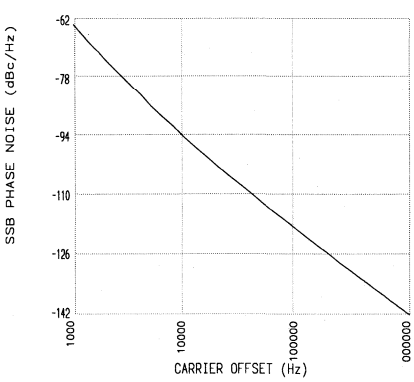
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	+25°C	+85°C
0.0	1236.49	1221.11	1205.83
2.0	1343.30	1324.13	1308.64
4.0	1423.56	1404.20	1389.28
6.0	1497.87	1480.68	1465.34
8.0	1583.67	1564.29	1547.91
10.0	1675.26	1658.05	1640.55
12.0	1768.08	1752.29	1738.70
14.0	1858.48	1840.62	1829.18
16.0	1941.62	1921.86	1910.47
18.0	2013.34	1992.40	1978.92
20.0	2068.65	2047.88	2035.53

FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=8V)		
	7V	9V
0.0	2.16	1.04
2.0	2.00	1.44
4.0	1.88	1.22
6.0	0.56	1.08
8.0	1.50	1.92
10.0	1.44	1.97
12.0	1.57	0.72
14.0	0.29	0.67
16.0	0.86	1.88
18.0	1.37	2.04
20.0	1.65	1.87

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-62
10000	-94
100000	-118
1000000	-141

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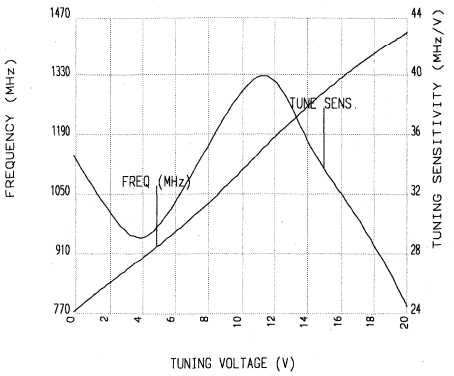
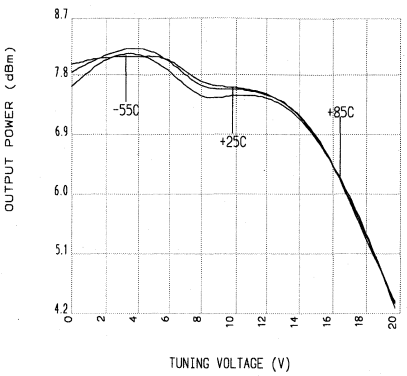
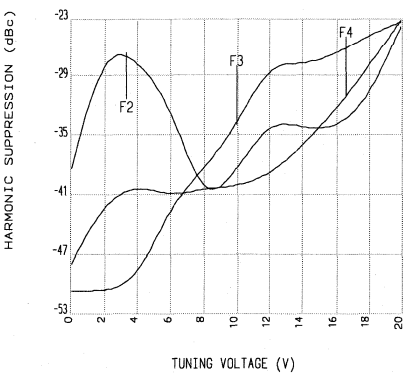
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

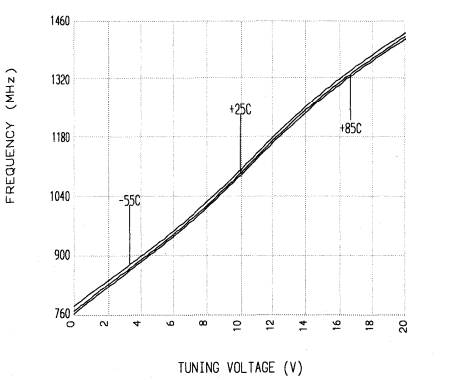


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	774.53	34.65
2.0	840.17	30.99
4.0	897.12	28.07
6.0	958.09	31.26
8.0	1026.58	35.13
10.0	1102.66	39.22
12.0	1184.86	40.91
14.0	1258.25	35.31
16.0	1323.99	32.17
18.0	1383.48	28.85
20.0	1434.85	24.55

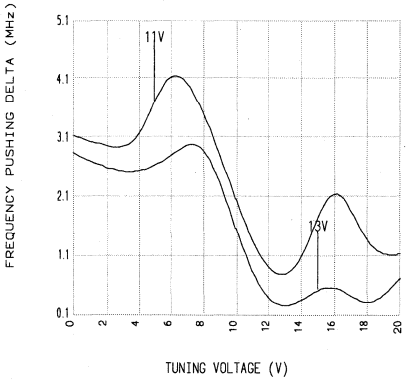
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
0.0	7.99	7.87	7.65
2.0	8.11	8.13	8.09
4.0	8.09	8.29	8.20
6.0	8.15	8.10	7.94
8.0	7.65	7.58	7.41
10.0	7.65	7.62	7.53
12.0	7.57	7.57	7.52
14.0	7.31	7.30	7.26
16.0	6.64	6.59	6.59
18.0	5.44	5.54	5.62
20.0	4.37	4.34	4.28

	HARMONICS (dBc)		
	F2	F3	F4
	-38.30	-50.63	-47.97
	-25.52	-50.69	-41.52
	-27.11	-49.78	-39.78
	-31.63	-41.80	-41.13
	-42.24	-38.41	-40.24
	-38.57	-33.91	-40.07
	-33.15	-27.31	-38.98
	-34.11	-27.77	-35.94
	-34.31	-26.65	-32.31
	-31.33	-24.66	-27.99
	-23.79	-23.29	-23.13

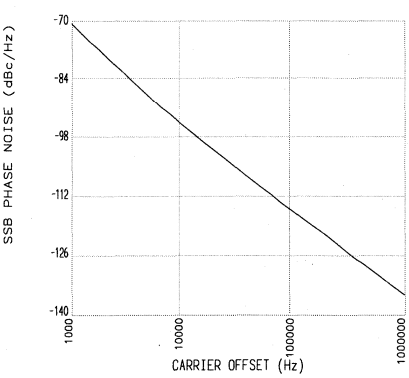
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	786.58	775.04	769.41
2.0	848.61	838.39	832.97
4.0	904.82	896.40	891.43
6.0	965.67	958.01	953.12
8.0	1033.65	1025.80	1020.79
10.0	1110.96	1103.08	1098.09
12.0	1192.50	1184.14	1178.93
14.0	1267.41	1258.92	1253.19
16.0	1332.76	1324.34	1318.94
18.0	1390.63	1382.10	1376.54
20.0	1441.92	1433.14	1427.03

FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
3.22	2.91
3.02	2.64
2.94	2.55
4.65	2.82
3.71	3.34
2.08	1.57
0.72	0.17
0.86	0.38
2.83	0.78
1.14	0.16
1.19	0.78

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-70
10000	-95
100000	-115
1000000	-135

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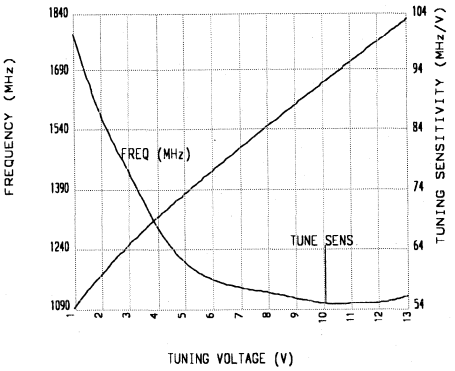
JTOS-1650

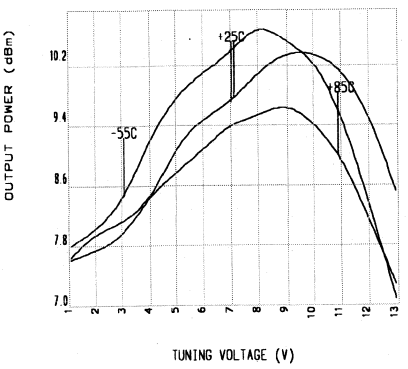
1200 to 1650 MHz

TUNING CHARACTERISTICS



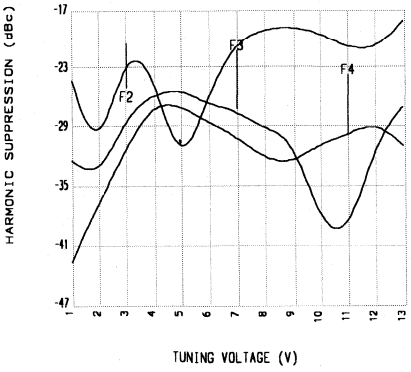
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.00	1490.32	57.94
1.00	1548.26	57.94
2.00	1589.60	41.34
3.00	1623.69	34.08
4.00	1653.76	30.08
5.00	1682.70	28.94
6.00	1714.65	31.95
7.00	1753.61	38.95
8.00	1801.41	47.81
9.00	1854.64	53.22
10.00	1904.73	50.09
11.00	1959.74	55.01
12.00	2013.32	53.58

POWER OUTPUT



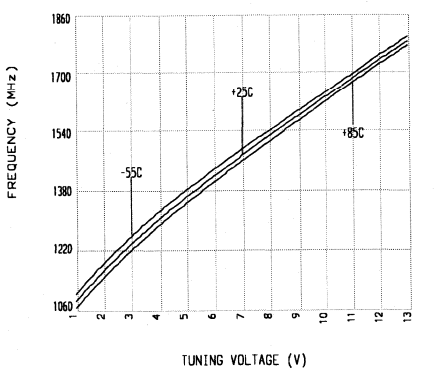
	Pout (dBm)		
	-55°C	+25°C	+85°C
	8.40	8.71	8.94
	9.06	10.01	10.13
	9.19	9.37	9.30
	9.61	10.27	10.19
	9.15	9.81	10.05
	9.78	10.11	9.89
	9.67	10.26	10.29
	9.99	10.46	10.24
	9.93	9.80	9.96
	9.48	10.67	10.72
	9.98	10.39	9.87
	9.19	9.42	9.22
	8.16	9.07	9.62

HARMONICS SUPPRESSION



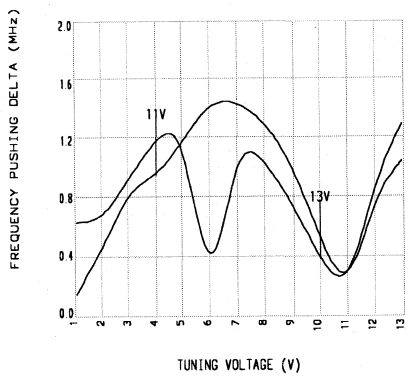
	HARMONICS (dBc)		
	F2	F3	F4
	-13.42	-25.26	-28.76
	-21.73	-27.56	-25.90
	-18.12	-29.45	-26.95
	-15.76	-29.09	-25.59
	-14.04	-29.71	-26.71
	-12.56	-31.40	-28.40
	-11.49	-31.16	-31.49
	-11.13	-31.63	-29.96
	-10.37	-30.03	-32.03
	-9.97	-29.97	-31.80
	-10.47	-29.80	-32.30
	-10.56	-32.56	-32.73
	-11.02	-31.85	-36.02

FREQ. VARIATION WITH TEMPERATURE



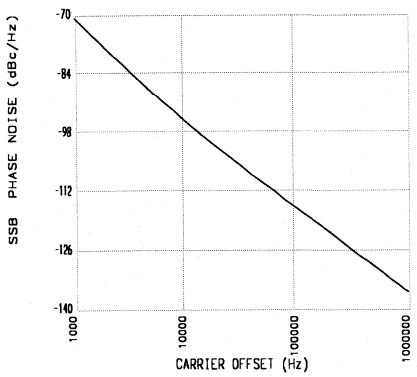
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
1.0	1106.73	1085.63	1067.20
2.0	1190.49	1170.27	1151.71
3.0	1267.65	1246.62	1228.18
4.0	1336.40	1315.12	1297.10
5.0	1394.36	1375.44	1358.98
6.0	1452.60	1434.07	1417.73
7.0	1508.07	1490.42	1475.01
8.0	1561.32	1546.49	1531.62
9.0	1615.27	1601.08	1587.11
10.0	1665.66	1652.87	1641.11
11.0	1719.10	1706.95	1695.58
12.0	1772.48	1758.82	1747.06
13.0	1822.76	1809.17	1797.64

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.16	0.66
0.48	0.67
0.90	0.98
0.98	1.24
1.22	1.39
1.51	0.00
1.51	1.27
1.36	1.09
1.08	0.79
0.54	0.40
0.13	0.14
0.86	0.97
1.09	1.35

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
1000	-70
10000	-95
100000	-115
1000000	-135

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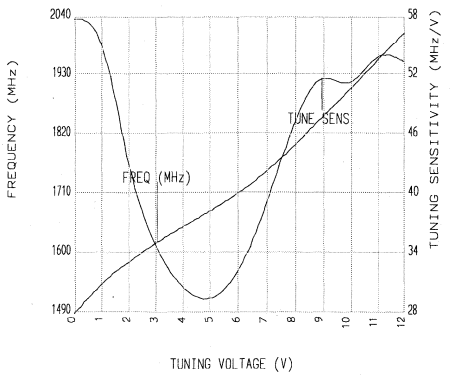
VOLTAGE CONTROLLED OSCILLATORS

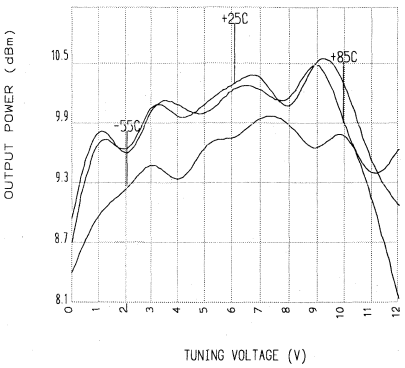
JTOS-1910

1625 to 1910 MHz

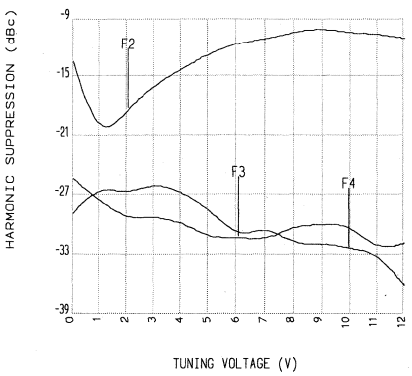
TUNING CHARACTERISTICS



POWER OUTPUT

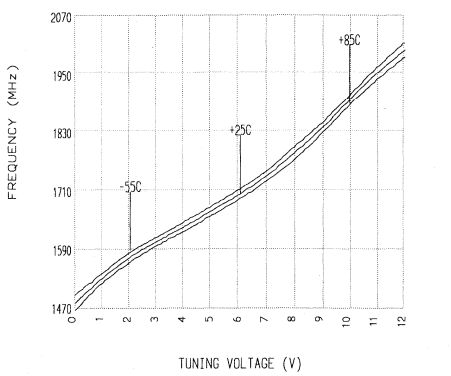


HARMONICS SUPPRESSION

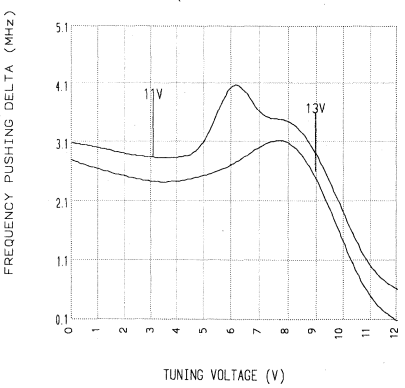


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY	Pout (dBm) -55°C	Pout (dBm) +25°C	Pout (dBm) +85°C	HARMONICS (dBc) F2	HARMONICS (dBc) F3	HARMONICS (dBc) F4
0.0	774.53	34.65	7.99	7.87	7.65	-38.30	-50.63	-47.97
2.0	840.17	30.99	8.11	8.13	8.09	-25.52	-50.69	-41.52
4.0	897.12	28.07	8.09	8.29	8.20	-27.11	-49.78	-39.78
6.0	958.09	31.26	8.15	8.10	7.94	-31.63	-41.80	-41.13
8.0	1026.58	35.13	7.65	7.58	7.41	-42.24	-38.41	-40.24
10.0	1102.66	39.22	7.65	7.62	7.53	-38.57	-33.91	-40.07
12.0	1184.86	40.91	7.57	7.57	7.52	-33.15	-27.31	-38.98
14.0	1258.25	35.31	7.31	7.30	7.26	-34.11	-27.77	-35.94
16.0	1323.99	32.17	6.64	6.59	6.59	-34.31	-26.65	-32.31
18.0	1383.48	28.85	5.44	5.54	5.62	-31.33	-24.66	-27.99
20.0	1434.85	24.55	4.37	4.34	4.28	-23.79	-23.29	-23.13

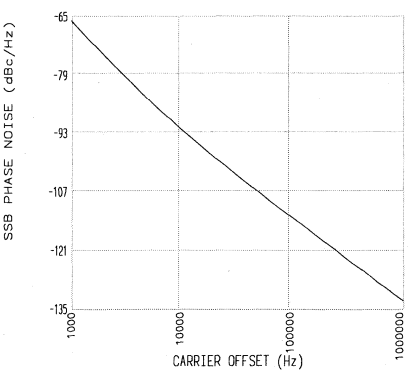
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	FREQUENCY(MHz) +25°C	FREQUENCY(MHz) +85°C
0.0	1508.26	1491.52	1476.39
1.0	1554.05	1544.82	1537.31
2.0	1598.97	1588.83	1577.63
3.0	1627.74	1619.79	1612.58
4.0	1660.60	1649.47	1639.71
5.0	1692.32	1683.38	1673.90
6.0	1725.22	1714.51	1704.68
7.0	1762.37	1753.12	1742.86
8.0	1813.99	1800.67	1784.91
9.0	1861.00	1849.10	1839.73
10.0	1920.01	1911.38	1901.14
11.0	1978.64	1967.46	1953.64
12.0	2028.35	2012.22	1998.63

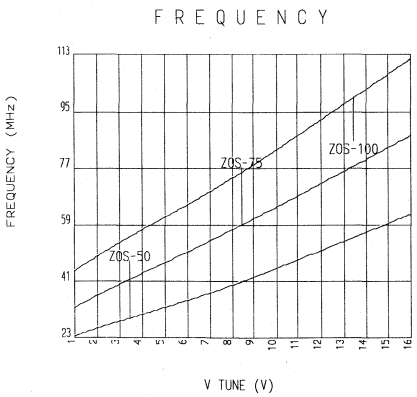
FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V) 11V	13V
3.22	2.91
3.13	2.76
3.02	2.64
2.96	2.54
2.94	2.55
3.07	2.66
4.65	2.82
3.51	3.17
3.71	3.34
3.12	2.72
2.08	1.57
1.00	0.49
0.72	0.17

PHASE NOISE CARRIER OFFSET (Hz)	PHASE NOISE SSB PHASE NOISE (dBc/Hz)
1000	-65
10000	-92
100000	-112
1000000	-132

Frequency (MHz)

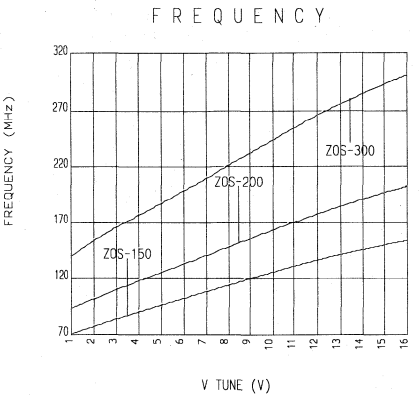
MODELS ZOS-50 to ZOS-1025

V tune (V)	ZOS-50	ZOS-75	ZOS-100	ZOS-150	ZOS-200	ZOS-300	ZOS-400	ZOS-535	ZOS-765	ZOS-1025
1	23.50	32.55	44.10	71.82	94.83	140.88	188.51	285.70	477.80	625.46
2	25.91	36.15	48.55	78.35	102.66	154.48	206.23	310.26	518.50	663.05
3	28.11	39.81	53.01	84.79	110.86	166.25	221.73	330.60	552.11	691.83
4	30.20	43.16	57.00	91.14	118.55	177.26	236.00	348.36	580.51	720.73
5	32.31	46.48	60.88	97.10	125.90	187.63	250.63	365.80	604.58	751.21
6	34.53	49.83	64.85	103.00	133.28	198.85	265.86	383.18	625.96	781.83
7	36.90	53.38	68.97	108.90	140.76	209.53	280.43	400.80	644.60	810.83
8	39.43	56.95	73.26	114.78	148.30	221.15	296.53	416.96	659.96	843.43
9	42.10	60.58	77.73	120.62	156.00	232.70	312.45	438.38	692.20	877.01
10	44.86	64.25	82.38	126.32	163.56	243.51	326.91	461.06	721.35	907.96
11	47.66	67.95	87.12	131.80	171.06	255.20	339.70	480.18	746.93	940.21
12	50.53	71.75	91.98	137.00	178.31	266.06	354.71	497.68	770.05	973.75
13	53.40	75.58	96.88	141.86	185.01	275.51	368.11	513.36	790.50	1002.18
14	56.30	79.46	101.76	146.35	191.46	284.78	379.78	526.45	808.60	1025.31
15	59.21	83.30	106.67	150.49	197.45	293.80	389.98	535.45	824.46	1044.81
16	62.08	87.01	111.52	154.22	202.80	301.78	398.81	546.08	838.33	1061.70



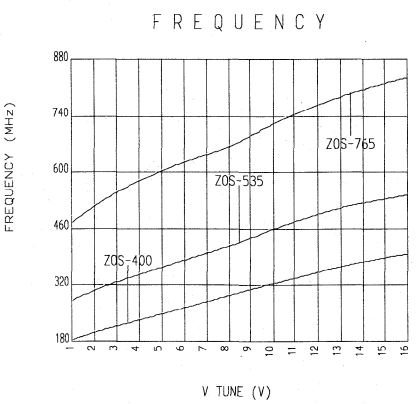
Pout Main (dBm)

V tune (V)	ZOS-50	ZOS-75	ZOS-100	ZOS-150	ZOS-200	ZOS-300	ZOS-400	ZOS-535	ZOS-765	ZOS-1025
1	9.31	9.17	9.93	9.69	10.05	8.85	9.99	8.81	8.07	9.24
2	10.12	9.99	10.09	10.17	10.40	9.42	10.24	9.25	8.50	9.17
3	10.17	9.86	9.98	9.99	10.39	9.53	10.37	9.47	8.67	9.22
4	10.11	9.70	9.89	9.88	10.36	9.60	10.44	9.59	8.93	9.01
5	10.00	9.52	9.78	9.79	10.28	9.71	10.44	9.71	8.74	8.68
6	9.82	9.33	9.69	9.70	10.18	9.68	10.33	9.70	8.75	8.64
7	9.60	9.12	9.57	9.60	10.09	9.65	10.15	9.60	8.72	8.65
8	9.33	8.87	9.42	9.49	10.00	9.61	10.01	9.48	8.53	8.37
9	9.02	8.60	9.28	9.36	9.87	9.65	9.95	9.20	8.46	8.26
10	8.66	8.32	9.11	9.23	9.75	9.59	9.95	9.17	7.97	8.12
11	8.27	8.01	8.93	9.10	9.66	9.46	9.95	9.15	7.84	7.85
12	7.87	7.71	8.71	8.96	9.56	9.32	9.72	8.96	7.68	7.75
13	7.46	7.40	8.53	8.82	9.46	9.24	9.56	8.83	7.34	7.72
14	7.05	7.09	8.33	8.70	9.37	9.14	9.41	8.56	7.03	7.68
15	6.61	6.81	8.13	8.55	9.30	9.03	9.28	8.25	6.72	7.65
16	6.20	6.53	7.94	8.43	9.25	8.96	9.15	8.00	6.47	7.52



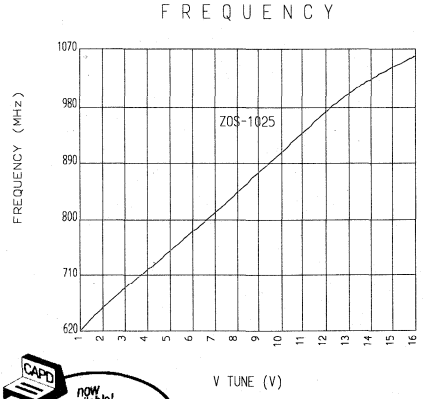
Pout Aux (dBm)

V tune (V)	ZOS-50	ZOS-75	ZOS-100	ZOS-150	ZOS-200	ZOS-300	ZOS-400	ZOS-535	ZOS-765	ZOS-1025
1	-12.65	-12.92	-12.25	-12.22	-12.03	-14.73	-12.23	-13.80	-14.68	-12.87
2	-11.76	-11.94	-11.43	-11.45	-11.27	-13.51	-12.05	-13.41	-14.38	-12.31
3	-11.40	-11.58	-11.42	-11.35	-11.15	-13.13	-11.89	-13.25	-14.26	-12.31
4	-11.41	-11.70	-11.49	-11.46	-11.16	-13.10	-11.80	-13.18	-14.10	-12.46
5	-11.45	-11.80	-11.59	-11.54	-11.22	-13.01	-11.82	-13.10	-14.11	-12.60
6	-11.57	-12.03	-11.63	-11.61	-11.28	-12.89	-12.00	-13.09	-14.26	-12.68
7	-11.75	-12.16	-11.72	-11.69	-11.35	-12.97	-12.22	-13.24	-14.34	-12.77
8	-11.96	-12.28	-11.84	-11.76	-11.48	-13.02	-12.39	-13.40	-14.60	-12.90
9	-12.18	-12.47	-11.89	-11.83	-11.58	-13.06	-12.50	-13.73	-14.65	-12.95
10	-12.38	-12.70	-12.02	-11.97	-11.64	-13.12	-12.51	-13.81	-15.07	-12.98
11	-12.67	-12.91	-12.13	-12.10	-11.78	-13.21	-12.52	-13.85	-15.53	-13.03
12	-12.99	-13.14	-12.25	-12.18	-11.85	-13.28	-12.86	-14.05	-15.49	-13.16
13	-13.28	-13.36	-12.31	-12.26	-11.91	-13.39	-13.02	-14.23	-15.68	-13.13
14	-13.50	-13.64	-12.46	-12.37	-12.03	-13.43	-13.20	-14.50	-15.98	-13.04
15	-13.86	-13.78	-12.67	-12.49	-12.06	-13.67	-13.36	-14.81	-16.62	-13.07
16	-14.13	-14.01	-12.87	-12.58	-12.12	-13.73	-13.50	-15.12	-16.96	-13.05



2nd Harmonics (dBc)

V tune (V)	ZOS-50	ZOS-75	ZOS-100	ZOS-150	ZOS-200	ZOS-300	ZOS-400	ZOS-535	ZOS-765	ZOS-1025
1	-19.65	-27.16	-28.74	-27.29	-28.13	-29.83	-23.71	-30.14	-30.20	-23.08
2	-19.30	-23.33	-27.06	-23.77	-23.61	-51.35	-21.72	-29.70	29.40	-23.55
3	-19.84	-24.03	-27.26	-24.75	-23.06	-37.59	-21.04	-27.37	28.91	-25.07
4	-20.45	-24.85	-27.49	-25.29	-22.86	-33.84	-20.74	-26.61	-27.49	-25.56
5	-21.50	-25.83	-27.88	-25.52	-23.12	-30.94	-21.03	-25.72	-27.76	-25.20
6	-22.49	-26.46	-28.29	-25.90	-23.84	-30.38	-21.38	-25.83	-27.27	-27.57
7	-23.94	-27.23	-28.67	-25.95	-24.41	-29.80	-22.02	-25.85	-26.41	-29.74
8	-25.50	-27.80	-29.02	-26.15	-24.79	-29.44	-22.99	-25.38	-26.23	-28.96
9	-27.67	-28.37	-29.21	-26.36	-25.47	-28.47	-24.06	-26.07	-27.14	-28.21
10	-30.30	-28.75	-29.87	-26.74	-26.32	-28.69	-24.70	-27.02	-28.02	-28.09
11	-33.74	-28.77	-30.86	-27.10	-26.89	-29.37	-25.17	-27.78	-29.37	-28.07
12	-38.17	-28.65	-31.62	-27.44	-27.29	-30.03	-25.88	-28.24	-30.25	-28.22
13	-44.90	-28.33	-32.10	-27.79	-27.52	-30.44	-26.89	-29.07	-30.58	-28.76
14	-47.31	-27.85	-32.38	-28.49	-27.75	-30.49	-28.22	-30.11	-31.43	-27.89
15	-41.55	-27.90	-32.81	-28.99	-28.17	-31.53	-30.60	-30.67	-32.50	-28.03
16	-38.14	-28.12	-33.28	-29.87	-28.24	-32.27	-31.56	-31.58	-33.24	-28.20



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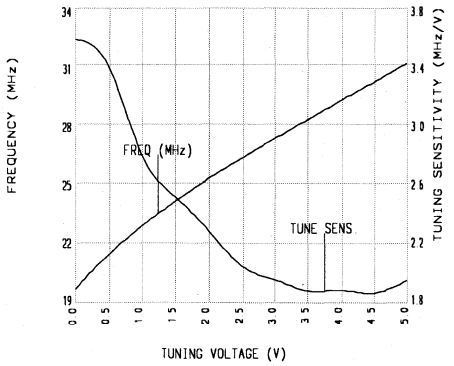
POS-50P/JTOS-50P

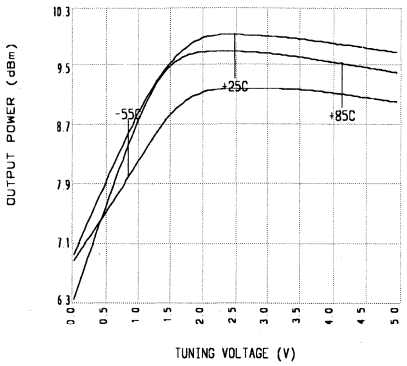
24 to 29 MHz

TUNING CHARACTERISTICS



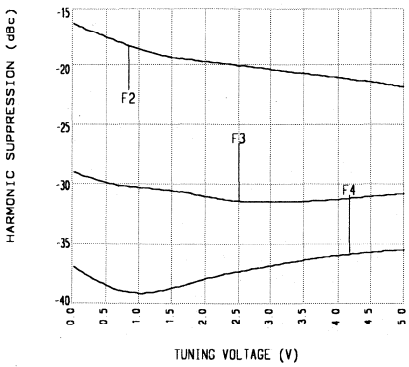
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	19.87	3.64
0.5	21.68	3.59
1.0	23.17	2.74
1.5	24.38	2.57
2.0	25.60	2.33
2.5	26.65	2.03
3.0	27.66	1.99
3.5	28.61	1.87
4.0	29.58	1.92
4.5	30.52	1.85
5.0	31.49	1.97

POWER OUTPUT



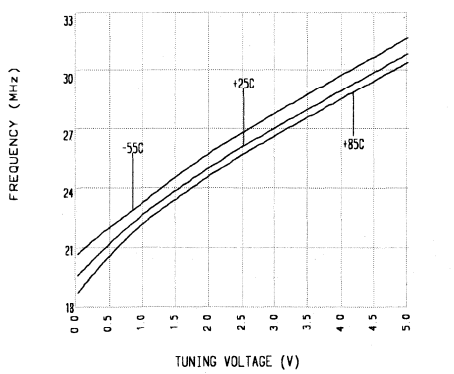
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	6.92	6.99	6.38
0.5	7.58	8.01	7.68
1.0	8.30	9.01	8.94
1.5	8.99	9.68	9.70
2.0	9.27	10.03	9.80
2.5	9.29	10.03	9.80
3.0	9.29	10.01	9.77
3.5	9.27	9.97	9.72
4.0	9.23	9.91	9.65
4.5	9.16	9.85	9.58
5.0	9.10	9.78	9.50

HARMONICS SUPPRESSION



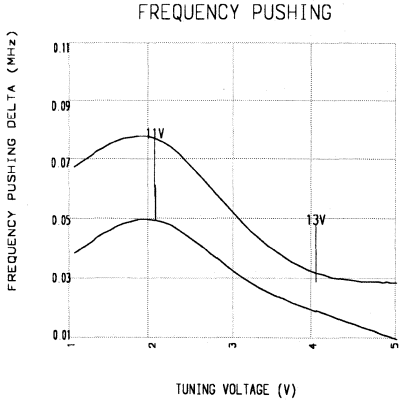
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-15.51	-28.42	-36.61
0.5	-16.74	-29.48	-38.42
1.0	-17.90	-29.78	-39.10
1.5	-18.60	-29.95	-38.48
2.0	-18.92	-30.54	-37.60
2.5	-19.22	-31.00	-36.99
3.0	-19.57	-31.04	-36.50
3.5	-19.95	-31.01	-35.98
4.0	-20.26	-30.78	-35.60
4.5	-20.69	-30.54	-35.34
5.0	-21.04	-30.28	-35.11

FREQ. VARIATION WITH TEMPERATURE



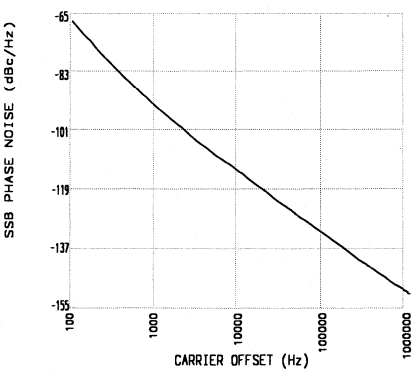
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	21.03	19.87	19.00
0.5	22.51	21.68	21.07
1.0	23.72	23.17	22.73
1.5	25.14	24.38	23.94
2.0	26.34	25.60	25.16
2.5	27.42	26.65	26.25
3.0	28.43	27.66	27.24
3.5	29.40	28.61	28.20
4.0	30.37	29.58	29.14
4.5	31.34	30.52	30.08
5.0	32.32	31.49	31.03

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
	11V	13V
0.0		
0.5		
1.0	.04	.07
1.5		
2.0	.06	.09
2.5		
3.0	.03	.05
3.5		
4.0	.02	.03
4.5		
5.0	.01	.03

PHASE NOISE

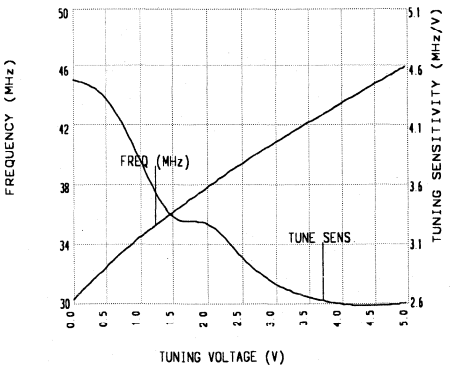


PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-65
1000	-93
10000	-112
100000	-132
1000000	-150

POS-75P/JTOS-75P

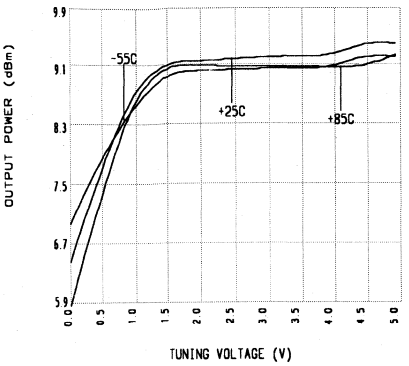
35 to 43 MHz

TUNING CHARACTERISTICS



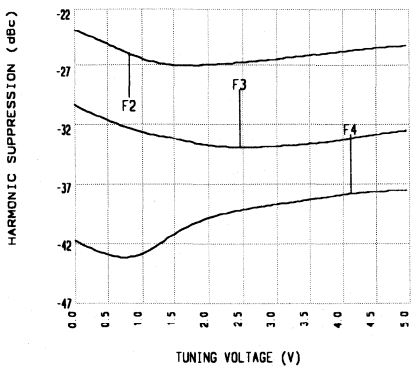
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	30.60	4.56
0.5	32.86	4.50
1.0	34.90	3.92
1.5	36.61	3.26
2.0	38.30	3.43
2.5	39.86	3.04
3.0	41.28	2.80
3.5	42.63	2.69
4.0	43.96	2.63
4.5	45.26	2.61
5.0	46.59	2.64

POWER OUTPUT



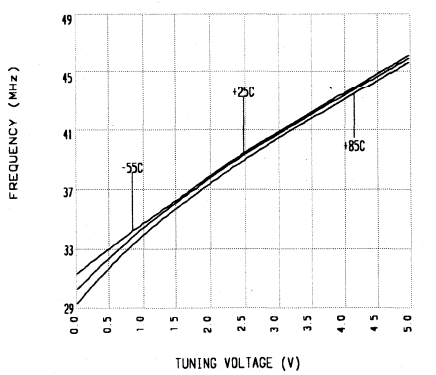
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	7.04	6.52	5.91
0.5	7.99	7.85	7.50
1.0	8.68	8.94	8.84
1.5	9.13	9.28	9.24
2.0	9.14	9.27	9.21
2.5	9.16	9.30	9.21
3.0	9.17	9.33	9.21
3.5	9.18	9.34	9.21
4.0	9.17	9.33	9.19
4.5	9.35	9.53	9.18
5.0	9.33	9.51	9.35

HARMONICS SUPPRESSION



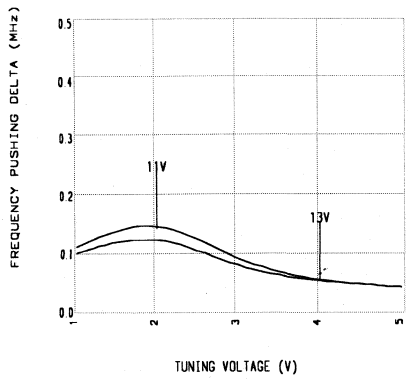
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-22.90	-29.40	-41.07
0.5	-24.07	-30.73	-42.57
1.0	-25.49	-31.82	-42.66
1.5	-26.11	-32.27	-40.44
2.0	-25.93	-32.93	-39.10
2.5	-25.79	-33.13	-38.46
3.0	-25.49	-32.99	-37.99
3.5	-25.17	-32.83	-37.67
4.0	-24.82	-32.49	-37.16
4.5	-24.50	-32.00	-36.83
5.0	-24.31	-31.65	-36.81

FREQ. VARIATION WITH TEMPERATURE



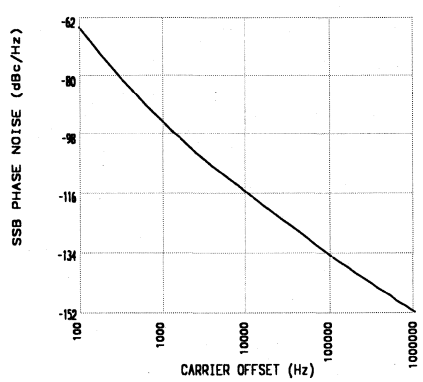
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	31.69	30.60	29.65
0.5	33.49	32.86	32.22
1.0	35.18	34.90	34.44
1.5	36.74	36.61	36.22
2.0	38.45	38.30	37.90
2.5	39.99	39.86	39.51
3.0	41.40	41.28	40.95
3.5	42.76	42.63	42.32
4.0	44.10	43.96	43.66
4.5	45.43	45.26	44.98
5.0	46.78	46.59	46.30

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
	11V	13V
0.0		
0.5		
1.0	.11	.12
1.5		
2.0	.15	.18
2.5		
3.0	.08	.09
3.5		
4.0	.06	.06
4.5		
5.0	.05	.05

PHASE NOISE



	PHASE NOISE	
	CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
0.0		
0.5		
1.0	100	-62
1.5		
2.0	1000	-93
2.5		
3.0	10000	-113
3.5		
4.0	100000	-133
4.5		
5.0	1000000	-150

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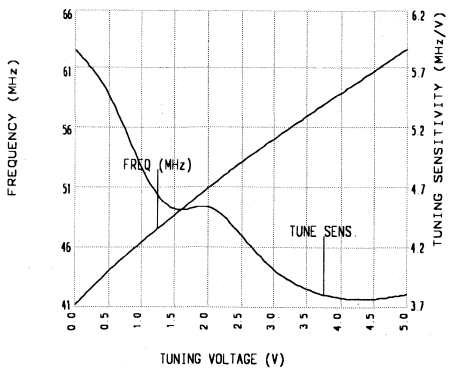
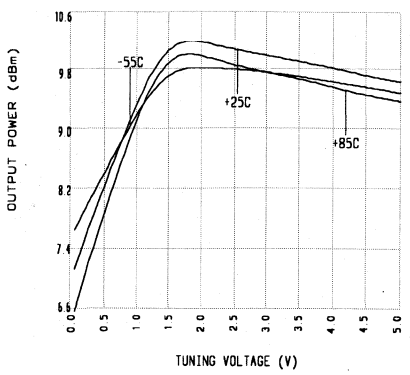
TUNING CHARACTERISTICS



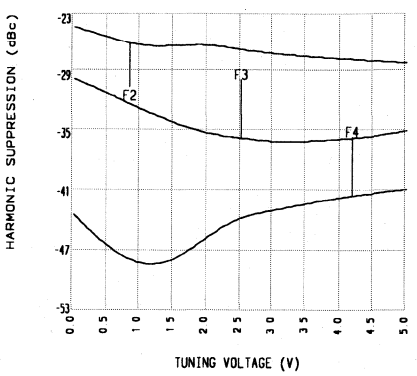
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	41.46	5.93
0.5	44.35	5.63
1.0	46.87	4.88
1.5	49.15	4.47
2.0	51.45	4.68
2.5	53.69	4.35
3.0	55.73	4.02
3.5	57.68	3.87
4.0	59.59	3.80
4.5	61.49	3.79
5.0	63.41	3.84

POWER OUTPUT



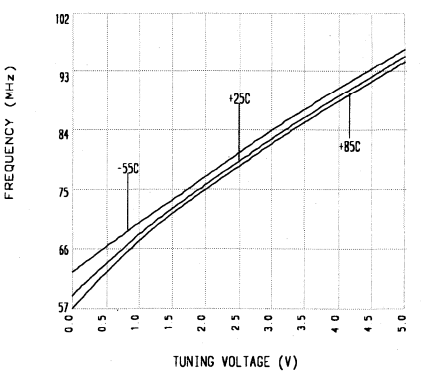
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	6.74	6.13	5.35
0.5	7.91	7.47	6.96
1.0	8.81	8.88	8.52
1.5	9.09	9.22	8.91
2.0	9.08	9.13	8.86
2.5	9.08	9.09	8.84
3.0	9.02	9.04	8.80
3.5	8.98	8.98	8.77
4.0	8.93	8.95	8.73
4.5	8.88	8.90	8.70
5.0	8.82	8.86	8.66

HARMONICS SUPPRESSION



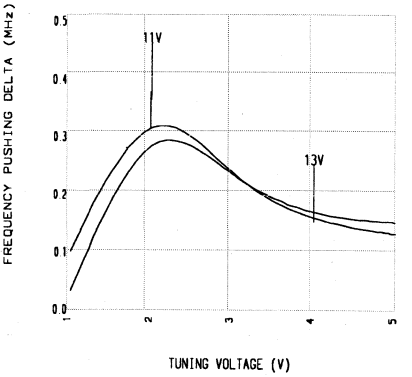
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-32.96	-33.12	-41.12
0.5	-31.13	-34.63	-42.80
1.0	-29.85	-37.02	-45.35
1.5	-35.52	-37.86	-44.86
2.0	-33.60	-37.60	-43.10
2.5	-33.73	-37.06	-41.89
3.0	-34.02	-36.35	-41.52
3.5	-34.13	-35.96	-40.63
4.0	-34.43	-35.43	-40.10
4.5	-34.71	-34.88	-39.71
5.0	-34.84	-34.17	-39.17

FREQ. VARIATION WITH TEMPERATURE



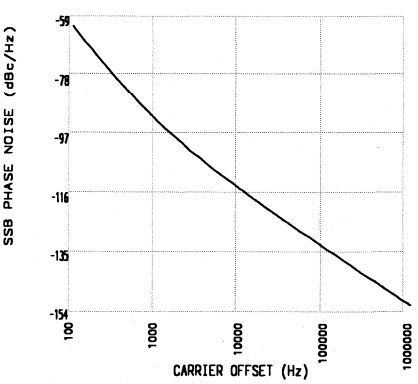
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	43.34	41.46	40.21
0.5	45.64	44.35	43.52
1.0	47.75	46.87	46.32
1.5	49.80	49.15	48.75
2.0	52.13	51.45	51.10
2.5	54.35	53.69	53.32
3.0	56.37	55.73	55.34
3.5	58.30	57.68	57.28
4.0	60.19	59.59	59.18
4.5	62.07	61.49	61.06
5.0	63.98	63.41	62.97

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
	11V	13V
0.0		
0.5		
1.0	0.02	0.03
1.5		
2.0	0.28	0.14
2.5		
3.0	0.22	0.22
3.5		
4.0	0.15	0.15
4.5		
5.0	0.13	0.12

PHASE NOISE

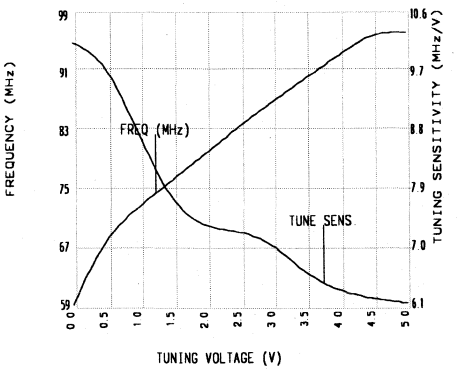


PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-59
1000	-91
10000	-112
100000	-131
1000000	-149

POS-150P/JTOS-150P

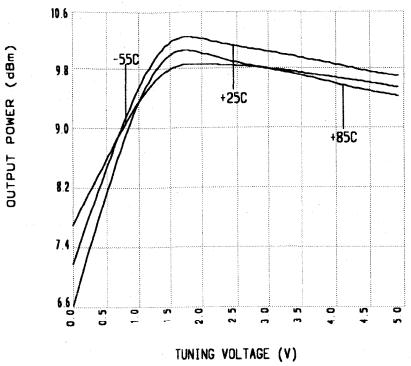
72 to 91 MHz

TUNING CHARACTERISTICS



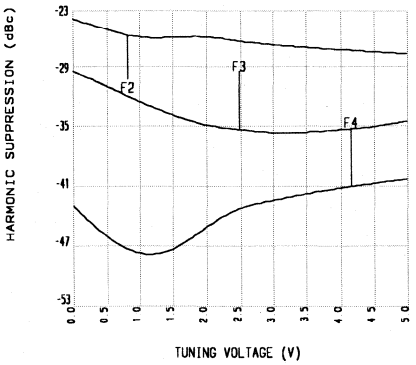
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	59.60	10.24
0.5	64.66	9.99
1.0	69.22	8.82
1.5	73.21	7.70
2.0	76.93	7.36
2.5	80.54	7.32
3.0	84.18	7.12
3.5	87.54	6.61
4.0	90.75	6.36
4.5	93.89	6.24
5.0	96.99	6.18

POWER OUTPUT



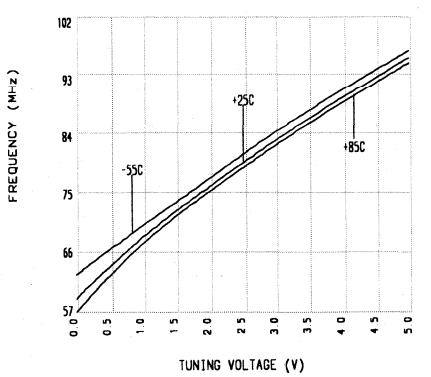
Pout (dBm)		
-55°C	+25°C	+85°C
7.72	7.18	6.61
8.59	8.46	8.11
9.43	9.62	9.45
9.95	10.36	10.19
9.95	10.30	10.11
9.93	10.19	9.97
9.89	10.12	9.88
9.83	10.03	9.79
9.75	9.95	9.68
9.69	9.84	9.57
9.61	9.76	9.49

HARMONICS SUPPRESSION



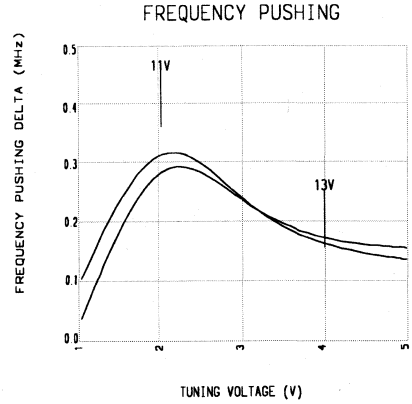
HARMONICS (dBc)		
F2	F3	F4
-23.33	-28.83	-42.83
-24.44	-30.27	-46.11
-25.46	-31.96	-48.13
-25.37	-33.37	-47.70
-25.17	-34.51	-45.01
-25.73	-34.90	-42.90
-26.16	-35.33	-42.33
-26.40	-35.24	-41.57
-26.66	-34.99	-40.99
-26.88	-34.71	-40.55
-27.11	-34.11	-40.11

FREQ. VARIATION WITH TEMPERATURE



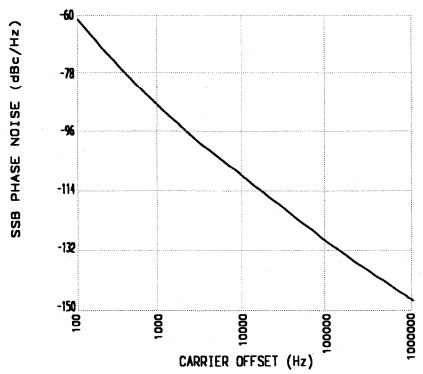
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	63.31	59.60	57.51
0.5	67.21	64.66	63.26
1.0	70.96	69.22	68.25
1.5	74.52	73.21	72.43
2.0	78.14	76.93	76.19
2.5	81.92	80.54	79.77
3.0	85.50	84.18	83.40
3.5	88.81	87.54	86.76
4.0	91.97	90.75	89.97
4.5	95.04	93.89	93.10
5.0	98.10	96.99	96.21

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.04	0.11
0.37	0.40
0.23	0.23
0.17	0.16
0.16	0.14

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-60
1000	-89
10000	-109
100000	-127
1000000	-147

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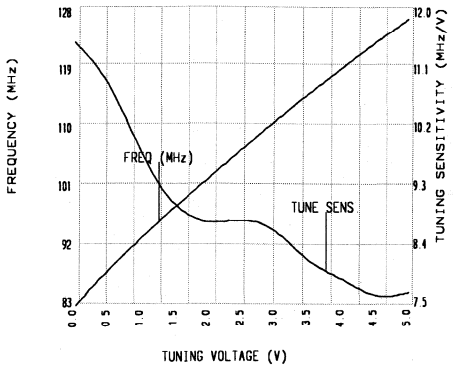
VOLTAGE CONTROLLED OSCILLATORS

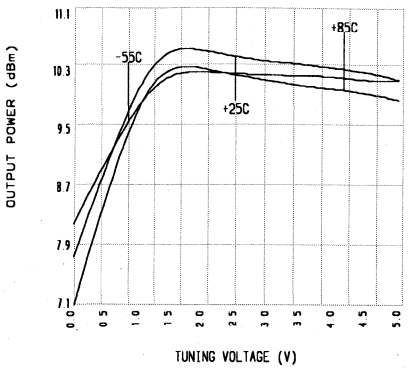
POS-200P/JTOS-200P

95 to 120 MHz

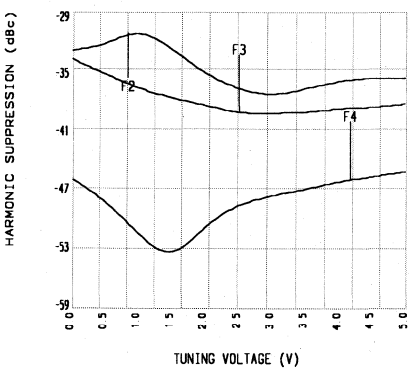
TUNING CHARACTERISTICS



POWER OUTPUT

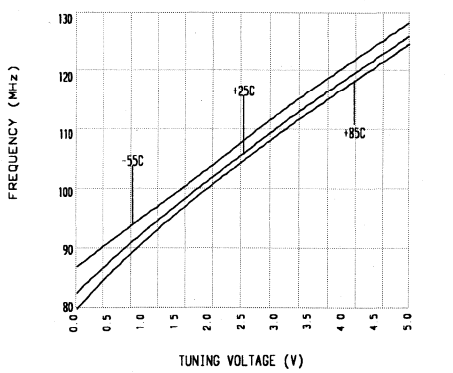


HARMONICS SUPPRESSION

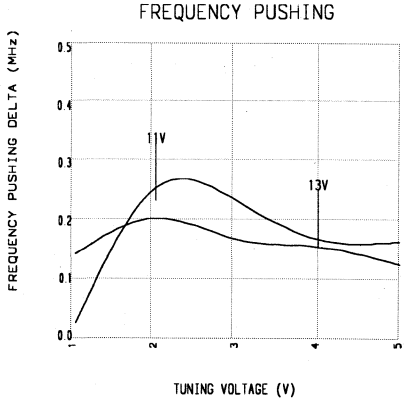


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY	Pout (dBm) -55°C	Pout (dBm) +25°C	Pout (dBm) +85°C	HARMONICS (dBc) F2	HARMONICS (dBc) F3	HARMONICS (dBc) F4
0.0	83.24	11.60	8.25	7.79	7.13	-32.16	-33.00	-45.50
0.5	88.92	11.10	9.13	9.06	8.66	-31.60	-34.60	-47.60
1.0	93.96	9.79	9.95	10.22	9.98	-29.76	-36.09	-51.26
1.5	98.54	8.99	10.35	10.71	10.47	-31.90	-37.06	-54.06
2.0	103.01	8.77	10.35	10.65	10.40	-34.67	-37.84	-50.17
2.5	107.36	8.89	10.32	10.55	10.30	-36.20	-38.70	-48.03
3.0	111.84	8.75	10.30	10.49	10.23	-36.97	-38.64	-47.14
3.5	115.96	8.14	10.30	10.46	10.15	-36.08	-38.58	-46.58
4.0	119.97	7.95	10.28	10.40	10.11	-35.35	-38.18	-45.68
4.5	123.82	7.60	10.22	10.35	10.06	-34.97	-38.13	-45.30
5.0	127.66	7.72	10.23	10.23	9.95	-35.08	-37.75	-44.75

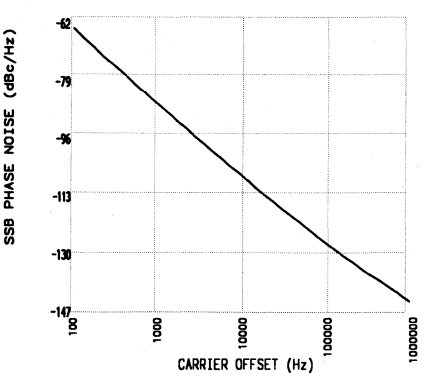
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



V-TUNE	FREQUENCY(MHz) -55°C	FREQUENCY(MHz) +25°C	FREQUENCY(MHz) +85°C
0.0	87.77	83.24	80.40
0.5	92.32	88.92	86.83
1.0	96.60	93.96	92.34
1.5	100.73	98.54	97.18
2.0	104.99	103.01	101.73
2.5	109.57	107.36	106.12
3.0	114.11	111.84	110.50
3.5	118.25	115.96	114.62
4.0	122.24	119.97	118.56
4.5	126.11	123.82	122.40
5.0	129.94	127.66	126.28

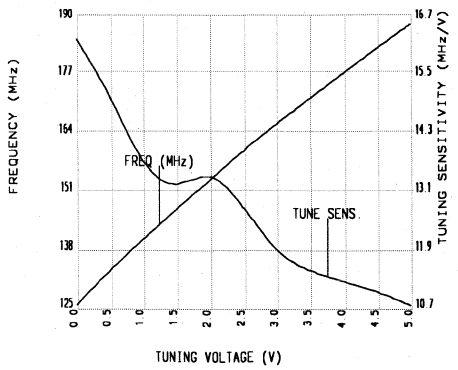
FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V) 11V	13V
0.15	0.03
0.24	0.33
0.16	0.24
0.17	0.16
0.13	0.17

PHASE NOISE CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-62
1000	-85
10000	-107
100000	-128
1000000	-145

POS-300P/JTOS-300P

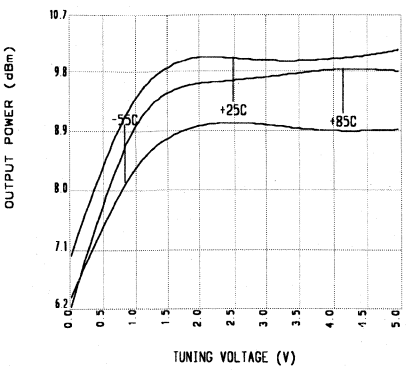
148 to 174 MHz

TUNING CHARACTERISTICS



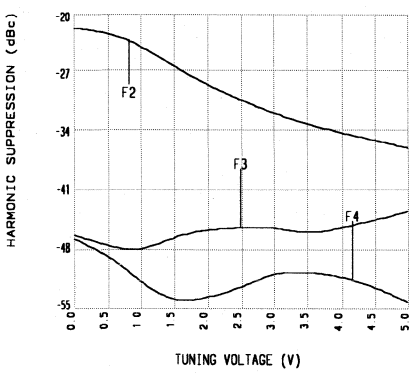
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	125.58	16.26
0.5	133.44	15.16
1.0	140.40	13.58
1.5	147.01	13.09
2.0	153.67	13.65
2.5	160.26	12.81
3.0	166.24	11.80
3.5	172.00	11.45
4.0	177.66	11.24
4.5	183.22	11.05
5.0	188.65	10.75

POWER OUTPUT



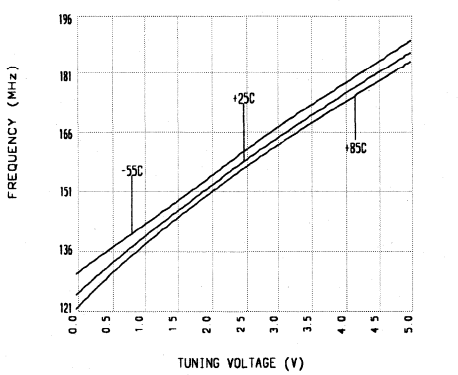
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	6.36	7.02	6.21
0.5	7.48	8.45	7.85
1.0	8.47	9.57	9.16
1.5	8.87	9.98	9.59
2.0	9.05	10.13	9.70
2.5	9.10	10.08	9.73
3.0	9.06	10.05	9.79
3.5	8.99	10.04	9.85
4.0	8.96	10.08	9.92
4.5	8.96	10.12	9.92
5.0	8.98	10.22	9.89

HARMONICS SUPPRESSION



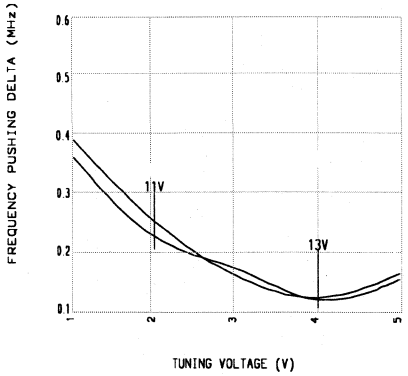
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-20.87	-45.87	-46.37
0.5	-21.30	-47.14	-48.14
1.0	-22.87	-48.04	-51.54
1.5	-25.50	-46.00	-54.17
2.0	-27.65	-45.15	-53.48
2.5	-29.45	-44.95	-52.29
3.0	-31.10	-44.77	-50.27
3.5	-32.42	-45.76	-50.26
4.0	-33.45	-44.95	-50.79
4.5	-34.33	-43.99	-51.99
5.0	-35.22	-42.89	-53.89

FREQ. VARIATION WITH TEMPERATURE



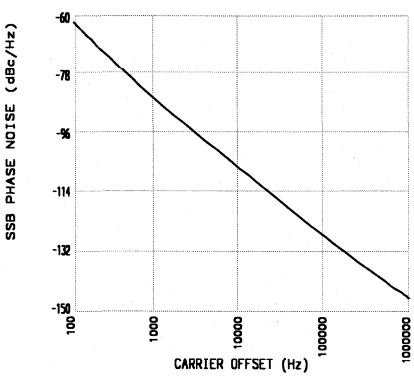
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	130.97	125.58	121.94
0.5	137.44	133.44	130.82
1.0	143.41	140.40	138.32
1.5	149.57	147.01	145.24
2.0	156.17	153.67	152.09
2.5	162.85	160.26	158.44
3.0	169.07	166.24	164.40
3.5	174.77	172.00	170.06
4.0	180.29	177.66	175.50
4.5	186.11	183.22	180.88
5.0	191.68	188.65	186.34

FREQUENCY PUSHING



	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc= 12V)	
	11V	13V
0.0		
0.5		
1.0	0.37	0.40
1.5		
2.0	0.21	0.25
2.5		
3.0	0.19	0.16
3.5		
4.0	0.10	0.11
4.5		
5.0	0.16	0.17

PHASE NOISE



	PHASE NOISE	
	CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
0.0		
0.5		
1.0	100	-60
1.5		
2.0	1000	-85
2.5		
3.0	10000	-105
3.5		
4.0	100000	-127
4.5		
5.0	1000000	-145

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POS-400P/JTOS-400P

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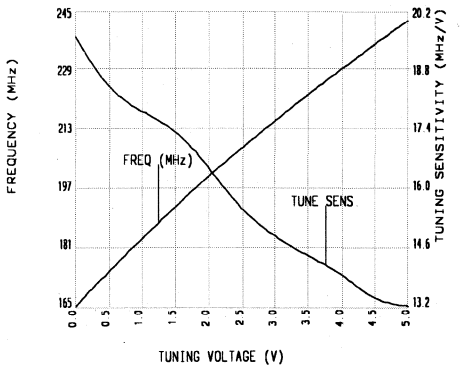
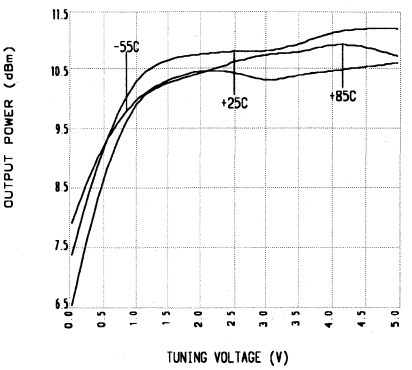
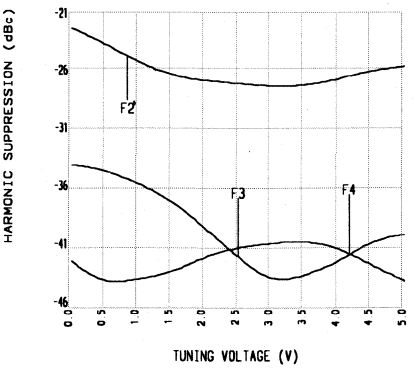
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

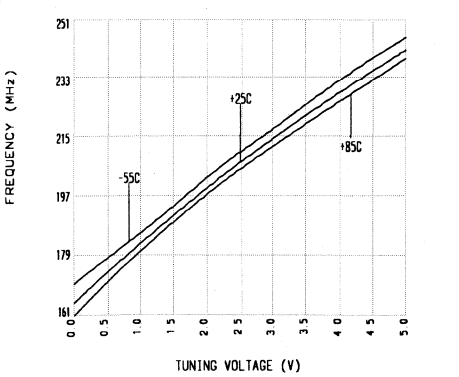


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	165.27	19.74
0.5	174.81	18.42
1.0	183.80	17.91
1.5	192.53	17.51
2.0	201.06	16.59
2.5	208.90	15.48
3.0	216.39	14.87
3.5	223.63	14.40
4.0	230.71	14.01
4.5	237.48	13.31
5.0	244.05	13.22

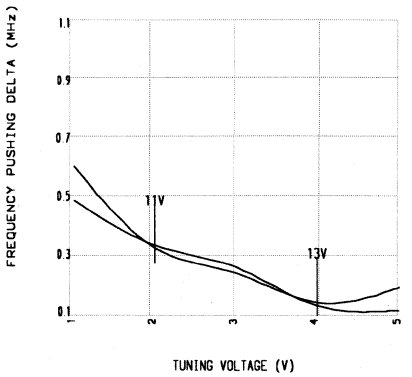
	Pout (dBm)		
V-TUNE	-55°C	+25°C	+85°C
0.0	7.95	7.40	6.54
0.5	9.44	9.43	8.94
1.0	10.14	10.54	10.17
1.5	10.44	10.81	10.38
2.0	10.60	10.86	10.54
2.5	10.58	10.93	10.73
3.0	10.36	10.91	10.89
3.5	10.52	11.03	10.88
4.0	10.58	11.26	11.07
4.5	10.65	11.32	11.01
5.0	10.72	11.31	10.84

	HARMONICS (dBc)		
V-TUNE	F2	F3	F4
0.0	-21.95	-33.78	-42.12
0.5	-23.31	-34.15	-44.15
1.0	-24.91	-35.41	-43.58
1.5	-26.14	-36.81	-43.14
2.0	-26.51	-39.17	-41.67
2.5	-26.73	-41.73	-40.90
3.0	-27.02	-44.02	-40.52
3.5	-26.97	-43.31	-40.31
4.0	-26.41	-42.24	-40.91
4.5	-25.64	-40.31	-42.48
5.0	-25.30	-39.80	-43.80

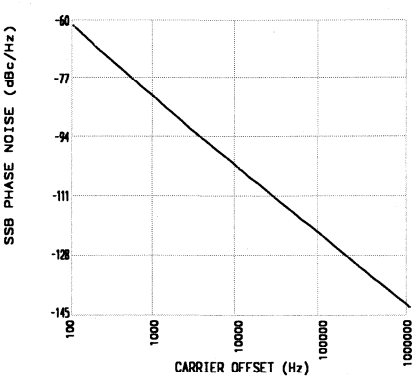
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	171.24	165.27	161.07
0.5	179.35	174.81	171.96
1.0	186.89	183.80	181.54
1.5	195.32	192.53	190.53
2.0	204.34	201.06	199.16
2.5	212.15	208.90	206.87
3.0	219.26	216.39	213.96
3.5	227.09	223.63	220.94
4.0	234.56	230.71	227.86
4.5	241.66	237.48	234.56
5.0	247.96	244.05	241.36

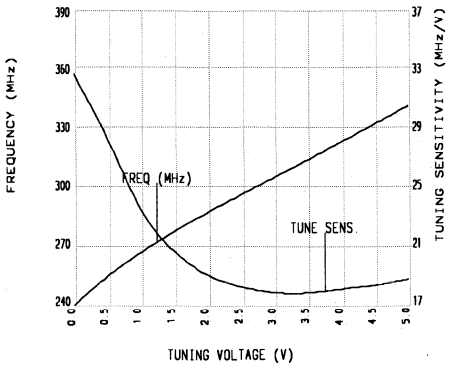
	FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
V-TUNE	11V	13V
0.0		
0.5		
1.0	0.62	0.50
1.5		
2.0	0.28	0.32
2.5		
3.0	0.28	0.30
3.5		
4.0	0.10	0.10
4.5		
5.0	0.20	0.12

	PHASE NOISE	
	CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
	100	-60
	1000	-82
	10000	-102
	100000	-122
	1000000	-142

POS-535P/JTOS-535P

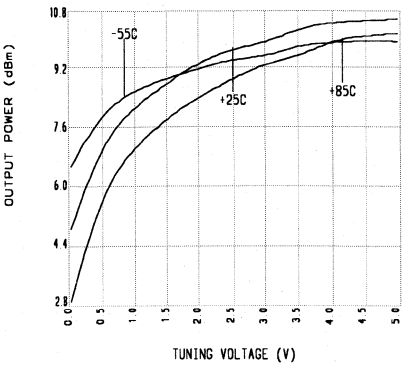
278 to 325 MHz

TUNING CHARACTERISTICS



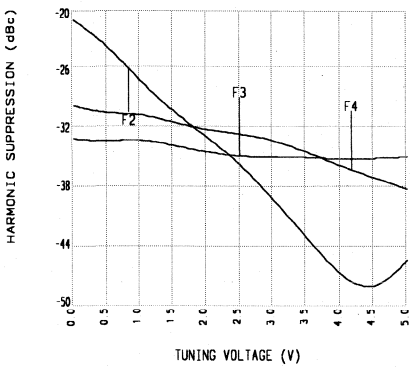
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	240.36	33.00
0.5	255.82	28.85
1.0	268.01	23.30
1.5	278.66	20.66
2.0	288.36	18.98
2.5	297.57	18.30
3.0	306.52	17.86
3.5	315.44	17.87
4.0	324.51	18.19
4.5	333.72	18.40
5.0	343.10	18.81

POWER OUTPUT



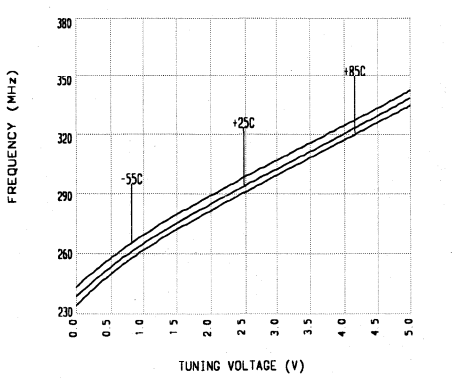
Pout (dBm)		
-55°C	+25°C	+85°C
6.62	4.90	2.90
8.14	7.35	6.04
8.75	8.28	7.17
9.05	8.93	7.95
9.32	9.49	8.55
9.60	9.91	9.04
9.66	10.03	9.48
9.99	10.46	9.67
10.06	10.61	10.11
10.10	10.67	10.24
10.08	10.70	10.30

HARMONICS SUPPRESSION



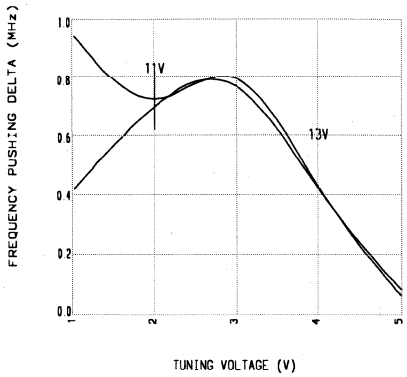
HARMONICS (dBc)		
F2	F3	F4
-20.22	-32.72	-29.22
-22.78	-32.95	-30.11
-26.67	-32.67	-30.00
-29.81	-33.31	-30.98
-32.37	-34.04	-31.70
-35.13	-34.47	-32.13
-38.94	-34.61	-32.78
-42.85	-34.52	-34.02
-47.00	-34.83	-35.50
-48.71	-34.71	-36.71
-45.21	-34.54	-37.87

FREQ. VARIATION WITH TEMPERATURE



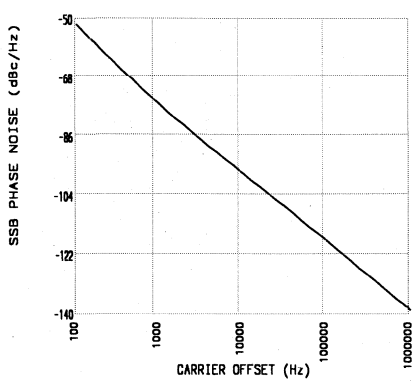
V-TUNE	FREQUENCY(MHz) -55°C	+25°C	+85°C
0.0	245.51	240.36	236.08
0.5	260.45	255.82	252.18
1.0	272.41	268.01	264.56
1.5	282.95	278.66	275.23
2.0	292.72	288.36	284.88
2.5	302.09	297.57	294.20
3.0	311.13	306.52	303.36
3.5	319.94	315.44	312.35
4.0	328.69	324.51	321.29
4.5	337.57	333.72	330.19
5.0	346.97	343.10	339.19

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.97	0.44
0.64	0.75
0.97	0.90
0.41	0.41
0.07	0.09

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-50
1000	-75
10000	-95
100000	-116
1000000	-137

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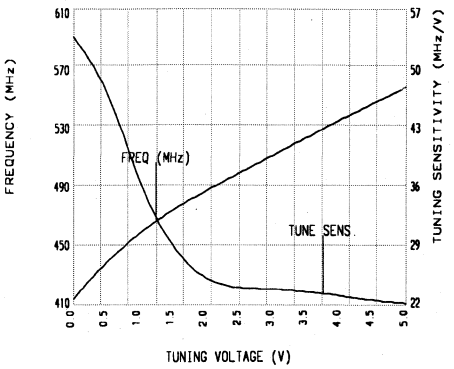
VOLTAGE CONTROLLED OSCILLATORS

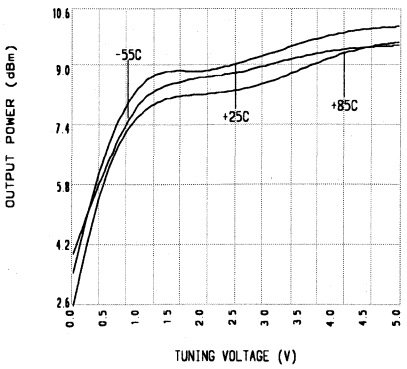
POS-765P/JTOS-765P

486 to 510 MHz

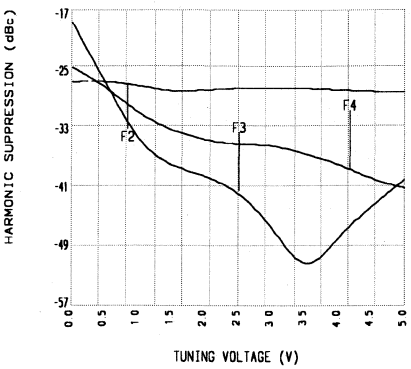
TUNING CHARACTERISTICS



POWER OUTPUT



HARMONICS SUPPRESSION

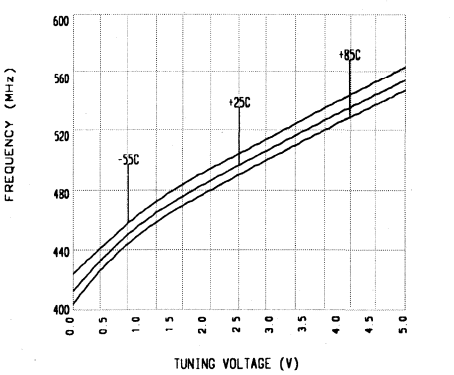


V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	416.18	54.63
0.5	442.16	49.27
1.0	462.17	36.64
1.5	477.47	28.99
2.0	490.47	25.11
2.5	502.62	24.28
3.0	514.74	24.29
3.5	526.77	23.93
4.0	538.57	23.43
4.5	550.08	22.81
5.0	561.39	22.46

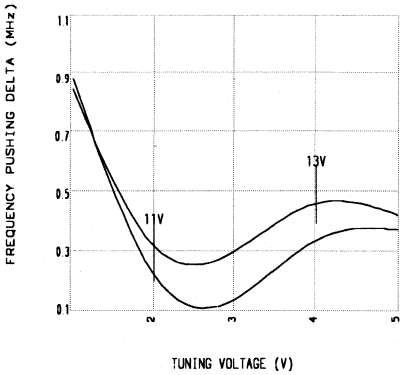
Pout (dBm)		
-55°C	+25°C	+85°C
4.07	3.55	2.63
6.54	7.19	6.64
8.44	8.85	8.03
8.74	9.18	8.42
8.96	9.04	8.46
9.01	9.30	8.54
9.28	9.55	8.77
9.50	9.88	9.14
9.68	10.11	9.51
9.76	10.27	9.77
9.81	10.33	9.90

HARMONICS (dBc)		
F2	F3	F4
-25.87	-17.54	-23.87
-25.69	-25.85	-26.35
-26.35	-34.51	-30.35
-27.29	-37.62	-32.62
-27.00	-38.67	-34.00
-26.71	-40.88	-34.54
-26.75	-45.59	-34.42
-26.71	-53.21	-35.88
-27.00	-46.83	-37.17
-27.22	-43.05	-39.39
-27.34	-39.34	-40.51

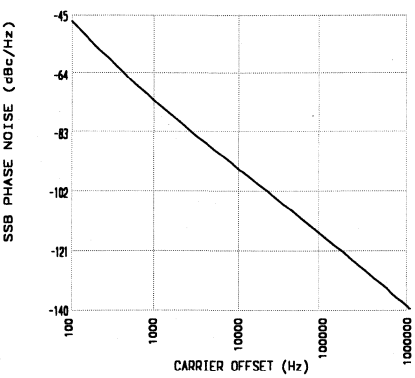
FREQ. VARIATION WITH TEMPERATURE



FREQUENCY PUSHING



PHASE NOISE



	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	427.70	416.18	407.58
0.5	449.76	442.16	436.07
1.0	469.81	462.17	455.87
1.5	485.44	477.47	470.87
2.0	498.69	490.47	483.76
2.5	510.52	502.62	496.03
3.0	522.70	514.74	508.14
3.5	535.01	526.77	520.09
4.0	547.10	538.57	531.78
4.5	558.87	550.08	543.16
5.0	570.45	561.39	554.32

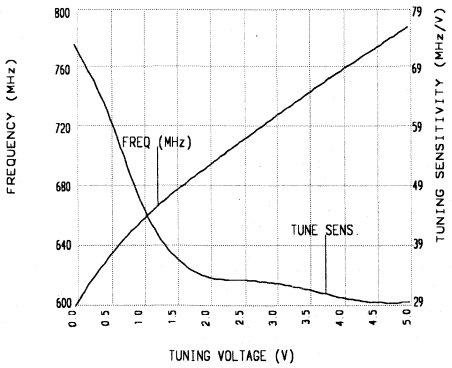
FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.88	0.92
0.21	0.10
0.29	0.10
0.54	0.41
0.44	0.39

PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-46
1000	-74
10000	-95
100000	-117
1000000	-140

POS-1025P/JTOS-1025P

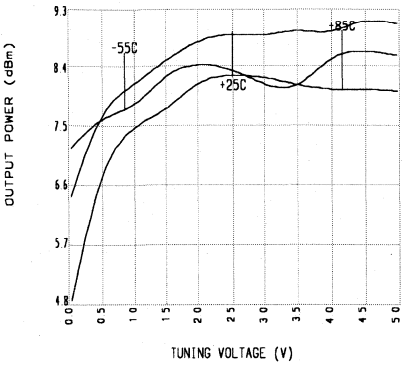
680 to 755 MHz

TUNING CHARACTERISTICS



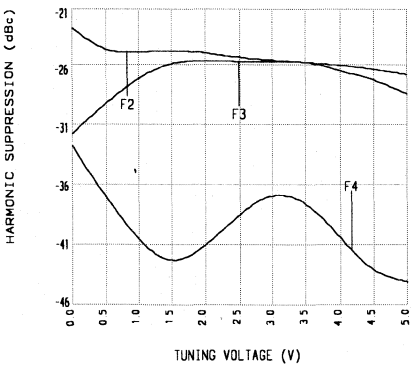
V-TUNE	FREQUENCY (MHz)	TUNING SENSITIVITY
0.0	600.96	74.25
0.5	635.61	64.32
1.0	660.32	45.46
1.5	679.74	37.02
2.0	696.92	33.63
2.5	713.86	33.85
3.0	730.49	33.14
3.5	746.67	32.01
4.0	762.14	30.49
4.5	777.03	29.59
5.0	791.89	29.72

POWER OUTPUT



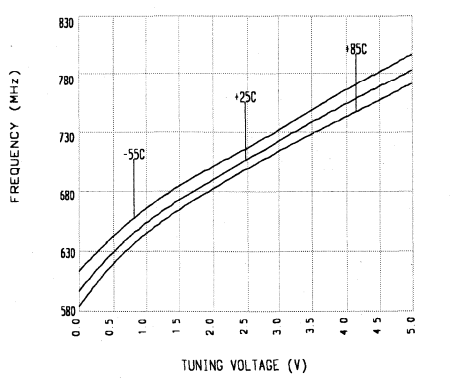
	Pout (dBm)		
	-55°C	+25°C	+85°C
0.0	7.23	6.49	4.87
0.5	7.75	7.94	7.12
1.0	7.84	8.21	7.59
1.5	8.41	8.61	7.81
2.0	8.55	8.91	8.30
2.5	8.46	9.01	8.36
3.0	8.18	8.95	8.33
3.5	8.10	9.08	8.19
4.0	8.68	8.96	8.12
4.5	8.75	9.26	8.14
5.0	8.65	9.15	8.10

HARMONICS SUPPRESSION



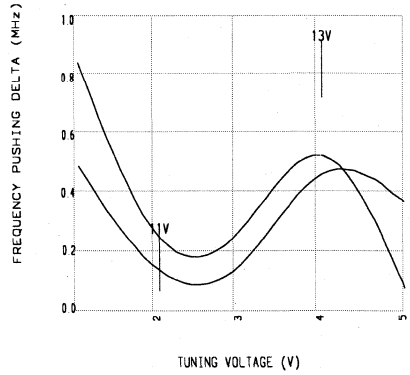
	HARMONICS (dBc)		
	F2	F3	F4
0.0	-21.96	-31.12	-32.12
0.5	-24.17	-28.51	-36.51
1.0	-24.05	-26.22	-40.38
1.5	-23.94	-24.94	-42.60
2.0	-24.06	-24.73	-40.89
2.5	-24.58	-24.92	-37.92
3.0	-24.79	-24.96	-35.96
3.5	-25.00	-24.83	-36.83
4.0	-25.21	-25.71	-40.05
4.5	-25.59	-26.42	-43.25
5.0	-26.02	-27.68	-43.85

FREQ VARIATION WITH TEMPERATURE



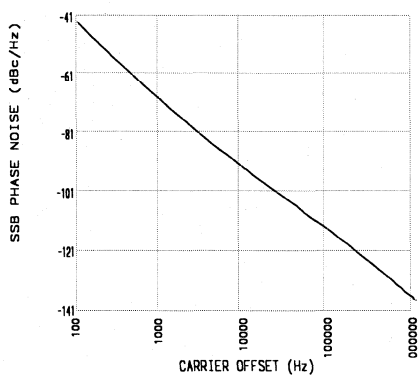
	FREQUENCY(MHz)		
V-TUNE	-55°C	+25°C	+85°C
0.0	618.42	600.96	587.81
0.5	648.48	635.61	626.06
1.0	672.76	660.32	651.44
1.5	691.93	679.74	671.51
2.0	708.39	696.92	689.26
2.5	723.86	713.86	706.14
3.0	739.79	730.49	721.74
3.5	756.87	746.67	736.54
4.0	774.28	762.14	750.97
4.5	790.17	777.03	765.28
5.0	805.25	791.89	779.85

FREQUENCY PUSHING



FREQUENCY PUSHING (MHz) (REFERRED TO Vcc=12V)	
11V	13V
0.51	0.87
0.07	0.12
0.08	0.21
0.60	0.74
0.38	0.08

PHASE NOISE



PHASE NOISE	
CARRIER OFFSET (Hz)	SSB PHASE NOISE (dBc/Hz)
100	-41
1000	-68
10000	-92
100000	-112
1000000	-136

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VOLTAGE CONTROLLED OSCILLATORS

LOW NOISE

JCOS-820WLN

V tune (V)	FREQUENCY (MHz)			SENSITIVITY (MHz/V)			Pout (dBm)			2nd HARMONIC (dBc)			3rd HARMONIC (dBc)		
	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°
0	748.34	746.70	744.95	—	—	—	13.33	13.05	10.79	-10.65	-11.35	-15.78	-20.77	-22.70	-26.53
1	756.34	755.01	753.18	8.00	8.31	8.22	13.51	13.14	11.37	-11.17	-11.73	-14.96	-21.39	-22.93	-25.68
2	762.99	761.79	759.71	6.65	6.78	6.53	13.56	13.20	11.71	-11.78	-12.54	-15.18	-21.60	-22.84	-25.36
3	769.65	768.41	766.04	6.66	6.63	6.33	13.33	13.09	12.07	-12.63	-13.28	-15.71	-23.09	-23.91	-25.47
4	776.80	775.46	772.67	7.16	7.04	6.64	12.94	12.79	12.12	-13.50	-14.14	-16.22	-23.22	-24.52	-26.81
5	784.48	782.99	779.80	7.68	7.54	7.13	12.61	12.52	12.03	-14.02	-14.58	-16.40	-24.76	-25.38	-26.86
6	792.70	791.14	787.54	8.22	8.15	7.74	12.58	12.45	12.00	-14.14	-14.58	-16.10	-25.90	-26.97	-28.82
7	801.36	799.70	795.75	8.66	8.56	8.21	12.85	12.70	12.19	-14.65	-14.78	-15.59	-30.03	-29.89	-29.79
8	810.21	808.39	804.29	8.85	8.69	8.54	13.11	13.03	12.38	-15.21	-15.31	-15.80	-34.41	-34.06	-33.46
9	819.17	816.89	813.71	8.96	8.50	9.42	12.89	12.89	11.82	-15.03	-15.47	-16.92	-40.91	-38.29	-35.49
10	828.54	826.75	824.30	9.38	9.86	10.59	12.36	11.84	10.74	-14.77	-15.64	-17.85	-41.00	-38.36	-38.51
11	837.95	836.81	834.42	9.41	10.07	10.12	11.76	11.20	10.17	-15.00	-15.91	-18.21	-41.96	-40.25	-37.85
12	847.45	846.36	843.77	9.50	9.55	9.36	11.18	10.82	9.97	-16.86	-17.45	-19.28	-39.58	-38.62	-36.99
13	856.62	855.32	852.27	9.17	8.96	8.50	10.41	10.24	9.80	-20.84	-21.33	-22.37	-37.00	-37.12	-36.60
14	865.04	863.34	859.54	8.42	8.02	7.27	9.31	9.32	9.36	-18.01	-26.56	-24.18	-34.63	-33.06	-33.08
15	870.24	868.57	865.45	5.20	5.23	5.91	8.24	8.64	9.13	-19.53	-19.86	-21.22	-29.81	-31.05	-31.94
16	875.01	873.95	871.44	4.77	5.38	5.99	8.76	8.90	9.08	-16.89	-17.94	-20.04	-28.47	-29.74	-32.31
17	880.21	879.27	876.98	5.20	5.32	5.54	9.17	9.14	9.06	-16.19	-17.24	-19.46	-29.96	-30.03	-31.14
18	884.81	883.93	881.80	4.60	4.66	4.82	9.57	9.44	9.13	-16.05	-16.87	-19.06	-30.93	-31.39	-31.86
19	888.93	888.04	885.96	4.12	4.11	4.15	9.89	9.72	9.31	-16.06	-16.79	-18.73	-29.11	-30.70	-32.68
20	892.75	891.83	889.70	3.81	3.79	3.74	10.02	9.86	9.45	-16.46	-16.93	-18.48	-28.22	-29.13	-31.24

JCOS-820BLN

V tune (V)	FREQUENCY (MHz)			SENSITIVITY (MHz/V)			Pout (dBm)			2nd HARMONIC (dBc)			3rd HARMONIC (dBc)		
	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°
0	781.68	779.73	776.34	—	—	—	4.45	4.46	4.05	-23.10	-29.20	-27.78	-46.79	-57.40	-57.79
1	788.05	786.20	782.90	6.37	6.47	6.56	4.48	4.50	4.12	-29.45	-29.39	-26.70	-46.82	-55.63	-58.19
2	793.33	791.46	788.11	5.28	5.26	5.21	4.51	4.54	4.15	-29.61	-29.51	-26.15	-45.87	-54.90	-57.82
3	798.36	796.46	793.02	5.03	5.00	4.91	4.56	4.59	4.18	-30.01	-29.89	-25.53	-46.17	-55.89	-56.16
4	803.54	801.58	798.08	5.18	5.12	5.06	4.58	4.61	4.23	-30.42	-30.30	-25.28	-48.07	-54.51	-56.81
5	809.07	807.04	803.43	5.53	5.46	5.35	4.58	4.62	4.23	-30.79	-30.82	-27.55	-47.21	-54.21	-57.73
6	815.13	813.00	809.27	6.06	5.96	5.84	4.54	4.60	4.17	-31.32	-31.14	-29.10	-45.22	-52.33	-55.57
7	821.70	819.43	815.71	6.57	6.43	6.44	4.45	4.50	3.98	-31.26	-32.02	-29.37	-44.35	-50.76	-54.86
8	829.56	826.18	822.80	6.86	6.75	7.09	4.32	4.35	3.66	-31.51	-32.82	-30.54	-43.60	-50.11	-52.45
9	835.18	832.93	830.29	6.62	6.76	7.49	4.02	3.99	3.21	-31.88	-33.80	-32.77	-41.19	-48.20	-50.32
10	841.21	840.08	837.80	6.04	7.14	7.52	3.31	3.16	2.55	-32.70	-35.20	-33.24	-37.77	-45.44	-48.91
11	847.38	846.70	844.77	6.17	6.62	6.97	2.32	2.32	2.05	-33.12	-35.12	-38.84	-35.61	-43.40	-47.23
12	852.63	852.27	851.22	5.25	5.58	6.45	2.97	2.61	1.96	-33.48	-33.88	-38.87	-36.87	-43.11	-45.67
13	858.98	858.52	857.53	6.35	6.25	6.31	3.27	2.88	2.01	-33.15	-33.68	-37.23	-37.51	-44.64	-46.40
14	865.29	864.76	863.67	6.31	6.24	6.14	3.27	2.93	2.04	-34.25	-34.18	-34.95	-38.88	-45.79	-48.61
15	871.22	870.62	869.41	5.92	5.85	5.74	3.13	2.86	2.05	-34.60	-34.47	-36.43	-38.33	-45.63	-48.47
16	876.52	875.88	874.57	5.31	5.26	5.15	2.98	2.77	2.04	-35.02	-35.02	-37.49	-39.32	-44.95	-48.84
17	881.30	880.60	879.17	4.78	4.72	4.60	2.77	2.64	2.00	-35.63	-35.43	-37.10	-39.56	-45.16	-48.60
18	885.56	884.84	883.33	4.26	4.24	4.16	2.55	2.46	1.88	-35.64	-35.94	-36.38	-40.65	-45.96	-48.73
19	889.31	888.55	887.00	3.75	3.71	3.66	2.39	2.34	1.81	-35.71	-36.46	-35.92	-40.47	-46.49	-49.40
20	892.61	891.84	890.23	3.30	3.29	3.24	2.25	2.23	1.75	-35.87	-36.90	-36.71	-40.24	-46.73	-45.93

JCOS-1100LN

V tune (V)	FREQUENCY (MHz)			SENSITIVITY (MHz/V)			Pout (dBm)			2nd HARMONIC (dBc)			3rd HARMONIC (dBc)		
	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°	-20°	+25°	+85°
0	1071.28	1067.10	1064.33	—	—	—	8.11	8.21	8.10	-18.12	-19.34	-20.14	-19.94	-20.40	-20.18
1	1075.49	1071.24	1068.42	4.21	4.17	4.08	8.00	8.19	8.15	-17.68	-18.93	-20.00	-19.81	-20.36	-20.98
2	1079.06	1074.27	1071.86	3.56	3.56	3.44	7.94	8.14	8.15	-17.35	-18.62	-19.60	-20.07	-20.07	-21.17
3	1082.46	1078.30	1075.24	3.40	3.48	3.38	7.91	8.06	8.09	-17.02	-18.30	-19.32	-20.19	-19.71	-20.81
4	1085.88	1081.87	1078.78	3.42	3.57	3.54	7.93	8.00	8.03	-16.64	-17.91	-18.32	-19.90	-19.71	-20.41
5	1089.45	1085.62	1082.57	3.57	3.74	3.79	7.99	8.00	7.97	-16.25	-17.61	-18.54	-19.53	-19.73	-19.87
6	1093.29	1089.59	1086.67	3.84	3.97	4.10	8.08	8.03	7.97	-15.83	-17.08	-18.08	-19.41	-19.78	-19.90
7	1097.49	1093.85	1091.01	4.19	4.26	4.34	8.19	8.13	8.01	-15.52	-16.51	-17.48	-19.62	-19.82	-20.09
8	1102.04	1098.43	1095.61	4.55	4.58	4.60	8.34	8.23	8.09	-15.33	-16.10	-16.89	-19.44	-19.98	-20.06
9	1106.78	1103.26	1100.42	4.74	4.83	4.80	8.54	8.38	8.22	-15.27	-15.92	-16.55	-19.80	-19.58	-20.02
10	1111.61	1108.17	1105.35	4.82	4.91	4.93	8.71	8.59	8.39	-15.14	-15.91	-16.36	-20.47	-19.87	-19.77
11	1116.51	1113.02	1110.26	4.91	4.84	4.91	8.77	8.77	8.59	-14.76	-15.71	-16.38	-20.64	-20.47	-20.13
12	1121.67	1117.97	1115.16	5.17	4.96	4.89	8.75	8.84	8.74	-14.26	-15.33	-16.24	-20.63	-20.42	-20.86
13	1126.97	1123.06	1120.01	5.29	5.08	4.86	8.67	8.81	8.80	-14.04	-14.98	-15.87	-20.50	-20.18	-20.43
14	1132.08	1128.23	1124.96	5.11	5.17	4.94	8.62	8.73	8.78	-14.01	-14.81	-15.53	-20.39	-19.93	-19.99
15	1136.77	1133.13	1129.85	4.70	4.90	4.89	8.60	8.69	8.71	-13.90	-14.89	-15.60	-20.12	-19.86	-19.96
16	1141.04	1137.50	1134.33	4.27	4.37	4.48	8.59	8.65	8.66	-13.89	-14.91	-15.73	-20.10	-19.54	-19.88
17	1144.88	1141.36	1138.28	3.84	3.86	3.95	8.55	8.65	8.63	-14.08	-14.94	-15.74	-19.79	-19.59	-19.56
18	1148.24	1144.74	1141.69	3.36	3.38	3.41	8.54	8.63	8.64	-14.54	-15.01	-15.71	-19.03	-19.54	-19.65
19	1151.02	1147.64	1144.62	2.78	2.90	2.93	8.57	8.68	8.69	-14.96	-15.05	-15.41	-18.47	-19.33	-19.62
20	1153.13	1150.02	1147.15	2.11	2.37	2.53	8.72	8.81	8.80	-14.57	-14.49	-14.85	-18.38	-19.24	-19.97

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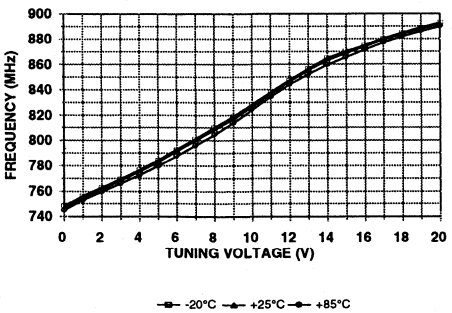
JCOS-820WLN

FREQ. VARIATION WITH TEMPERATURE



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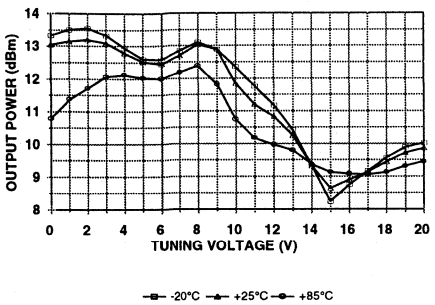

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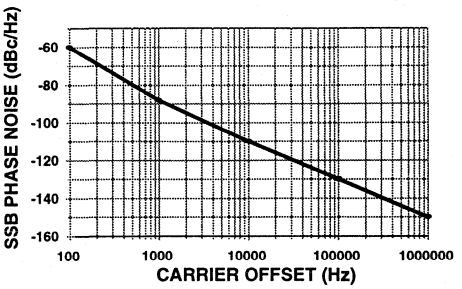

JCOS-820BLN

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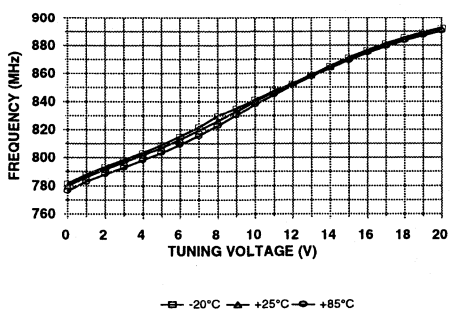

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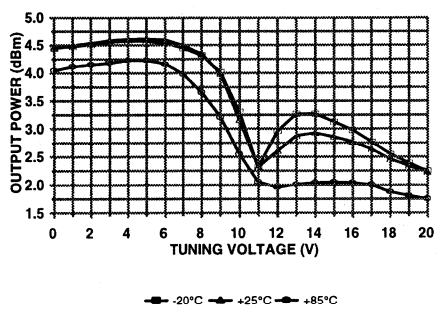

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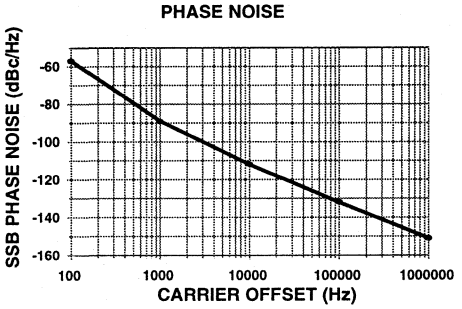
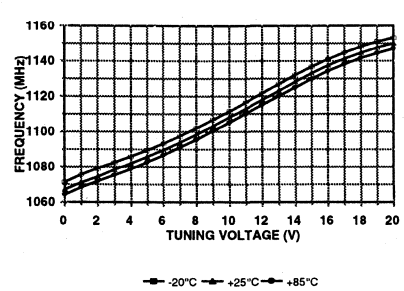


JCOS-1100LN

FREQ. VARIATION WITH TEMPERATURE



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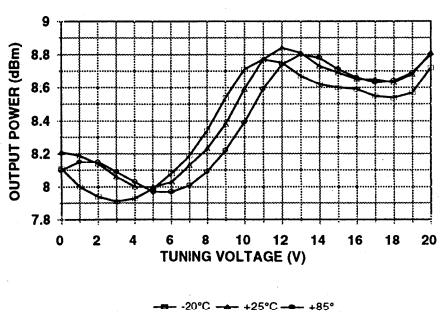

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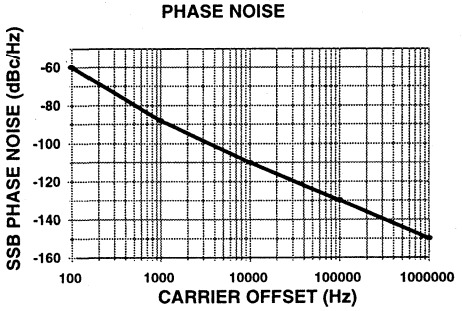

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Application: ☐ Industrial/Commercial ☐ Military ☐ Space

Oscillator Frequency Range:	_____MHz to_____MHz
Output Load:	50 Ohms
Output Power (Sinusoidal):	_____ dBm (Min.) / _____dBm (Max.)
Output Power Variation:	_____ dB Peak To Peak
Harmonic Suppression:	2nd:-_____dBc (Max.) 3rd: -_____dBc (Max.), 4th: -_____dBc (Max.)
Tuning Voltage:	_____ V (Min.) / _____ V (Max.)
Tuning Sensitivity:	_____ MHz/V (Min.) / _____MHz/V (Max.)
Modulation Bandwidth:	_____ kHz
DC Supply Voltage:	_____ Volts
DC Supply Current:	_____ mA (Max.)

Phase Noise:

Offset Freq.	SSB Noise Level	Offset Freq.	SSB Noise Level
_____Hz	_____dBc/Hz	_____Hz	_____dBc/Hz
_____Hz	_____dBc/Hz	_____Hz	_____dBc/Hz

Frequency Pulling (12 dB Ret. Loss):	_____MHz Peak-Peak ☐ Typ. ☐ Max.
Frequency Pushing:	_____MHz/V ☐ Typ. ☐ Max.
Operating Case Temperature:	_____ to _____ (°C)
Storage Temperature:	_____ to _____ (°C)
Package:	☐ Surface Mount ☐ Plug In ☐ Connector: ☐ BNC ☐ TNC ☐ SMA ☐ Type N ☐ Other_____
Hermeticity Required:	☐ Yes ☐ No

Special Requirements:_____

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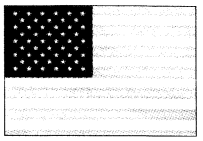
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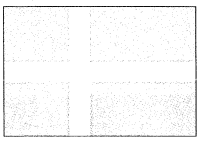
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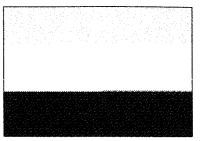
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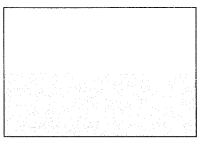
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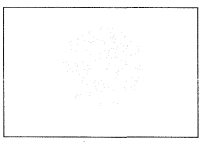
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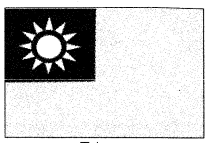
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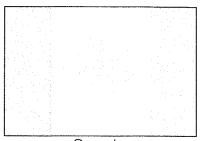
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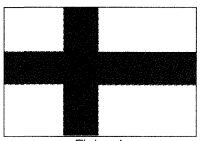
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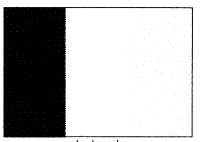
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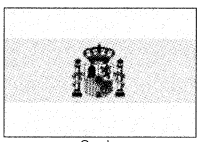
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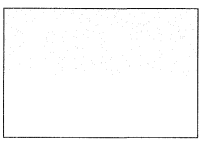
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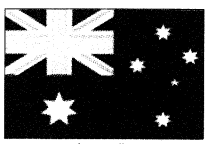
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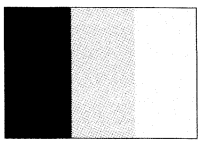
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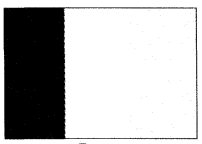
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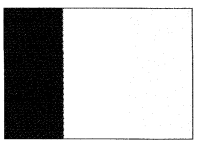
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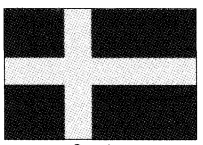
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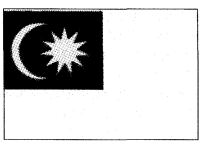
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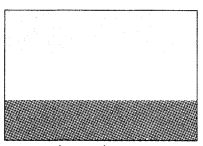
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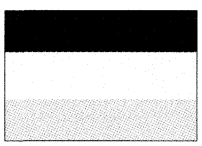
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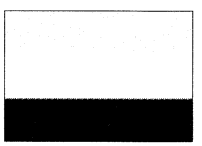
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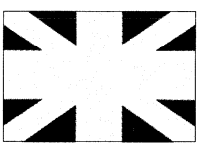
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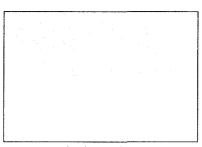
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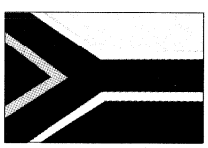
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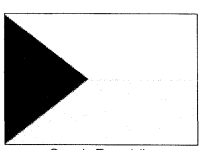
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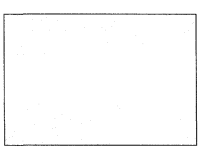
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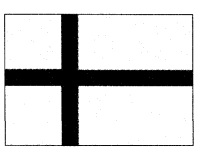
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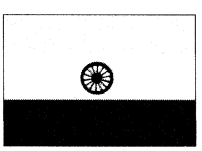
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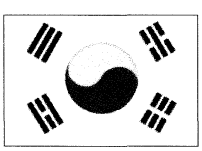
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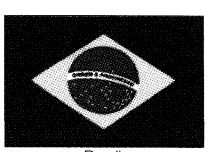
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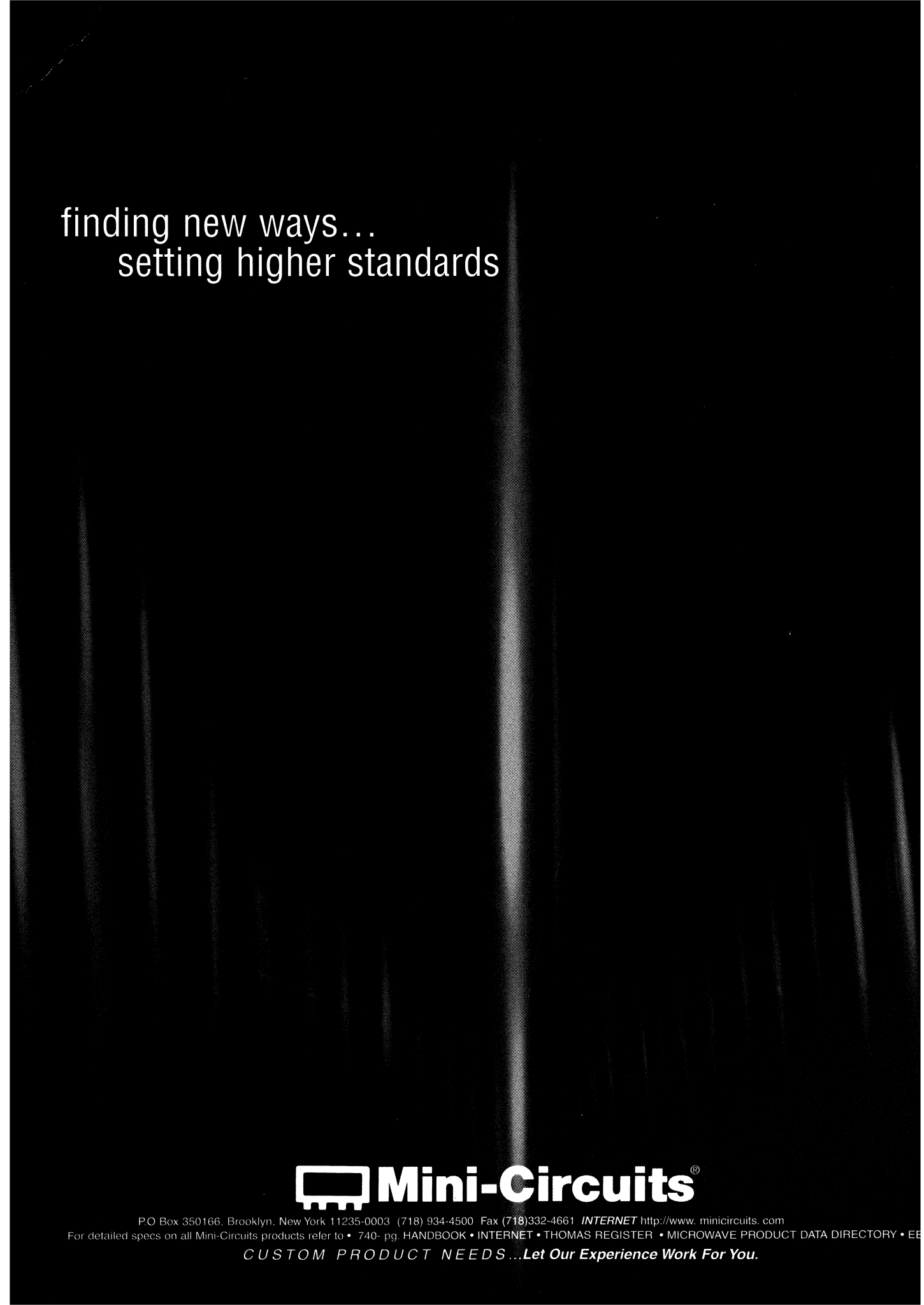

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