Microwave

Components • Adapters • Cable Assemblies • Connectors

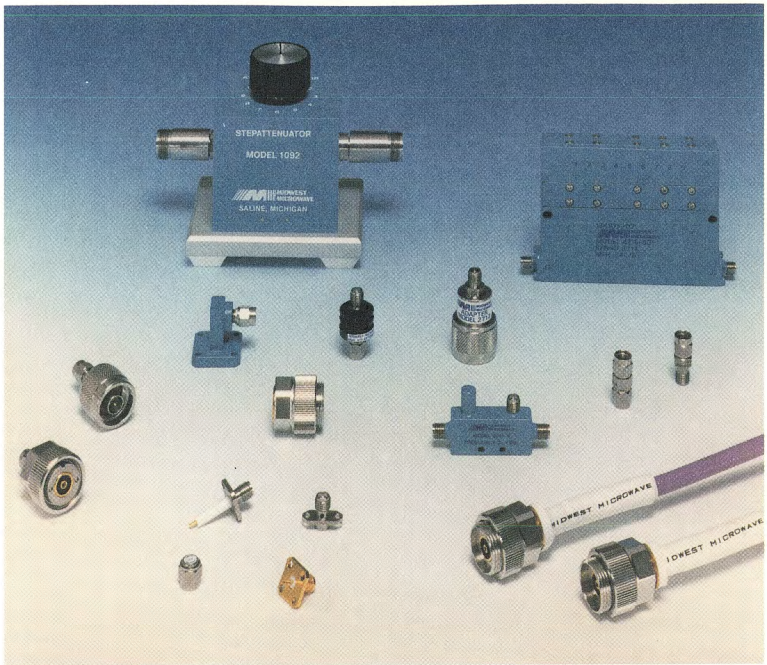
MIDWEST MICROWAVE

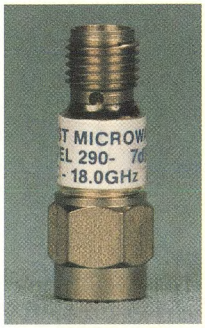
MIDWEST MICROWAVE

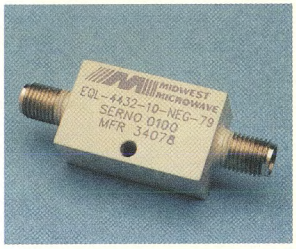
Quality is the Only Thing

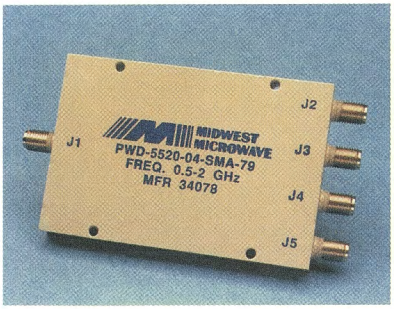
Midwest Microwave is a company made up of highly motivated people who are totally dedicated to the design and manufacture of coaxial microwave components, cable assemblies, and connectors of the highest quality available anywhere in the world. This complete assortment of standard products presented here are the result of over twenty two years of careful engineering design and development using state of the art, technology, design techniques, and equipment. Midwest Microwave has taken a leadership position in providing the user with an extraordinarily broad selection of products to successfully construct a highly reliable, high quality, low cost microwave system.

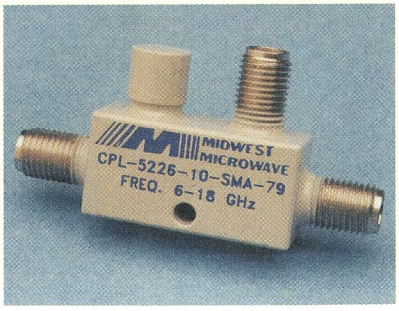
This catalog has been divided into convenient sections covering each product category as described by the primary table of contents with further delineation of each product provided by secondary tables of contents found at the beginning of each product section. Most of the sections begin with general information and technical discussion in the form of definitions of parameters which are meant to assist the user in determining the performance characteristics most important to their particular application. An appendix is provided containing other useful technical information and in addition, and also for the convenience of the user, a complete model number - page number cross reference has been provided in the index at the end of this catalog. For further information or assistance in selecting Midwest's products, please call or fax the factory or return the convenient reply card provided.











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How to Order

When entering your order, please address your order to Midwest Microwave at the applicable factory address and specify the Midwest Microwave Model No., (with your specification no. if applicable) and the description of the product you require. If custom design, special performance, or special test requirements are required, please describe them completely. If necessary, a special model number will be assigned to the product by our engineering staff.

Important Note: All orders must be addressed and sent via e-mail, normal mail, or by fax to the factory in Saline, Michigan, or to our International Operations office in England in order to be valid and qualify for warranty.

On-Line Ordering via the Internet

On-line ordering, via the Internet, for standard catalog products is also available at:
U.S.A.: http://www.midwestmicrowave.com
International: http://www.midwest-microwave.ltd.uk
Note: All orders via the internet will be by credit card only.

Terms

Domestic U.S.A.: Net 30 days. F.O.B. Saline Michigan. Payments must be addressed to Midwest Microwave
International: Net 30 days F.O.B. Reading, England.
A letter of credit may be required on certain accounts.

Performance Specifications

Performance specifications may change, the Midwest model numbers may change, or products may be modified or discontinued at Midwest Microwave's discretion without prior notice and without incurring any obligation to make the same changes on products previously delivered to the original purchaser.

Warranty

Midwest Microwave warrants to the original purchaser each of its products to be free under normal use and service from defects in materials and workmanship for a period of one year from the date of delivery to the original purchaser. This warranty shall be fulfilled by Midwest Microwave replacing or repairing at its plant free of any charge (except diodes), including related labor, any product or part which proves to have been defective as determined by Midwest Microwaves's examination. This warranty is void for any products that have been disassembled, modified, or subjected to conditions that exceed the applicable specifications or ratings of such product. This warranty is void if the original purchase order was not made to Midwest Microwave or its authorized distributors. This warranty is the extent of the obligation or liability assumed by Midwest Microwave with respect to its products and no other warranty or guarantee is either expressed or implied. All warranty returns must be authorized in advance by Midwest Microwave through the issuance by Midwest Microwave of a "Return Material Authorization Number" (RMA No.), and such RMA No. must appear on all return documents and debit memo's related to the returned material.

Capabilities and Facilities

Midwest Microwave

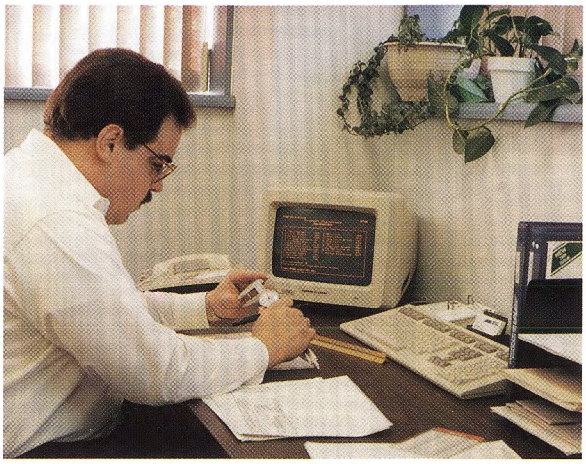
Midwest Microwave is a leading manufacturer of microwave components with twenty years of specific experience in designing and producing state of the art microwave components.

"Quality is The Only Thing" is the motto and byword at Midwest Microwave. It is profoundly evident in every product and service provided to all of our customers throughout the world.

Midwest Microwave is committed and dedicated to a "Total Quality Management" (TQM) approach in all of its activities from design integrity at the inception of the product, all the way through the manufacturing process until successful completion and shipment to our customers.

Midwest Microwave maintains a highly trained staff of sales, administrative, manufacturing, and quality engineers that are ready and eager to serve your requirements. Midwest Microwave occupys a modern 32,000 square foot facility that provides the platform of opportunity for customers who seek Midwest Microwave's standard products and which are available on an off the shelf basis throughout the world along with access to special designs that are provided on a prompt and efficient schedule to meet the needs of our customers.

Midwest Microwave maintains a substantial inventory of its products at the factory as well as at its European facility for immediate delivery to customers that may not be able to afford the time required by the normal order-delivery process. This on-hand inventory is convieniently available to users throughout the world via the Company's advanced on-line ordering system at it's Internet Website.



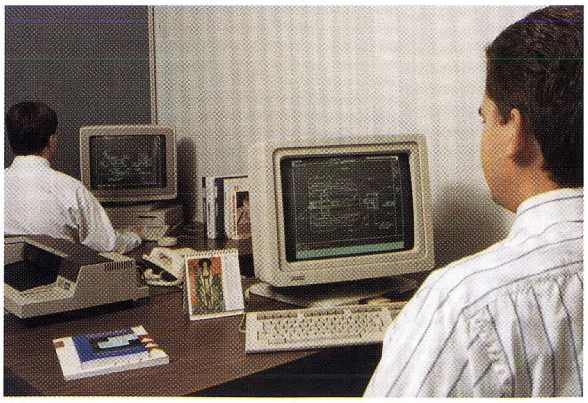
Design Conception is the first Quality step toward a successful product

Technical Capabilities and Facilities

Microwave Components of the broad product range and high performance characteristics that have been designed and produced by Midwest Microwave requires a highly trained staff of creative and innovative engineers supported by the latest in computer aided design and test equipment.

Midwest Microwave has assembled and currently utilizes a completely modern state of the art facility that has the capability to design and completely manufacture a broad range of Attenuators, Step Attenuators, Couplers, Hybrid Couplers, D.C. Blocks, Terminations, Gain Equalizers, Phase Shifters, Adapters, Connectors, and Cable Assemblies as well as Integrated Multi-function Packages that combine a number of Midwest's individual component capabilities.

Precise Assembly assures performance to specifications



Computer Aided Design (CAD) provide speed and accuracy of product design

Capabilities and Facilities

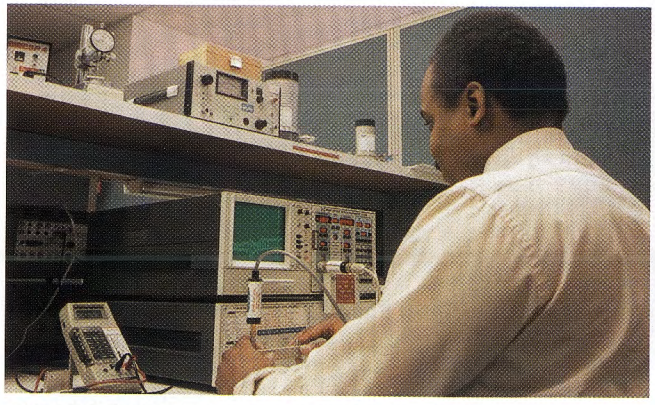
Computer Aided Design Analysis and Optimization support Research and Development

Total Quality Management (TQM)

"Constant and Continual Improvement" in not only product development, but all aspects of operations, is the only acceptable mode at Midwest Microwave.

The commitment to total quality is singularly the most powerful driving force behind the product development and manufacture at Midwest Microwave. Midwest's high quality reputation has been achieved and maintained through the dedicated efforts of all of it's employees and their total commitment to quality.

Midwest Microwave maintains complete manufacturing control over its products through continual investment in state of the art capital equipment in every phase of operations. This in-house capability allows Midwest to achieve very high reliability at very low cost for commercial as well as military applications.



Advanced testing techniques support research and development

Research and Development

Microwave systems are continually becoming more complex, demanding more performance and higher reliability from the individual components that make up its structure.

Midwest Microwave maintains a highly qualified, professional staff of research engineers to respond to our customers requirements in an innovative manner such that the most advanced techniques are employed that best suit the particular needs of these advanced, complex, and demanding microwave systems.

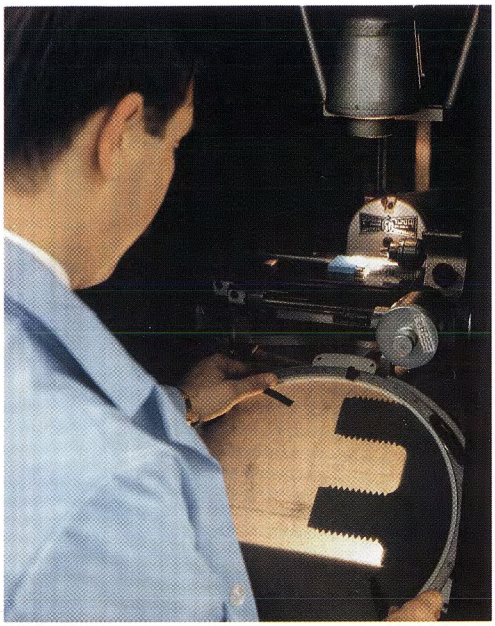
The research and development efforts are aided by the utilization of state of the art, sophisticated computer software and hardware design tools. Through the use of these advanced design tools, our research team is able to optomize the performance of the desired component prior to fabrication, saving valuable time and expense.

Precise Machining provides performance accuracy

Midwest Microwave has exhibited extraordinary talent in designing components that perform above and beyond their expectations even when they are subjected to hostile environments. These achievements did not come about accidentally but rather through careful and clever sophisticated design techniques developed during the hundreds of combined man years of experience that Midwest possesses.

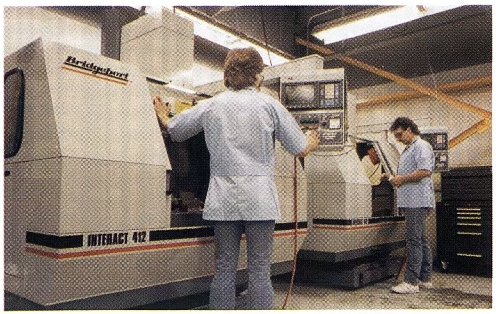
All of Midwest Microwave's products are designed, manufactured, and tested to the most exacting and rigorous standards.

Capabilities and Facilities



Optical Comparator Inspection provides dimensional integrity

CNC Lathes produce accurately turned microwave parts



CNC Milling Machine Centers provide manufacturing precision

Quality Assurance

The Quality Assurance Department at Midwest Microwave is the heartbeat of its total quality commitment, coordinating the administrative, technical and manufacturing processes as well as providing educational training in quality systems and procedures to all departments.

"Quality is The Only Thing" is truly the driving motivation behind Midwest Microwave's quality system that participates at the initial stage of contract, and engineering design and development. The department controls and documents all of the manufacturing processes and work operations for all phases of purchasing, planning, material handling, machining, processing, assembly, testing, through finally shipping to the customer.

The Quality Assurance System is in compliance with MIL-I-45208, and can meet or exceed MIL-Q-9858. In anticipation of ISO 9000 approval, Midwest Microwave has precisely documented all operating processes and has implemented a Statistical Process Control System that utilizes complete data collection of critical performance parameters and a calibration system that meets MIL-STD-45662.

Environmental Testing

The stringent environmental requirements of the microwave system of today as well as in the future require complete test exposure to critical and hostile elements. Midwest Microwave adheres to the requirements of MIL-STD-202, MIL-STD-810, and MIL-STD-883.

QPL MIL-SPEC Approvals

Midwest Microwave is a qualified supplier of a wide variety of microwave components that are currently being used on many high reliability programs both military and commercial.

QPL Approved

Attenuators	MIL-A-3933
SMA Connectors	MIL-C-39012
Terminations (Dummy Loads)	MIL-D-39030
In-Series Adapters	MIL-A-55339
SMA Receptacles	MIL-C-83517

D.E.S.C. Approved

Between Series Adapters	8501814
Between Series Adapters	8503812
Between Series Adapters	8504412
SMA Connectors	84149S, 85022S, & 85037S Series
SSMA Connectors	86116ZSG - 861120ZSG Series
BMA Blind Mate Connectors	85071Z - 85074Z Series

Commercial and Direct Equivalents

Couplers	MIL-C-15370
Waveguide Adapters	MIL-A-22641
Power Dividers	MIL-P-23971
Variable Attenuators	MIL-A-24215

Attenuators

Fixed • Variable • Stepped • Digital

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Attenuators

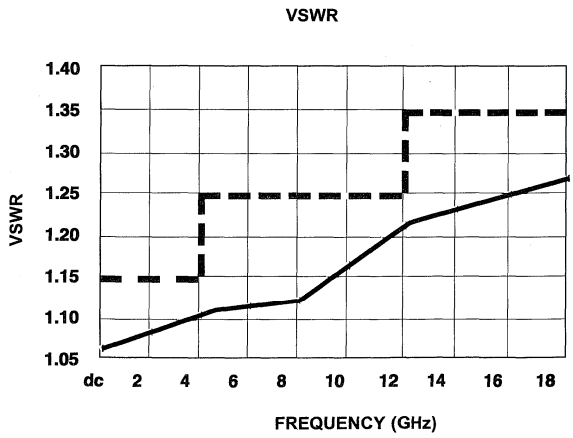
General Information

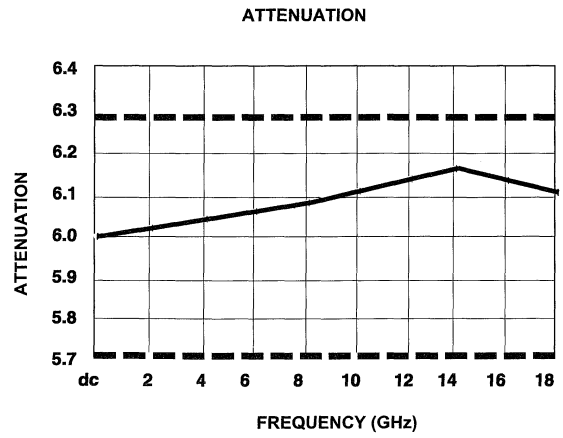
- **MIL-A-3933 Qualified (QPL)**
- **dc - 4, dc - 8, dc - 12.4, dc - 18 and dc - 26 GHz Performance**
- **Small Size, Light Weight, Rugged Construction**
- **Average Power available up to 20 Watts**
- **Meets MIL-E-5400 and MIL-16400 Environmental Requirements**
- **SMA, BMA, N, TNC, BNC, SC, 3.5mm, and 7mm Connector Configurations**

Attenuators are passive components designed for the purpose of reducing the input power in a matched transmission line system by a predictable amount on a linear basis. Midwest Microwave offers this complete product line of fixed coaxial attenuators, ruggedly designed for system or laboratory test use. These units exhibit low VSWR and high accuracy attenuation performance over the temperature range of -54C to +125C and meet the environmental requirements of MIL-E-5400 and MIL-E-16400. Medium power attenuators with average power levels of up to 20 Watts are available in up to 30 dB levels in .5 dB increments providing broadband performance and low frequency sensitivity while exhibiting very stable operation over temperature extremes. Standard cataloge units are available off the shelf for immediate delivery and special units can be custom designed by Midwest's engineering staff to accomodate unique system needs.

All Midwest Attenuators are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial applications.

Typical Fixed Attenuator Performance Characteristics





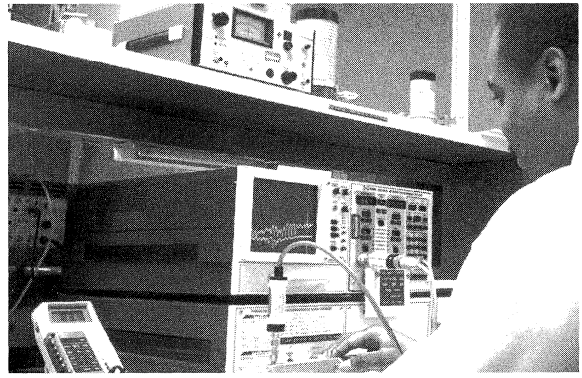
Attenuators

Definition of Parameters

Attenuation - The technical term is most often used in connection with loss or insertion loss in a transmission line. Insertion loss is a combination of two types of losses; impedance mismatch loss (*reflective*) and attenuation loss (*dissipative*). Mismatch loss is the ratio of power that would be absorbed by a unit or device under test , if it were perfectly impedance matched, to the actual power absorbed by the device. Attenuation is the ratio of power into a component to the power out under impedance matched conditions, and represents the actual power dissipated within the component. Thereby, Insertion loss is the ratio of the power delivered to a matched load by a matched generator before and after the insertion of a component into the transmission line. When a component is perfectly matched to the transmission line and to the load, the mismatch loss is zero and the insertion loss is the same as the attenuation.

Precise Attenuator Assembly assures high performance

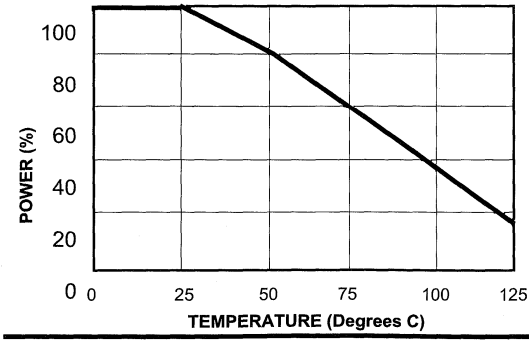
Average Power - The maximum average (cw) power is the maximum input power specified and applied for one hour minimum at the specified temperature of 25 degrees C with the output terminated in a matched impedance such that the specified properties of the attenuator will not be altered or changed after the unit is returned to ambient temperature at a power level that is 20 dB below the maximum specified input power. If the attenuator is operated at higher temperatures then it is necessary to derate the power rating accordingly. The derating curve and specifications shown below describes this specifically.



100% testing of performance parameters guarantees quality

Peak Power - The maximum peak power at a pulse width or duty cycle of 5 microseconds together with the average power when applied for a minimum period of one hour with the output terminated with a matched load will not damage or permanantly alter the specified properties of the attenuator.

Temperature Coefficient - The maximum change of insertion loss in dB per degree C from 20 C over the maximum operating temperature range. To obtain the change in insertion loss, multiply the temperature coefficient by the temperature change and then by the value in dB of the attenuator.



Custom Design Availability - In addition to the wide variety of standard model attenuators available on an off the shelf basis, Midwest Microwave retains an extensive engineering staff to accomodate your special requirements. A complete in-house design and manufacturing facility is provided including all testing and documentation for high reliability aerospace applications.

- Frequency applications that are extended
- Attenuation values in .5 dB increments
- Higher Power requrements
- High Performance, narrow bandwidth applications
- Connector interfaces and mounting requirements that are extraordinary.

Temperature Specifications

Operating Temperature Range: -54C to +125C
Temperature Coefficient: 1/10,000 dB /dB/Degree C

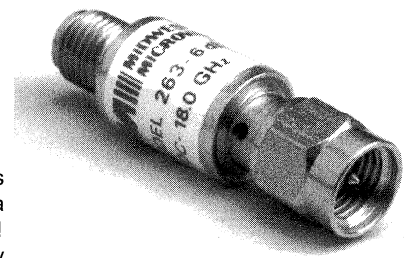
Note: All mechanical dimensions are in inches with milimeters shown in parenthesis. tolerances are as follows: 0.XX = ± .020 and 0.XXX = ± .005

Attenuators

SMA Miniature Type

DC - 18 GHz High Performance

- **DC-2, DC-4, DC-8, and DC-12.4 units available**
- **0 - 60 dB Attenuation Values**
- **Rugged Stainless Steel Construction**
- **Any Male/Female combination available**
- **Low cost alternatives available**



Midwest Microwave's SMA miniature series of fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in a small light weight package size. Attenuation values up through 60 dB in 1 dB increments are available with any of the units described and with any combination of female or male SMA connectors.

SPECIFICATIONS - HIGH PERFORMANCE

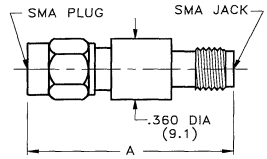
Frequency: DC - 18.0, DC - 12.4, DC - 8.0 GHz
DC - 4.0, DC - 2.0 GHz

Attenuation Accuracy:
1-10 dB ± 0.3 dB
11-20 dB ± 0.5 dB
21-40 dB ±1.0 dB
41-60 dB ±1.5 dB

VSWR: 1.07+.015 (f GHz) max.
Power: 2 Watts Average @ 25C derated linearly to .5 Watts @ 125C
Peak Power: 200 Watts
Operating Temperature Range: - 65 to + 125C
Finish: Passivated Stainless Steel

DC - 18 GHz	263 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0263-XX-SMA-02	ATT-263F-XX-SMA-02	ATT-263M-XX-SMA-02

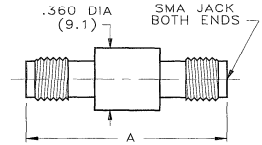
XX = Attenuation Value: Select 01-60dB in 1dB increments
(.5 dB increments available)
HIGH PERFORMANCE



Attenuation Value	Length A
1-20 dB	1.20
21-60 dB	1.49

DC - 12.4 GHz	205 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0205-XX-SMA-02	ATT-205F-XX-SMA-02	ATT-205M-XX-SMA-02

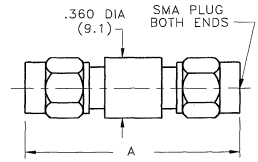
XX = Attenuation Value: Select 01-60dB in 1dB increments
(.5 dB increments available)
HIGH PERFORMANCE



Attenuation Value	Length A
1-20 dB	1.07
21-60 dB	1.36

DC - 8.0 GHz	206 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0206-XX-SMA-02	ATT-206F-XX-SMA-02	ATT-206M-XX-SMA-02

XX = Attenuation Value: Select 01-60dB in 1dB increments
(.5 dB increments available)
HIGH PERFORMANCE



Attenuation Value	Length A
1-20 dB	1.33
21-60 dB	1.62

Note: * U.S. Patent No. 3,824,506 applies to all " Fixed Attenuators.

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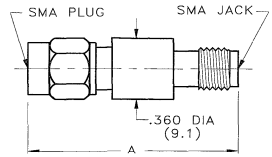
Attenuators

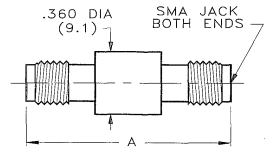
SMA Miniature Type

DC - 4.0 GHz	238 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0238-XX-SMA-02	ATT-238F-XX-SMA-02	ATT-238M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



Attenuation Value	Length A
1-20 dB	1.20
21-60 dB	1.49

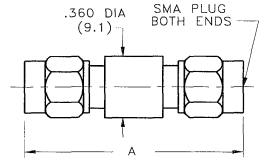
DC - 2.0 GHz	208 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0208-XX-SMA-02	ATT-208F-XX-SMA-02	ATT-208M-XX-SMA-02
XX = Attenuation Value: Select 01-60dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



Attenuation Value	Length A
1-20 dB	1.07
21-60 dB	1.36

Low Cost - Inexpensive Types

DC - 18.0 GHz	333 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0333-XX-SMA-02	ATT-333F-XX-SMA-02	ATT-333M-XX-SMA-02
XX = Attenuation Value: Select 01-60dB in 1dB increments *LOW COST*		



Attenuation Value	Length A
1-20 dB	1.33
21-60 dB	1.62

DC - 8.0 GHz	334 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0334-XX-SMA-02	ATT-334F-XX-SMA-02	ATT-334M-XX-SMA-02
XX = Attenuation Value: Select 01-60dB in 1dB increments *LOW COST*		

DC - 2.0 GHz	335 SerieS	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0335-XX-SMA-02	ATT-335F-XX-SMA-02	ATT-335M-XX-SMA-02
XX = Attenuation Value: Select 01-60dB in 1dB increments *LOW COST*		

SPECIFICATIONS - LOW COST

Attenuation Accuracy:

	DC - 12.4 GHz	12.4 - 18 GHz
1-4 dB	± 0.75 dB	± 0.75 dB
5-8 dB	± 0.75 dB	± 1.00 dB
9-12 dB	± 1.00 dB	± 1.25 dB
13-20 dB	± 1.50 dB	± 1.50 dB
21-40 dB	± 2.00 dB	± 2.00 dB
41-60 dB	± 2.50 dB	± 2.50 dB

VSWR:	Frequency (GHz)
1.25 max	DC - 4.0
1.45 max	4.0 - 12.4
1.65 max	12.4 - 18.0

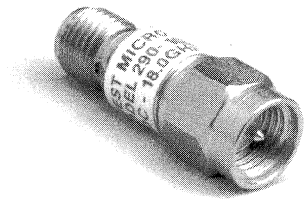
Power: 2 Watts Average @ 25C derated linearly to .5 watts @ 125C
Peak Power: 200 Watts
Operating Temperature Range: -65 to +125C
Finish: Passivated Stainless Steel
Dimensions: Same as 263 Series

Note: * U.S. Patent No. 3,824,506 applies to all " Fixed Attenuators.

DC - 26.5 GHz High Performance

- **DC-2, DC-8, DC-12.4, and DC-18.0 GHz units available**
- **Rugged Stainless Steel Construction**
- **Any Male/Female combination available**
- **Low cost alternatives available**

Midwest Microwave's SMA subminiature series of fixed coaxial attenuators (MINIPAD®) provide temperature stable, ruggedly built, precision performance in a compact light weight package size. Attenuation values up through 30 dB in 1 dB increments are available with any of the units described and with any combination of female or male SMA connectors.



SPECIFICATIONS - HIGH PERFORMANCE

Frequency: DC - 26.5, DC - 18.0, DC - 12.4 GHz
DC - 8.0, and DC - 2.0 GHz

Attenuation Accuracy: 1-6 dB ± 0.3dB
7-20 dB ± 0.5 dB
21-30 dB ±1.0 dB

VSWR: 1.07+.015 (f GHz) max.

Power: 2 Watts Average @ +25°C derated linearly to .5 watts @ +125°C

Peak Power: 200 Watts

Operating Temperature Range: -65 to +125C

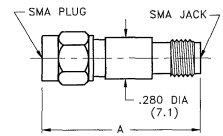
Finish: Passivated Stainless Steel

TYPE II LOW VSWR - HIGH PERFORMANCE IMPROVED SPECIFICATIONS

(see next page)

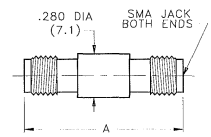
Frequency GHz	VSWR
DC - 4.0 GHz	1.12 max
4.0 - 8.0 GHz	1.15 max
8.0 - 18 GHz	1.20 max

DC - 26.5 GHz	298 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0298-XX-SMA-02	ATT-298F-XX-SMA-02	ATT-298M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



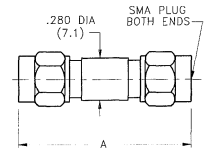
Attenuation Value	Length A
1-12 dB	0.86
13-30 dB	1.02

DC - 18.0 GHz	290 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0290-XX-SMA-02	ATT-290F-XX-SMA-02	ATT-290M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



Attenuation Value	Length A
1-12 dB	0.90
13-30 dB	1.03

DC - 12.4 GHz	291 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0291-XX-SMA-02	ATT-291F-XX-SMA-02	ATT-291M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



Attenuation Value	Length A
1-12 dB	0.98
13-30 dB	1.12

Note: * U.S. Patent No. 3,824,506 applies to all "MINIPAD" ® Fixed Attenuators

Attenuators

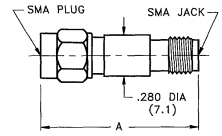
SMA Subminiature "MINIPAD"®

DC - 8.0 GHz	292 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0292-XX-SMA-02	**ATT-292F-XX-SMA-02**	**ATT-292M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		

DC - 2.0 GHz	294 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0294-XX-SMA-02	**ATT-294F-XX-SMA-02**	**ATT-294M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		

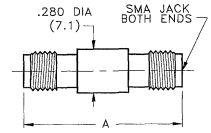
LOW VSWR - Type II High Performance Attenuators

DC - 18.0 GHz	451 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0451-XX-SMA-02	**ATT-451F-XX-SMA-02**	**ATT-451M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments *LOW VSWR - see improved performance specifications on page 10.*		



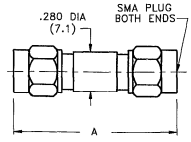
Attenuation Value	Length A
1-12 dB	0.86
13-30 dB	1.02

DC - 12.4 GHz	452 Series Model Numbers	
Male/Female	**Female/Female**	**Male/Male**
ATT-0452-XX-SMA-02	**ATT-452F-XX-SMA-02**	**ATT-452M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments *LOW VSWR - see improved performance specifications on page 10.*		



Attenuation Value	Length A
1-12 dB	0.90
13-30 dB	1.03

DC - 4.0 GHz	454 Series Model Numbers	
Male/Female	**Female/Female**	**Male/Male**
ATT-0454-XX-SMA-02	**ATT-454F-XX-SMA-02**	**ATT-454M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments *LOW VSWR - see improved performance specifications on page 10.*		



Attenuation Value	Length A
1-12 dB	0.98
13-30 dB	1.12

Notes: 1. Low VSWR Models are available in Hex Body - Designate by subsituting "HEX" for "SMA" in Model No.

2. U.S. Patent No. 3,824,506 applies to all "MINIPAD" ® Fixed Attenuators

Hex Body Types - High Performance

DC - 26.5 GHz	Hex Body 298HEX Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0298-XX-HEX-02	ATT-298F-XX-HEX-02	ATT-298M-XX-HEX-02

XX = Attenuation Value: Select 01-30dB in 1dB increments
(.5 dB increments available)

HIGH PERFORMANCE

DC - 18.0 GHz	Hex Body 290HEX Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0290-XX-HEX-02	ATT-290F-XX-HEX-02	ATT-290M-XX-HEX-02

XX = Attenuation Value: Select 01-30dB in 1dB increments
(.5 dB increments available)

HIGH PERFORMANCE

DC - 12.4 GHz	Hex Body 291HEX Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0291-XX-HEX-02	ATT-291F-XX-HEX-02	ATT-291M-XX-HEX-02

XX = Attenuation Value: Select 01-30dB in 1dB increments
(.5 dB increments available)

HIGH PERFORMANCE

DC - 8.0 GHz	Hex Body 292HEX Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0292-XX-HEX-02	ATT-292F-XX-HEX-02	ATT-292M-XX-HEX-02

XX = Attenuation Value: Select 01-30dB in 1dB increments
(.5 dB increments available)

HIGH PERFORMANCE

DC - 2.0 GHz	Hex Body 294HEX Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0294-XX-HEX-02	ATT-294F-XX-HEX-02	ATT-294M-XX-HEX-02

XX = Attenuation Value: Select 01-30dB in 1dB increments
(.5 dB increments available)

HIGH PERFORMANCE

SPECIFICATIONS - HIGH PERFORMANCE

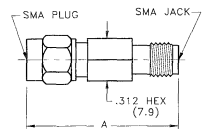
Attenuation Accuracy: 1-6 dB ± 0.3 dB
7-20 dB ± 0.5 dB
21-30 dB ± 1.0 dB

VSWR: 1.07+.015(f GHz) max

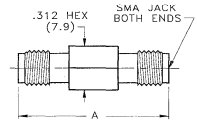
Power: 2 Watts Average @ +25 °C derated linearly to .5 watts @ +125 °C and 200 Watts peak

Operating Temperature Range: -65 °C to +125 °C

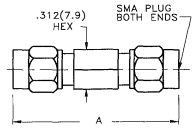
Finish: Passivated Stainless Steel



Attenuation Value	Length A
1-12 dB	0.86
13-30 dB	1.02



Attenuation Value	Length A
1-12 dB	0.90
13-30 dB	1.03



Attenuation Value	Length A
1-12 dB	0.98
13-30 dB	1.12

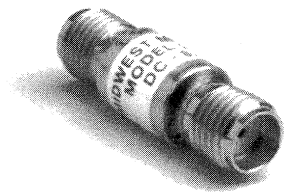
Note: * U.S. Patent No. 3,824,506 applies to all " Fixed Attenuators.

Attenuators

SMA Subminiature "MINIPAD"®

Round Body - Low Cost - Inexpensive Types

DC - 18.0 GHz	444 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0444-XX-SMA-02	ATT-444F-XX-SMA-02	ATT-444M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		



DC - 12.4 GHz	445 Series	Model Numbers
Male/Female	Female /Female	Male/Male
ATT-0445-XX-SMA-02	ATT-445F-XX-SMA-02	ATT-445M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

DC - 8.0 GHz	446 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0446-XX-SMA-02	ATT-446F-XX-SMA-02	ATT-446M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

DC - 4.0 GHz	447 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0447-XX-SMA-02	ATT-447F-XX-SMA-02	ATT-447M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

DC - 2.0 GHz	448 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0448-XX-SMA-02	ATT-448F-XX-SMA-02	ATT-448M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

Note: Low Cost Models are available in Hex Body - Designate by subsituting "HEX" for "000" in Model No.

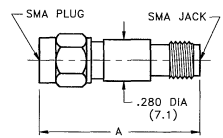
SPECIFICATIONS - LOW COST

Attenuation Accuracy:

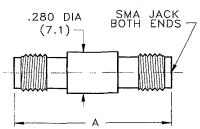
	DC - 12.4 GHz	12.4 - 18 GHz
1-4 dB	± 0.75 dB	± 0.75 dB
5-8 dB	± 0.75 dB	± 1.00 dB
9-12 dB	± 1.00 dB	± 1.25 dB
13-20 dB	± 1.50 dB	± 1.50 dB
21-30 dB	± 2.00 dB	± 2.00 dB

VSWR:

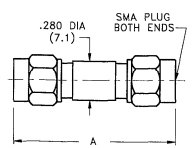
Frequency (GHz)	VSWR
DC - 4.0	1.25 max
4.0 - 12.4	1.45 max
12.4 - 18.0	1.65 max



Attenuation Value	Length A
1-12 dB	0.86
13-30 dB	1.02



Attenuation Value	Length A
1-12 dB	0.90
13-30 dB	1.03



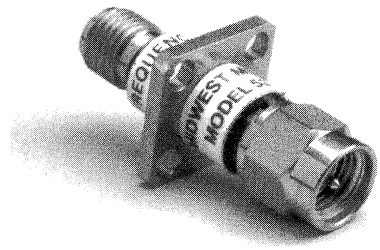
Attenuation Value	Length A
1-12 dB	0.98
13-30 dB	1.12

Attenuators

SMA Subminiature "MINIPAD"®

Flange Mount Types - High Performance

DC - 18 GHz Flange Mount 523 Series		Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0523-XX-SMA-02	**ATT-523F-XX-SMA-02**	**ATT-523M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) ***HIGH PERFORMANCE***		



DC - 12.4 GHz Flange Mount 524 Series		Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0524-XX-SMA-02	**ATT-524F-XX-SMA-02**	**ATT-524M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) ***HIGH PERFORMANCE***		

SPECIFICATIONS - HIGH PERFORMANCE

Attenuation Accuracy: 1-6 dB ± 0.3 dB; 7-20 dB ± 0.5 dB; 21-30 dB ± 1.0 dB

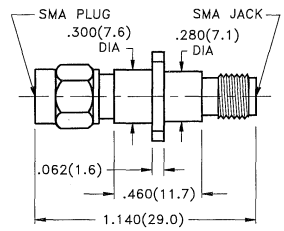
VSWR: 1.07+.015(f GHz) max

Power: 2 Watts Average @ +25 °C derated linearly to .5 watts @ +125 °C and 200 Watts peak

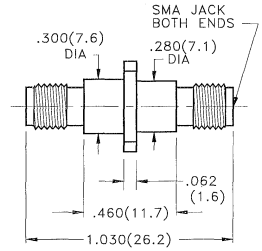
Operating Temperature Range: -65 to +125 °C

Finish: Passivated Stainless Steel

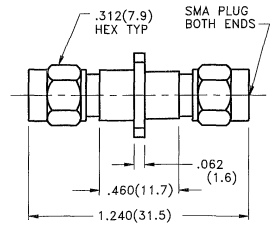
DC - 8.0 GHz Flange Mount 531 Series		Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0531-XX-SMA-02	**ATT-531F-XX-SMA-02**	**ATT-531M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) ***HIGH PERFORMANCE***		



DC - 4.0 GHz Flange Mount 525 Series		Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0525-XX-SMA-02	**ATT-525F-XX-SMA-02**	**ATT-525M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) ***HIGH PERFORMANCE***		



DC - 2.0 GHz Flange Mount 526 Series		Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0526-XX-SMA-02	**ATT-526F-XX-SMA-02**	**ATT-526M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) ***HIGH PERFORMANCE***		



Note: * U.S. Patent No. 3,824,506 applies to all " Fixed Attenuators.

Attenuators SMA Subminiature "MINIPAD"®

Flange Mount Types - Low Cost - Inexpensive

DC - 18 GHz	Flange Mount 532 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0532-XX-SMA-02	**ATT-532F-XX-SMA-02**	**ATT-532M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

DC - 12.4 GHz	Flange Mount 533 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0533-XX-SMA-02	**ATT-533F-XX-SMA-02**	**ATT-533M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

DC - 8.0 GHz	Flange Mount 534 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0534-XX-SMA-02	**ATT-534F-XX-SMA-02**	**ATT-534M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST - Improved VSWR		

DC - 4.0 GHz	Flange Mount 535 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0535-XX-SMA-02	**ATT-535F-XX-SMA-02**	**ATT-535M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST - Improved VSWR		

DC - 2.0 GHz	Flange Mount 536 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0536-XX-SMA-02	**ATT-536F-XX-SMA-02**	**ATT-536M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments		
LOW COST		

Flange Mount type Attenuators are useful in many system or test instrument requirements where it is necessary to pass a signal through a panel and also take advantage of the opportunity to insert an attenuator while saving valuable space and weight. These units possess the same high performance characteristics as the standard 290 series.

The units are manufactured using rugged stainless steel construction and are designed to operate under very hostile environmental conditions.

SPECIFICATIONS - LOW COST

Attenuation Accuracy:

	DC - 12.4 GHz	12.4 - 18 GHz
1-10 dB	± 0.75 dB	± 0.75 dB
11-20 dB	± 0.75 dB	± 1.00 dB
21-30 dB	± 1.00 dB	± 1.25 dB

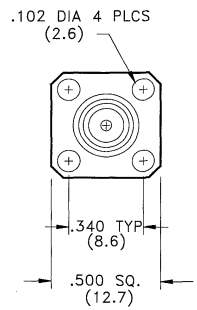
VSWR:

Frequency (GHz)	VSWR
DC - 4.0	1.25 max
4.0 - 12.4	1.45 max
12.4 - 18.0	1.65 max

Power: 2 Watts Average @ +25 °C derated linearly to .5 watts @ 125C and 200 Watts peak

Operating Temperature Range: -65 to +125 °C

Finish: Passivated Stainless Steel



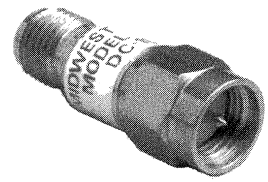
Typical End View - All Models

Attenuators

SMA Ultraminiature Type

DC - 18 GHz High Performance

- **DC-2, DC-4, DC-8, and DC-12.4 units also available**
- **0 - 30 dB Attenuation Values**
- **Rugged Stainless Steel Construction**
- **Any Male/Female combination available**
- **Small Size - Lightweight**



Midwest Microwave's SMA Ultraminiature series of fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in a very small light weight package size. Attenuation values up through 30 dB in 1 dB increments are available with any of the units described and with any combination of female or male SMA connectors.

SPECIFICATIONS - HIGH PERFORMANCE

Frequency: DC - 18.0, DC - 12.4, DC - 8.0 GHz
DC - 4.0, DC - 2.0 GHz

Attenuation Accuracy: 1-6 dB ±0.3dB
7-20 dB ±0.5 dB
21-30 dB ±1.0 dB

VSWR: 1.07+.015 (f GHz) max.

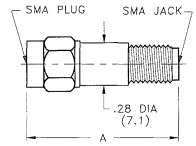
Power: 2 Watts average @ +25 °C derated linearly to .5 watts @ +125 °C

Peak Power: 200 Watts

Operating Temperature Range: - 65 to + 125 °C

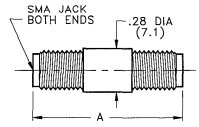
Finish: Passivated Stainless Steel

DC - 18 GHz	275 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0275-XX-SMA-02	ATT-275F-XX-SMA-02	ATT-275M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



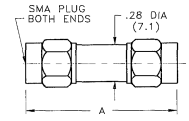
Attenuation Value	Length A
1-12 dB	0.750
13-30 dB	0.875

DC - 12.4 GHz	276 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0276-XX-SMA-02	ATT-276F-XX-SMA-02	ATT-276M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



Attenuation Value	Length A
1-12 dB	0.700
13-30 dB	0.825

DC - 8.0 GHz	277 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0277-XX-SMA-02	ATT-277F-XX-SMA-02	ATT-277M-XX-SMA-02
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available) *HIGH PERFORMANCE*		



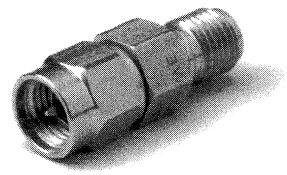
Attenuation Value	Length A
1-12 dB	0.875
13-30 dB	1.00

Note: * U.S. Patent No. 3,824,506 applies to all " Fixed Attenuators.

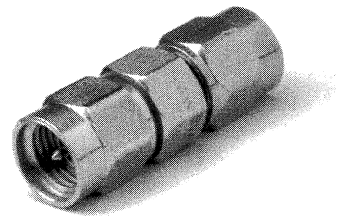
Attenuators

SMA Ultraminiature Type

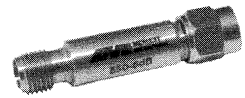
DC - 4.0 GHz	278 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0278-XX-SMA-02	**ATT-278F-XX-SMA-02**	**ATT-278M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available)		



DC - 2.0 GHz	279 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0279-XX-SMA-02	**ATT-279F-XX-SMA-02**	**ATT-279M-XX-SMA-02**
XX = Attenuation Value: Select 01-30dB in 1dB increments (.5 dB increments available)		



DC - 26.5 GHz 3.5mm High Performance



- **Extended Frequency Performance**
- **0 - 20 dB Attenuation Values**
- **3.5 mm Precision Connectors (mates with SMA)**
- **Small Size - Light Weight**
- **Any Male/Female Connector Configuration**
- **Rugged Stainless Steel Construction**

Midwest Microwave's 3.5 mm subminiature series of precision fixed coaxial attenuators provide extended frequency operation of up to 26.5 GHz when mated with connector interfaces of the same family. These temperature stable, ruggedly built, precision attenuators allow high performance in a very small light weight package size. Attenuation values up through 20 dB in 1 dB increments are available with any combination of female or male 3.5mm connectors.

SPECIFICATIONS - HIGH PERFORMANCE

Frequency: **DC - 18.0, DC - 26.5 GHz**

Attenuation Accuracy: **1-6 dB ± 0.5 dB**
7-20 dB ± 0.7 dB

Operating Temp Range: **- 65 to + 125C**

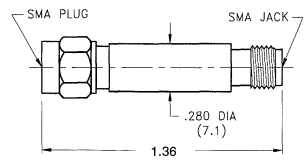
VSWR: **1.07 + 0.015 f (GHz)**

Power: **2 Watts Average @ +25 °C**
derated linearly to .5 watts @ +125 °C

Peak Power: **200 Watts**

Finish: **Passivated Stainless Steel**

DC - 26.5 GHz	550 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
ATT-0550-XX-35M-02	**ATT-550F-XX-35M-02**	**ATT-550M-XX-35M-02**
XX = Attenuation Value: Select 01-20dB in 1dB increments (.5 dB increments available) ***26.5 GHz Extended Frequency Performance***		



Note: dimensions shown above are for the Male/Female version. The length for the Female/Female version is 1.33 and for the Male/Male version is 1.39.

Note: For DC - 18.0 GHz Model, subsitute "551" for "550" in Model No.

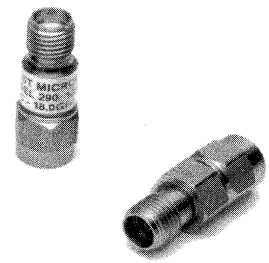
Attenuators

QPL • High Reliability

MIL-A-3933 Qualified (QPL)

- **Non-Screened and Screened Units Available**
- **100% Tested**
- **Military Applications**

Midwest Microwave's QPL Attenuator productswere designed, tested and have been qualified to the stringent requirements of the latest effective issue of the applicable military specifications. By selecting a part that appears on a QPL list, a user is assured that the part will meet or exceed the performance specifications set forth in the MIL Specification as a minimum standard of performance.



MIL Part Slash No. Group	Description	Frequency (GHz)	Attenuation (dB)
MIL-A-3933/25	SMA Subminiature - Male/Female	DC - 4.0, DC - 12.4, DC - 18.0	0 - 40
MIL-A-3933/14	SMA Miniature - Male/Female	DC - 12.4	1 - 40
MIL-A-3933/16	SMA Miniature - Male/Female	DC - 18.0	0 - 40
MIL-A-3933/24	SMA Panel Mtd - Female/Female	2.0 - 12.4	10, 15, ,20, 40
MIL-A-3933/17	TNC - Male/Female	DC - 4.5, DC - 18.0	1-8, 10, 12, 15, 20, 25, 30, & 40
MIL-A-3933/19	BNC - Male/Female	DC - 4.5	1-6, 8, 10-13, 15, 20, & 40
MIL-A-3933/18	Type N - Male/Female	DC - 18.0	3, 6, , 10, 20, & 40
MIL-A-3933/16	Type N Lossy Line Type - Male/Female	0.4 - 18.0, 0.5-18.0	1 & 2
		0.6 - 18.0	3
		1.0 - 18.0	4 - 10
		2.0 - 18.0	20

Note: Please refer to the QPL parts section on page 238 for complete listing of QPL part numbers.

Screened Attenuators per Table IV of MIL-A-3933

Screening Tests:

- Thermal Shock
- Conditioning
- Visual & Mechanical Inspection
- Pre-Burn-In Electrical:
  - DC Resistance
  - VSWR
  - Attenuation
- Burn-In 240 Hours
- Post Burn-In Electrical:
  - DC Resistance
  - VSWR
  - Attenuation
- Radiographic Inspection

Non-Screened Attenuators per Table V of MIL-A-3933

Group A Inspection Tests

- Visual & Mechanical Examination
- VSWR
- Attenuation
- Stability of Attenuation:
  - After Peak Power

Note: All Screened Attenuators are tested 100% per Table IV and V of MIL-A-3933.
All Non-Screened Attenuators are tested 100% per Table V of MIL-A-3933.

Space Qualified Attenuators

Midwest Microwave manufactures High Reliability (Hi-Rel) Attenuators suitable for use under space flight conditions. These units are manufactured using a system that provides complete tracability of all of the piece parts that make up their assembly. All non-metal materials used meet or exceed the outgassing requirements of NASA specifications JSC SP-R-0022 for a TML of 1% max and a CVCM of .1% max.. All Hi-Rel components are manufactured in a clean room environment exceeding the requirements of FED-STD-201 Class 100,000. Hi-Rel attenuators are manufactured to individual customer specifications and undergo extensive testing similar to the testing outlined below.

In-Process Inspections	Sample Size
Visual & Mechanical Dimensions	100%
Plating Thickness	5 pcs.
Solderability	5 pcs.
Plating Adhesion	5 pcs.
Contact Captivation	100%
Rotational Contact Retention	6 pcs.
Axial Contact Retention	6 pcs.
Proof Torque	100%
Contact Engaging Force	100%
Contact Separating Force	100%

Group A Inspections - 100%

- Visual & Mechanical Inspection
- Thermal Shock
- Sinusoidal Vibration
- Electrical Characterisitics
- Peak Power
- Connector Engaging/Separating Force
- Radiographic Inspections
- PIND Test
- Visual & Mechanical Inspection

Group B Inspections - 100%

- Electrical Characteristics @ Operating Temperature Extremes
- Contact Engaging/Separating Forces
- Coupling Mechanism Proof Torque
- Connector Mounting Proof Torque

Group C Inspections - 100%

- Vibration
- Shock
- Moisture Resistance
- Electrical Characteristics
- Resistance to Solvents

Flange Mounted - Integrated Design

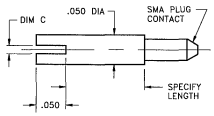
- **DC - 18 GHz Performance**
- **Tab, Slot, or Rod Contact for Microstrip use**
- **Interchangeable Transition Contact Pins**
- **Reduces Package Size and Weight**

This series of SMA flange mounted Connector-Attenuators are ideally suited for use on microstrip packages where size and weight are a consideration. By combining the Attenuator and the launching Connector, space and weight as well as cost savings is accomplished. The resistive film circuit is designed to improve reliability and lower mismatch losses by eliminating the need for separate coaxial components. The units exhibit low VSWR and are ruggedly constructed of stainless steel and are temperature stabilized for use in hostile environments.

Model No.	Attenuation	VSWR	Fig.
ATT-0300--XX-SMA-02	01 - 06 ± 0.30 07 - 10 ± 0.50 11 - 20 ± 0.75	1.20 @ DC - 4 GHz 1.35 @ 4 - 12.4 GHz 1.50@12.4 - 18 GHz	1
ATT-0310--XX-SMA-02	01 - 06 ± 0.30 * 07 - 10 ± 0.50 11 - 20 ± 0.75 21 - 30 ± 1.00	1.15 @ DC - 4 GHz 1.25 @ 4-12.4 GHz 1.50 @12.4 -18GHz	2
ATT-0311-XX-SMA-02	01 - 06 ± 0.30 * 07 - 10 ± 0.50 11 - 20 ± 0.75 21 - 30 ± 1.00	1.15 @ DC - 4 GHz 1.25 @ 4-12.4 GHz 1.50 @12.4 -18GHz	3
ATT-0312-XX-SMA-02	01 - 06 ± 0.30 * 07 - 10 ± 0.50 11 - 20 ± 0.75 21 - 30 ± 1.00	1.15 @ DC - 4 GHz 1.25 @ 4-12.4 GHz 1.50 @ 12.4 -18GHz	4
ATT-0314-XX-SMA-02	01 - 06 ± 0.30 * 07 - 10 ± 0.50 11 - 20 ± 0.75 21 - 30 ± 1.00	1.15 @ DC - 4 GHz 1.25 @ 4-12.4 GHz 1.50 @12.4 -18GHz	5

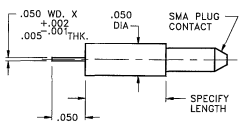
Note: When ordering, replace "XX" in Model No. with desired Attenuation Value. Interchangeable center pin must be ordered separately, see Part No's below.
* From 12.4 to 18 GHz, Attenuation accuracy is ± 0.40 dB

Interchangeable Pin Configurations

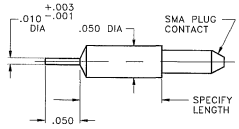


"CC"	DIM "C" ± .002
-01	0.012
-02	0.018
-03	0.028
-04	0.036

Part No. **PPM-0020-CC-YYY-01**



Part No. **PPM-0030-05-YYY-01**



Part No. **PPM-0040-06-YYY-01**

Notes:
1. Select desired length of interchangeable center pins in accordance with package requirements and substitue the three digit decimal length for "YYY" in the Part No.
2. All Attenuator Models are rated at 2 Watts Average and 200 Watts Peak.
3. Finish : Housings are Passivated Stainless Steel, Center Pins are gold plated.

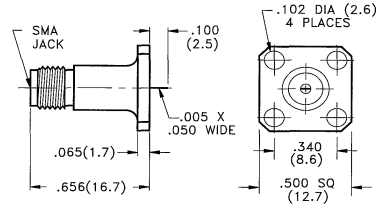


Figure 1 - non- removeable tab contact

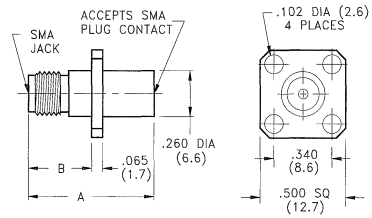


Figure 2

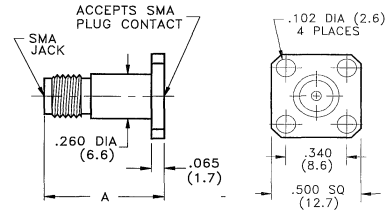


Figure 3

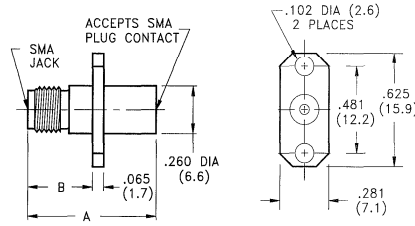


Figure 4

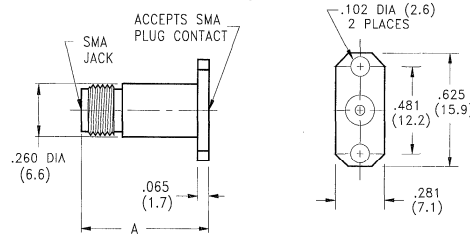


Figure 5

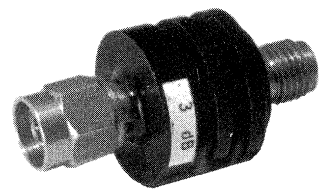
dB	DIM A	DIM B
1-12	.615 (15.6)	.375 (9.5)
13-30	.765 (19.4)	.525 (13.3)

Attenuators

SMA Medium Power Types

DC - 18 GHz High Performance

- **DC-18 GHz Performance**
- **5, 10, and 20 Watt Model selection**
- **Rugged Stainless Steel Interface Construction**
- **Any Male/Female combination available**
- **Low VSWR - High Performance.**

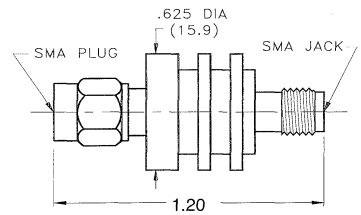


Midwest Microwave's SMA series of medium power fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages. Attenuation values range through 40 dB in 1 dB increments and are available with any combination of female or male SMA connectors

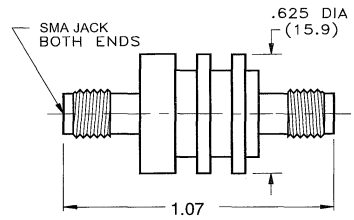
5 Watts - DC - 18 GHz

Frequency: DC - 18.0, DC-12.4, and DC-6.0 GHz units available
Attenuation Values: 1 thru 20 dB in 1 dB Increments
Attenuation Accuracy: 1- 6 dB ± 0.3dB
7-10 dB ± 0.5 dB
11-20 dB ± 0.7 dB
VSWR: 1.25 max. @ DC - 6.0 GHz, 1.30 max. @ 6 - 12.4 GHz, and 1.40 max. @ 12.4 - 18.0 GHz
Power: 5 Watts Average @ +40C derated linearly to 0.5 Watts @ +125C
Peak Power: 200 Watts
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum and Stainless Steel Connectors

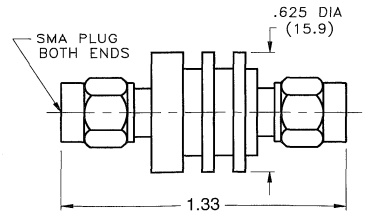
DC - 18.0 GHz	473 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0473-XX-SMA-07	ATT-473F-XX-SMA-07	ATT-473M-XX-SMA-07
XX = Attenuation Value: Select 01-20dB in 1dB increments *5 WATTS*		



DC - 12.4 GHz	474 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0474-XX-SMA-07	ATT-474F-XX-SMA-07	ATT-474M-XX-SMA-07
XX = Attenuation Value: Select 01-20dB in 1dB increments *5 WATTS*		



DC - 6.0 GHz	475 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0475-XX-SMA-07	ATT-475F-XX-SMA-07	ATT-475M-XX-SMA-07
XX = Attenuation Value: Select 01-20dB in 1dB increments *5 WATTS*		

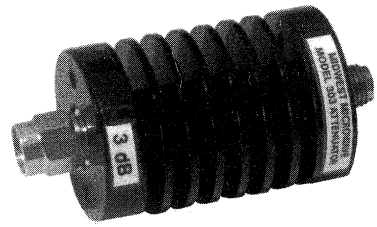


MIDWEST MICROWAVE

Attenuators

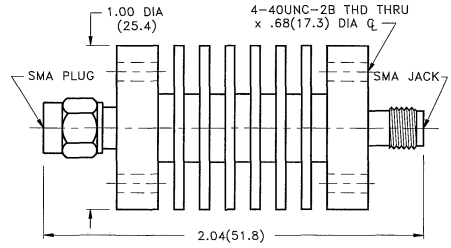
SMA Medium Power Types

10 Watts - DC - 18 GHz Performance

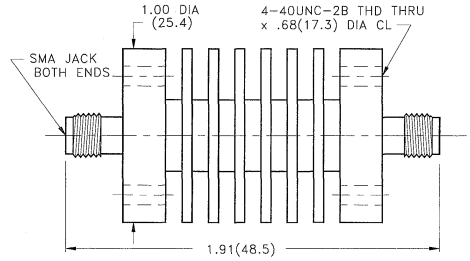


Frequency: DC - 18.0, DC-12.4, DC-6.0, and DC-2.0 GHz units available
Attenuation Values: 1 thru 40 dB in 1 dB Increments
Attenuation Accuracy: 1- 10 dB ± 0.5dB
11-20 dB ± 0.7 dB
21-40 dB ± 1.0dB
VSWR: 1.25 max. @ DC - 2.0 GHz, 1.40 max. @ 2 - 12.4 GHz, and 1.50 max. @ 12.4 - 18.0 GHz
Power: 10 Watts Average @ +40C derated linearly to 0.5 Watts @ +125C
Peak Power: 100 Watts except 488 Series which is 5 Kilowatts
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum and Stainless Steel Connectors

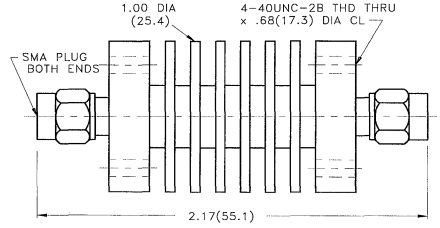
DC - 18.0 GHz	303 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0303-XX-SMA-07	ATT-303F-XX-SMA-07	ATT-303M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
10 WATTS		



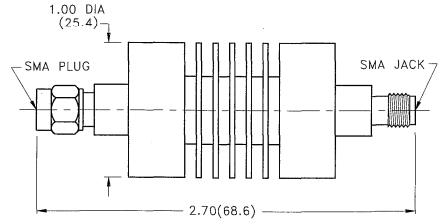
DC - 12.4 GHz	471 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0471-XX-SMA-07	ATT-471F-XX-SMA-07	ATT-471M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
10 WATTS		



DC - 6.0 GHz	472 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0472-XX-SMA-07	ATT-472F-XX-SMA-07	ATT-472M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
10 WATTS		



DC - 2.0 GHz	488 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0488-XX-SMA-07	ATT-488F-XX-SMA-07	ATT-488M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
10 WATTS Average - 5 Kilowatts Peak		



Attenuators

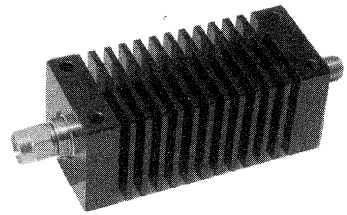
SMA Medium Power Types

20 Watts - DC - 18 GHz Performance

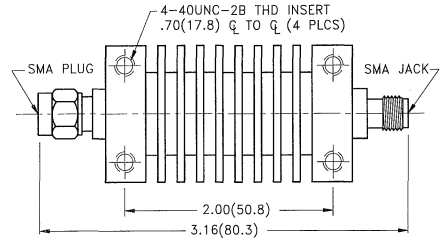
Frequency: DC - 18.0 , DC-12.4, DC-6.0, and DC-2.0 GHz units available
Attenuation Values: 1 thru 40 dB in 1 dB Increments
Attenuation Accuracy:

	DC-12.4 GHz	12.4 - 18 GHz
1- 6 dB	± 0.3 dB	± 0.5 dB
7-10 dB	± 0.5 dB	± 0.75 dB
11-20 dB	± 0.75 dB	± 1.0 dB
21-40 dB	± 1.0 dB	± 1.5 dB

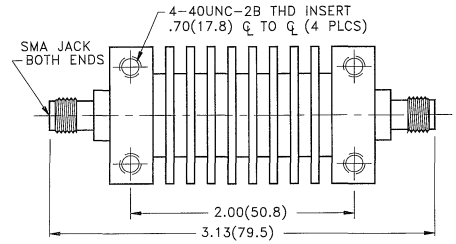
VSWR: 1.25 max. @ DC - 12.4 GHz, and 1.50 max. @ 12.4 - 18.0 GHz
Power: 20 Watts Average @ +40C derated linearly to 5 Watts @ +125C
Peak Power: 500 Watts
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum and Stainless Steel Connectors



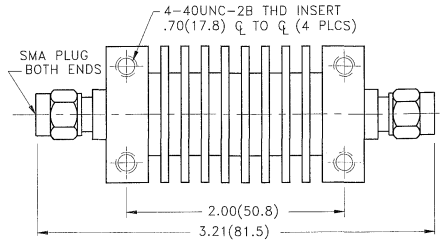
DC - 18.0 GHz	526 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0553-XX-SMA-07	ATT-553F-XX-SMA-07	ATT-553M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
20 WATTS		



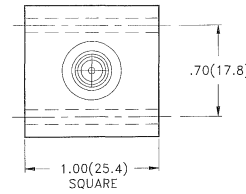
DC - 12.4 GHz	527 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0527-XX-SMA-07	ATT-527F-XX-SMA-07	ATT-527M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
20 WATTS		



DC - 6.0 GHz	525 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0554-XX-SMA-07	ATT-554F-XX-SMA-07	ATT-554M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
20 WATTS		



DC - 2.0 GHz	524 Series	Model Numbers
Male/Female	Female/Female	Male/Male
ATT-0555-XX-SMA-07	ATT-555F-XX-SMA-07	ATT-555M-XX-SMA-07
XX = Attenuation Value: Select 01-40dB in 1dB increments		
20 WATTS		



MIDWEST MICROWAVE

Attenuators

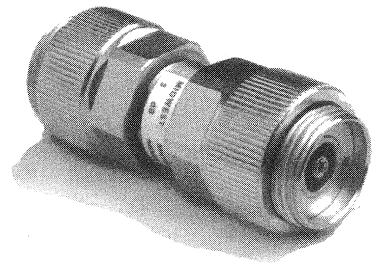
7mm Precision Types

DC - 18 GHz Precision Performance

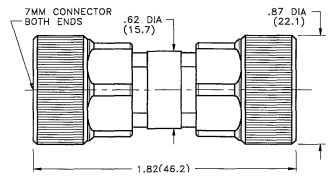
Frequency: DC - 18.0 GHz
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

1 - 6 dB	± 0.3 dB
7 - 20 dB	± 0.5 dB
21 - 40 dB	± 0.7 dB
41 - 60 dB	± 1.5 dB

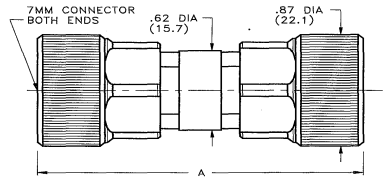
Impedance: 50 Ohms
VSWR: as noted
Power: as noted
Peak Power: 200 Watts on 2 Watt units and 100 Watts on medium power units
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum and Stainless Steel Connectors



DC - 18.0 GHz	431 Series	Model Number
7mm Precision - Low VSWR		
ATT-0431-XX-7MM-02		
Attenuation Value = XX, Select 3, 6, 10, or 20 dB VSWR: 1.12 @ DC-4.0, 1.15 @ 4.0-8.0, and 1.20 @ 8.0-18.0 (GHz) max. Power: 2 Watts average @ +25 ° C derated linearly to 0.5 Watts @ +125 °C		

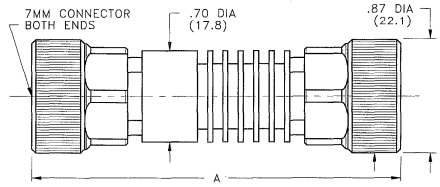


DC - 18.0 GHz	220 Series	Model Number
7mm Precision - Broadband Performance		
ATT-0220-XX-7MM-02		
Attenuation Value= XX, Select 1 thru 60 dB in 1 dB Increments VSWR: 1.07 + 0.015 f (GHz) Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C		



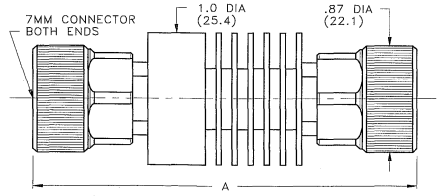
Attenuation	A
1 - 20 dB	2.19
21 - 60 dB	2.47

DC - 12.4 GHz	395 Series	Model Number
7mm Precision - 5 Watts		
ATT-0395-XX-7MM-02		
Attenuation Value = XX, Select 01 thru 40 dB in 1 dB increments VSWR: 1.06 + 0.02f (GHz) Power: 5 Watts average @ +25 °C derated linearly to 1 Watt @ +125 °C		



Attenuation	A
1 - 6 dB	2.68
7 - 40 dB	3.12

DC - 12.4 GHz	396 Series	Model Number
7mm Precision - 10 Watts		
ATT-0396-XX-7MM-02		
Attenuation Value = XX, Select 01 thru 40 dB in 1 dB increments VSWR: 1.06 + 0.02 f (GHz) max Power: 10 Watts average @ +25 °C derated linearly to 1 Watt @ +125 °C		



Attenuation	A
1 - 6 dB	2.68
7 - 40 dB	3.12

Attenuators

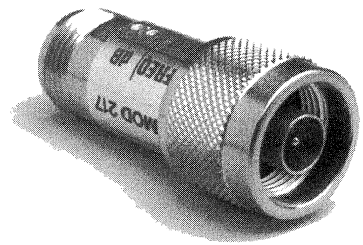
Type N

DC - 18 GHz Precision Performance

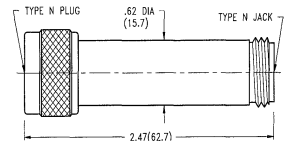
Frequency: DC - 18.0 GHz, DC - 12.4, and DC - 8.0 units available
Attenuation Values: 1 - 60 dB as noted
Attenuation Accuracy:

1 - 6 dB	± 0.3 dB
7 - 20 dB	± 0.5 dB
21 - 40 dB	± 0.7 dB
41 - 60 dB	± 1.5 dB

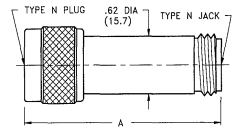
Impedance: 50 Ohms
VSWR: 1.07 + 0.015 f (GHz) max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 200 Watts
Operating Temperature Range: -54 °C to +125 °C
Finish: Stainless Steel



DC - 18.0 GHz	389 Series	Model Number
Type N Precision - Low VSWR		
ATT-0389-XX-NNN-02		
Attenuation Value = XX, Select 3, 6, 10, or 20 dB *Calibration Data Supplied*	VSWR: 1.12 @ DC-4 GHz 1.15 @ 4 - 8 GHz 1.20 @ 8 - 18 GHz	

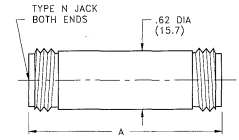


DC - 18.0 GHz	219 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0219-XX-NNN-02	ATT-219F-XX-NNN-02	ATT-219M-XX-NNN-02
Attenuation Value= XX, Select 1 thru 60 dB in 1 dB Increments		



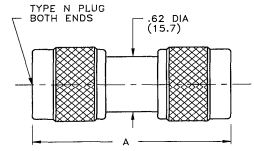
Attenuation Value	Length A
1 - 20 dB	1.77 (45.0)
21 - 60 dB	2.05 (52.1)

DC - 12.4 GHz	218 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0218-XX-NNN-02	ATT-218F-XX-NNN-02	ATT-218M-XX-NNN-02
Attenuation Value= XX, Select 1 thru 60 dB in 1 dB Increments		



Attenuation Value	Length A
1 - 20 dB	1.74 (44.2)
21 - 60 dB	2.02 (51.3)

DC - 8.0 GHz	217 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0217-XX-NNN-02	ATT-217F-XX-NNN-02	ATT-217M-XX-NNN-02
Attenuation Value= XX, Select 1 thru 60 dB in 1 dB Increments		



Attenuation Value	Length A
1 - 20 dB	1.56 (39.6)
21 - 60 dB	1.84 (47.0)

Note: U.S. Patent No. 3,824,506 and 4,011,531 applies to 217, 218, and 219 series Attenuators.

Attenuators

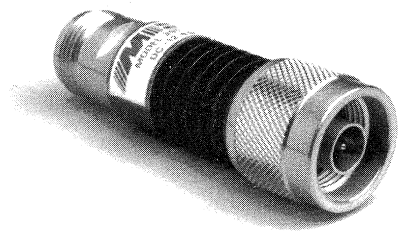
Type N - Medium Power

5 Watts - DC - 18 GHz Precision Performance

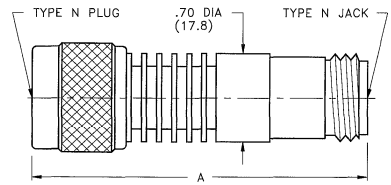
Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8, and DC - 2.0 units available
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

	DC-12.4 GHz	12.4-18.0 GHz
1 - 6 dB	± 0.3 dB	± 0.5 dB
7 - 20 dB	± 0.5 dB	± 0.75 dB
21 - 40 dB	± 0.7 dB	± 1.0 dB

Impedance: 50 Ohms
VSWR: 1.06 + 0.02 f (GHz) max
Power: 5 Watts average @ +40 °C derated linearly to 1 Watt @ +125 °C
Peak Power: 100 Watts
Operating Temperature Range: -54 °C to +125 °C
Finish: Black Anodized Aluminum with Stainless Steel Connectors

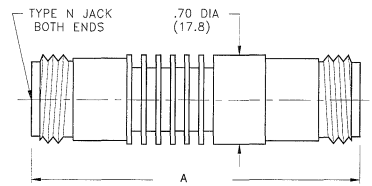


DC - 18.0 GHz	390 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0390-XX-NNN-07	ATT-390F-XX-NNN-07	ATT-390M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
5 Watts		



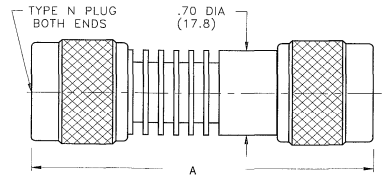
Attenuation Value	Length A
1 - 6 dB	2.38 (60.5)
7 - 40 dB	2.82 (71.6)

DC - 12.4 GHz	391 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0391-XX-NNN-07	ATT-391F-XX-NNN-07	ATT-391M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
5 Watts		



Attenuation Value	Length A
1 - 6 dB	2.32 (59.0)
7 - 40 dB	2.75 (69.9)

DC - 8.0 GHz	393 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0393-XX-NNN-07	ATT-393F-XX-NNN-07	ATT-393M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
5 Watts		



Attenuation Value	Length A
1 - 6 dB	2.48 (63.0)
7 - 40 dB	2.91 (74.0)

DC - 2.0 GHz	394 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0394-XX-NNN-07	ATT-394F-XX-NNN-07	ATT-394M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
5 Watts		

Attenuators

Type N - Medium Power

10 Watts - DC - 18 GHz Precision Performance

Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8.0 and DC - 2.0 units available
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

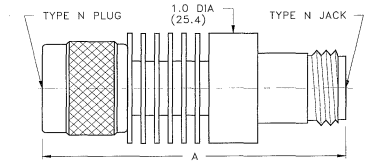
	DC-12.4 GHz	12.4-18.0 GHz
1 - 6 dB	± 0.3 dB	± 0.5 dB
7 - 20 dB	± 0.5 dB	± 0.75 dB
21 - 40 dB	± 0.7 dB	± 1.0 dB

Impedance: 50 Ohms
VSWR: 1.06 + 0.02 f (GHz) max
Power: 10 Watts average @ 40C derated linearly to 1 Watt @ 125C
Peak Power: 100 Watts except Model 477 series is 5Kilowatts
Operating Temperature Range: -54 °C to +125 °C
Finish: Black Anodized Aluminum with Stainless Steel Connectors

DC - 18.0 GHz	397 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0397-XX-NNN-07	ATT-397F-XX-NNN-07	ATT-397M-XX-NNN-07

Attenuation Value = XX, Select 01 thru 40 dB in 1 dB increments

10 Watts

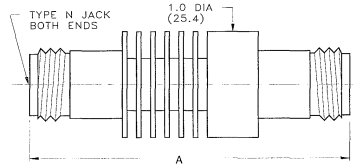


Attenuation Value	Length A
1 - 6 dB	2.38 (60.5)
7 - 40 dB	2.82 (71.6)

DC - 12.4 GHz	392 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0392-XX-NNN-07	ATT-392F-XX-NNN-07	ATT-392M-XX-NNN-07

Attenuation Value= XX, Select 01 thru 40 dB in 1 dB Increments

10 Watts

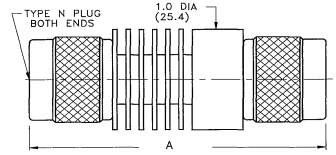


Attenuation Value	Length A
1 - 6 dB	2.32 (58.9)
7 - 40 dB	2.75 (69.9)

DC - 8.0 GHz	398 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0398-XX-NNN-07	ATT-398F-XX-NNN-07	ATT-398M-XX-NNN-07

Attenuation Value= XX, Select 01 thru 40 dB in 1 dB Increments

10 Watts

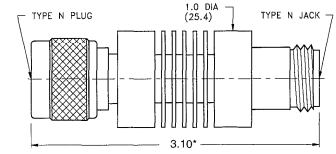


Attenuation Value	Length A
1 - 6 dB	2.48 (63.0)
7 - 40 dB	2.91 (73.9)

DC - 2.0 GHz	477 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0477-XX-NNN-07	ATT-477F-XX-NNN-07	ATT-477M-XX-NNN-07

Attenuation Value= XX, Select 03 thru 40 dB in 1 dB Increments

10 Watts - 5 Kilowatts Peak *VSWR: 1.25 Max.*



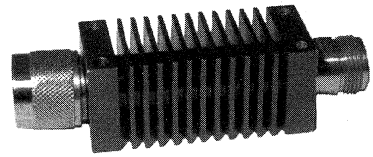
Note: Female to Female Model is 3.02 (76.7) long
Male to Male Model is 3.18 (80.8) long

Note: U.S. Patent No. 4,011,531 applies.

Attenuators

Type N - Medium Power

20 Watts - DC - 18 GHz Precision Performance

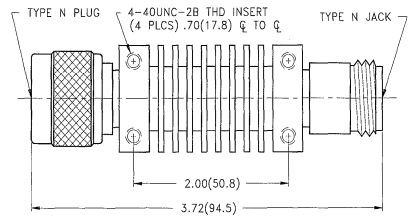


Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8, and DC - 2.0 units available
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

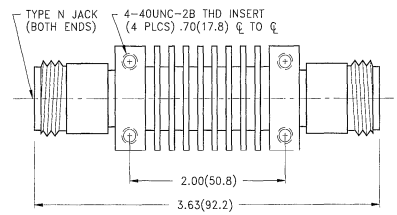
	DC-12.4 GHz	12.4-18.0 GHz
1 - 6 dB	± 0.3 dB	± 0.5 dB
7 - 10 dB	± 0.5 dB	± 0.75 dB
11 - 20 dB	± 0.75 dB	± 1.0 dB
21 - 40 dB	± 1.0 dB	± 1.5 dB

Impedance: 50 Ohms
VSWR: 1.25 max @ DC - 12.4 GHz, 1.50 max @ 12.4 - 18.0 GHz
Power: 20 Watts average @ +40 °C derated linearly to 5 Watts @ +125 °C
Peak Power: 500 Watts
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum with Stainless Steel Connectors

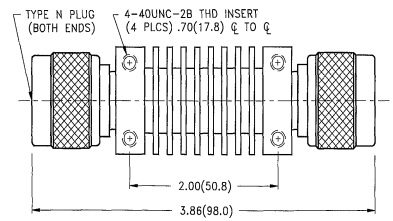
DC - 18.0 GHz	547 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0547-XX-NNN-07	ATT-547F-XX-NNN-07	ATT-547M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20Watts		



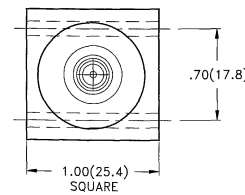
DC - 12.4 GHz	528 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0528-XX-NNN-07	ATT-528F-XX-NNN-07	ATT-528M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		



DC - 8.0 GHz	559 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0559-XX-NNN-07	ATT-559F-XX-NNN-07	ATT-559M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



DC - 2.0 GHz	549 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0549-XX-NNN-07	ATT-549F-XX-NNN-07	ATT-549M-XX-NNN-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



Attenuators

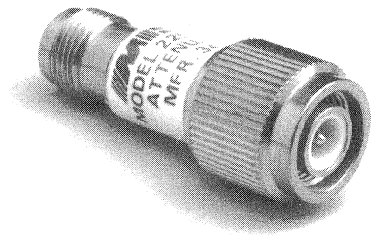
TNC Type

DC - 18 GHz Precision Performance

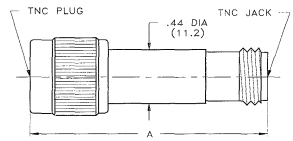
Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8.0 and DC - 2.0 units available
Attenuation Values: 1 - 60 dB in 1 dB increments
Attenuation Accuracy:

1 - 6 dB	± 0.3 dB
7 - 20 dB	± 0.5 dB
21 - 40 dB	± 1.0 dB
41 - 60 dB	± 1.5 dB

Impedance: 50 Ohms
VSWR: 1.07 + 0.015 f (GHz) max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 200 Watts
Operating Temperature Range: -54C to +125C
Finish: Stainless Steel

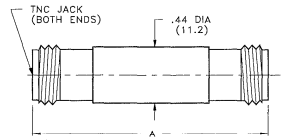


DC - 18.0 GHz	225 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0225-XX-TNC-02	ATT-225F-XX-TNC-02	ATT-225M-XX-TNC-02
Attenuation Value = XX, Select 01 thru 60 dB in 1 dB increments *Broadband Performance*		



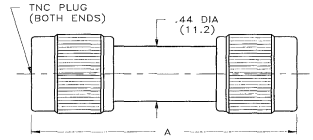
Attenuation Value	Length A
1 - 20 dB	1.57 (39.9)
21 - 60 dB	1.84 (46.7)

DC - 12.4 GHz	224 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0224-XX-TNC-02	ATT-224F-XX-TNC-02	ATT-224M-XX-TNC-02
Attenuation Value= XX, Select 01 thru 60 dB in 1 dB Increments		



Attenuation Value	Length A
1 - 20 dB	1.66 (42.2)
21 - 60 dB	1.93 (49.0)

DC - 8.0 GHz	223 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0223-XX-TNC-02	ATT-223F-XX-TNC-02	ATT-223M-XX-TNC-02
Attenuation Value= XX, Select 01 thru 60 dB in 1 dB Increments		



Attenuation Value	Length A
1 - 20 dB	1.71 (43.4)
21 - 60 dB	1.98 (50.3)

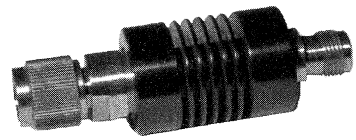
DC - 2.0 GHz	222 Series	Model Number
Male/Female	Female / Female	Male / Male
ATT-0222-XX-TNC-02	ATT-222F-XX-TNC-02	ATT-222M-XX-TNC-02
Attenuation Value= XX, Select 1 thru 60 dB in 1 dB Increments		

Note: U.S. Patent No. 3,824,506 and 4,011,531 applies.

Attenuators

TNC Type - Medium Power

10 Watts - DC - 18 GHz Precision Performance

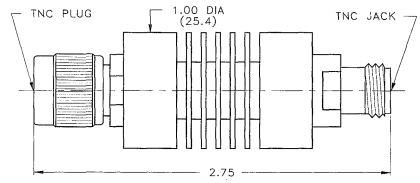


Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8, and DC - 2.0 units available
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

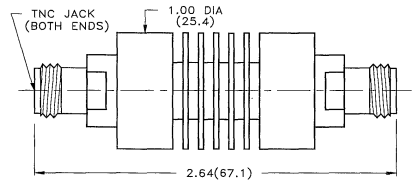
	DC-12.4 GHz	12.4-18.0 GHz
1 - 6 dB	± 0.3 dB	± 0.5 dB
7 - 20 dB	± 0.5 dB	± 0.75 dB
21 - 40 dB	± 1.0 dB	± 1.5 dB

Impedance: 50 Ohms
VSWR: 1.25 max @ DC - 12.4 GHz, 1.50 @ 12.4 - 18.0 GHz
Power: 10 Watts average @ 40 C derated linearly to 1 Watt @ 125 C
Peak Power: 100 watts and 5 Kilowatts on 476 Series
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum with Stainless Steel Connectors

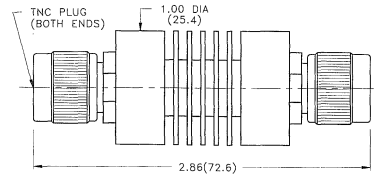
DC - 18.0 GHz	480 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0480-XX-TNC-07	ATT-480F-XX-TNC-07	ATT-480M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments *10 Watts*		



DC - 12.4 GHz	479 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0479-XX-TNC-07	ATT-479F-XX-TNC-07	ATT-479M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments *10 Watts*		



DC - 8.0 GHz	478 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0478-XX-TNC-07	ATT-478F-XX-TNC-07	ATT-478M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments *10 Watts*		



DC - 2.0 GHz	476 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0476-XX-TNC-07	ATT-476F-XX-TNC-07	ATT-476M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments *10 Watts - 5 Kilowatts Peak*		

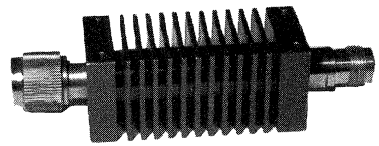
Attenuators

TNC Type - Medium Power

20 Watts - DC - 18 GHz Precision Performance

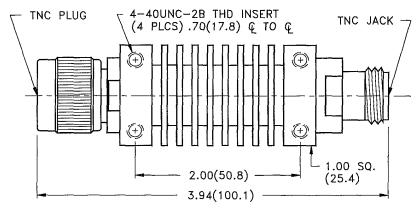
Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8, and DC - 2.0 units available
Attenuation Values: 1 - 40 dB in 1 dB increments
Attenuation Accuracy:

	DC-12.4 GHz	12.4-18.0 GHz
1 - 6 dB	± 0.3 dB	± 0.5 dB
7 - 10 dB	± 0.5 dB	± 0.75 dB
11 - 20 dB	± 0.75 dB	± 1.0 dB
21 - 40 dB	± 1.0 dB	± 1.5 dB

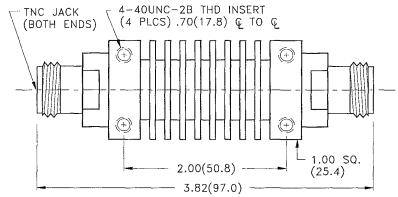


Impedance: 50 Ohms
VSWR: 1.25 max @ DC - 12.4 GHz, 1.50 @ 12.4 - 18.0 GHz
Power: 20 Watts average @ 40 C derated linearly to 1 Watt @ 125 C
Peak Power: 500 Watts
Operating Temperature Range: -54C to +125C
Finish: Black Anodized Aluminum with Stainless Steel Connectors

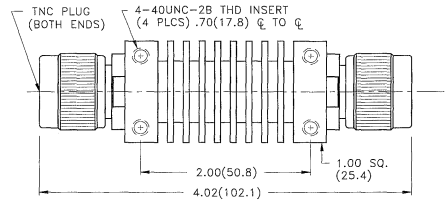
DC - 18.0 GHz	580 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0580-XX-TNC-07	ATT-580F-XX-TNC-07	ATT-580M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



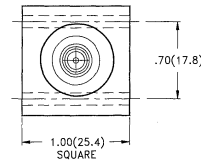
DC - 12.4 GHz	529 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0529-XX-TNC-07	ATT-529F-XX-TNC-07	ATT-529M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



DC - 8.0 GHz	579 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0579-XX-TNC-07	ATT-579F-XX-TNC-07	ATT-579M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



DC - 2.0 GHz	578 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0578-XX-TNC-07	ATT-578F-XX-TNC-07	ATT-578M-XX-TNC-07
Attenuation Value = XX, Select 1 - 40 dB in 1 dB increments		
20 Watts		



MIDWEST MICROWAVE

Attenuators

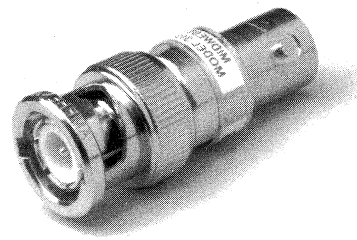
BNC Type

DC - 4 GHz Performance

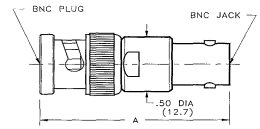
Frequency: DC - 4.0 GHz and DC - 2.0 units available
Attenuation Values: 1 - 40 dB as noted
Attenuation Accuracy:

1 - 6 dB	± 0.3 dB
7 - 10 dB	± 0.5 dB
11 - 20 dB	± 0.75 dB
21 - 40 dB	± 1.0 dB
41-60 dB	± 1.5 dB

Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C U.O.S.
Peak Power: 200 Watts for 2Watt units and 100 Watts Peak for 5 & 10 Watt
Operating Temperature Range: -54C to +125C
Finish: Nickel Plated Brass and Black Anodized Aluminum

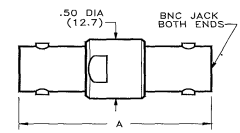


DC - 4.0 GHz	313 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0313-XX-BNC-10	ATT-313F-XX-BNC-10	ATT-313M-XX-BNC-10
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		

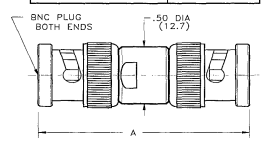


Attenuation Value	Length A
1 - 20 dB	1.36
21 - 60 dB	1.65

DC - 2.0 GHz	314 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0314-XX-BNC-10	ATT-314F-XX-BNC-10	ATT-314M-XX-BNC-10
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		

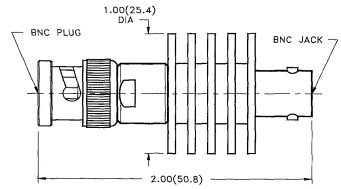


Attenuation Value	Length A
1 - 20 dB	1.43
21 - 60 dB	1.72

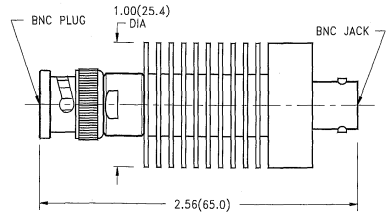


Attenuation Value	Length A
1 - 20 dB	1.55
21 - 60 dB	1.84

DC - 4.0 GHz	581 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0581-XX-BNC-07	ATT-581F-XX-BNC-07	ATT-581M-XX-BNC-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		
5 Watts		



DC - 4.0 GHz	582 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0582-XX-BNC-07	ATT-582F-XX-BNC-07	ATT-582M-XX-BNC-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		
10 Watts		



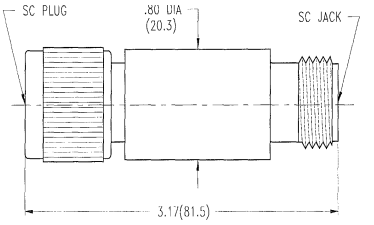
Attenuators

SC Type

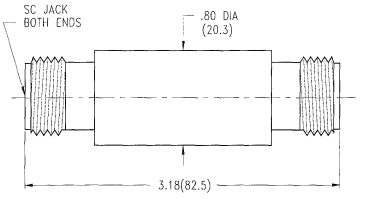
DC - 11GHz Performance

Frequency: DC - 11.0 GHz and DC - 2.0 units available
Attenuation Values: 1 - 60 dB in 1 dB increments
Attenuation Accuracy: 1 - 6 dB ± 0.3 dB
7 - 20 dB ± 0.5 dB
21 - 40 dB ± 0.75 dB
41 - 60 dB ± 1.0 dB
Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2Watts average @ 25 C derated linearly to 0.5 Watts @ 125 C
10 Watts average @ 40C derated linearly to 0.5 watts @ 125 C
Peak Power: 0.2 Kilowatts
Operating Temperature Range: -54C to +125C
Finish: Stainless Steel

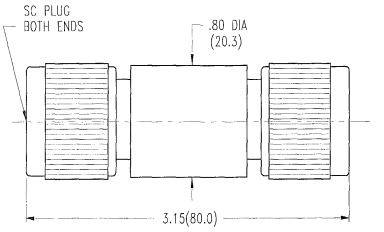
DC - 11.0 GHz	560 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0560-XX-SCO-02	ATT-560F-XX-SCO-02	ATT-560M-XX-SCO-02
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		



DC - 2.0 GHz	561Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0561-SCO-02	ATT-561F-XX-SCO-02	ATT-561M-XX-SCO-02
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		



DC - 11.0 GHz	562 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0562-XX-SCO-07	ATT-562F-XX-SCO-07	ATT-562M-XX-SCO-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments *10 Watts*		



DC - 2.0 GHz	563 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0563-XX-SCO-07	ATT-563F-XX-SCO-07	ATT-563M-XX-SCO-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments *10 Watts - 5 Kilowatts Peak*		

Attenuators

HN Type

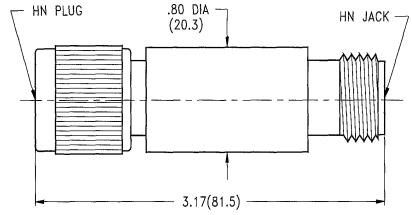
DC - 8 GHz Performance

Frequency: DC - 8.0 GHz and DC - 2.0 units available
Attenuation Values: 1 - 60 dB in 1 dB increments
Attenuation Accuracy:

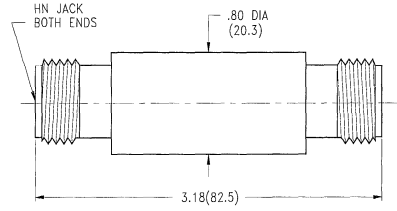
1 - 6 dB	± 0.3 dB
7 - 20 dB	± 0.5 dB
21 - 40 dB	± 0.75 dB
41 - 60 dB	± 1.0 dB

Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2Watts average @ 25 C derated linearly to 0.5 Watts @ 125 C
10 Watts average @ 40C derated linearly to 0.5 watts @ 125 C
Peak Power: 0.2 Kilowatts
Operating Temperature Range: -54C to +125C
Finish: Stainless Steel

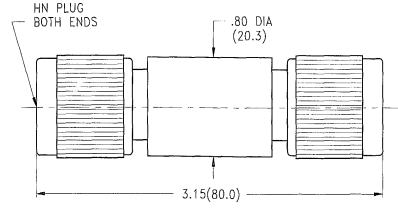
DC - 8.0 GHz	584 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0584-XX-HNO-02	ATT-584F-XX-HNO-02	ATT-584M-XX-HNO-02
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		



DC - 2.0 GHz	583Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0583-XX-HNO-02	ATT-583F-XX-HNO-02	ATT-583M-XX-HNO-02
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments		



DC - 8.0 GHz	586 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0586-XX-HNO-07	ATT-586F-XX-HNO-07	ATT-586M-XX-HNO-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments ***10 Watts***		



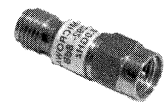
DC - 2.0 GHz	585 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0585-XX-HNO-07	ATT-585F-XX-HNO-07	ATT-585M-XX-HNO-07
Attenuation Value = XX, Select 1 - 60 dB in 1 dB increments ***10 Watts - 5 Kilowatts Peak***		

Attenuators

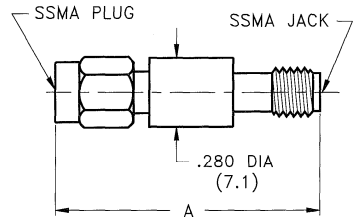
SSMA Type

DC - 18 GHz Performance - Subminiature Size

Frequency: DC - 18.0 GHz, DC - 12.4, DC - 8, and DC - 2.0 units available
Attenuation Values: 1 - 20 dB as noted
Attenuation Accuracy: 1 - 6 dB ± 0.3 dB
7 - 10 dB ± 0.5 dB
11 - 20 dB ± 0.75 dB
Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 200 Watts
Operating Temperature Range: -54 °C to +125 °C
Finish: Stainless Steel

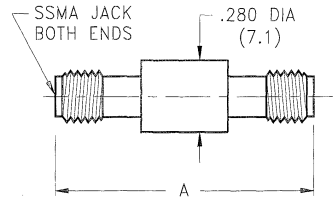


DC - 18.0 GHz	590 Series	Model Number
Male / Female	Female / Female	Male / Male
ATT-0590-XX-SSM-02	ATT-590F-XX-SSM-02	ATT-590M-XX-SSM-02
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		



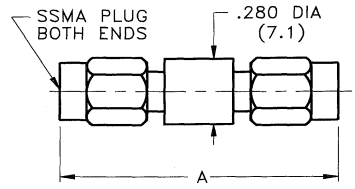
Attenuation Value	Length A
1 - 12 dB	1.10 (27.9)
13 - 20 dB	1.14 (29.0)

DC - 12.4 GHz	589 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0589-XX-SSM-02	ATT-589F-XX-SSM-02	ATT-589M-XX-SSM-02
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		



Attenuation Value	Length A
1 - 12 dB	0.98 (24.9)
13 - 20 dB	1.11(28.2)

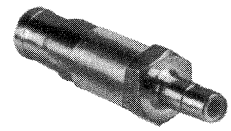
DC - 8.0 GHz	588 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0588-XX-SSM-02	ATT-588F-XX-SSM-02	ATT-588M-XX-SSM-02
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		

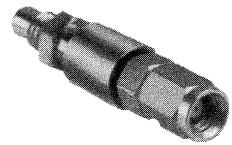


Attenuation Value	Length A
1 - 12 dB	1.04 (26.4)
13 - 20 dB	1.17 (29.7)

DC - 2.0 GHz	587 Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0587-XX-SSM-02	ATT-587F-XX-SSM-02	ATT-587M-XX-SSM-02
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		

SMB and SMC - DC - 4 GHz Performance



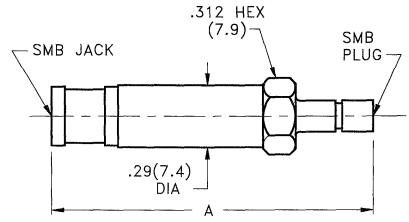


This new series of SMB and SMC Attenuators are especially suitable for use in commercial and low frequency military systems. They have been designed to withstand the same hostile environmental conditions as all of the other Midwest Microwave series of Attenuators.

Frequency: DC - 4 GHz
Attenuation Values: 1 - 20 dB as noted
Attenuation Accuracy: 1 - 6 dB ± 0.3 dB
7 - 10 dB ± 0.5 dB
11 - 20 dB ± 0.75 dB
Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 200 Watts
Operating Temperature Range: -54 °C to +125 °C
Finish: Nickel Plated Brass

SMB Type

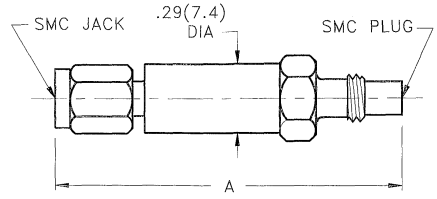
DC - 12.4 GHz	591 SMB Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0591-XX-SMB-10	ATT-591F-XX-SMB-10	ATT-591M-XX-SMB-10
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		



Attenuation Value	Length A
1 - 12 dB	1.42 (36.0)
13 - 20 dB	1.54 (39.1)

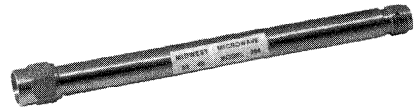
SMC Type

DC - 8.0 GHz	592 SMC Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0592-XX-SMC-10	ATT-592F-XX-SMC-10	ATT-592M-XX-SMC-10
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments		



Attenuation Value	Length A
1 - 12 dB	1.42 (36.0)
13 - 20 dB	1.54(39.1)

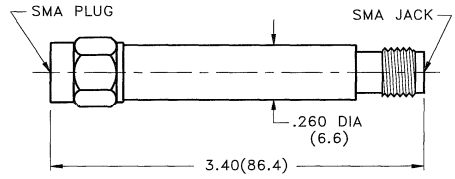
SMA - 18GHz Performance



Specifications

Frequency Range: 1-18GHz 3-18 GHz 5-18 GHz 6-18 GHz
Attenuation Values: 1-4 dB 5-9dB 10-15dB 16-20 dB
Max Deviation from Nominal: ± 0.5 dB or 5% whichever is greater
Impedance: 50 Ohms
VSWR: 1.25 max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 5 Kilowatts
Operating Temperature Range: -54C to +125C
Finish: Passivated Stainless Steel
Calibration: Supplied at 4, 8, 12, and 18 GHz

DC - 18.0 GHz 204 Series Model Number
Male / Female
ATT-0204-XX-SMA-02
Attenuation Value = XX, Select 1 - 20 dB in 1 dB increments



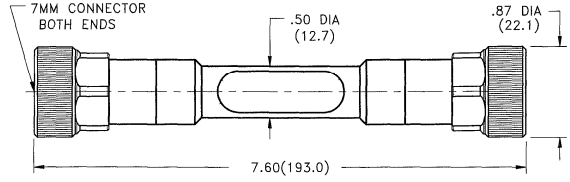
7mm Precision - 1 - 18GHz Performance

Frequency Range: 1-18GHz 3-18 GHz 5-18 GHz
Attenuation Values: 3 & 6 dB 10 dB 20 dB
Max Deviation from Nominal: ± 0.3 dB @ 8 GHz
Frequency Sensitivity (from value @ 8 GHz):

dB Value	f req Sensitivity
3 dB	± 0.5 dB
6 dB	± 0.6 dB
10 dB	± 1.0 dB
20 dB	± 1.2 dB

VSWR: 1.08 + 0.03 / f (GHz)
Power: 2 Watts average @ +40 °C derated linearly to 0.5 Watts average @ +125 °C
Peak Power: 5 Kilowatts
Operating Temperature Range: -54C to +125C
Finish: Passivated Stainless Steel
Calibration: Supplied at 4, 8, 12, and 18 GHz

DC - 18.0 GHz 340A Series Model Number
7mm Precision
ATT-340A-XX-7MM-02
Attenuation Value = XX, Select 3, 6, 10, and 20 dB
7mm Precision



Attenuators

Lossy Line Type

Type N Precision 1-18 GHz Performance

This series of Lossy Line Attenuators are very useful for a variety of test bench requirements. The lossy line is the simplest, most basic type of coaxial attenuator. The lossy line in these attenuators is actually the center conductor of a simple coaxial structure. The lossy line possesses some basic advantages over conventional attenuators in that they exhibit low VSWR characteristics that improve as frequency increases and are also very useful where phase tracking is important.

Specifications

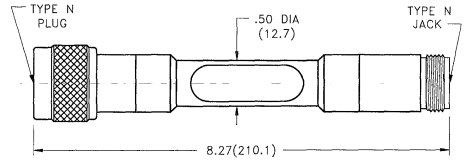
Frequency Range: 1-18 GHz 3-18 GHz 5-18 GHz
Attenuation Values: 3 & 6 dB 10 dB 20 dB
Max Deviation from Nominal: ± 0.3 dB @ 8 GHz
Frequency Sensitivity (from Value @ 8 GHz):

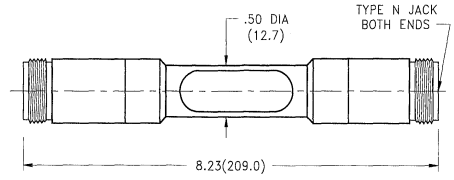
dB Value	freq Sensitivity
3 dB	± 0.5 dB
6 dB	± 0.6 dB
10 dB	± 1.0 dB
20 dB	± 1.2 dB

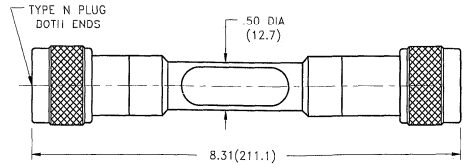
Power: 2 Watts average @ +40 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 5 Kilowatts

Impedance: 50 Ohms
VSWR: 1.08 + 0.03/ f (GHz)
Operating Temperature Range: -54C to +125C
Finish: Passivated Stainless Steel
Calibration: Supplied at 4, 8, 12.4, and 18 GHz

DC - 18.0 GHz	340N Series	Model Number
Male/Female	Female/Female	Male/Male
ATT-0340-XX-NNN-02	ATT-340F-XX-NNN-02	ATT-340M-XX-NNN-02
Attenuation Value = XX, Select 3, 6, 10, & 20 dB		
Precision N		







SMA - DC - 18 GHz Precision Performance

Frequency: DC-18.0 and DC - 12 .4 GHz sets
Attenuation Values: 3, 6, 10, and 20 dB one each per set
Attenuation Accuracy:

DC-18.0	DC-12..4	Accuracy
3 & 6 dB	3, 6, & 10 dB	± 0.3 dB
10 & 20 dB	20 dB	± 0.5 dB

Impedance: 50 Ohms
VSWR: 1.07 + 0.015 f (GHz) max
Power: 2 Watts average, 200 Watts peak
Finish: Passivated Stainless Steel
Calibration: Data Supplied at 4, 8, 12.4, and 18 GHz

DC - 18.0 GHz	Model Number	DC - 12.4 GHz
Male / Female		Male / Female
ATS-3554-18-SMA-02		ATS-3553-12-SMA-02

Midwest Microwave's Calibrated Attenuator Sets consist of a set of four precision, broadband, fixed attenuators with values of 3, 6, 10, and 20 dB. These sets are available with a choice of SMA, N, or 7mm passivated stainless steel precision connectors.

7mm - DC - 18 GHz Precision Performance

Frequency: DC - 18 .0 and DC-12.4 GHz sets
Attenuation Values: 3, 6, 10, and 20 dB one each per set
Attenuation Accuracy:

DC-18.0	DC-12..4	Accuracy
3 & 6 dB	3, 6, & 10 dB	± 0.3 dB
10 & 20 dB	20 dB	± 0.5 dB

Impedance: 50 Ohms
VSWR: 1.07 + 0.015 f (GHz) max
Power: 2 Watts average, 200 watts peak
Finish: Passivated Stainless Steel
Calibration: Data Supplied at 4, 8, 12.4, and 18.0 GHz

DC - 18.0 GHz	Model Number	DC - 12.4 GHz
7mm		7mm
ATS-3552-18-7MM-02		ATS-3555-12-7MM-02

Calibrated Attenuator Sets are intended for laboratory or field use. The precision, broadband, fixed attenuators are supplied in a shock resistant storage case. the inside cover of the storage case holds the calibration data.

Type N - DC - 18 GHz Precision Performance

Frequency: DC - 18 .0 and DC-12.4 GHz sets
Attenuation Values: 3, 6, 10, and 20 dB one each per set
Attenuation Accuracy:

DC-18.0	DC-12..4	Accuracy
3 & 6 dB	3, 6, & 10 dB	± 0.3 dB
10 & 20 dB	20 dB	± 0.5 dB

Impedance: 50 Ohms
VSWR: 1.07 + 0.015 f (GHz) max
Power: 2 Watts average, 200 Watts peak
Finish: Passivated Stainless Steel
Calibration: Data Supplied at 4, 8, 12.4, and 18.0 GHz

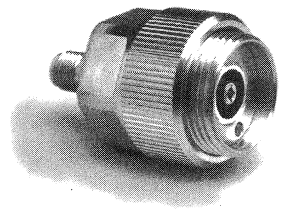
DC - 18.0 GHz	Model Number	DC - 12.4 GHz
Male / Female		Male / Female
ATS-3551-18-NNN-02		ATS-3550-12-NNN-02

The calibration data includes test results at DC, 4.0, 8.0, 12.4, and 18.0 GHz. All measurement standards used have calibration traceability to the National Bureau of Standards.

DC - 18 GHz 7 mm Precision Performance

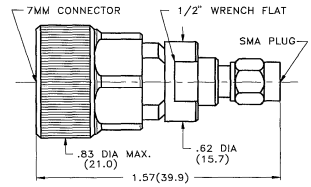
Specifications

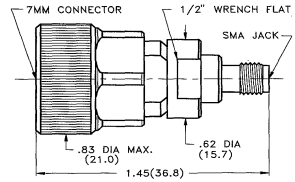
Frequency: DC - 18.0 GHz
Attenuation Values: 1 - 10 dB in 1 dB increments and 20 dB
Attenuation Accuracy: 1 - 10 dB ± 0.3 dB
20 dB ± 0.5 dB
Impedance: 50 Ohms
VSWR: 1.12 @ DC-4, 1.15 @ 4-8, and 1.20 @ 8-18 GHz max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 200 Watts
Operating Temperature Range: -54 °C to +125 °C
Finish: Passivated Stainless Steel
Calibration: Supplied at 4, 8, 12, and 18 GHz



7mm to SMA

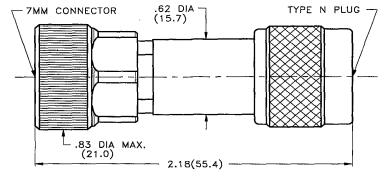
DC - 18.0 GHz	7mm / SMA	Model Numbers
7mm / SMA Male	7mm / SMA Female	
ADP-0105-XX-000-02	ADP-0106-XX-000-02	
Attenuation Value = XX, Select 01 -10 dB in 1 dB increments, and 20 dB *7mm Precision*		

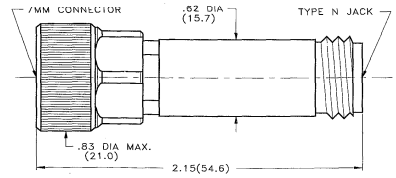




7mm to Type N

DC - 18.0 GHz	7mm / Type N	Model Numbers
7mm / N Male	7mm / N Female	
ADP-0107-XX-000-02	ADP-0108-XX-000-02	
Attenuation Value = XX, Select 01 -10 dB in 1 dB increments, 20 and 30 dB *7mm Precision*		

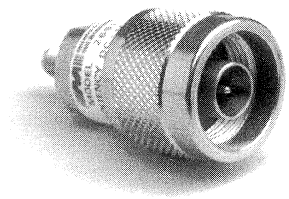




Type N to SMA DC - 18 GHz Performance

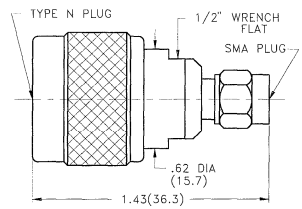
Specifications

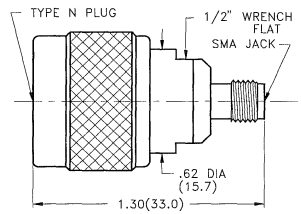
Frequency: DC - 18.0 GHz
Attenuation Values: 1 - 30 dB in 1 dB increments
Attenuation Accuracy: 1 - 6 dB ± 0.3 dB
7 - 20 dB ± 0.5 dB
21 - 30 dB ± 1.0 dB
Impedance: 50 Ohms
VSWR: 1.10@ DC-4, 1.20 @ 4-10, and 1.30 @ 10-18 GHz max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.2 Killowatts
Operating Temperature Range: -54 °C to +125 °C
Finish: Passivated Stainless Steel



Type N Male to SMA

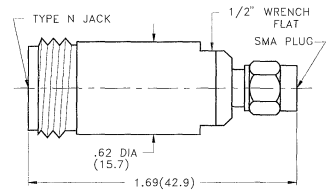
DC - 18.0 GHz Type N / SMA Model Numbers	
N Male / SMA Male	N Male / SMA Female
ADP-0101-XX-000-02	ADP-0102-XX-000-02
Attenuation Value = XX, Select 01 -30 dB in 1 dB increments *Precision N / SMA*	

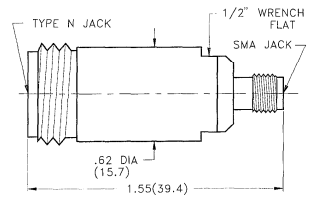




Type N Female to SMA

DC - 18.0 GHz Type N / SMA Model Numbers	
N Female / SMA Male	N Female / SMA Female
ADP-0103-XX-000-02	ADP-0104-XX-000-02
Attenuation Value = XX, Select 01 -30 dB in 1 dB increments *Precision N / SMA*	

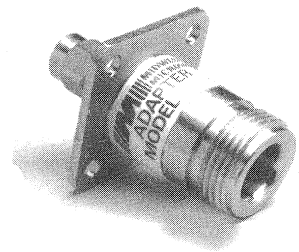




Type N and TNC Flange Mount to SMA

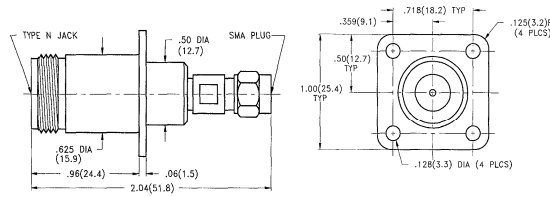
Specifications

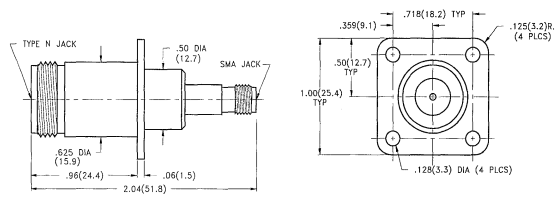
Frequency: DC - 18.0 GHz
Attenuation Values: 1 - 20 dB in 1 dB increments
Attenuation Accuracy: 1 - 10 dB ± 0.5 dB
11- 20 dB ± 0.75 dB
Impedance: 50 Ohms
VSWR: 1.12 @ DC-4, 1.20 @ 4-10, and 1.30 @ 10-18 GHz max
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.2 Kilowatts
Operating Temperature Range: -54 °C to +125 °C
Finish: Passivated Stainless Steel



N Flanged Female to SMA

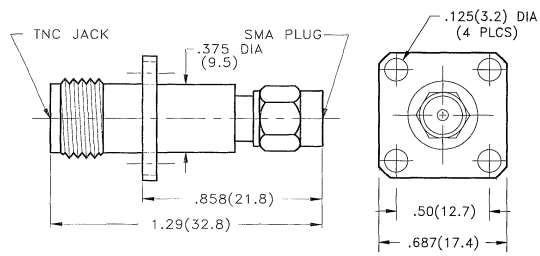
DC - 18.0 GHz N Flange / SMA Model Numbers	
N Flange / SMA Male	N Flange / SMA Female
ADP-304M-XX-000-02	ADP-304F-XX-000-02
Attenuation Value = XX, Select 01 -20 dB in 1 dB increments *Precision N*	

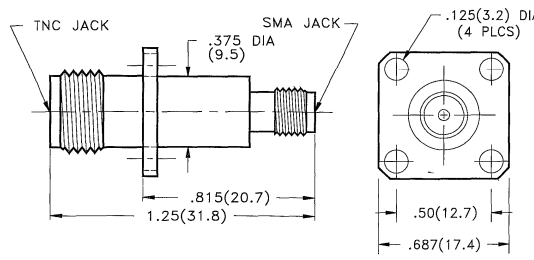




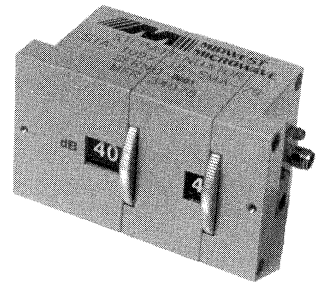
TNC Flanged Female to SMA

DC - 18.0 GHz TNC Flange / SMA Model Numbers	
TNC Flange Female/ SMA Male	TNC Flange Female / SMA Female
ADP-533M-XX-000-02	ADP-533F-XX-000-02
Attenuation Value = XX, Select 01 -20 dB in 1 dB increments	





Thumbwheel - Panel Mount - 0 to 69 dB in 1 dB Steps



Specifications

Frequency: DC-18.0 GHz

Attenuation Values: 0 -9 dB, 0-60 dB, and 0-69 dB Models available

Attenuation Accuracy:

0-9 dB in 1 dB steps		0-60 dB in 10 dB steps		0-69 dB in 1 dB steps	
Step	Deviation	Step	Deviation	Step	Deviation
0	0.5	0	0.5	0	0.5
1	± 0.5	10	± 0.5	1-9	± 0.5
2	± 0.5	20	± 0.7	10-19	± 1.0
3	± 0.5	30	± 0.9	20-29	± 1.2
4	± 0.5	40	± 1.0	30-39	± 1.4
5	± 0.5	50	± 1.3	40-49	± 1.5
6	± 0.5	60	± 1.5	50-59	± 1.9
7	± 0.5			60-69	± 2.0
8	± 0.5				
9	± 0.5				

Switching Repeatability: <0.05 dB

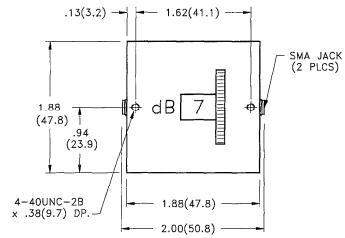
Switching Life: 1,000,000 cycles

VSWR: 1.65 max

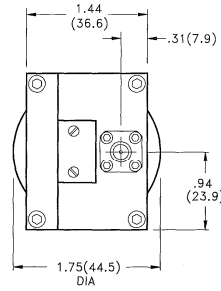
Impedance: 50 Ohms

Power: 2 Watts average

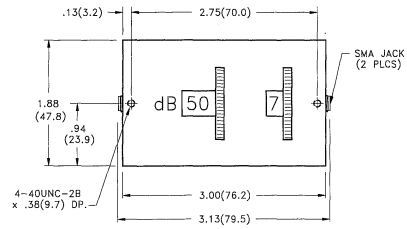
Connectors: SMA, 7mm, or N Female* with Passivated Stainless Steel Finish



0 - 9 dB in 1 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1095-18-SMA-79	STA-1095-18-NNN-79	STA-1095-18-7MM-79



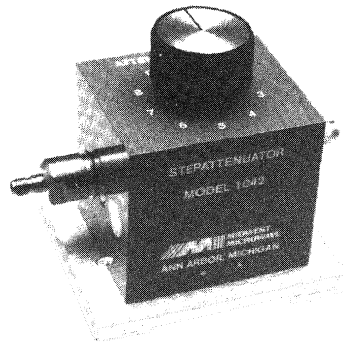
0 - 60 dB in 10 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1096-18-SMA-79	STA-1096-18-NNN-79	STA-1096-18-7MM-79



0 - 69 dB in 1 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1097-18-SMA-79	STA-1097-18-NNN-79	STA-1097-18-7MM-79

*Note: TNC Connectors and or Male or Male/Female Connector combinations are available upon special request.

Bench Top - 0 to 9 dB in 1 dB Steps

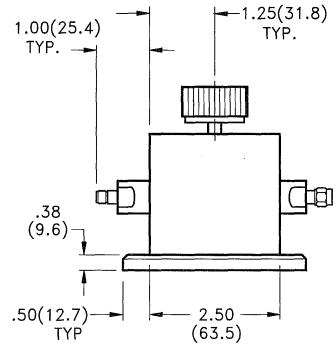


Specifications

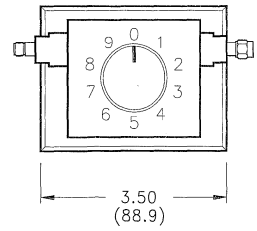
Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available
Attenuation Values: 0 - 9 dB
Attenuation Accuracy:

Attenuation (dB)	DC-18.0	DC-12..4	DC - 8.0	DC - 4.0
1- 9	± 0.5	± 0.4	± 0.4	± 0.3

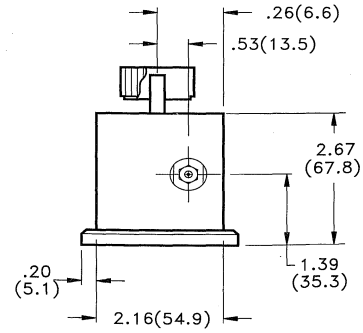
Impedance: 50 Ohms
VSWR: 1.25 @ DC - 4 , 1.40 @ 4 - 12.4, 1.50 @ 12.4 - 18.0 GHz max
Zero Position Insertion Loss: 0.3 dB @ DC-4 GHz, 0.5 dB @ 4-12.4 GHz, and 0.75 dB @ 12.4-18 GHz max.
Power: 2 Watts average
Operating Temperature Range: 0C to +55C
Switching Repeatability: 0.05 dB
Switching Life: 1,000,000 cycles
Mechanical Stops: Clockwise @ Maximum, Counterclockwise @ Minimum
Finish of Connectors: Passivated Stainless Steel



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
7mm Precision		
STA-1042-18-7MM-79	STA-1042-12-7MM-79	STA-1042-04-7MM-79

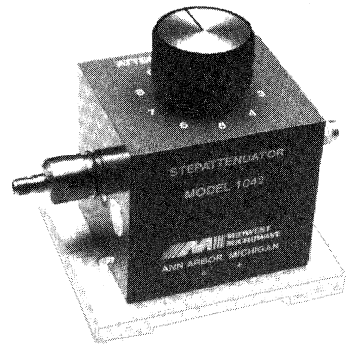


DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
Type N		
STA-1042-18-NNN-79	STA-1042-12-NNN-79	STA-1042-04-NNN-79



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
SMA		
STA-1042-18-SMA-79	STA-1042-12-SMA-79	STA-1042-04-SMA-79

Bench Top - 0 to 60 dB in 10 dB Steps

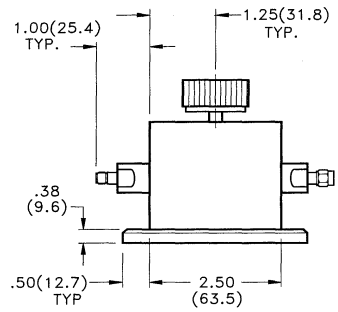


Specifications

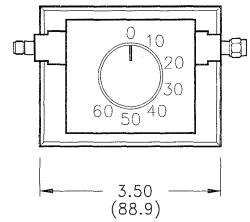
Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available
Attenuation Values: 0 - 60 dB
Attenuation Accuracy:

Attenuation (dB)	DC-18.0	DC-12.4	DC - 8.0	DC-4.0
10-60	± 0.6 or 2.5%	± 0.5 or 2.5%	± 0.5 or 2%	± 0.4 or 2%

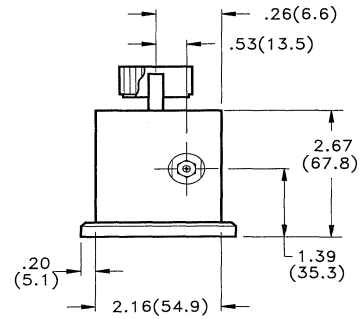
Impedance: 50 Ohms
VSWR: 1.25 @ DC - 4 GHz, 1.40 @ 4 - 12.4 GHz, 1.5 0 @ 12.4 - 18.0 GHz max
Zero Position Insertion Loss: 0.3 dB @ DC-4 GHz, 0.5 dB @ 4-12.4 GHz, and 0.75 dB @ 12.4-18 GHz max.
Power: 2 Watts average
Operating Temperature Range: 0C to +55C
Switching Repeatability: 0.05 dB
Switching Life: 1,000,000 cycles
Mechanical Stops: Clockwise @ Maximum, Counterclockwise @ Minimum
Finish of Connectors: Passivated Stainless Steel



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
7mm Precision		
STA-1043-18-7MM-79	STA-1043-12-7MM-79	STA-1043-04-7MM-79



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
Type N		
STA-1043-18-NNN-79	STA-1043-12-NNN-79	STA-1043-04-NNN-79



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
SMA		
STA-1043-18-SMA-79	STA-1043-12-SMA-79	STA-1043-04-SMA-79

Bench Top - 0 to 69 dB in 1 dB Steps

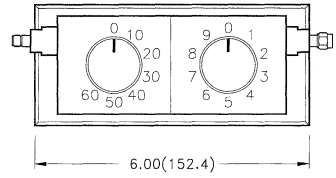
Specifications

Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available
Attenuation Values: 0 - 69 dB
Attenuation Accuracy:

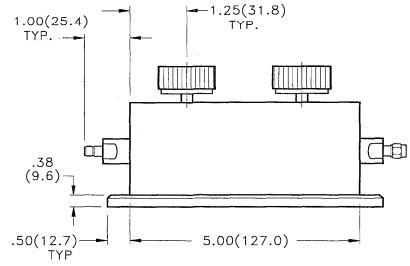
Attenuation (dB)	DC-18.0	DC-12..4	DC - 8.0	DC - 4.0
1- 9	± 0.5	± 0.4	± 0.4	± 0.3
10-19	± 1.0	± 1.0	± 0.9	± 0.8
20-29	± 1.2	± 1.2	± 1.1	± 1.0
30-39	± 1.4	± 1.4	± 1.3	± 1.2
40-49	± 1.5	± 1.5	± 1.4	± 1.3
50-59	± 1.6	± 1.6	± 1.5	± 1.4
60-69	± 1.8	± 1.8	± 1.6	± 1.5

Impedance: 50 Ohms
VSWR: 1.35 @ DC - 4 , 1.50 @ 4 - 12.4, 1.65 @ 12.4 - 18.0 GHz max
Zero Position Insertion Loss: 0.7 @ DC-4 GHz, 1.0 dB @ 4-12.4 GHz, and 1.5 dB @ 12.4-18 GHz max.
Power: 2 Watts average
Operating Temperature Range: 0C to +55C
Switching Repeatability: 0.05 dB
Switching Life: 1,000,000 cycles
Mechanical Stops: Clockwise @ Maximum dB, Counterclockwise @ Minimum dB
Finish of Connectors: Passivated Stainless Steel

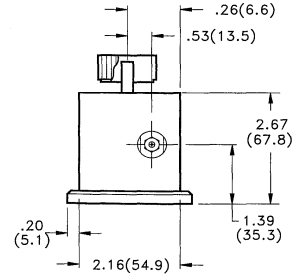
DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
7mm Precision		
STA-1044-18-7MM-79	STA-1044-12-7MM-79	STA-1044-04-7MM-79



DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
Type N		
STA-1044-18-NNN-79	STA-1044-12-NNN-79	STA-1044-04-NNN-79

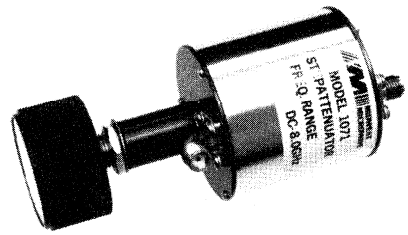


DC - 18.0 GHz	DC - 12.4 GHz	DC - 4.0 GHz
SMA		
STA-1044-18-SMA-79	STA-1044-12-SMA-79	STA-1044-04-SMA-79



Panel Mount - 0 to 60 dB in 10 dB Steps

Specifications



Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available

Attenuation Values: 0 - 60 dB

Attenuation Accuracy:

Attenuation (dB)	DC-18.0	DC-12..4	DC - 8.0	DC - 4.0
10	± 0.5	± 0.5	± 0.4	± 0.3
20	± 0.6	± 0.5	± 0.4	± 0.3
30	± 0.7	± 0.6	± 0.5	± 0.4
40	± 1.0	± 0.8	± 0.6	± 0.5
50	± 1.2	± 1.0	± 0.8	± 0.7
60	± 1.5	± 1.2	± 0.9	± 0.8

Impedance: 50 Ohms

VSWR: 1.2 @ DC - 4 , 1.3 @ 4 - 8.0, 1.45 @ 8-12.4, 1.5 @ 12.4 - 18.0 GHz max

Zero Position Insertion Loss:

Freq (GHz)	DC-4	4-8	8-12.4	12.4-18.0
dB max	0.3	0.4	0.5	0.7

Power: 2 Watts average

Operating Temperature Range: 0C to +55C

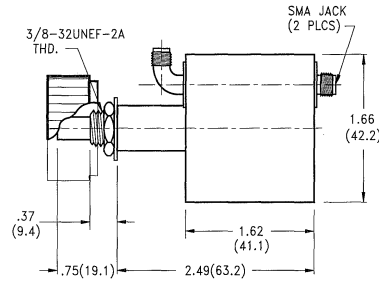
Switching Repeatability: 0.05 dB

Switching Life: 1,000,000 cycles

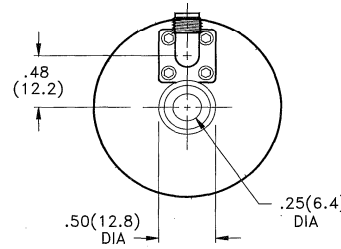
Mechanical Stops: Maximum dB - clockwise, Minimum dB - counterclockwise

Connector Types: SMA swept right angle female on shaft end and straight on rear

Finish of Connectors: Passivated Stainless Steel



DC - 18.0 GHz	DC - 12.4 GHz
STA-1071-18-SMA-07	STA-1071-12-SMA-07
1071 Series	
DC - 8.0 GHz	DC - 4.0 GHz
STA-1071-08-SMA-07	STA-1071-04-SMA-07



Panel Mount - 0 to 9 dB in 1 dB Steps

Specifications

Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available

Attenuation Values: 0 - 9 dB

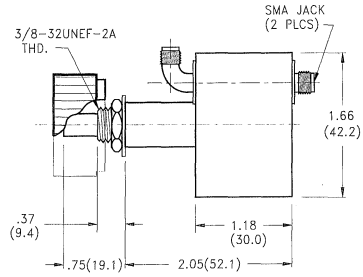
Attenuation Accuracy:

	Frequency			
Attenuation (dB)	DC-18.0	DC-12..4	DC - 8.0	DC - 4.0
1-9	± 0.5	± 0.3	± 0.3	± 0.3

Connector Types: SMA swept right angle female on shaft end and straight on rear

Finish of Connectors: Passivated Stainless Steel

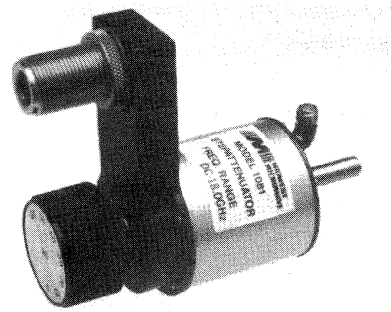
Note: All other performance specifications are the same as the 1071 series shown above.



DC - 18.0 GHz	DC - 12.4 GHz
STA-1072-18-SMA-07	STA-1072-12-SMA-07
1072 Series	
DC - 8.0 GHz	DC - 4.0 GHz
STA-1072-08-SMA-07	STA-1072-04-SMA-07

Panel Mount - 0 to 60 dB in 10 dB Steps

Specifications



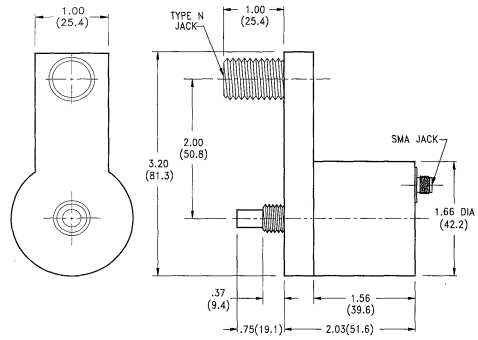
Frequency: DC-18.0 , and DC - 12 .4 GHz units available
Attenuation Range: 0 - 60 dB
Attenuation Accuracy:

Attenuation (dB)	DC-18.0	DC-12..4
10	± 0.5	± 0.5
20	± 0.6	± 0.5
30	± 0.7	± 0.6
40	± 1.0	± 0.8
50	± 1.2	± 1.0
60	± 1.5	± 1.2

Impedance: 50 Ohms
VSWR: 1.25 @ DC - 4 , 1.45 @ 4 - 12.4, 1.5 @ 12.4 - 18.0 GHz max
Zero Position Insertion Loss:

Freq (GHz)	DC-12.4	12.4-18.0
dB max	0.8	1.0

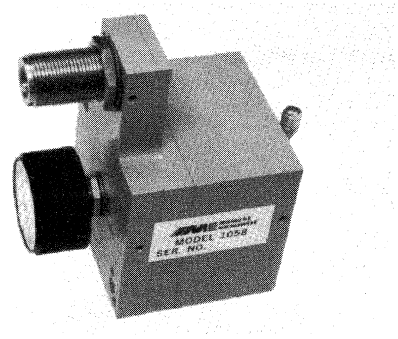
Power: 2 Watts average @ 25C
Operating Temperature Range: -10C to +75C
Switching Repeatability: 0.05 dB
Switching Life: 1,000,000 cycles
Mechanical Stops: 0 dB and 60 dB positions
Connector Types: Type N female thru panel and SMA straight female at rear.
Finish of Connectors: Passivated Stainless Steel



DC - 18.0 GHz	DC - 12.4 GHz
1081 Series	
STA-1081-18-SMA-07	STA-1081-12-SMA-07

Panel Mount - 0 to 60 dB in 10 dB Steps

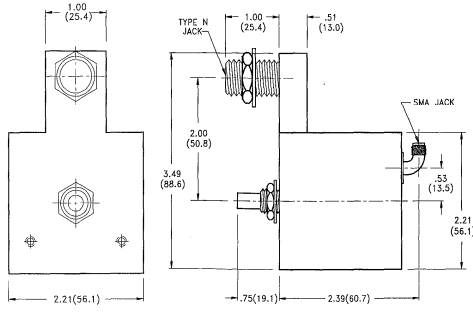
Specifications



Frequency: DC-18.0 , and DC - 12 .4 GHz units available
Attenuation Range: 0 - 60 dB
Attenuation Accuracy: ± 0.5 dB or 2% of incremental attenuation*
Impedance: 50 Ohms
VSWR: 1.25 @ DC - 4 , 1.5 @ 4 - 12.4, 1.5 @ 12.4 - 18.0 GHz max
Zero Position Insertion Loss:

Freq (GHz)	DC-12.4	12.4-18.0
dB max	0.8	1.0

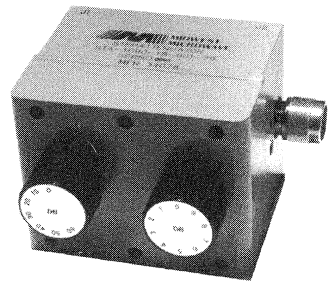
Power: 2 Watts average @ 25C
Operating Temperature Range: 0 C to +60C
Switching Repeatability: 0.05 dB
Switching Life: 1,000,000 cycles
Mechanical Stops: 0 dB and 60 dB positions
Connector Types: Type N female thru panel and SMA swept female at rear.
Finish of Connectors: Passivated Stainless Steel



DC - 18.0 GHz	DC - 12.4 GHz
1058 Series	
STA-1058-18-SMA-79	STA-1058-12-SMA-79

* Which ever is greater

Bench Top - 0 to 69 dB in 1 dB Steps



Specifications

Frequency: DC-18.0 , DC - 12 .4, DC - 8.0, and DC - 4.0 GHz units available

Attenuation Values: 0 - 69 dB

Attenuation Accuracy:

Attenuation (dB)	DC-18.0	DC-12..4	DC - 8.0	DC - 4.0
1- 9	± 0.5	± 0.4	± 0.4	± 0.3
10-19	± 1.0	± 1.0	± 0.9	± 0.8
20-29	± 1.2	± 1.2	± 1.1	± 1.0
30-39	± 1.4	± 1.4	± 1.3	± 1.2
40-49	± 1.5	± 1.5	± 1.4	± 1.3
50-59	± 1.6	± 1.6	± 1.5	± 1.4
60-69	± 1.8	± 1.8	± 1.6	± 1.5

Impedance: 50 Ohms

VSWR: 1.35 @ DC - 4 , 1.50 @ 4 - 12.4, 1.65 @ 12.4 - 18.0 GHz max

Zero Position Insertion Loss: 0.7 @ DC-4 GHz, 1.0 dB @ 4-12.4 GHz, and 1.5 dB @ 12.4-18 GHz max.

Power: 2 Watts average

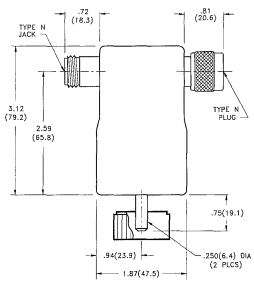
Operating Temperature Range: 0C to +55C

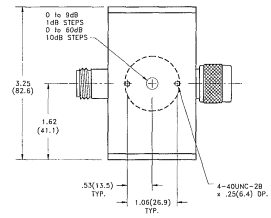
Switching Repeatability: 0.05 dB

Switching Life: 1,000,000 cycles

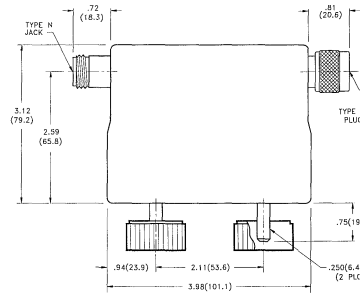
Mechanical Stops: Clockwise @ Maximum dB, Counterclockwise @ Minimum dB

Finish of Connectors: Passivated Stainless Steel

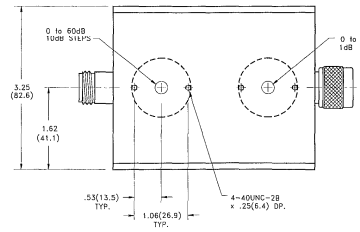




0 - 9 dB in 1 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1054-18-SMA-79	STA-1054-18-NNN-79	STA-1054-18-7MM-79



0 - 60 dB in 10 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1055-18-SMA-79	STA-1055-18-NNN-79	STA-1055-18-7MM-79

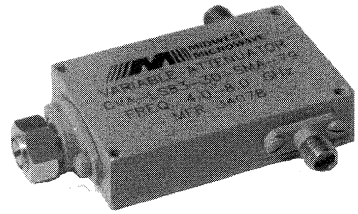


0 - 69 dB in 1 dB Steps		DC - 18.0 GHz
SMA	N	7mm Precision
STA-1056-18-SMA-79	STA-1056-18-NNN-79	STA-1056-18-7MM-79

Attenuators

Continuously Variable

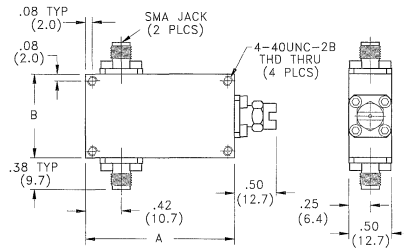
1 - 18 GHz - Level Set Types - Subminiature



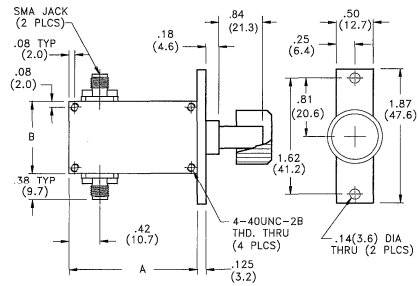
Specifications

Frequency Range: 1 - 18 GHz as noted on chart
Attenuation Range: 0 - 40 dB as noted on chart
Impedance: 50 Ohms
VSWR: 1.50 max typical
Insertion Loss: 0.5 dB max
Power: 5 Watts average
Peak Power: 3 Kilowatts
Operating Temperature Range: -65 to +125C
Resetability: 0.1 dB max
Finish : Housing is painted grey per MIL-F-14072
Connectors are Passivated Stainless Steel

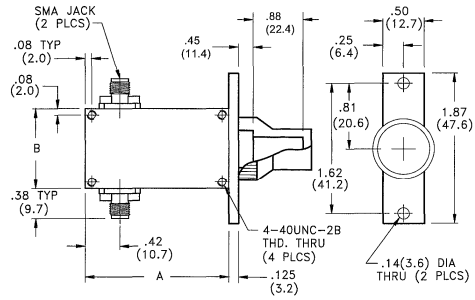
Midwest Microwave's series of Subminiature Continuously Variable Attenuators were designed to meet the most stringent environmental conditions. The units are available in a Standard simple locking type configuration, a Panel mount type with a knob, or a panel mount type with a Turns-counting dial for refrence setting or calibration is also an available option. SMA connector configurations are standard, however Type N or TNC connector configurations are also available (see note).



S = Standard Locking Nut Type



P = Panel Mounting Type



T = Turns Counting Panel Mounting Type

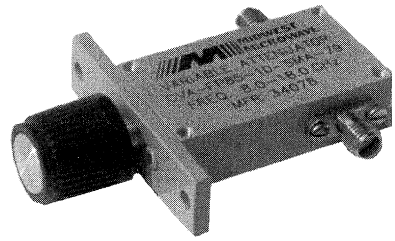
Level Set Models			
Frequency Range	Atten Range	Model Number	Case Style
1.0 - 2.0	10	CVA-LS81-10-SMA-79	2
2.0 - 4.0	10	CVA-LS82-10-SMA-79	1
	20	CVA-LS82-20-SMA-79	2
4.0 - 8.0	10	CVA-LS83-10-SMA-79	1
	20	CVA-LS83-20-SMA-79	1
	30	CVA-LS83-30-SMA-79	2
8.0 - 12.4	10	CVA-LS84-10-SMA-79	1
	20	CVA-LS84-20-SMA-79	1
	30	CVA-LS84-30-SMA-79	1
	40	CVA-LS84-40-SMA-79	2
7.0 - 18.0	10	CVA-LS85-10-SMA-79	1
	20	CVA-LS85-20-SMA-79	1
	30	CVA-LS85-30-SMA-79	1
	40	CVA-LS85-40-SMA-79	2
12.4 - 18.0	10	CVA-LS86-10-SMA-79	1
	20	CVA-LS86-20-SMA-79	1
	30	CVA-LS86-30-SMA-79	1
	40	CVA-LS86-40-SMA-79	2

Notes:
1. To designate a Panel type option, subsitute "P" for "S" in the Model No..
2. To designate a Turns-Counting Dial option, subsitute "T" for "S" in the Model No..
3. To designate Type N or TNC connectors, subsitute "NNN" or "TNC" for "SMA" in the Model No.

Attenuators

Continuously Variable

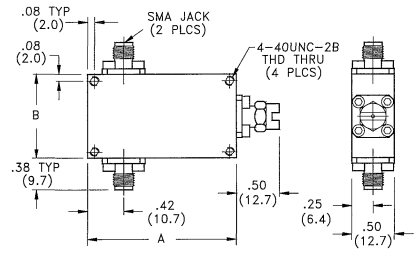
Flat with Frequency Types - Subminiature



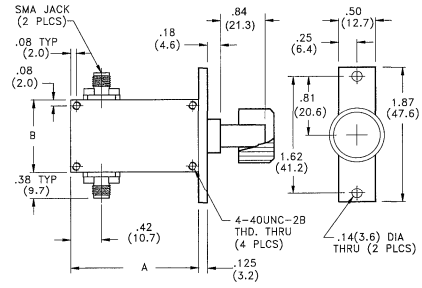
Specifications

Frequency Ranges: 1-18 GHz as noted
Attenuation Range: 0 - 20 dB as noted
Flattness: see table
Impedance: 50 Ohms
VSWR: 1.50 max
Insertion Loss: 0.5 dB max
Power: 5 Watts average, 3Kilowatts Peak
Operating Temperature Range: -65 to +125C
Resetability: 0.1 dB max
Finish: Housing is painted grey per MIL-F-14072
Connectors are Passivated Stainless Steel

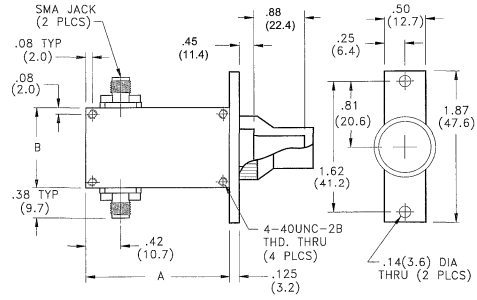
Midwest Microwave's series of Subminiature Continuously Variable Attenuators were designed to meet the most stringent environmental conditions. The Flat with Frequency Types are useful for applications where a specific level of attenuation is required over a frequency band and reasonable attenuation flattness over the frequency band is necessary. The units are available in a Standard simple locking type configuration, a Panel mount type with a knob, or a Turns-counting dial type, also panel mounted, for refrence setting or if calibration is desired. SMA connector configurations are standard, however Type N or TNC connector configurations are also available (see note below for designation information).



S = Standard Locking Nut Type



P = Panel Mounting Type



T = Turns Counting Panel Mounting Type

Flat with Frequency Models				
Frequency Range (GHz)	Atten Range (dB)	Flattness (± dB)	Model Number	Case Style
2.0 - 4.0	10	1.5	CVA-FS82-10-SMA-79	2
	20	1.5	CVA-FS82-20-SMA-79	2
4.0 - 8.0	10	1.0	CVA-FS83-10-SMA-79	2
	20	1.5	CVA-FS83-20-SMA-79	2
8.0 - 12.4	10	0.5	CVA-FS84-10-SMA-79	2
	20	1.0	CVA-FS84-20-SMA-79	2
8.0 - 18.0	10	1.5	CVA-FS85-10-SMA-79	1
12.4 - 18.0	10	1.0	CVA-FS86-10-SMA-79	1

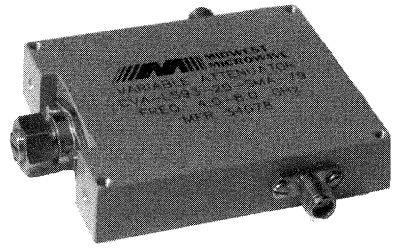
Case Style	DIM "A"	DIM "B"
1	.615 (15.6)	.375 (9.5)
2	.765 (19.4)	.525 (13.3)

Notes:
1. To designate a Panel type option, subsitute "P" for "S" in the Model No..
2. To designate a Turns-Counting Dial option, subsitute "T" for "S" in the Model No..
3. To designate Type N or TNC connectors, subsitute "NNN" or "TNC" for "SMA" in the Model No.

Attenuators

Continuously Variable

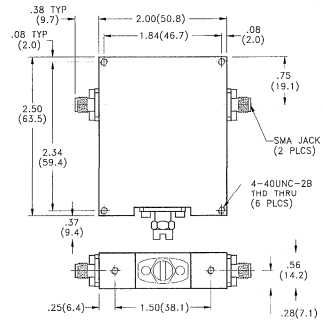
1 - 18 GHz Level Set Types - Miniature



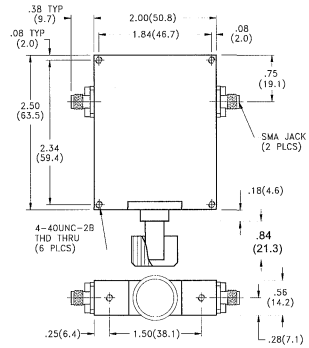
Specifications

Frequency Range: 1-18 GHz as noted
Attenuation Range: 0 - 40 dB as noted
Impedance: 50 Ohms
VSWR: 1.50 max
Insertion Loss: 0.5 dB max
Power: 5 Watts average, 3Kilowatts Peak
Operating Temperature Range: -65 to +125C
Resetability: 0.1 dB max
Finish: Connectors are Passivated Stainless Steel
Housings are Irridited Aluminum Painted Grey per MIL-F-14072

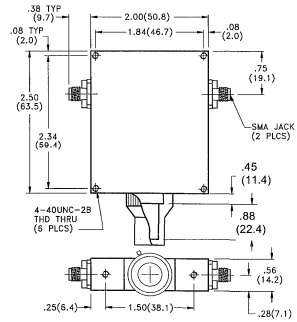
Midwest Microwave's series of Level Set Miniature Continuously Variable Attenuators were designed to meet the most stringent environmental conditions. The Level Set Types are useful for applications where a specific level of attenuation is required at one frequency and flattness over the frequency band is not necessary. The units are available in a Standard simple locking type configuration, a Panel mount type with a knob, or a Turns-counting dial type, also panel mounted, for refrence setting or if calibration is desired. SMA connector configurations are standard, however Type N or TNC connector configurations are also available (see note below).



S = Standard Locking Nut Type



P = Panel Mounting Type



T = Turns Counting Panel Mounting Type

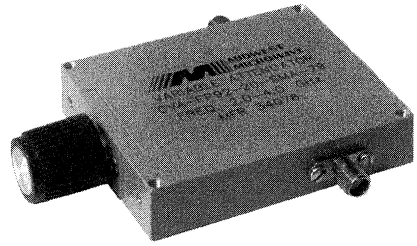
Level Set Models		
Freq Range (GHz)	**Atten Range (dB)**	**Model Number**
1.0 - 2.0	15	CVA-LS91-15-SMA-79
2.0 - 4.0	10	CVA-LS92-10-SMA-79
	20	CVA-LS92-20-SMA-79
	30	CVA-LS92-30-SMA-79
4.0 - 8.0	10	CVA-LS93-10-SMA-79
	20	CVA-LS93-20-SMA-79
	30	CVA-LS93-30-SMA-79
	40	CVA-LS93-40-SMA-79
8.0 - 12.4	10	CVA-LS94-10-SMA-79
	20	CVA-LS94-20-SMA-79
	30	CVA-LS94-30-SMA-79
	40	CVA-LS94-40-SMA-79
12.4 - 18.0	10	CVA-LS95-10-SMA-79
	20	CVA-LS95-20-SMA-79
	30	CVA-LS95-30-SMA-79
	40	CVA-LS95-40-SMA-79

Notes:
1. To designate a Panel type option, subsitute "P" for "S" in the Model No..
2. To designate a Turns-Counting Dial option, subsitute "T" for "S" in the Model No..
3. To designate Type N or TNC connectors, subsitute "NNN" or "TNC" for "SMA" in the Model No.

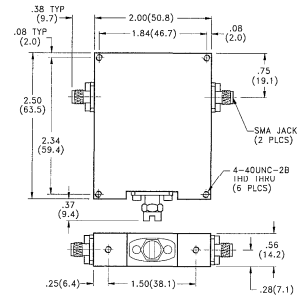
Flat with Frequency Types - Miniature

Specifications

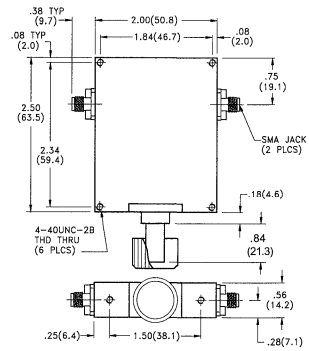
Frequency Ranges: 1-18 GHz as noted
Attenuation Range: 0 - 30 dB as noted
Flatness: see table
Impedance: 50 Ohms
VSWR: 1.50 max
Insertion Loss: 0.5 dB max
Power: 5 Watts average
Peak Power: 3 Kilowatts Peak
Operating Temperature Range: -65 to +125C
Resetability: 0.1 dB max
Finish: Connectors are Passivated Stainless Steel
Housings are Irridited Aluminum Painted Grey per MIL-F-14072



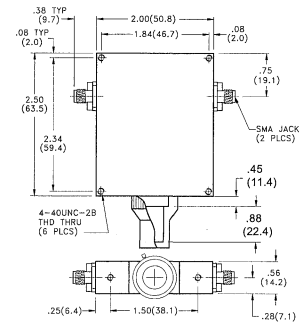
Midwest Microwave's series of Miniature Continuously Variable Attenuators were designed to meet the most stringent environmental conditions. The Flat with Frequency Types are useful for applications where a specific level of attenuation is required over a frequency band and reasonable attenuation flattness over the frequency band is necessary. The units are available in a Standard simple locking type configuration, a Panel mount type with a knob, or a Turns-counting dial type, also panel mounted, for refrence setting or if calibration is desired. SMA connector configurations are standard, however Type N or TNC connector configurations are also available (see note below).



S = Standard Locking Nut Type



P = Panel Mounting Type



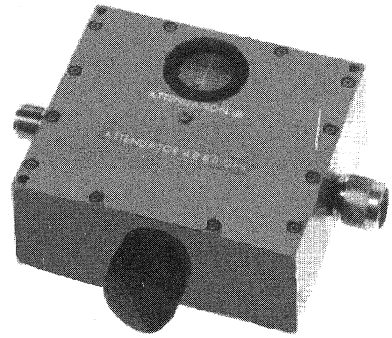
T = Turns Counting Panel Mounting Type

Flat with Frequency Models			
Freq Range (GHz)	**Atten Range (dB)**	**Flattness (± dB)**	**Model Number**
1.2 - 1.4	15	1.5	CVA-FS91-15-SMA-79
2.0 - 4.0	10	1.0	CVA-FS92-10-SMA-79
	20	1.5*	CVA-FS92-20-SMA-79
4.0 - 8.0	10	0.5	CVA-FS93-10-SMA-79
	20	1.0	CVA-FS93-20-SMA-79
8.0 - 12.4	10	0.5	CVA-FS94-10-SMA-79
	20	1.0	CVA-FS94-20-SMA-79
	30	2.0	CVA-FS94-30-SMA-79
12.4 - 18.0	20	1.0	CVA-FS95-20-SMA-79
	30	2.0	CVA-FS95-30-SMA-79

*Note:Flattness is +/- 1.5 dB @ 0 - 13 dB and +/- 2.25 dB @ 13 - 20 dB

Notes:
1. To designate a Panel type option, subsitute "P" for "S" in the Model No..
2. To designate a Turns-Counting Dial option, subsitute "T" for "S" in the Model No..
3. To designate Type N or TNC connectors, subsitute "NNN" or "TNC" for "SMA" in the Model No.

0 - 20 dB Precision Variable Attenuation

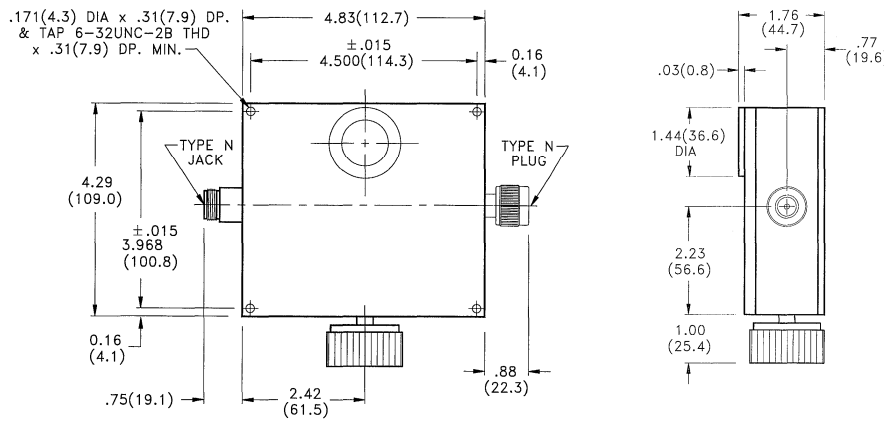


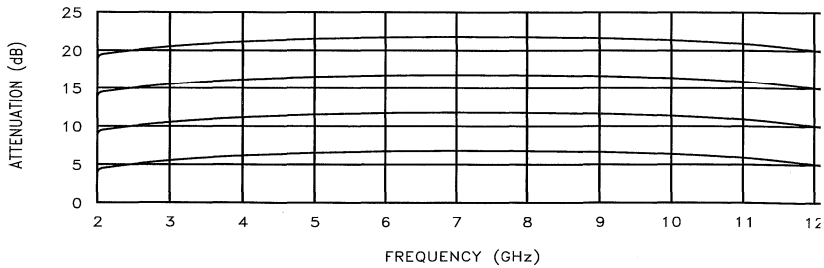
- **4.0 - 8.0 GHz Performance**
- **Direct Dial Reading**
- **Accurate Calibration**
- **Flat Frequency Response**
- **Panel Mounting Right Angle Drive Available**

Specifications

Frequency: 4.0 - 8.0 GHz
Attenuation Range: 0 - 20 dB
Attenuation Accuracy: ± 1.0 dB
Impedance: 50 Ohms
VSWR: 1.25
Zero Position Insertion Loss: 1.0 dB max
Power: 10 Watts average, 5 kW peak
Connectors: Type N Male/Female Passivated Stainless Steel

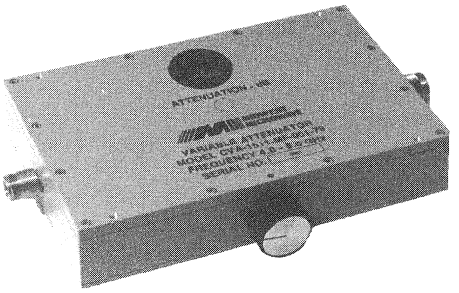
4.0 - 8.0 GHz Calibrated Variable Attenuator 0 - 20 dB	
Bench Top Side Panel Drive	Front Panel Right Angle Drive
CVA-1511-20-NNN-79	CVA-1512-20-NNN-79





0 - 40 dB Precision Variable Attenuation

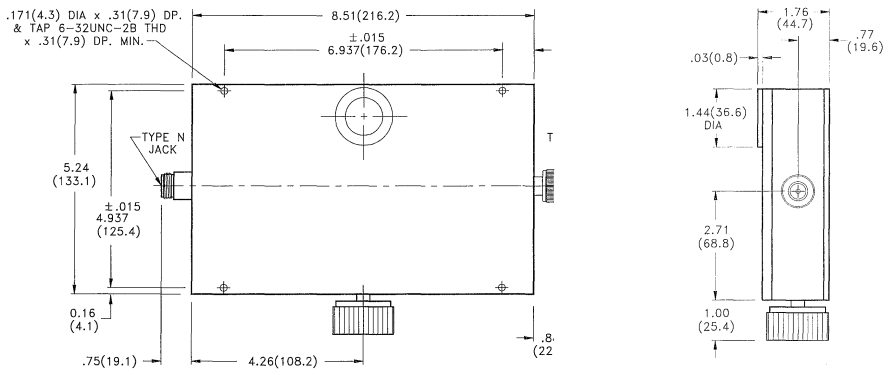
- **4.0 - 8.0 GHz Performance**
- **Direct Dial Reading**
- **Accurate Calibration**
- **Flat Frequency Response**
- **Panel Mounting Right Angle Drive Available**

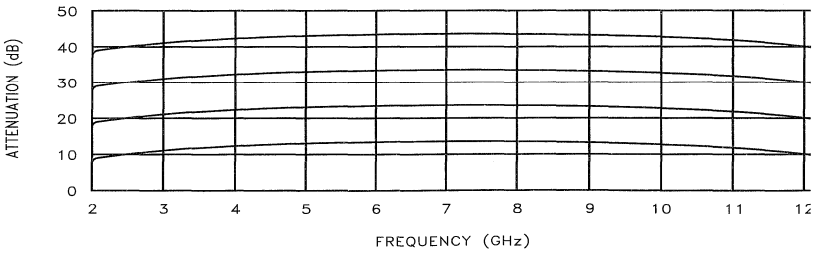


Specifications

Frequency: 4.0 - 8.0 GHz
Attenuation Range: 0 - 40 dB
Attenuation Accuracy: ± 1.5 dB
Impedance: 50 Ohms
VSWR: 1.25
Zero Position Insertion Loss: 1.0 dB max
Power: 10 Watts average, 5 kW peak
Connectors: Type N Male/Female Passivated Stainless Steel

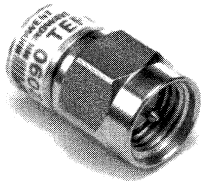
4.0 - 8.0 GHz Calibrated Variable Attenuator 0 - 40 dB	
Bench Top Side Panel Drive	Front Panel Right Angle Drive
CVA-1511-40-NNN-79	CVA-1512-40-NNN-79





Terminations

Coaxial



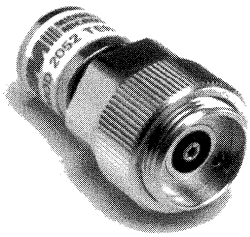
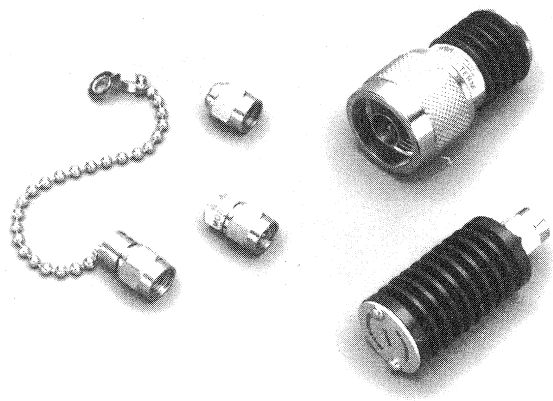


Table of Contents

Terminations

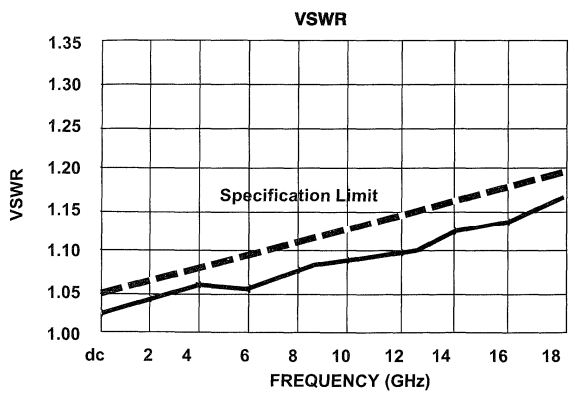
General Information

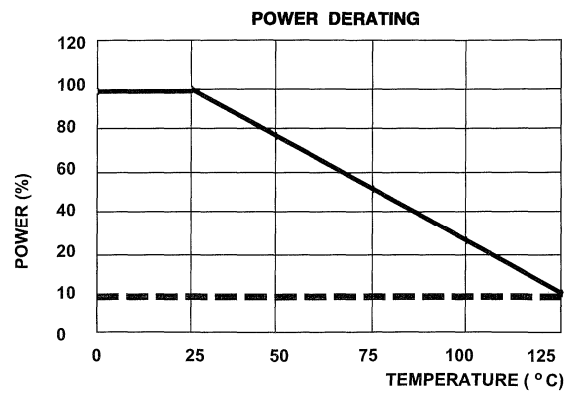
- **MIL-D-39030 Qualified (QPL)**
- **dc - 4, dc - 8, dc - 12.4, dc - 18 and dc - 26 GHz Performance**
- **Small Size, Light Weight, Rugged Construction**
- **Average Power available up to 20 Watts**
- **Meets MIL-E-5400 and MIL-E-16400 Environmental Requirements**
- **SMA, BMA, N, TNC, BNC, SC, 3.5mm, and 7mm Connector Configurations**



Midwest Microwave Coaxial Terminations are designed to meet the extreme demands of today's microwave test or operating system applications. They are available in a complete assortment of connector interfaces and are small in size and light in weight. Feed thru terminations and precision shorts and opens are also available. All Midwest Microwave Terminations are ruggedly constructed of stainless steel and are 100% swept frequency tested to assure that the highest quality performance possible is attained. They posses 50 ohm impedance and will operate successfully over the temperature range of - 55 °C to +125 °C and will exhibit low VSWR over the entire frequency range. Midwest Microwave offers this complete product line of Coaxial Terminations, ruggedly designed for system or laboratory and that meet the environmental requirements of MIL-E-5400 and MIL-E-16400. Average power levels of up to 20 Watts are available providing broadband performance and low frequency sensitivity with good temperaturestability. Other standard Terminations such as precision mismatches, short and open circuit units are also available. Standard cataloge units are available off the shelf for immediate delivery or special units can be custom designed by Midwest's engineering staff to accomodate unique system needs. All Midwest Terminations are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communication applications.

Typical Coaxial Termination Performance



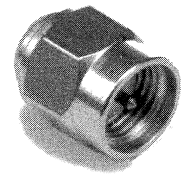


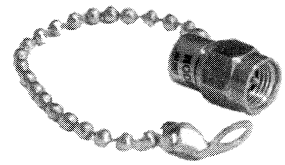
Terminations

SMA Miniature Male Plug

Ultra Short - 0.5 Watt High Performance

- **DC - 2, DC - 8, DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**





Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with any of the units described.

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0, and DC - 2.0 GHz
VSWR: 1.05 + 0.008 f (GHz) max @ DC - 18.0 GHz, 1.30 max @ 18 - 26.5 GHz
Power: 0.5 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

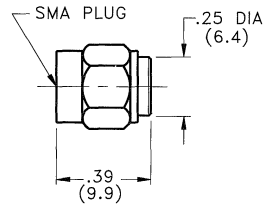
DC - 26.5 GHz	2443 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2443-M0-SMA-02	TRM-2443-MC-SMA-02

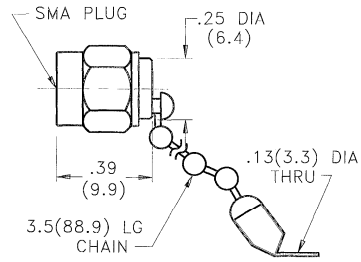
DC - 18 GHz	2444 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2444-M0-SMA-02	TRM-2444-MC-SMA-02

DC - 12.4 GHz	2445 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2445-M0-SMA-02	TRM-2445-MC-SMA-02

DC - 8.0 GHz	2446 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2446-M0-SMA-02	TRM-2446-MC-SMA-02

DC - 2.0 GHz	2447 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2447-M0-SMA-02	TRM-2447-MC-SMA-02



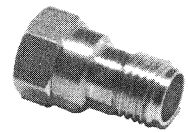


Terminations

SMA Miniature Female Jack

Ultra Short - 0.5 Watt High Performance

- **DC - 2, DC - 8.0, DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**



Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with any of the units described.

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0, and DC - 2.0 GHz
VSWR: 1.05 + 0.008 f (GHz) max @ DC - 18.0 GHz, 1.30 max @ 18 - 26.5 GHz
Power: 0.5 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

DC - 26.5 GHz	2443 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2443-F0-SMA-02	TRM-2443-FC-SMA-02

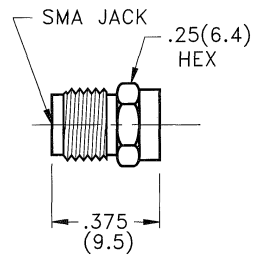
DC - 18 GHz	2444 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2444-F0-SMA-02	TRM-2444-FC-SMA-02

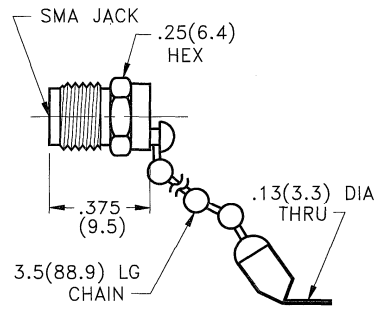
DC - 12.4 GHz	2445 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2445-F0-SMA-02	TRM-2445-FC-SMA-02

DC - 8.0 GHz	2446 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2446-F0-SMA-02	TRM-2446-FC-SMA-02

DC - 2.0 GHz	2447 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2447-F0-SMA-02	TRM-2447-FC-SMA-02

Note: Bead Chains are 3.5 inches long.





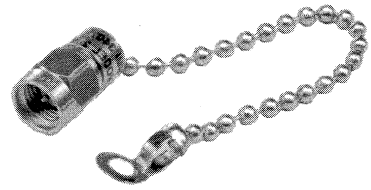
Terminations

SMA Miniature Male Plug

2 Watt High Performance

- **DC - 2, DC - 8, DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

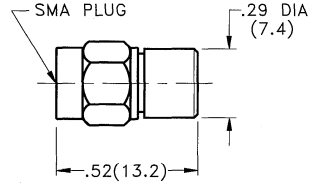
Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available withany of the units described.



SPECIFICATIONS

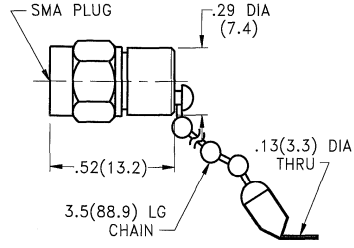
Impedance: **50 Ohms**
Frequency: **DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0 and DC - 2.0 GHz**
VSWR: **1.05 + 0.008 f (GHz) max @ DC - 18.0 GHz, 1.30 max @ 18 - 26.5 GHz**
Power: **2 Watts max @ 25 °C derated to 1 Watt @ +125°C**
Operating Temperature Range: **-65 to +125 °C**
Finish: **Passivated Stainless Steel**

DC - 26.5 GHz	2054 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2054-M0-SMA-02	TRM-2054-MC-SMA-02



DC - 18 GHz	2055 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2055-M0-SMA-02	TRM-2055-MC-SMA-02

DC - 12.4 GHz	2056 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2056-M0-SMA-02	TRM-2056-MC-SMA-02



DC - 8.0 GHz	2058 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2058-M0-SMA-02	TRM-2058-MC-SMA-02

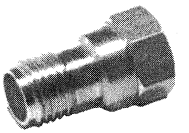
DC - 2.0 GHz	2059 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2059-M0-SMA-02	TRM-2059-MC-SMA-02

Terminations

SMA Miniature Female Jack

Low VSWR - 2 Watt High Performance

- **DC - 2, DC - 8.0, DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**



Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with any of the units described.

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0 and DC - 2.0 GHz
VSWR: 1.05 + 0.008 f (GHz) max @ DC - 18.0 GHz, 1.30 max @ 18 - 26.5 GHz
Power: 2 Watts max @ 25 °C derated to 1 Watt @ +125°C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

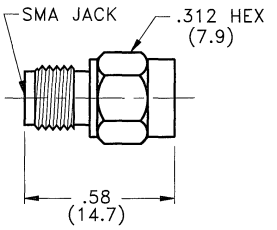
DC - 26.5 GHz	2054 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2054-F0-SMA-02	TRM-2054-FC-SMA-02

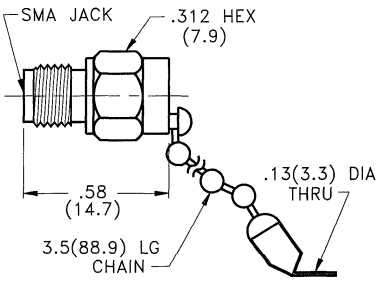
DC - 18 GHz	2055 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2055-F0-SMA-02	TRM-2055-FC-SMA-02

DC - 12.4 GHz	2056 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2056-F0-SMA-02	TRM-2056-FC-SMA-02

DC - 8.0 GHz	2058 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2058-F0-SMA-02	TRM-2058-FC-SMA-02

DC - 2.0 GHz	2059 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2059-F0-SMA-02	TRM-2059-FC-SMA-02





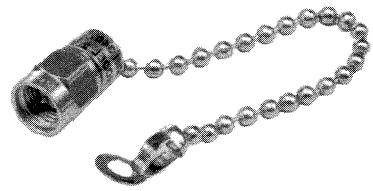
Terminations

SMA Miniature Male Plug

Low VSWR - 2 Watt High Performance

- **DC - 2, DC - 8,DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. These Models offer improved, lower VSWR performance over units described on the previous page. Bead Chains are available with any of the units described.



SPECIFICATIONS

Impedance: **50 Ohms**
Frequency: **DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0 and DC - 2.0 GHz**
VSWR: **1.05 @ DC - 4 GHz, 1.10 @ 4.0 - 12 GHz, 1.14 @ 12 - 18 GHz, and 1.30 @ 18.0-26.5 GHz**
Power: **2 Watts max @ 25 °C derated linearly to 1 Watt @ 125 °C**
Operating Temperature Range: **-65 to +125 °C**
Finish: **Passivated Stainless Steel**

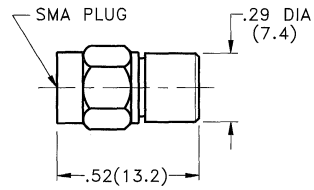
DC - 26.5 GHz	2089 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2089-M0-SMA-02	TRM-2089-MC-SMA-02

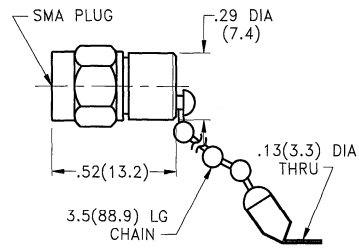
DC - 18 GHz	2090 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2090-M0-SMA-02	TRM-2090-MC-SMA-02

DC - 12.4 GHz	2091 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2091-M0-SMA-02	TRM-2091-MC-SMA-02

DC - 8.0 GHz	2092 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2092-M0-SMA-02	TRM-2092-MC-SMA-02

DC - 2.0 GHz	2093 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2093-M0-SMA-02	TRM-2093-MC-SMA-02



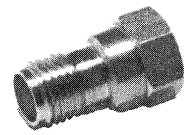


Terminations

SMA Miniature Female Jack

Low VSWR - 2 Watt High Performance

- **DC - 2, DC - 8, DC - 12.4, DC - 18, and DC - 26.5GHz units available**
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**



Midwest Microwave's SMA miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. These Models offer improved, lower VSWR performance over units described on the previous page. Bead Chains are available with any of the units described.

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 26.5, DC - 18.0, DC - 12.4., DC - 8.0 and DC - 2.0 GHz
VSWR: 1.05 @ DC - 4 GHz, 1.10 @ 4.0 - 12 GHz, 1.14 @ 12 - 18 GHz, and 1.30 @ 18.0-26.5 GHz
Power: 2 Watts max @ 25 °C derated linearly to 1 Watt @ 125 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

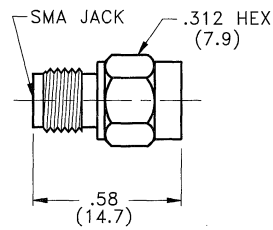
DC - 26.5 GHz	2089 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2089-F0-SMA-02	TRM-2089-FC-SMA-02

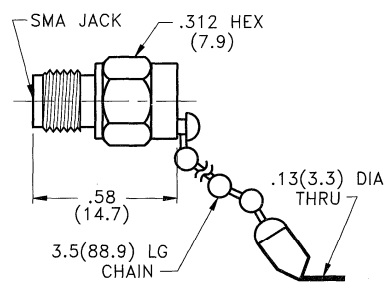
DC - 18 GHz	2090 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2090-F0-SMA-02	TRM-2090-FC-SMA-02

DC - 12.4 GHz	2091 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2091-F0-SMA-02	TRM-2091-FC-SMA-02

DC - 8.0 GHz	2092 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2092-F0-SMA-02	TRM-2092-FC-SMA-02

DC - 2.0 GHz	2093 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2093-F0-SMA-02	TRM-2093-FC-SMA-02





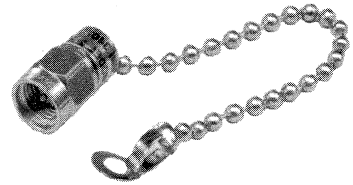
Terminations

3.5 mm 26.5 GHz Type

DC - 26.5 GHz - 2 Watts High Performance

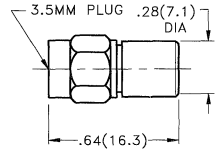
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**
- **Mates with Standard SMA Interface**

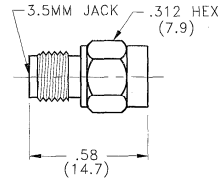
Midwest Microwave's 3.5mm series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. All Models mate non-destructively with standard SMA connector interfaces. Bead Chains are available with any of the units described.



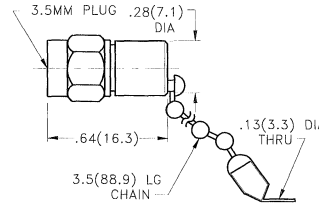
SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 and DC - 26.5 GHz
VSWR: 1.12 max @ DC - 18.0 GHz and 1.18 max @ 18.0 - 26.5 GHz
Power: 2 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

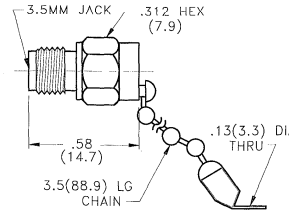




DC - 26.5 GHz	2160 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2160-M0-35M-02	TRM-2160-MC-35M-02
Female Jack	Female Jack with Chain
TRM-2160-F0-35M-02	TRM-2160-FC-35M-02

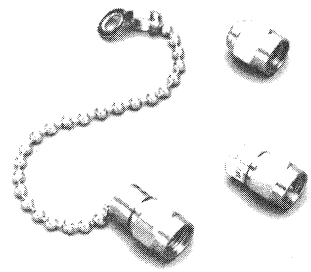


DC - 18.0 GHz	2161 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2161-M0-35M-02	TRM-2161-MC-35M-02
Female Jack	Female Jack with Chain
TRM-2161-F0-35M-02	TRM-2161-FC-35M-02



Note: Bead Chains are 3.5 inches long

MIL-D-39030 Qualified (QPL) SMA Low Power



- **Non-Screened and Screened Units Available**
- **100% Tested**
- **Military Applications**

Midwest Microwave's QPL Termination products were designed, tested and have been qualified to the stringent requirements of the latest effective issue of the applicable military specifications. By selecting a part that appears on a QPL list, a user is assured that the part will meet or exceed the performance specifications set forth in the MIL Specification as a minimum standard of performance.

MIL Part Slash No.	Description	Frequency (GHz)
MIL-D-39030/3	SMA Subminiature - Male and Female Low Power	4.4 - 5.0 DC - 10.0 DC - 18.0 2.0 - 19.0
MIL-D-39030/5	TNC Low Power - Male and Female	DC - 10.0 DC - 11.0 0.3 - 12.4
MIL-D-39030/6	Type N Low Power - Male and Female	DC - 12.4 .03 - 12.4 DC - 18.0
MIL-D-39030/7	BNC Low Power - Male and Female	DC - 2.50
MIL-D-39030/8	TNC Medium Power - Male and Female	DC - 6.0

Note: Please refer to the section covering QPL parts on page 237 for complete listing of part numbers.

Screened Terminations per Table III of MIL-D-39030

Screening Tests:

- Visual & Mechanical Inspection
- Weight Measurement
- VSWR Electrical Testing
- Thermal Shock Exposure
- VSWR Electrical Testing
- Burn-In Exposure for 96 Hours
- VSWR Electrical Testing

Non-Screened Terminations per Table III of MIL-D-39030

Group A Inspection Tests

- Visual & Mechanical Examination
- Weight Measurement
- VSWR Electrical Testing

Note: All Screened Terminations are tested 100% per Table III of MIL-D-39030.
All Non-Screened Terminations are also tested 100% per Table III of MIL-D-39030.

Space Qualified Terminations

Midwest Microwave manufactures High Reliability (Hi-Rel) Terminations suitable for use under space flight conditions. These units are manufactured using a system that provides complete tracability of all of the piece parts that make up their assembly. All non-metal materials used meet or exceed the outgassing requirements of NASA specifications JSC SP-R-0022 for a TML of 1% max and a CVCM of .1% max.. All Hi-Rel components are manufactured in a clean room environment exceeding the requirements of FED-STD-209 Class 100,000. Hi-Rel Terminations are manufactured to individual customer specifications and undergo extensive testing similar to the testing outlined below.

In-Process Inspections	Sample Size
Visual & Mechanical Dimensions	100%
Plating Thickness	5 pcs.
Solderability (when applicable)	5 pcs.
Plating Adhesion	5 pcs.
Contact Captivation	100%
Rotational Contact Retention	6 pcs.
Axial Contact Retention	6 pcs.
Proof Torque	100%
Contact Engaging Force	100%
Contact Separating Force	100%

Group A Inspections - 100%

- Visual & Mechanical Inspection
- Thermal Shock
- Sinusoidal Vibration
- Electrical Characterisitics
- Peak Power
- Connector Engaging/Separating Force
- Radiographic Inspections
- PIND Test
- Visual & Mechanical Inspection

Group B Inspections - 100%

- Electrical Characteristics @ Operating Temperature Extremes
- Contact Engaging/Separating Forces
- Coupling Mechanism Proof Torque
- Connector Mounting Proof Torque

Group C Inspections - 100%

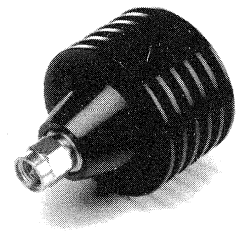
- Vibration
- Shock
- Moisture Resistance
- Electrical Characteristics
- Resistance to Solvents

Terminations

SMA Medium Power Types

DC - 18 GHz High Performance

- **2, 5, and 10 Watt Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

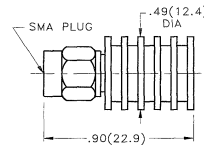


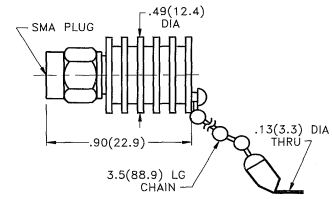
Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 2, 5, and 10 Watts are offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

2 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.008 f (GHz)
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 500 Watts
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2057 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2057-M0-SMA-07	TRM-2057-MC-SMA-07

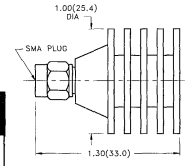


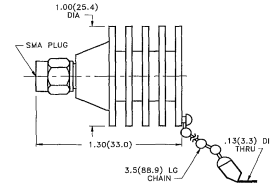


5 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.01 f (GHz)
Power: 5 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2010 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2010-M0-SMA-07	TRM-2010-MC-SMA-07

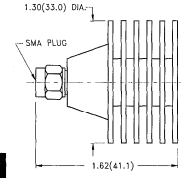


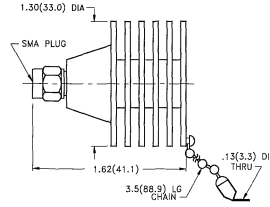


10 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.01 f (GHz)
Power: 10 Watts average @ +25 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2013 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2013-M0-SMA-07	TRM-2013-MC-SMA-07



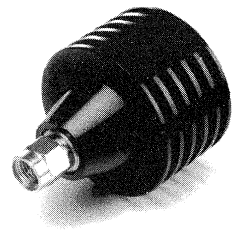


Terminations

SMA Medium Power Types

DC - 18 GHz High Performance

- **2, 5, and 10 Watt Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

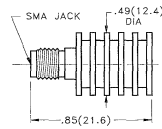


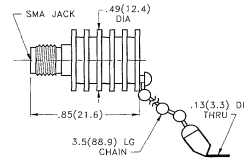
Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 2, 5, and 10 Watts are offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

2 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.008 f (GHz)
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 500 Watts
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2057 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2057-F0-SMA-07	TRM-2057-FC-SMA-07

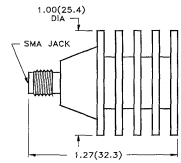


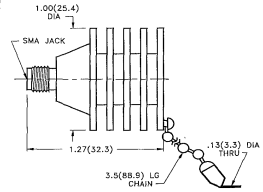


5 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.01 f (GHz)
Power: 5 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2010 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2010-F0-SMA-07	TRM-2010-FC-SMA-07

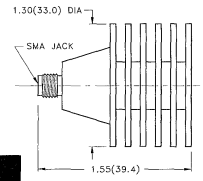


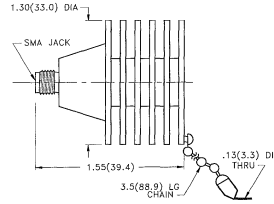


10 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.01 f (GHz)
Power: 10 Watts average @ +25 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2013 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2013-F0-SMA-07	TRM-2013-FC-SMA-07



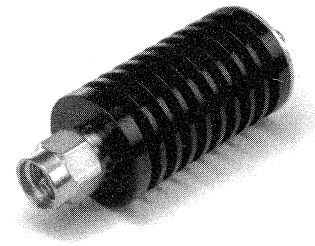


Terminations

SMA Medium Power Types

10 and 20 Watt - DC - 18 GHz

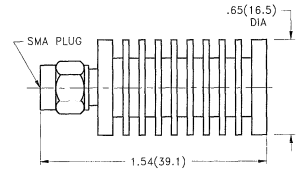
- **10 and 20 Watt Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

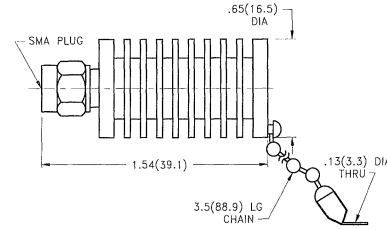


Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 10 and 20 Watts are offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

10 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.20 @ DC - 8.0 GHz, 1.30 @ 8 - 12.4 GHz, 1.35 @ 12.4 - 18.0 GHz
Power: 10 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C

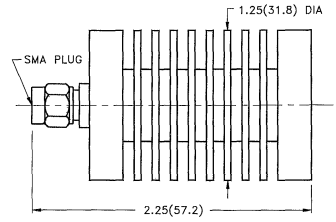


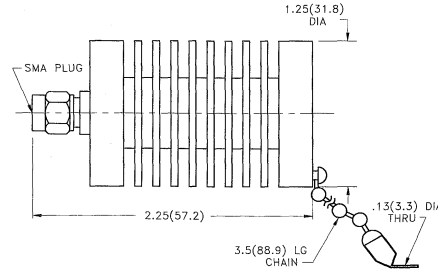


DC - 18.0 GHz	2138 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2138-M0-SMA-07	TRM-2138-MC-SMA-07

20 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0, DC - 12.4, DC - 8.0, DC - 4.0, and DC - 2.0 GHz
VSWR: 1.25 @ DC - 12.4 GHz, 1.35 @ 12.4 - 18.0 GHz
Power: 20 Watts average @ +25 °C derated linearly to 5 Watts @ +125 °C
Peak Power: 6 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C





DC - 18.0 GHz	2129 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2129-M0-SMA-07	TRM-2129-MC-SMA-07
DC - 12.4 GHz	**2134 Series Model Numbers**
TRM-2134-M0-SMA-07	TRM-2134-MC-SMA-07
DC - 8.0 GHz	**2136 Series Model Numbers**
TRM-2136-M0-SMA-07	TRM-2136-MC-SMA-07
DC - 4.0 GHz	**2139 Series Model Numbers**
TRM-2139-M0-SMA-07	TRM-2139-MC-SMA-07
DC - 2.0 GHz	**2143 Series Model Numbers**
TRM-2143-M0-SMA-07	TRM-2143-MC-SMA-07

Terminations

SMA Medium Power Types

10 and 20 Watt - DC - 18 GHz

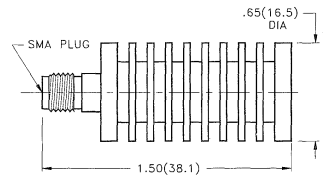
- **10 and 20 Watt Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

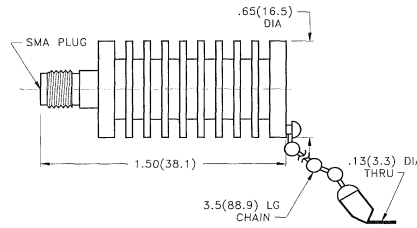
Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 10 and 20 Watts are offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

10 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.20 @ DC - 8.0 GHz, 1.30 @ 8 - 12.4 GHz, 1.35 @ 12.4 - 18.0 GHz
Power: 10 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2138 Series Model Numbers
Female Jack	Female Jack with Chain
TRM-2138-F0-SMA-07	TRM-2138-FC-SMA-07

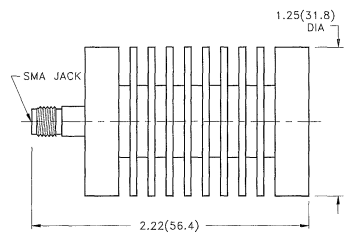


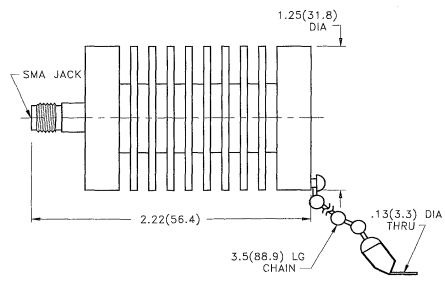


20 Watts - DC - 18 GHz

Impedance: 50 Ohms
Frequency: DC - 18.0, DC - 12.4, DC - 8.0, DC - 4.0, and DC - 2.0 GHz
VSWR: 1.25 @ DC - 12.4 GHz, 1.35 @ 12.4 - 18.0 GHz
Power: 20 Watts average @ +25 °C derated linearly to 5 Watts @ +125 °C
Peak Power: 6 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2129 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2129-F0-SMA-07	TRM-2129-FC-SMA-07
DC - 12.4 GHz	**2134 Series Model Numbers**
TRM-2134-F0-SMA-07	TRM-2134-FC-SMA-07
DC - 8.0 GHz	**2136 Series Model Numbers**
TRM-2136-F0-SMA-07	TRM-2136-FC-SMA-07
DC - 4.0 GHz	**2139 Series Model Numbers**
TRM-2139-F0-SMA-07	TRM-2139-FC-SMA-07
DC - 2.0 GHz	**2143 Series Model Numbers**
TRM-2143-F0-SMA-07	TRM-2143-FC-SMA-07



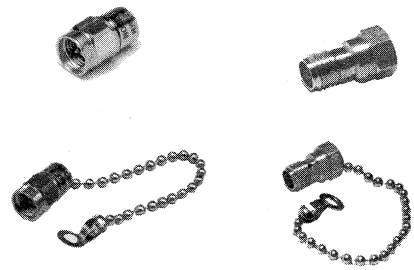


Terminations

SSMA - SMMA

DC - 18.0 GHz - 0.5 Watt High Performance

- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on Subminiature Models**



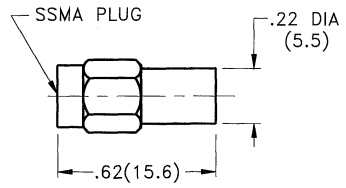
Midwest Microwave's SSMA Subminiature and SMMA Ultraminiature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with the Subminiature units, but are not available with the Ultraminiature units.

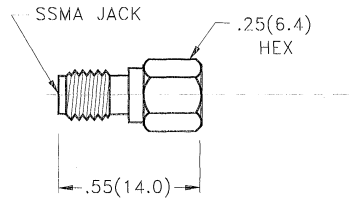
SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.10 + 0.01 (f GHz)
Power: 0.5 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

Subminiature

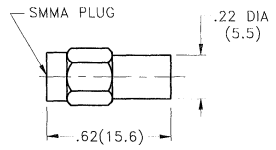
DC - 18.0 GHz	2180 Series Model Numbers
Male Plug	**Male Plug with Chain**
TRM-2180-MO-SSM-02	**TRM-2180-MC-SSM-02**
Female Jack	**Female Jack with Chain**
TRM-2180-FO-SSM-02	**TRM-2180-FC-SSM-02**

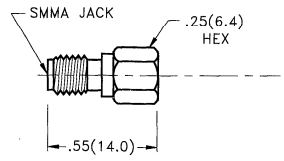




Ultraminiature

DC - 18.0 GHz	2181 Series Model Numbers
Male Plug	**TRM-2181-MO-SMM-02**
Female Jack	**TRM-2181-FO-SMM-02**



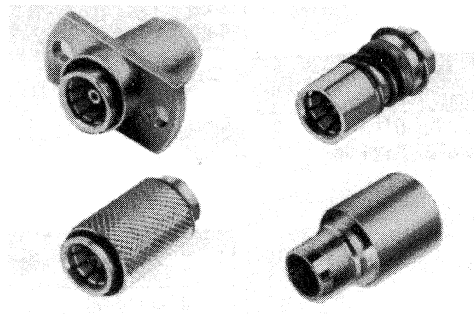


Note: Bead Chains are 3.5 inches long and are not available on Ultraminiature Series Models.

Terminations

BMA Blind Mate Type

DC - 18.0 GHz - 0.5 Watt High Performance

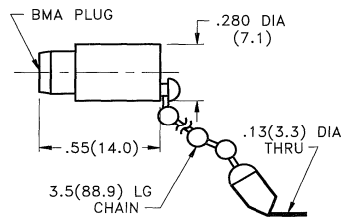


- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

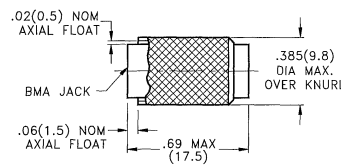
Midwest Microwave's BMA Miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with all of the types described.

SPECIFICATIONS

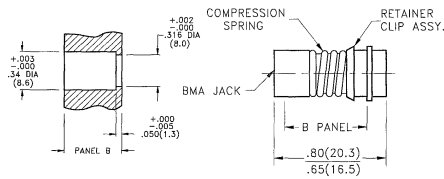
Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.10 + 0.01 (f GHz)
Power: 0.5 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel



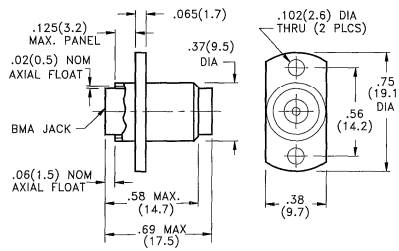
DC - 18.0 GHz	2191 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2191-M0-BMA-02	TRM-2191-MC-BMA-02
Female Jack	Female Jack with Chain
TRM-2191-F0-BMA-02	TRM-2191-FC-BMA-02



DC - 18.0 GHz	2192 Series Model Numbers
Female Jack	TRM-2192-F0-BMA-02



DC - 18.0 GHz	2193 Series Model Numbers
Female Jack	TRM-2193-F0-BMA-02



Note: Bead Chains are 3.5 inches long.

Terminations

SMB - SMC Types

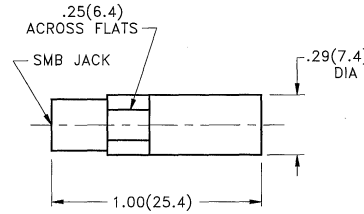
DC - 4.0 GHz - 0.5 Watt Performance

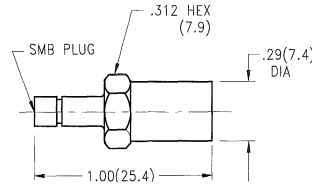
- **Low VSWR**
- **Rugged Stainless Steel Construction**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

Midwest Microwave's SMB and SMC Subminiature series of high performance low frequency coaxial Terminations provide temperature stable, ruggedly built, low VSWR performance in a compact light weight package size. They are useful in commercial low frequency communication systems as well as military applications. Bead Chains are available with the all of the types described.

SPECIFICATIONS

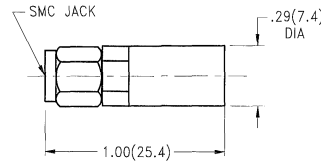
Impedance: 50 Ohms
Frequency: DC - 4.0 GHz
VSWR: 1.15 max @ DC - 2.0 GHz, 1.25 max @ 2.0 - 4.0 GHz
Power: 0.5 Watts max @ 25 °C
Operating Temperature Range: -65 to +125 °C
Finish: Passivated Stainless Steel

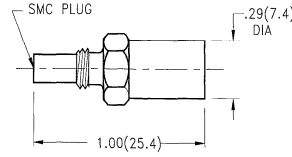




SMB Subminiature

DC - 4.0 GHz	2198 Series Model Numbers
Female Plug	Female Plug with Chain
TRM-2198-F0-SMB-02	TRM-2198-FC-SMB-02
Male Jack	Male Jack with Chain
TRM-2198-M0-SMB-02	TRM-2198-MC-SMB-02





SMC Subminiature

DC - 4.0 GHz	2199 Series Model Numbers
Female Plug	Female Plug with Chain
TRM-2199-F0-SMC-02	TRM-2199-FC-SMC-02
Male Jack	Male Jack with Chain
TRM-2199-M0-SMC-02	TRM-2199-MC-SMC-02

Note: Bead Chains are 3.5 inches long.

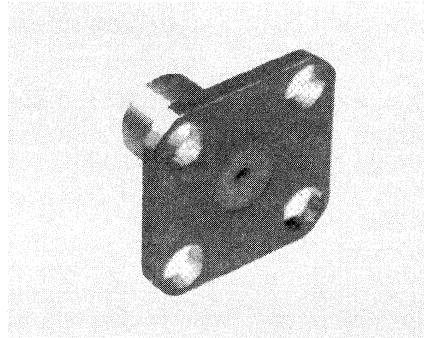
Terminations

Flange Mount Type

DC - 18 GHz - 0.5 Watt Performance

- **Low VSWR Performance**
- **Tab, Slot, or Rod Contact for Microstrip use**
- **Interchangeable Transition Contact Pins**
- **0.375, 0.50, 0.687, and 1.00 inch Standard SquareFlanges**

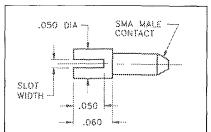
This series of flange mounted Terminations are ideally suited for use on microstrip packages where size and weight are a consideration. By combining the Termination into the launching flange, space and weight saving as well as cost is accomplished. The units utilize a sliding contact method that provides isolation from expansion stress as a result of temperature changes. The units are ruggedly constructed of stainless steel and are temperature stabilized for use in hostile environments.



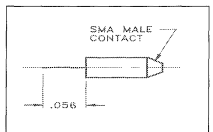
Model No.	Contact Type	VSWR
TRM-XXXX--YY-FLG-02	Slot (See table)	1.10 @ DC - 4 GHz 1.20 @ 4 - 12.4 GHz 1.30 @ 12.4 -18 GHz
TRM-XXXX--YY-FLG-02	Tab	1.10 @ DC - 4 GHz 1.20 @ 4 - 12.4 GHz 1.30 @ 12.4 -18 GHz
TRM-XXXX-YY-FLG-02	0.020 Dia. Rod	1.10 @ DC - 4 GHz 1.20 @ 4 - 12.4 GHz 1.30 @ 12.4 -18 GHz

Note: When ordering, select flange size and replace "XXXX" with the four digits that are shown below the figure with the flange size desired.
To select the type center contact and slot width (if applicable), replace "YY" with dash No. for desired male contact pin with Slot width, Tab, or Rod.
(See Selection Table below)

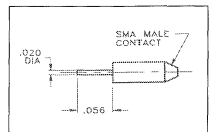
Contact Type	Dimension		- YY
Slot	WIDTH	0.012 0.018 0.028 0.036	- 01 - 02 - 03 - 04
Tab	0.005 Thk x 0.050 wide		- 05
Rod	0.020 Dia.		- 06



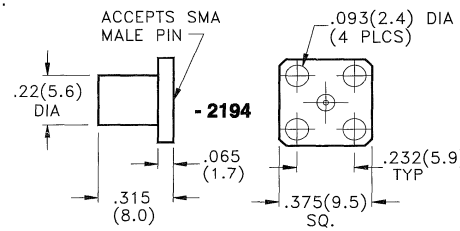
SLOT - 01 to - 04

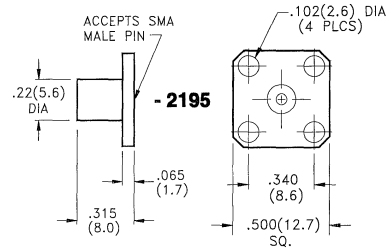


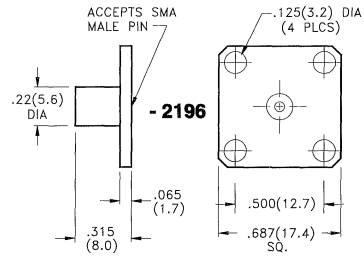
TAB - 05

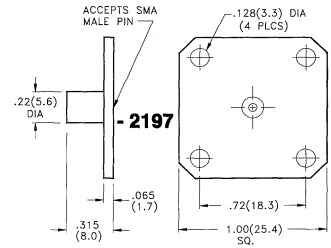


ROD - 06









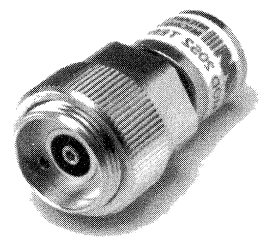
Note: All Models are available with EMI gasketed flange face, designate by subsituting "EMI" for "FLG" in Model No.

Terminations

7mm Type

DC - 18 GHz Precision Performance

- **7mm Precision Performance**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**



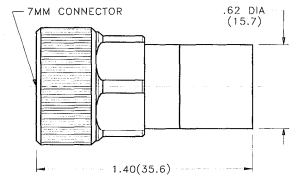
Midwest Microwave's 7mm series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and in the case of medium power units, black anodized finned aluminum housings to dissapate heat efficiently. Low VSWR performance is exhibited and units are suitable for laboratory test systems as well as operating systems.

7mm Precision DC - 18 GHz

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.03 + 0.003 f (GHz)
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2002 Series Model Numbers
7mm	7mm
TRM-2002-00-7MM-02	TRM-2002-0C-7MM-02

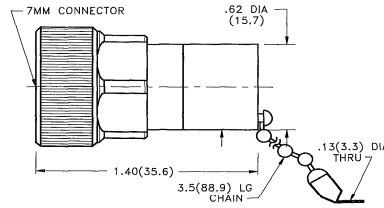


Broadband Performance DC - 18 GHz

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz, 1.10 @ 4 - 12.4 GHz, and 1.15 @ 12.4 - 18.0 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2052 Series Model Numbers
7mm	7mm
TRM-2052-00-7MM-02	TRM-2052-0C-7MM-02



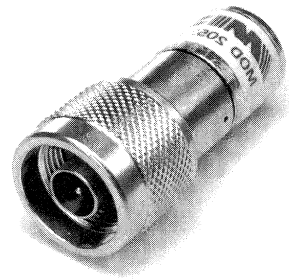
Terminations

Type N

DC - 18 GHz - High Performance

- **Precision and Broadband Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

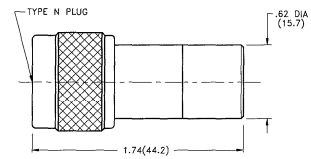
Midwest Microwave's N Type series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings. Input Power levels of 2 Watts is offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

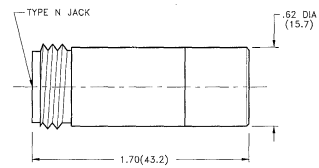


DC - 18 GHz - Precision N Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.03 + 0.005 f (GHz)
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C



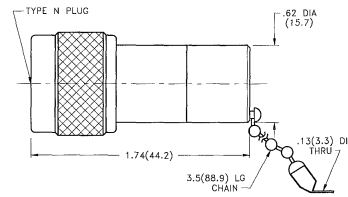


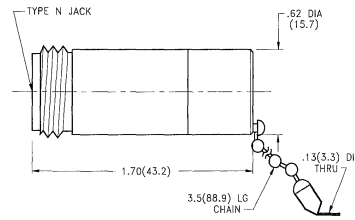
DC - 18.0 GHz 2001 Series Model Numbers	
Male Plug	Male Plug with Chain
TRM-2001-M0-NNN-02	TRM-2001-MC-NNN-02
Female Jack	Female Jack with Chain
TRM-2001-F0-NNN-02	TRM-2001-FC-NNN-02

DC - 12.4 GHz Broadband Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 12.4 GHz
VSWR: 1.07 @ DC - 4 GHz, 1.12 @ 4 - 12.4 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

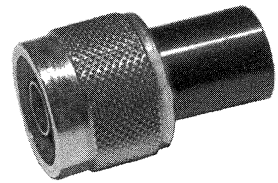




DC - 12.4 GHz 2053 Series Model Numbers	
Male Plug	Male Plug with Chain
TRM-2053-M0-NNN-02	TRM-2053-MC-NNN-02
Female Jack	Female Jack with Chain
TRM-2053-F0-NNN-02	TRM-2053-FC-NNN-02

Low Cost DC - 18 GHz Performance

- **Type N Precision Performance**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**



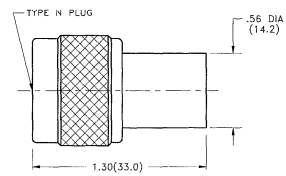
Midwest Microwave's Type N series of Low Cost coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors. The units are designed to optimize cost reduction and their performance per cost ratio is excellent. Low VSWR performance is exhibited and units are suitable for a variety of commercial operating or test systems.

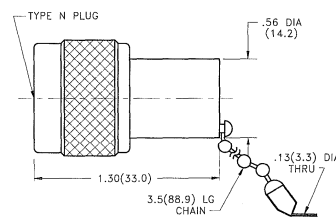
Low Cost Type N Precision - DC - 18 GHz

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.25 max.
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2070 Series Model Numbers
N Male Plug	N Male Plug with Chain
TRM-2070-M0-NNN-07	TRM-2070-MC-NNN-07
Female Jack	Female Jack with Chain
TRM-2070-F0-NNN-07	TRM-2070-FC-NNN-07



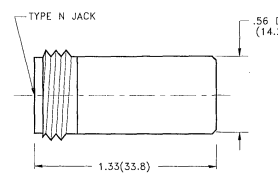


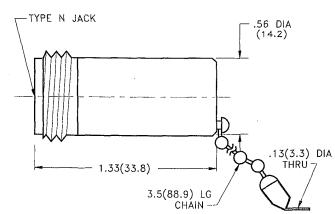
Low Cost Broadband Performance DC - 4.0 GHz

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 4.0 GHz
VSWR: 1.15 max.
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C

DC - 4.0 GHz	2071 Series Model Numbers
N Male Plug	N Male Plug with Chain
TRM-2071-M0-NNN-07	TRM-2071-MC-NNN-07
Female Jack	Female Jack with Chain
TRM-2071-F0-NNN-07	TRM-2071-FC-NNN-07

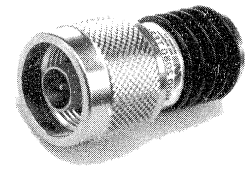




Terminations Type N - Medium Power Types

DC - 18 GHz - 10 Watt Performance

- **DC - 12.4 and DC - 18.0 GHz Model selection**
- **10 Watts of Power Handling at 40 °C**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**



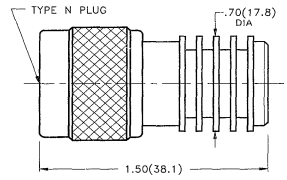
Midwest Microwave's N Type series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings of black anodized finned aluminum for maximum heat dissapation. Input Power levels of 10 Watts is offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

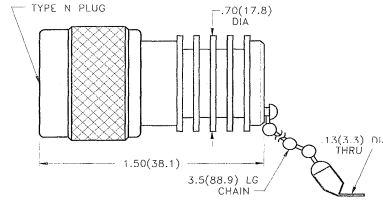
10 Watt DC - 18 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.05 + 0.01 f (GHz)
Power: 10 Watts average @ +25 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 18.0 GHz	2098 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2098-M0-NNN-07	TRM-2098-MC-NNN-07
Female Jack	Female Jack with Chain
TRM-2098-F0-NNN-07	TRM-2098-FC-NNN-07



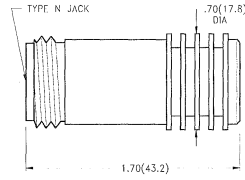


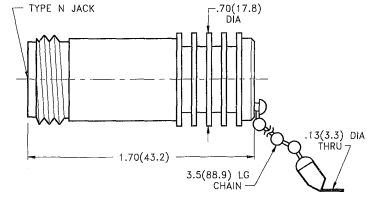
10 Watt DC - 12.4 GHz Performance

SPECIFICATIONS

Frequency: DC - 12.4 GHz
VSWR: 1.05 + 0.01 f (GHz)
Impedance: 50 Ohms
Power: 10 Watts average @ +25 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 12.4 GHz	2080 Series Model Numbers
Male Plug	Male Plug with Chain
TRM-2080-M0-NNN-07	TRM-2080-MC-NNN-07
Female Jack	Female Jack with Chain
TRM-2080-F0-NNN-07	TRM-2080-FC-NNN-07



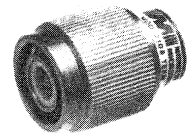


Terminations

TNC Type

DC - 18 GHz - High Performance

- **Precision and Broadband Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

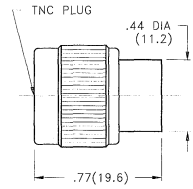


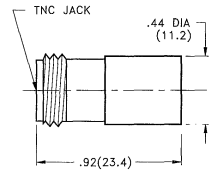
Midwest Microwave's TNC Type series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings. Input Power levels of 2 Watts is offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

DC - 18 GHz Precision Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.20 @ DC - 8.0 GHz and 1.25 @ 8.0 - 18.0 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C



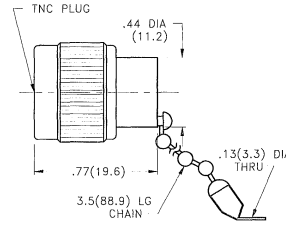


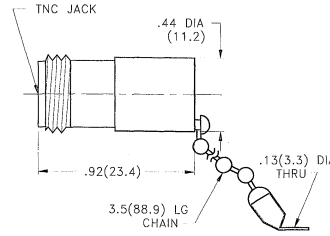
DC - 18.0 GHz	2108 Series Model Numbers
TNC Male Plug	TNC Male Plug with Chain
TRM-2108-M0-TNC-02	TRM-2108-MC-TNC-02
TNC Female Jack	TNC Female Jack with Chain
TRM-2108-F0-TNC-02	TRM-2108-FC-TNC-02

DC - 12.4 GHz Broadband Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 12.4 GHz
VSWR: 1.20 @ DC - 8.0 GHz, 1.25 @ 8.0 - 12.4 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C

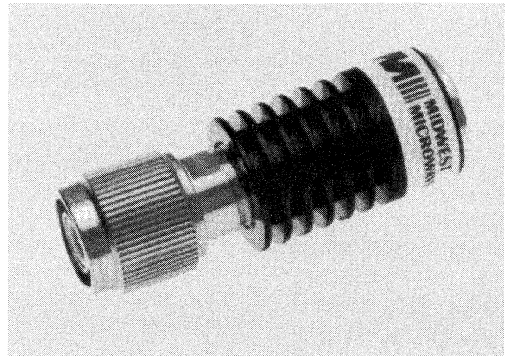




DC - 12.4 GHz	2107* Series Model Numbers
TNC Male Plug	TNC Male Plug with Chain
TRM-2107-M0-TNC-02	TRM-2107-MC-TNC-02
TNC Female Jack	TNC Female Jack with Chain
TRM-2107-F0-TNC-02	TRM-2107-FC-TNC-02

* Note: Low cost , DC - 4.0 GHz Models are available as the 2110 Series. Subsitute 2110 in place of 2107 to designate.

DC - 18 GHz 5 Watt Performance



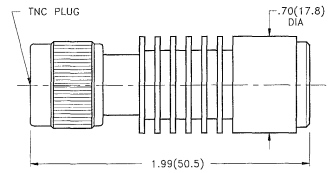
- **Precision TNC Performance**
- **5 Watt Average - 5 Kw Peak Power**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Interface Construction**

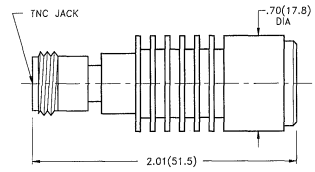
Midwest Microwave's TNC type series of coaxial medium power Terminations provide temperature stable, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. The units are designed to optimize performance and reliability with low VSWR performance and are suitable for use in military or commercial systems with MIL-E-5400 and MIL-E-16400 requirements.

5 Watts - DC - 18 GHz

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 18.0 GHz
VSWR: 1.30 max.
Power: 5 Watts average @ +40 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 5 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C



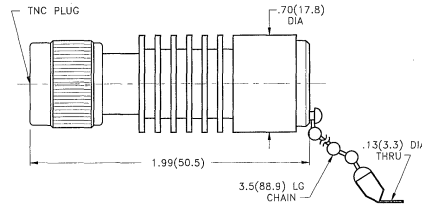


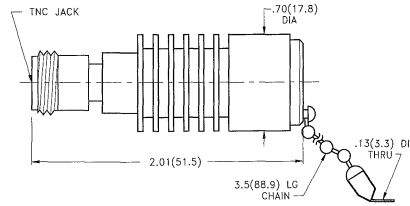
DC - 18.0 GHz	2142 Series Model Numbers
TNC Male Plug	TNC Male Plug with Chain
TRM-2142-M0-TNC-07	TRM-2142-MC-TNC-07
TNC Female Jack	TNC Female Jack with Chain
TRM-2142-F0-TNC-07	TRM-2142-FC-TNC-07

5 Watts - DC - 4 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 4.0 GHz
VSWR: 1.20 max.
Power: 5 Watts average @ +40 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 5 Kilowatt (5 microsecond pulse width)
Operating Temperature Range: -54 °C to +125 °C





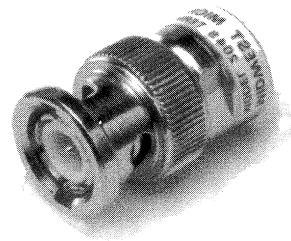
DC - 4.0 GHz	2140 Series Model Numbers
TNC Male Plug	TNC Male Plug with Chain
TRM-2140-M0-TNC-07	TRM-2140-MC-TNC-07
TNC Female Jack	TNC Female Jack with Chain
TRM-2140-F0-TNC-07	TRM-2140-FC-TNC-07

Terminations

BNC Type

DC - 4.0 GHz Performance

- **Low Cost Model selection**
- **Broad Frequency Band Coverage**
- **Low VSWR - 50 Ohm Performance.**
- **5 Watt Model available**



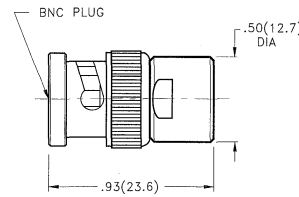
Midwest Microwave's BNC Type series of coaxial Terminations provide temperature stable, ruggedly performance in light weight reasonably sized packages using high quality connectors and housings. Input Power levels of 2 and 5 Watts is offered with low VSWR performance and units meet all of the stringent environmental test requirements of MIL-E-5400 and MIL-E-16400.

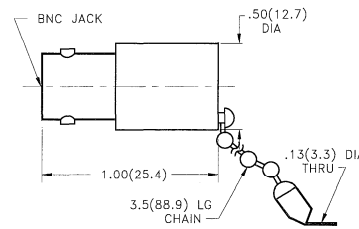
2 Watts DC - 4.0 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 4.0 GHz
VSWR: 1.20 max @ DC - 4.0 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C

DC - 4.0 GHz	2048 Series Model Numbers
BNC Male Plug	BNC Male Plug with Chain
TRM-2048-M0-BNC-10	TRM-2048-MC-BNC-10
BNC Female Jack	BNC Female Jack with Chain
TRM-2048-F0-BNC-10	TRM-2048-FC-BNC-10



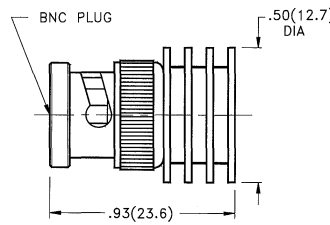


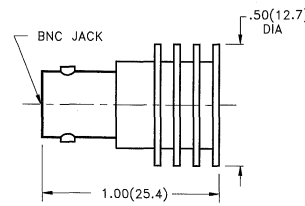
5 Watts DC - 4.0 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 4.0 GHz
VSWR: 1.20 @ DC - 4.0 GHz
Power: 5 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.5 Kilowatts
Operating Temperature Range: -54 °C to +125 °C

DC - 4.0 GHz	2049 Series Model Numbers
BNC Male Plug	BNC Male Plug with Chain
TRM-2049-M0-BNC-07	TRM-2049-MC-BNC-07
BNC Female Jack	BNC Female Jack with Chain
TRM-2049-F0-BNC-07	TRM-2049-FC-BNC-07



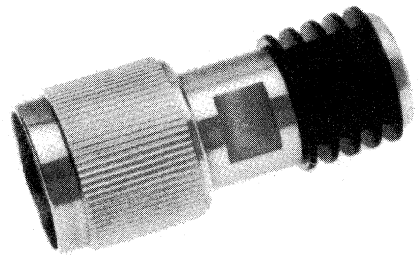


Terminations

SC Type

DC - 11.0 GHz Performance

- **Wideband Performance**
- **5 Watt Model available**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Construction**



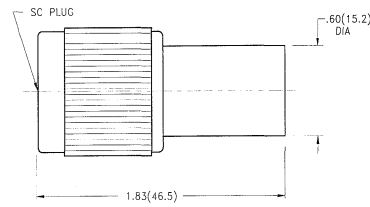
Midwest Microwave's SC type series of coaxial low and medium power Terminations provide temperature stable, performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. The units are designed to optimize performance and reliability with low VSWR performance and are suitable for use in military or commercial systems with Mil-E-5400 and Mil-E-16400 requirements.

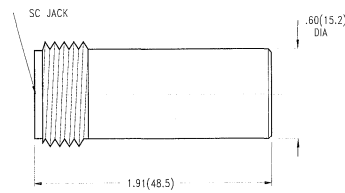
2 Watts - DC - 11.0 GHz - Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 11.0 GHz
VSWR: 1.20 max.
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 11.0 GHz	2117 Series Model Numbers
SC Male Plug	SC Male Plug with Chain
TRM-2117-M0-SC0-02	TRM-2117-MC-SC0-02
SC Female Jack	SC Female Jack with Chain
TRM-2117-F0-SC0-02	TRM-2117-FC-SC0-02



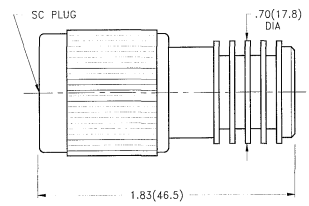


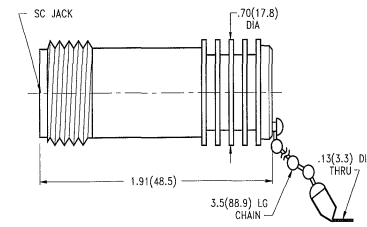
5 Watts - DC - 11.0 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 11.0 GHz
VSWR: 1.20 max.
Power: 5 Watts average @ +40 °C derated linearly to 1.0 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 11.0 GHz	2118 Series Model Numbers
SC Male Plug	SC Male Plug with Chain
TRM-2118-M0-SC0-07	TRM-2118-MC-SC0-07
SC Female Jack	SC Female Jack with Chain
TRM-2118-F0-SC0-07	TRM-2118-FC-SC0-07



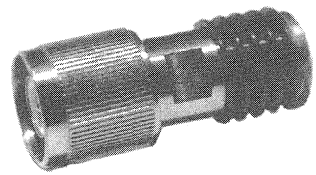


Terminations

HN Type

DC - 8.0 GHz Performance

- **Wideband Performance**
- **5 Watt Model available**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Construction**



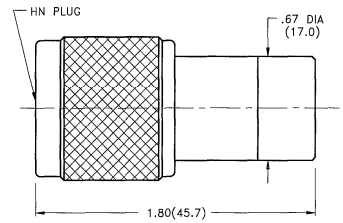
Midwest Microwave's HN type series of coaxial low and medium power Terminations provide temperature stable, performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. The units are designed to optimize performance and reliability with low VSWR performance and are suitable for use in military or commercial systems with Mil-E-5400 and Mil-E-16400 requirements.

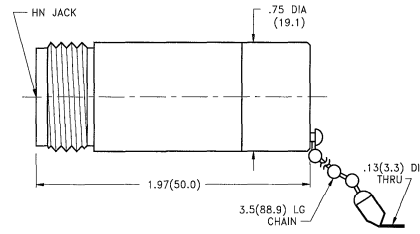
2 Watts - DC - 8.0 GHz Performance

SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 8.0 GHz
VSWR: 1.25 max @ DC - 8.0 GHz
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 8.0 GHz	2120 Series Model Numbers
HN Male Plug	HN Male Plug with Chain
TRM-2120-M0-HN0-02	TRM-2120-MC-HN0-02
HN Female Jack	HN Female Jack with Chain
TRM-2120-F0-HN0-02	TRM-2120-FC-HN0-02



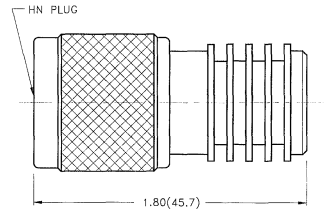


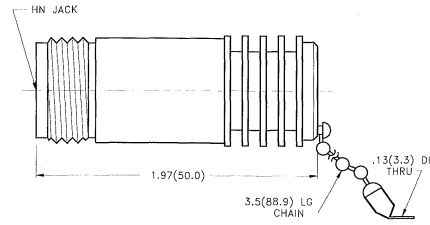
5 Watts DC - 8.0 Performance

SPECIFICATIONS

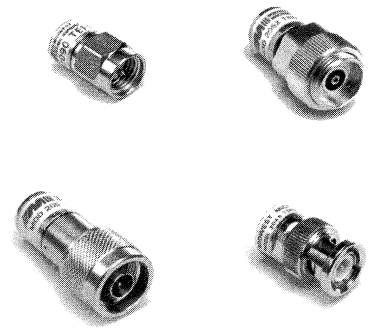
Impedance: 50 Ohms
Frequency: DC - 8.0 GHz
VSWR: 1.25 @ DC - 8.0 GHz
Power: 5 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 1 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

DC - 8.0 GHz	2121 Series Model Numbers
HN Male Plug	HN Male Plug with Chain
TRM-2121-M0-HN0-07	TRM-2121-MC-HN0-07
HN Female Jack	HN Female Jack with Chain
TRM-2121-F0-HN0-07	TRM-2121-FC-HN0-07





Mismatches for Testing

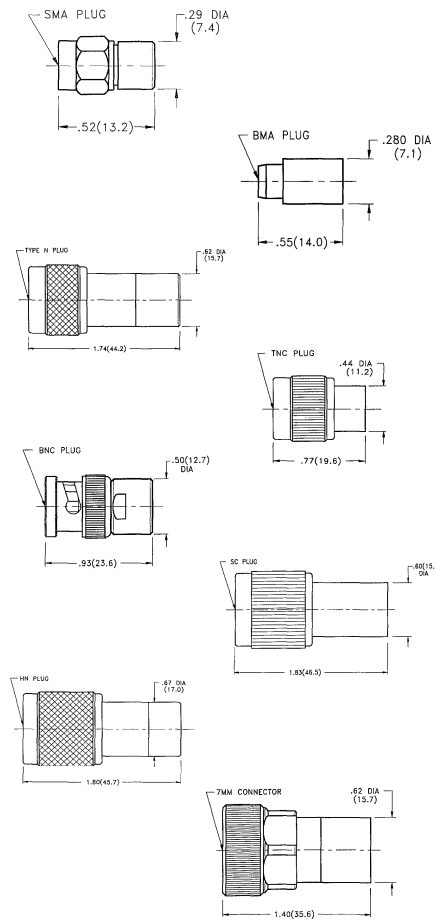


- **SMA, 7mm, N, TNC, BNC, and BMA types available**
- **Convenient for Phase Testing**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

Midwest Microwave's series of Plug and Jack Mismatches are conveniently offered in all of the popular connector interfaces. They are particularly useful for performing phase measurement tests. The units are available in eight standard mismatch values and special versions are available on request. All of the units are finished in passivated stainless steel except for the BNC type which is nickel plated brass.

Connector Type	Model Numbers	
	Male Plug	Female Jack
SMA	MSM-2170-MX-SMA-02	MSM-2170-FX-SMA-02
BMA*	MSM-2170-FX-BMA-02	MSM-2170-MX-BMA-02
Type N	MSM-2170-MX-NNN-02	MSM-2170-FX-NNN-02
TNC	MSM-2170-MX-TNC-02	MSM-2170-FX-TNC-02
BNC	MSM-2169-MX-BNC-10	MSM-2169-FX-BNC-10
SC	MSM-2169-MX-SC0-02	MSM-2169-FX-SC0-02
HN	MSM-2169-MX-HN0-02	MSM-2169-FX-HN0-02
7mm	MSM-2170-0X-7MM-02	

X = Mismatch Value dash No., Select from chart below and subsitute in Model No.



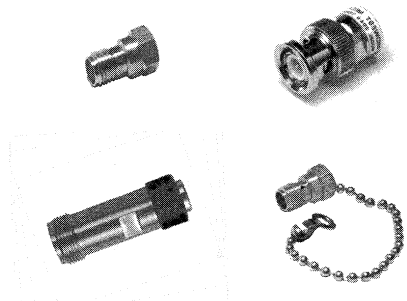
X	VSWR		ACCURACY
Dash No.	Mismatch Value	DC - 4 GHz	4 - 18 GHz
- 1	1.05	± 0.05	± 0.05
- 2	1.10	± 0.05	± 0.07
- 3	1.20	± 0.05	± 0.10
- 4	1.30	± 0.05	± 0.10
- 5	1.40	± 0.05	± 0.10
- 6	1.50	± 0.05	± 0.10
- 7	1.75	± 0.10	± 0.15
- 8	2.00	± 0.10	± 0.20

Note: 1. Plug Models are shown above, Jack Models are shown on the opposite page.
2. * BMA units are "Female Plug" and "Male Jack".
3. SC , HN, and BNC Types are rated to 4 GHz only.

Terminations

Short and Open Circuits

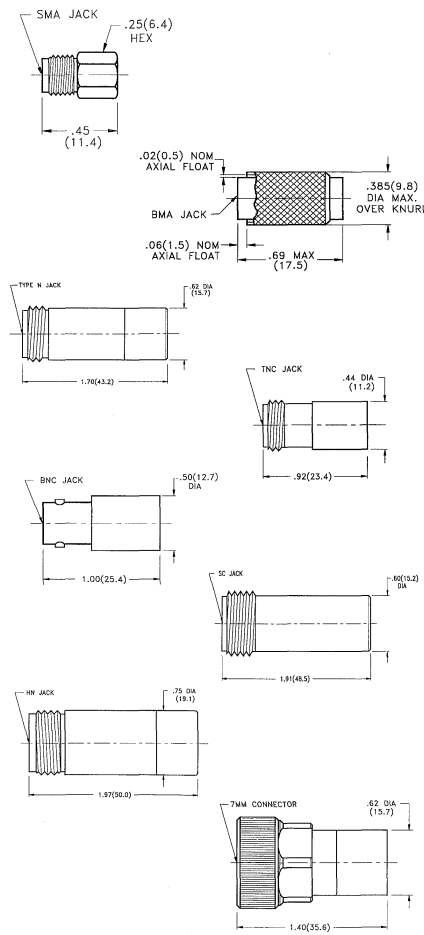
Short Circuits for Testing



- **SMA, 7mm, N, TNC, BNC, and BMA types available**
- **Convenient for Phase Testing**
- **Small Size, Light Weight**
- **Bead Chain available on all Models**

Midwest Microwave's series of Short Circuits are conveniently offered in all of the popular male and female connector interfaces. They are particularly useful for performing phase measurement tests. The units are finished in passivated stainless steel except for the BNC type which is nickel plated brass.

Connector Type	Short Circuit Model Numbers	
	Male Plug	Female Jack
SMA	SHT-2172-M0-SMA-02	SHT-2172-F0-SMA-02
BMA*	SHT-2173-F0-BMA-02	SHT-2173-M0-BMA-02
Type N	SHT-2174-M0-NNN-02	SHT-2174-F0-NNN-02
TNC	SHT-2175-M0-TNC-02	SHT-2175-F0-TNC-02
BNC	SHT-2176-M0-BNC-10	SHT-2176-F0-BNC-10
SC	SHT-2177-M0-SC0-02	SHT-2177-F0-SC0-02
HN	SHT-2178-M0-HN0-02	SHT-2178-F0-HN0-02
7mm	SHT-2179-00-7MM-02	



Connector Type	Open Circuit Model Numbers	
	Male Plug	Female Jack
SMA	OPN-2182-M0-SMA-02	OPN-2182-F0-SMA-02
BMA*	OPN-2183-F0-BMA-02	OPN-2183-M0-BMA-02
Type N	OPN-2184-M0-NNN-02	OPN-2184-F0-NNN-02
TNC	OPN-2185-M0-TNC-02	OPN-2185-F0-TNC-02
BNC	OPN-2186-M0-BNC-10	OPN-2186-F0-BNC-10
SC	OPN-2187-M0-SC0-02	OPN-2187-F0-SC0-02
HN	OPN-2188-M0-HN0-02	OPN-2188-F0-HN0-02
7mm	OPN-2189-0X-7MM-02	

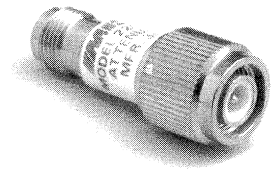
Notes:
1. Jack Models are shown above, Plug Models are shown on the opposite page.
2. * BMA units are "Female Plug" and "Male Jack".
3. SC , HN, and BNC Types are rated to 4 GHz only.
4. Bead Chains are available on all units, to designate subsitue a "C" for the "0" following the "M" or the "F" in Model No.

Terminations

Feed Thru Type

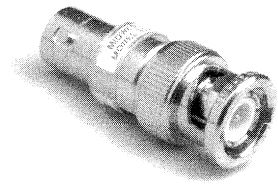
DC - 500 MHz Performance

- **Wideband Performance**
- **5 Watt Model available**
- **Low VSWR - 50 Ohm - High Performance.**
- **Rugged Stainless Steel Construction**



Midwest Microwave's Feed Thru type series of coaxial Terminations provide temperature stable, performance in light weight reasonably sized packages using standard coaxial connector interfaces. The units are designed to allow the monitoring of a signal waveform or magnitude while terminating the signal into a matched load. By connecting a high impedance oscilloscope to the output, the signal waveform can be measured.

DC - 500 MHz - Performance

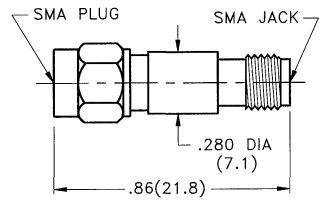


SPECIFICATIONS

Impedance: 50 Ohms
Frequency: DC - 500 MHz
VSWR: 1.25 max.
Power: 2 Watts average @ +25 °C derated linearly to 0.5 Watts @ +125 °C
Peak Power: 0.25 Kilowatt
Operating Temperature Range: -54 °C to +125 °C

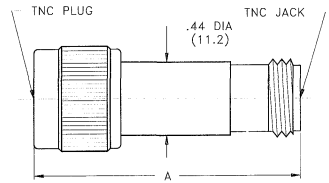
SMA Type

DC - 500 MHz	2106 Series	Model Number
Male/Female	Female/Female	Male/Male
TRM-2106-MF-SMA-02	TRM-2106-FF-SMA-02	TRM-2106-MM-SMA-02



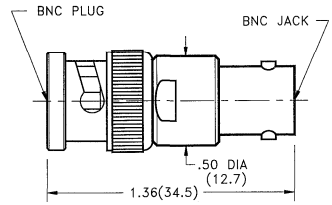
TNC Type

DC - 500 MHz	2200 Series	Model Number
Male/Female	Female/Female	Male/Male
TRM-2200-MF-TNC-02	TRM-2200-FF-TNC-02	TRM-2200-MM-TNC-02



BNC Type

DC - 500 MHz	2050 Series	Model Number
Male/Female	Female/Female	Male/Male
TRM-2050-MF-BNC-10	TRM-2050-FF-BNC-10	TRM-2050-MM-BNC-10

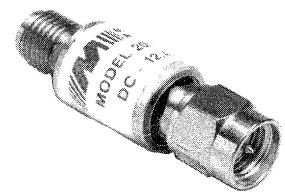


DC BLOCKS

SMA Type

DC - 18 GHz Performance

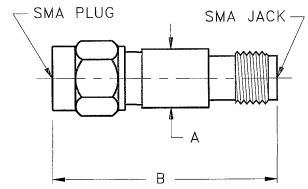
- **Inside/Outside and Inside only**
- **Greater than 60 dB Isolation at 1KHz**
- **Low VSWR and Insertion loss**
- **Rugged Stainless Steel Construction**



Midwest Microwave's Inside/Outside and Inside only DC Blocks pass all frequencies from 100 Mhz to 18 GHz while exhibiting low insertion loss and low VSWR. The inner only DC Blocks pass all frequencies from 250 MHz to 18 GHz while also exhibiting low insertion loss and low VSWR. Both types pose a very high insertion loss to frequencies such as 60 Hz, 120 Hz, 400 Hz, and 1 KHz. They are designed for laboratory, production line, or system use and are available in all of the popular connector interfaces. They are manufactured using rugged stainless steel and are 100 % tested to assure dependable high quality performance.

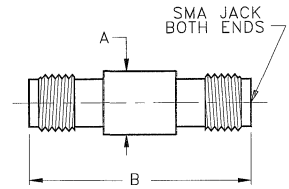
SPECIFICATIONS

Frequency: **250 MHz - 18.5 GHz**
VSWR: **1.35 max.**
Impedance: **50 Ohms**
Insertion Loss: **0.5 dB**
Isolation: **> 60 dB @ 1 KHz**
D.C. Working Voltage: **200 Volts min.**
Operating Temperature Range: **-20 to +100 °C**
Finish: **Passivated Stainless Steel**



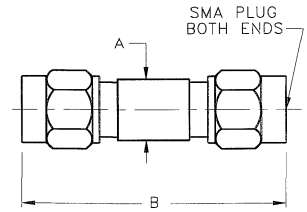
INSIDE ONLY

250 MHz - 18.5 GHz	Inside Only 3510 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
DCB-3510-MF-SMA-02	**DCB-3510-FF-SMA-02**	**DCB-3510-MM-SMA-02**
A = 0.280 (7.1) Dia. B = 0.880 (22.4) Long	A = 0.280 (7.1) Dia. B = 0.780 (19.8) Long	A = 0.280 (7.1) Dia. B = 0.980 (24.9) Long



INSIDE / OUTSIDE

500 MHz - 18.5 GHz	Inside / Outside 3511 Series	Model Numbers
Male/Female	**Female/Female**	**Male/Male**
DCB-3511-MF-SMA-02	**DCB-3511-FF-SMA-02**	**DCB-3511-MM-SMA-02**
A = 0.480 (12.2) Dia. B = 1.100 (27.9) Long	A = 0.480 (12.2) Dia. B = 1.020 (25.9) Long	A = 0.480 (12.2) Dia. B = 1.200 (30.5) Long

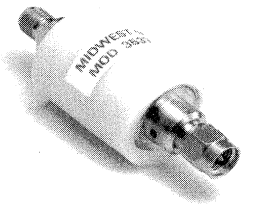


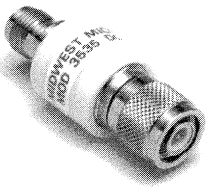
DC BLOCKS

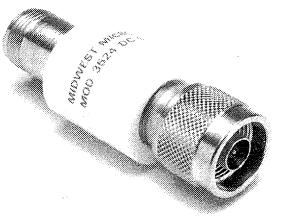
SMA • 7mm • N • TNC

Inside/Outside High Performance

- **0.1 - 12.4 GHz and 0.1 - 18.0 GHz units available**
- **Greater than 65 dB Isolation at 1KHz**
- **Low VSWR and Insertion loss**
- **Rugged Stainless Steel Construction**







Midwest Microwave's high performance Inside/Outside DC Blocks pass all frequencies from 100 Mhz to 18 GHz while exhibiting low insertion loss and low VSWR. The units pose a very high insertion loss to frequencies such as 60 Hz, 120 Hz, 400 Hz, and 1 KHz. They are designed for laboratory, production line, or system use and are available in all of the popular connector interfaces. They are manufactured using rugged stainless steel and are 100 % tested to assure dependable high quality performance.

SPECIFICATIONS

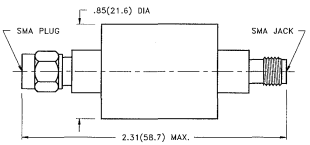
Frequency: 0.1 - 12.4 GHz and 0.1 - 18.0 GHz
VSWR: 1.20 max @ 0.01 - 8.0 GHz, 1.25 max @ 8.0 - 12.4 GHz, and 1.35 max @ 12.4 - 18.0 GHz
Impedance: 50 Ohms
Insertion Loss: 0.5 dB max
Isolation: > 65 dB @ 1 KHz
DC Working Voltage: 200 Volts
Operating Temperature Range: -20 °C to +125 °C
Finish: Passivated Stainless Steel

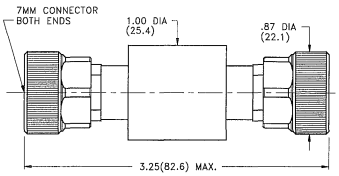
100 MHz - 18.0 GHz	SMA Type	100 MHz - 12.4 GHz
Male / Female		Male / Female
DCB-3538-IO-SMA-02		DCB-3537-IO-SMA-02

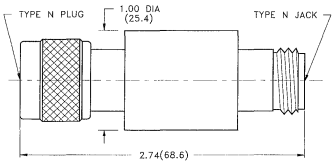
100 MHz - 18.0 GHz	7 mm	100 MHz - 12.4 GHz
Male / Female		Male / Female
DCB-3549-IO-7MM-02		DCB-3548-IO-7MM-02

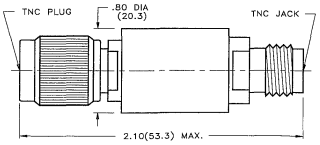
100 MHz - 18.0 GHz	N Type	100 MHz - 12.4 GHz
Male / Female		Male / Female
DCB-3525-IO-NNN-02		DCB-3524-IO-NNN-02

100 MHz - 18.0 GHz	TNC Type	100 MHz - 12.4 GHz
Male / Female		Male / Female
DCB-3535-IO-TNC-02		DCB-3534-IO-TNC-02









Note: BNC, SC, and HN Types are also available, please consult the factory for Model Numbers.

MIDWEST MICROWAVE

Couplers

Directional • 90° Hybrid • 180° Hybrid

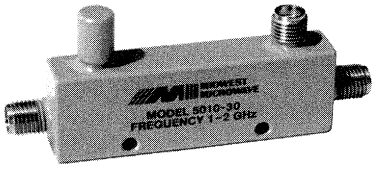
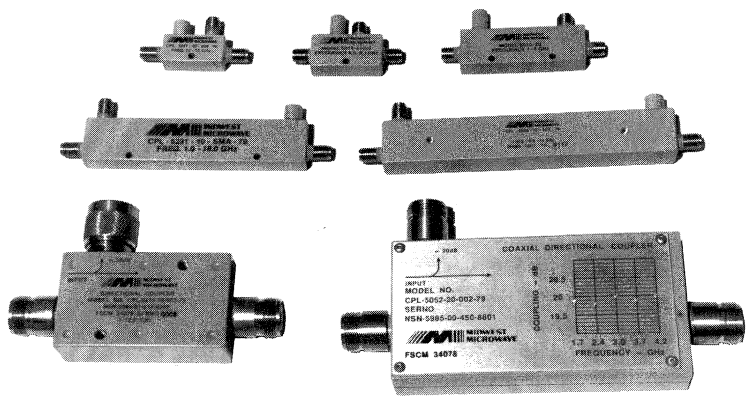


Table of Contents

Couplers

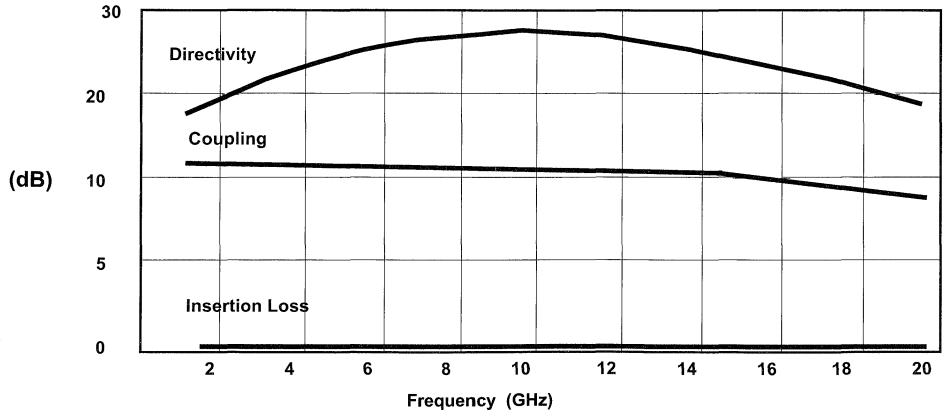
General Information

- **0.5 - 18 GHz High Directivity Performance**
- **Octave, Broadband and Ultrabroadband Frequency Coverage**
- **Small Size, Light Weight, Rugged Construction**
- **Meets MIL-E-5400 and MIL-16400 Environmental Requirements**



Couplers are usually four port passive devices containing two separate transmission lines, each having one port on each end and that come into proximity to each other such that microwave energy propogating on one of the lines will couple to the other. The four ports are almost always matched to an impedance of 50 ohms. Midwest Microwave manufactures three basic types of couplers. Directional Couplers, 90° Hybrid Couplers, and 180° Hybrid Couplers. They are small, lightweight, broadband couplers that most often use rugged stripline circuit construction and perform extremely well over the wide temperature range of -54° C to +125° C. They are also designed to perform with low insertion loss and high isolation. Units are available in octave and multi-octave frequency bandwidths with some ultra-broadband units available covering the band of 0.5 to 18.0 GHz with a few Models operating up to 26.5 GHz. They exhibit low ripple and high directivity. The 90° and 180° Hybrid Couplers are available in both crossover and non-crossover configurations. The Couplers are designed to meet the stringent environmental requirements of MIL-E-5400 and MIL-E-16400. Standard catalog units are available with SMA connectors with other connector types available upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accomodate unique system needs. All Midwest Couplers are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.

Typical DirectionalCoupler Characteristics



MIDWEST MICROWAVE

Couplers

Definition of Parameters

Coupler - A four port device that contains two separate transmission lines, the Primary Line (J1-J2), and the Coupled Line (J3-J4), each having one port at each end, (as designated in figure 1 below). Because of their proximity to each other, microwave energy propogating on one of the lines, couples unidirectionally to the other line causing microwave energy to appear on it.

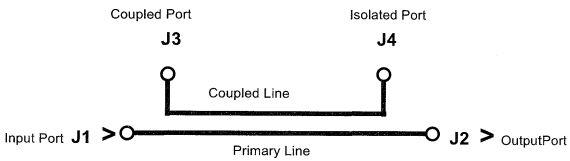
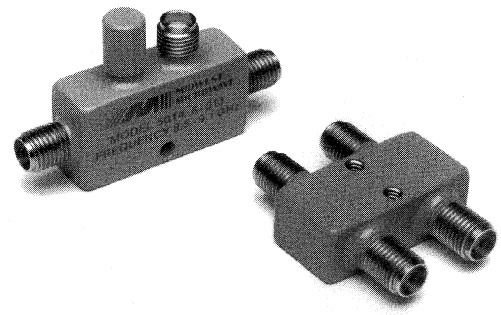


Figure 1



Frequency - Directional Couplers will only perform satisfactorily over a finite frequency band. Design goals are continually aimed toward broadening the frequency bandwidth as much as possible.

Primary Line - The transmission line (primary circuit) between the input port J1 and the output port J2 is called the Primary Line. It is usually the line on which the signal to be coupled or sampled is propogating.

Coupled Line - The transmission line to which the Primary Line signal is coupled is called the Coupled Line. It is usually terminated at the isolated port with a 50 ohm termination.

Coupling - The coupling of energy from the primary line to the coupled line is accomplished as follows: A portion of the microwave power input at port J1, (see Figure 1), is coupled to port J3 and the remaining power continues out through the output port J2. The amount of coupled energy will vary slightly over the frequency range of the coupler. This characteristic is known as 'ripple' and is controllable through design technique, but cannot be completely eliminated.

Coupling is expressed as follows:

Coupling (dB) = - 10 Log [P3/P1]

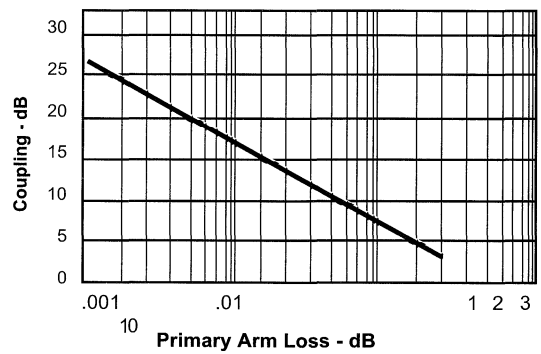
Note: P3 and P1 represent the microwave power levels at ports J3 and J1respectively.

An example of a 10 dB coupler would direct 1/10 of the power input at J1 out of the coupled port at J3 and the remaining 9/10 of the power will continue to pass down the primary line to the J2 output port. The isolated port at J4 will not receive any power in a theoretically ideal coupler, but in reality it is usually terminated to absorb any reflected power from J3. Conversely, if power were input in the opposite direction at J2, J4 would become the coupled port and J3 would become the isolated port.

Insertion Loss - In a directional coupler, the total insertion loss from the primary line input to the primary line output is equal to the coupling loss plus resistive, dielectric and reflection losses. In an ideal coupler, where dissipative losses are ignored, the primary line loss due to the coupling effect of power going to the coupled line is expressed as follows:

Insertion Loss (dB) = 10 Log [1-P3/P1]

The relationship of coupling loss to coupling for an ideal (dissipationless) coupler is shown in the graph below.



Directivity - The measure of how well the isolated port is isolated, such that the highest amount of coupled power actually gets to the coupled port. In reality, not all of the power ever does, some of the power always arrives at the isolated port. If the power at the isolated port is 20 dB below the power at the coupled port, the coupler is said to have 20 dB of directivity.

Directivity is expressed as follows:

Directivity (dB) = -10 Log [P4/P3]

Note: Assuming that the input power is at the input port J1

Isolation - Isolation is another way of expressing the measure of how much power is leaking to the isolated port. It is expressed as follows:

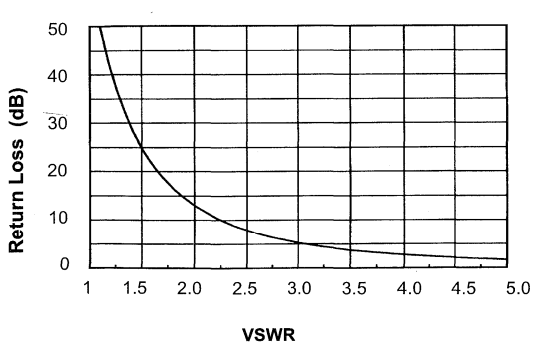
Isolation (dB) = -20 Log [P4/P1]

It is clear that Isolation and Directivity are really measuring the same characteristic, i.e.

Isolation (dB) = Coupling (dB) + Directivity (dB)

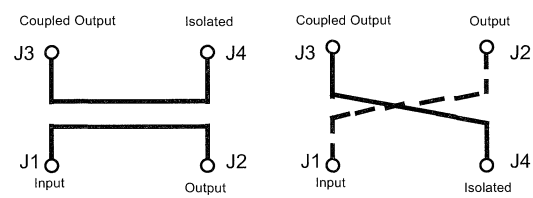
A simple example would be that of a 10 dB coupler with 20 dB directivity which would obviously then have 30 dB of isolation. Directivity rather than isolation is usually specified on directional couplers where isolation is usually specified on Hybrid Couplers.

VSWR - Directional Couplers unfortunately posses many reflections as a result of impedance mismatches and other discontinuities contained in their circuitry usually caused by practical physical constraints imposed by system space requirements. Referring to Figure 1, a mismatch at the output port J2 or at the coupled port J3, will reduce directivity by an amount equal to the return loss (in dB) of the mismatch. It does not matter whether the mismatch is connected to the output port of the coupler J2, or is inherent in the coupler circuit itself. By measuring the directivity of a coupler which has very high directivity and low VSWR, the VSWR of the termination or load connected to the output port J2 can be determined. This is a very convenient characteristic that allows Directional Couplers to be extremely useful in measuring VSWR. Reflectometer test methods utilize this characteristic of directional couplers. The relationship between return loss (dB) and VSWR is shown graphically below and is also mathmatically expressed in the equation set forth below the graph.



Return Loss (dB) = - 10 Log [VSWR/VSWR+1] [2]

90° Hybrid Couplers - Hybrid Couplers are generally a 3 dB Directional Coupler where the coupled port output signal and the primary line output signal are out of phase with each other by 90°. Since -3 dB equates to half power, a 3 dB coupler is really a power divider that divides power equally between the primary line output port and the coupled line output port while providing a 90° phase difference between the two signals. Hybrid Couplers are available in crossover configurations, where both the primary and the coupled output ports are physically on the same side of the circuit, and in non-crossover configurations where the coupled output port is physically on the opposite side of the primary output port. This location option is purely for mechanical convenience. 90° Hybrid Couplers are also known as Quadrature Hybrids because the 90° phase difference is called a Quadrant. It may also be noted that any one of the four ports can be designated the input port and the same relationship between ports will remain. This occurs because electrically as well as mechanically a 90° Hybrid Coupler is symmetrical. The diagram below describes both the crossover and non-crossover 90° Hybrid Couplers.



Non-Crossover Hybrid **Crossover Hybrid**

Figure 2

180° Hybrid Couplers - When a 90° Phase Shifter is added in front of the output port J2, microwave power input at the sum (Σ) port will divide equally in amplitude between port J1 and port J2 and will be in phase with each other. The difference (Δ) being the isolated port. If the power is input at the difference (Δ) port, the power will divide equally in amplitude, however port J1 and port J2 will now have a 180° phase difference and the sum (Σ) port will become the isolated port. In addition when simultaneous coherent microwave signal inputs are supplied to ports J1 and J2, the Σ port will produce a signal that is the sum (Σ) of the two input signals, and the Δ port will produce a signal that is the difference (Δ) between the two input signals.

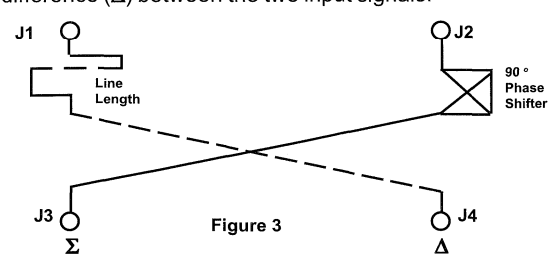


Figure 3

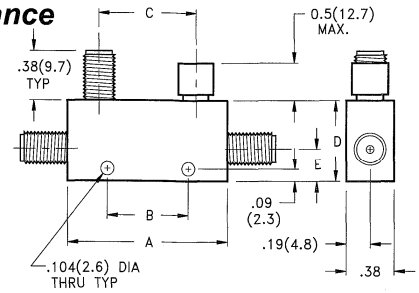
Couplers

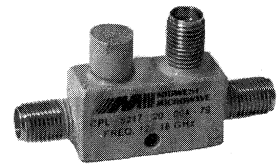
Directional Couplers • Octave Bandwidth

SMA Miniature High Performance

- **Full Octave Frequency Band Performance**
- **Low VSWR - High Directivity**
- **Small Lightweight**
- **Meets Mil-E-5400 and Mil-E16400**

Midwest Microwave's SMA miniature series of high performance directional couplers are small, lightweight, ruggedly constructed stripline units that posses inherently low insertion loss and VSWR with high directivity Units are available in octave frequency bandwidths covering the entire range of 0.5-18.0 GHz.





ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	COUPLING (dB) (incl Freq Sensitivity)	FREQUENCY SENSITIVITY	INSERTION LOSS (dB) max	DIRECTIVITY (dB) min	VSWR max	POWER Input Avg (W)	POWER Refl Avg (W)	POWER Peak (kW) (W)
0.5 - 1.0	4	CPL-5210-06-SMA-79	6 ± 1.0	± 0.60	0.15	25	1.10	50	4	4
	4	CPL-5210-10-SMA-79	10 ± 1.0	± 0.75	0.15	25	1.10	50	10	4
	4	CPL-5210-20-SMA-79	20 ± 1.0	± 0.75	0.15	25	1.10	50	50	4
	4	CPL-5210-30-SMA-79	30 ± 1.0	± 0.75	0.15	25	1.10	50	50	4
1.0 - 2.0	3	CPL-5211-06-SMA-79	6 ± 1.0	± 0.60	0.20	25	1.15	50	4	4
	3	CPL-5211-10-SMA-79	10 ± 1.0	± 0.75	0.20	25	1.15	50	10	4
	3	CPL-5211-20-SMA-79	20 ± 1.0	± 0.75	0.20	25	1.15	50	50	4
	3	CPL-5211-30-SMA-79	30 ± 1.0	± 0.75	0.20	25	1.15	50	50	4
2.0 - 4.0	2	CPL-5212-06-SMA-79	6 ± 1.0	± 0.60	0.20	22	1.15	50	4	4
	2	CPL-5212-10-SMA-79	10 ± 1.0	± 0.75	0.20	22	1.15	50	10	4
	2	CPL-5212-20-SMA-79	20 ± 1.0	± 0.75	0.20	22	1.15	50	50	4
	2	CPL-5212-30-SMA-71	30 ± 1.0	± 0.75	0.20	22	1.15	50	50	4
2.6 - 5.2	1	CPL-5213-06-SMA-79	6 ± 1.0	± 0.60	0.25	20	1.25	50	4	4
	1	CPL-5213-10-SMA-79	10 ± 1.0	± 0.75	0.25	20	1.25	50	10	4
	1	CPL-5213-20-SMA-79	20 ± 1.0	± 0.75	0.25	20	1.25	50	50	4
	5	CPL-5213-30-SMA-79	30 ± 1.0	± 0.75	0.25	20	1.25	50	50	4
4.0 - 8.0	1	CPL-5214-6-SMA-79	6 ± 1.0	± 0.50	0.35	20	1.25	50	4	4
	1	CPL-5214-10-SMA-79	10 ± 1.0	± 0.50	0.35	20	1.25	50	10	4
	1	CPL-5214-20-SMA-79	20 ± 1.0	± 0.50	0.35	20	1.25	50	50	4
	5	CPL-5214-30-SMA-79	30 ± 1.0	± 0.50	0.35	20	1.25	50	50	4
7.0 - 12.4	1	CPL-5215-06-SMA-79	6 ± 1.0	± 0.40	0.50	17	1.35	50	4	4
	1	CPL-5215-10-SMA-79	10 ± .75	± 0.50	0.40	17	1.35	50	10	4
	1	CPL-5215-20-SMA-79	20 ± .75	± 0.50	0.30	17	1.35	50	50	4
	5	CPL-5215-30-SMA-79	30 ± 1.0	± 0.50	0.30	17	1.35	50	50	4
7.0 - 18.0	1	CPL-5216-06-SMA-79	6 ± 1.0	± 0.50	0.65	15	1.35	50	4	3
	1	CPL-5216-10-SMA-79	10 ± 1.0	± 0.50	0.50	15	1.40	50	10	3
	1	CPL-5216-20-SMA-79	20 ± 1.0	± 0.75	0.50	15	1.45	50	50	3
	5	CPL-5216-30-SMA-79	30 ± 1.0	± 0.75	0.50	15	1.45	50	50	3
12.4 - 18.0	1	CPL-5217-06-SMA-79	6 ± 1.0	± 0.40	0.65	15	1.35	50	4	2
	1	CPL-5217-10-SMA-79	10 ± 1.0	± 0.50	0.50	15	1.45	50	10	2
	1	CPL-5217-20-SMA-79	20 ± 1.0	± 0.75	0.50	15	1.45	50	50	2
	5	CPL-5217-30-SMA-79	30 ± 1.0	± 0.75	0.50	15	1.45	50	50	2

Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number. See next page for dimensions.

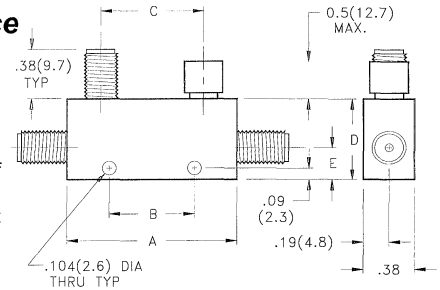
Couplers

Directional Couplers • Ultra - Wideband

Ultra-Wideband Performance

- **Full 0.5 - 18.0 GHz bandwidth units**
- **Low VSWR - High Directivity**
- **Rugged Stripline Construction**
- **Meets Mil-E-5400 and Mil-E16400**

Midwest Microwave's SMA miniature series of Ultra-Wideband high performance directional couplers are small, lightweight, components that perform extremely well over multi-octave and Ultra-Wideband frequencys covering the entire range of 0.5 - 18.0 GHz. .



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHZ)	CASE STYLE	MODEL NUMBER	COUPLING (dB) (incl Freq Sensitivity)	FREQUENCY SENSITIVITY	INSERTION LOSS (dB) max	DIRECTIVITY (dB) min	VSWR max	POWER Input Avg (W)	POWER Refl Avg (W)	POWER Peak (kW) (W)
0.5 - 2.0	6	CPL-5220-06-SMA-79	6 + 1.0	± 0.50	0.40	22	1.20	50	10	4
	6	CPL-5220-10-SMA-79	10 ± 1.0	± 0.50	0.40	22	1.20	50	10	4
	6	CPL-5220-16-SMA-79	16 ± 1.0	± 0.50	0.40	22	1.20	50	40	4
	6	CPL-5220-20-SMA-79	20 ± 1.0	± 0.50	0.40	22	1.20	50	50	4
1.0 - 4.0	6	CPL-5221-06-SMA-79	6 ± 1.0	± 0.50	0.50	22	1.25	50	10	4
	6	CPL-5221-10-SMA-79	10 ± 1.0	± 0.50	0.50	22	1.25	50	10	4
	6	CPL-5221-16-SMA-79	16 ± 1.0	± 0.50	0.50	22	1.25	50	40	4
	6	CPL-5221-20-SMA-79	20 ± 1.0	± 0.50	0.50	22	1.25	50	50	4
2.0 - 8.0	7	CPL-5222-06-SMA-79	6 ± 1.0	± 0.50	0.60	20	1.25	50	10	4
	7	CPL-522210-SMA-79	10 ± 1.0	± 0.50	0.60	20	1.25	50	10	4
	7	CPL-5222-16-SMA-79	16 ± 1.0	± 0.50	0.60	20	1.25	50	40	4
	7	CPL-5222-20-SMA-79	20 ± 1.0	± 0.50	0.60	20	1.25	50	50	4
6.0 - 18.0	1	CPL-5226-06-SMA-79	6 ± 1.0	± 0.50	0.65	15	1.40	50	10	3
	1	CPL-5226-10-SMA-79	10 ± 1.0	± 0.50	0.60	15	1.40	50	10	3
	1	CPL-5226-16-SMA-79	16 ± 1.0	± 0.50	0.60	15	1.40	50	40	3
	1	CPL-5226-20-SMA-79	20 ± 1.0	± 0.50	0.60	15	1.40	50	50	3
0.5 - 18.0	6	CPL-5230-10-SMA-79	10* ± 1.5	± 1.00	0.80	15**	1.50	50	10	3
	6	CPL-5230-16-SMA-79	16* ± 1.5	± 1.00	0.80	15**	1.50	50	40	3
	6	CPL-5230-20-SMA-79	20* ± 1.5	± 1.00	0.80	15**	1.50	50	50	3
1.0 - 18.0	6	CPL-5231-10-SMA-79	10* ± 1.0	± 0.60	1.05	15**	1.50	50	10	3
	6	CPL-5231-16-SMA-79	16* ± 1.0	± 0.60	0.80	15**	1.50	50	40	3
	6	CPL-5231-20-SMA-79	20* ± 1.0	± 0.50	0.80	15**	1.50	50	50	3
2..0 - 18.0	7	CPL-5232-06-SMA-79	6* ± 1.0	± 0.50	0.80	15**	1.40	50	10	3
	7	CPL-5232-10-SMA-79	10* ± 1.0	± 0.50	0.80	15**	1.40	50	10	3
	7	CPL-5232-16-SMA-79	16* ± 1.0	± 0.50	0.80	15**	1.40	50	40	3
	7	CPL-5232-20-SMA-79	20* ± 1.0	± 0.50	0.80	15**	1.40	50	50	3

* Coupling is referenced to the output port.

** Directivity is 12 dB from 12.4 - 18.0 GHz.

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	WEIGHT Gr
1	1.00 (25.4)	N/A	0.50 (12.7)	0.50 (12.7)	0.22 (5.6)	0.60	17.0
2	1.16 (29.4)	0.34 (8.7)	0.66 (16.7)	0.50 (12.7)	0.22 (5.6)	0.64	18.2
3	1.78 (45.2)	0.94 (23.8)	1.28 (32.5)	0.50 (12.7)	0.22 (5.6)	0.82	23.2
4	3.00 (76.2)	1.00 (25.4)	2.5 (63.5)	0.75 (19.1)	0.31 (7.9)	1.50	43.0
5	1.00 (25.4)	N/A	0.50 (12.7)	0.63 (15.9)	0.22 (5.6)	0.67	19.0
6	3.50 (88.9)	2.00 (50.8	3.00 (76.2)	0.75 (19.1)	0.25 (6.3)	1.75	49.6
7	2.00 (50.8)	0.95 (24.2)	1.50 (38.1)	0.63 (16.0)	0.22 (5.6)	1.30	36.9

Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

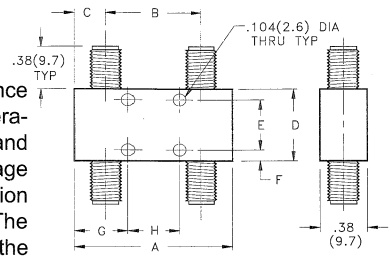
Couplers

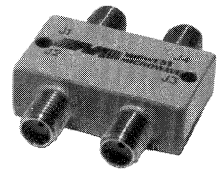
3 dB 90° Hybrids - Crossover Type

250 MHz - 18.0 GHz High Performance

- **Low VSWR - High Isolation**
- **90° Quadrature Phase**
- **Small Size, Light Weight**
- **Meets MIL-E-5400 and MIL-E-16400**

Midwest Microwave's series of high performance 90° Crossover Hybrid Couplers provide temperature stable, low VSWR, high isolation, broadband performance in a compact light weight package size. All models use rugged stripline construction with a variety of stainless steel connectors. The crossover feature, putting both outputs on the same side of the unit is convenient for most systems where space and weight is a premium.





ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	POWER (In) Avg (W)	POWER (In) Peak (kW)
OCTAVE BANDWIDTH TYPES								
.25-0.5	3	**HYB-5309-X3-SMA-79**	± 0.5	0.20	25	1.15	50	3
.50-1.0	3	**HYB-5310-X3-SMA-79**	± 0.5	0.20	25	1.15	50	3
1.0-2.0	2	**HYB-5311-X3-SMA-79**	± 0.5	0.20	22	1.15	50	3
2.0-4.0	1	**HYB-5312-X3-SMA-79**	± 0.5	0.25	22	1.25	50	3
2.6-5.2	1	**HYB-5313-X3-SMA-79**	± 0.5	0.25	20	1.25	50	3
4.0-8.0	1	**HYB-5314-X3-SMA-79**	± 0.5	0.30	20	1.25	50	3
7.0-12.4	1	**HYB-5315-X3-SMA-79**	± 0.5	0.50	18	1.45	50	3
12.4-18.0	1	**HYB-5317-X3-SMA-79**	± 0.5	0.50	15	1.45	50	3
MULTI-OCTAVE BANDWIDTH TYPES								
.50-2.0	7	**HYB-5320-X3-SMA-79**	± 0.5	0.60	24	1.30	30	3
.50-8.0	6	**HYB-5321-X3-SMA-79**	± 0.5	1.00	20	1.50	30	3
2.0-8.0	5	**HYB-5322-X3-SMA-79**	± 0.5	0.75	17	1.30	30	3
2.0-12.4	4	**HYB-5325-X3-SMA-79**	± 0.5	0.80	17	1.45	50	3
6.0-18.0	1	**HYB-5326-X3-SMA-79**	± 0.5	0.60	15	1.45	50	3
2.0-18.0	4	**HYB-5332-X3-SMA-79**	± .75	1.00	17	1.50	30	3

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	F	G	H	WEIGHT Oz	WEIGHT Gr
1	1.00 (25.4)	0.50 (12.7)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0 .093 (2.4)	0.50 (12.7)	N/A	0.60	17
2	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0 .093 (2.4)	1.00 (25.4)	N/A	0.64	18
3	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	1.00 (25.4)	0.812 (22.1)	0 .093 (2.4)	1.00 (25.4)	N/A	0.82	23
4	2.70 (68.6)	2.20 (55.9)	0.25 (6.3)	1.06 (26.9)	0.86 (21.8)	0.10 (2.54)	0.84 (21.3)	1.030 (26.2)	2.30	65
5	2.70 (68.6)	2.20 (55.9)	0.25 (6.3)	0.86 (21.8)	N/A	0.43 (10.9)	0.58 (14.7)	1.560 (39.6)	2.70	75
6	7.00 (177.8)	6.10 (155.0)	0.45 (11.4)	1.50 (38.1)	1.180 (30.0)	0.16 (4.1)	2.25 (57.2)	2.500 (63.5)	8.00	227
7	5.58 (141.7)	5.00 (127.0)	0.29 (7.4)	0.70 (17.8)	N/A	0.35 (8.9)	0.08 (2.0)	5.420(137.7)	2.35	67

Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

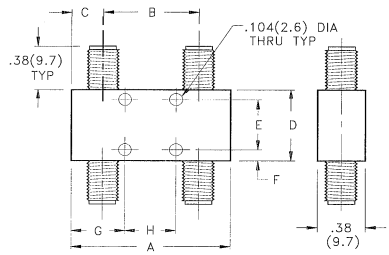
Couplers

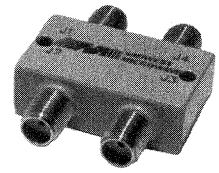
3 dB 90° Hybrids - Non-Crossover Type

250 MHz - 18.0 GHz High Performance

- **Low VSWR - High Isolation**
- **90° Quadrature Phase**
- **Small Size, Light Weight**
- **Meets MIL-E-5400 and MIL-E-16400**

Midwest Microwave's series of high performance 90° Non-Crossover Hybrid Couplers are identical to the crossover type except that the output ports are on opposite sides of the unit. The non-crossover feature, putting the outputs on opposite sides of the unit is convenient for some situations where it is convenient and precious space and weight can be conserved.





ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	POWER (In) Avg (W)	POWER (In) Peak (kW)
OCTAVE BANDWIDTH TYPES								
.25-0.5	3	HYB-5309-03-SMA-79	± 0.5	0.20	25	1.20	50	3
.50-1.0	3	HYB-5310-03-SMA-79	± 0.5	0.20	25	1.20	50	3
1.0-2.0	2	HYB-5311-03-SMA-79	± 0.5	0.20	22	1.20	50	3
2.0-4.0	1	HYB-5312-03-SMA-79	± 0.5	0.25	22	1.25	50	3
2.6-5.2	1	HYB-5313-03-SMA-79	± 0.5	0.30	20	1.25	50	3
4.0-8.0	1	HYB-5314-03-SMA-79	± 0.5	0.30	20	1.35	50	3
7.0-12.4	1	HYB-5315-03-SMA-79	± 0.5	0.50	18	1.45	50	3
12.4-18.0	1	HYB-5317-03-SMA-79	± 0.5	0.60	15	1.45	50	3
MULTI-OCTAVE BANDWIDTH TYPES								
.50-2.0	7	HYB-5320-03-SMA-79	± 0.5	0.60	24	1.30	50	3
2.0-8.0	2	HYB-5322-03-SMA-79	± 0.5	0.75	17	1.30	50	3
6.0-18.0	1	HYB-5326-03-SMA-79	± 0.5	0.60	15	1.45	50	3

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	F	G	H	WEIGHT Oz	WEIGHT Gr
1	1.00 (25.4)	0.50 (12.7)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0 .093 (2.4)	0.50 (12.7)	N/A	0.60	17
2	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0 .093 (2.4)	1.00 (25.4)	N/A	0.64	18
3	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	1.00 (25.4)	0.812 (22.1)	0 .093 (2.4)	1.00 (25.4)	N/A	0.82	23
7	5.58 (141.7)	5.00 (127.0)	0.29 (7.4)	0.70 (17.8)	N/A	0.35 (8.9)	0.08 (2.0)	5.420(137.7)	2.35	67

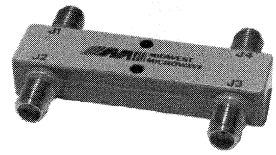
Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

Couplers

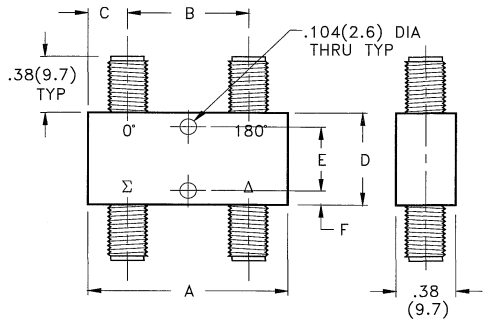
3 dB 180° Hybrids- Crossover Type

Excellent Phase and Amplitude Balance

- **500 MHz to 18.0 GHz Performance**
- **0° or 180° Phase Difference**
- **Low VSWR - High Isolation**
- **Rugged StriplineConstruction**
- **Meets MIL-E-5400 and MIL-E-16400**



Midwest Microwave's series of 3 dB 180° Hybrid Couplers may be used as a power divider or combiner. A microwave signal applied at the sum (Σ) port will result in two equal amplitude, in phase signals at the output ports. Conversely, a microwave signal applied at the difference (Δ) port will result in two equal amplitude but 180° out of phase signals at the output ports.



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	POWER (In) Avg (W)	POWER (In) Peak (kW)
.50-1.0	1	**HYB-5410-X3-SMA-79**	± 0.5	0.4	24	1.30	30	3
1.0-2.0	2	**HYB-5411-X3-SMA-79**	± 0.5	0.5	24	1.35	30	3
2.0-4.0	3	**HYB-5412-X3-SMA-79**	± 0.5	0.7	22	1.35	30	3
2.6-5.2	4	**HYB-5413-X3-SMA-79**	± 0.5	0.7	20	1.35	30	3
4.0-8.0	4	**HYB-5414-X3-SMA-79**	± 0.5	0.7	20	1.35	30	3
7.0-12.4	6	**HYB-5415-X3-SMA-79**	± 0.5	0.8	17	1.45	30	3
7.0-18.0	6	**HYB-5416-X3-SMA-79**	± 0.6	1.2	14	1.70	30	3
12.4-18.0	6	**HYB-5417-X3-SMA-79**	± 0.6	1.2	12	1.70	30	3
4.0-12.4	5	**HYB-5423-X3-SMA-79**	± 0.6	1.0	17	1.50	30	3

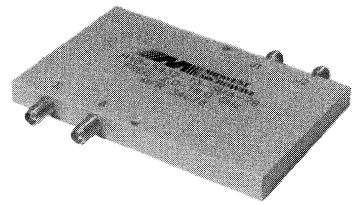
MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	F	WEIGHT Oz	WEIGHT Gr
1	3.25 (82.6)	2.5 (63.5)	0.50 (12.7)	1.25 (31.8)	1.00 (25.4)	0.13 (3.2)	2.8	70
2	2.00 (50.8)	1.25 (31.8)	0.50 (12.7)	1.25 (31.8)	1.00 (25.4)	0.13 (3.2)	2.0	47
3	1.44 (36.5)	0.69 (17.5)	0.38 (9.7)	1.25 (31.8)	1.00 (25.4)	0.13 (3.2)	1.5	38
4	1.25 (31.8)	0.50 (12.7)	0.38 (9.7)	1.25 (31.8)	1.00 (25.4)	0.13 (3.2)	1.5	38
5	1.50 (38.1)	0.75 (19.1)	0.38 (9.7)	1.00 (25.4)	0.75 (19.1)	0.13 (3.2)	1.2	34
6	1.25 (31.8)	0.50 (12.7)	0.38 (9.7)	1.00 (25.4)	0.75 (19.1)	0.13 (3.2)	1.1	31

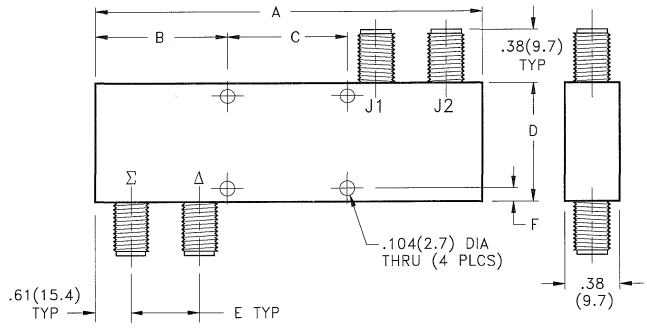
Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

1 - 18.0 GHz - Ultrabroadband Performance

- **High Isolation**
- **Excellent Phase and Amplitude Balance**
- **Rugged Stripline Construction**
- **Meets MIL-E-5400 and MIL-E-16400**



Midwest Microwave's series of high performance 180° Hybrid Couplers (Magic T's) provide an important function in any system where power combining or division is required. A signal applied at the sum (Σ) port will divide into two equal amplitude, in phase signals at the output ports. Conversely, a signal applied at the difference (Δ) port will result in two equal amplitude but 180° out of phase signals at the output ports. In addition, if two coherent signals are simultaneously applied at the output ports, the vectoral sum of those two signals will appear at the sum (Σ) port and the vectoral difference between the two signals will appear at the difference (Δ) port.



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	POWER (In) Avg (W)	POWER (In) Peak (kW)
2.0-8.0	1	HYB-5422-T3-SMA-79	± 0.5	2.3	18	1.60	30	3
2.0-12.4	3	HYB-5425-T3-SMA-79	± 0.7	2.3	15	2.00	30	3
1.0-12.4	2	HYB-5427-T3-SMA-79	± 1.0	2.5	15	2.00	30	3
1.0-18.0	2	HYB-5431-T3-SMA-79	± 1.5	4.5	12	2.50	20	2
2.0-18.0	3	HYB-5432-T3-SMA-79	± 1.0	4.0	12	2.30	20	2

MECHANICAL SPECIFICATIONS - INCHES (mm)

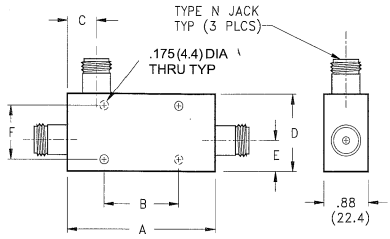
CASE STYLE	A	B	C	D	E	F	WEIGHT Oz	WEIGHT Gr
1	3.04 (77.2)	0.093 (2.4)	N/A	1.35 (34.3)	0.53 (13.5)	0.67 (17.0)	2.8	78
2	6.13 (155.6)	2.06 (52.4)	2.00 (50.8)	2.50 (63.5)	0.75 (19.1)	0.093 (2.4)	9.5	270
3	3.91(99.3)	1.96 (49.7)	N/A	2.50 (63.5)	0.75 (19.1)	0.093 (2.4)	5.4	152

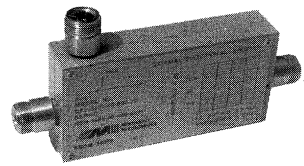
Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

500 Watt High Performance

- **500 MHz to 18.0 GHz Frequency Range**
- **Low VSWR - High Directivity**
- **500 Watt High Power Capability**
- **Individually Calibrated**

Midwest Microwave's series of High Power Directional Couplers are useable for system or testing where flat frequency response over extended bandwidths is required. They possess high directivity and will withstand high input power under extreme environmental conditions. Standard units have stainless steel Type N female connectors but are also available with TNC connectors.





Note: Case Style 7 has two mounting holes.

ELECTRICAL SPECIFICATIONS

Frequency Range (GHz)	Case Style	Model Number	Coupling (dB) (Incl Freq Sensitivity)	Frequency Sensitivity (dB)	Insertion Loss (dB) max	Directivity (dB) min	VSWR max	Power (In) Avg In (W)	Avg Ref (W)	Avg Peak (kW)
.5-1.0	1	CPL-5044-10-NNN-79	10 ± 1.0	± 0.75	0.20	30	1.15	200	50	10
	1	CPL-5044-20-NNN-79	20 ± 1.0	± 0.75	0.20	30	1.15	500	500	10
	2	CPL-5044-30-NNN-79	30 ± 1.0	± 0.75	0.20	30	1.15	500	500	10
1.0-2.0	3	CPL-5045-10-NNN-79	10 ± 1.0	± 0.75	0.20	30	1.15	200	50	10
	3	CPL-5045-20-NNN-79	20 ± 1.0	± 0.75	0.20	30	1.15	500	500	10
	4	CPL-5045-30-NNN-79	30 ± 1.0	± 0.75	0.20	30	1.15	500	500	10
2.0-4.0	3	CPL-5046-10-NNN-79	10 ± 1.0	± 0.75	0.20	25	1.15	200	50	10
	3	CPL-5046-20-NNN-79	20 ± 1.0	± 0.75	0.20	27	1.15	500	500	10
	4	CPL-5046-30-NNN-79	30 ± 1.0	± 0.75	0.20	27	1.15	500	500	10
4.0-10.0	5	CPL-5047-10-NNN-79	10 ± 1.0	± 0.75	0.25	20*	1.20	200	50	10
	5	CPL-5047-20-NNN-79	20 ± 1.0	± 0.75	0.25	20*	1.20	500	500	10
	6	CPL-5047-30-NNN-79	30 ± 1.0	± 0.75	0.25	20*	1.20	500	500	10
7.0-12.4	7	CPL-5048-10-NNN-79	10 ± .75	± 0.75	0.25	15	1.25	200	50	10
	7	CPL-5048-20-NNN-79	20 ± .75	± 0.75	0.25	15	1.25	500	500	10
	7	CPL-5048-30-NNN-79	30 ± .75	± 0.75	0.25	15	1.25	500	500	10
12.4-18.0	7	CPL-5049-10-NNN-79	10 ± .75	± 0.75	0.35	15	1.30	200	50	10
	7	CPL-5049-20-NNN-79	20 ± .75	± 0.75	0.35	15	1.30	500	500	10
	7	CPL-5049-30-NNN-79	30 ± .75	± 0.75	0.35	15	1.30	500	500	10

* Directivity is 17 dB from 8.0 - 10.0 GHz.

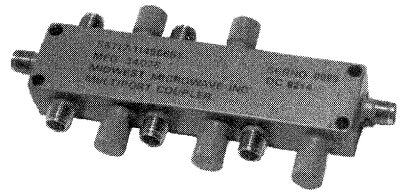
MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	F	WEIGHT Lbs	Kg
1	6.25 (158.8)	3.00 (76.2)	0.51 (13.0)	2.13 (54.0)	0.87 (22.1)	1.687 (42.9)	1.2	0.52
2	6.25 (158.8)	3.00 (76.2)	0.51 (13.0)	2.13 (54.0)	0.69 (17.5)	1.687 (42.9)	1.2	0.52
3	4.10 (104.1)	1.09 (27.7)	0.50 (12.7)	2.13 (54.0)	0.87 (22.1)	1.687 (42.9)	1.0	0.45
4	4.10 (104.1)	1.09 (27.7)	0.50 (12.7)	2.13 (54.0)	0.69 (17.5)	1.687 (42.9)	1.0	0.45
5	5.10 (129.5)	2.00 (50.8)	0.66 (16.8)	2.13 (54.0)	0.57 (14.5)	1.687 (42.9)	1.1	0.50
6	5.10 (129.5)	2.00 (50.8)	0.57 (14.5)	2.13 (54.0)	0.69 (17.5)	1.687 (42.9)	1.1	0.50
7	2.50 (63.5)	1.13 (28.7)	0.60 (15.2)	1.50 (38.1)	0.60 (15.2)	1.093 (27.8)	0.8	0.40

Note: TNC or Type N output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

Multi-Couplers

- **500 MHz - 18.0 GHz Frequency Coverage**
- **Custom Coupling Values**
- **Rugged Stripline Construction**
- **Small Size, Light Weight**
- **Meets MIL-E-5400 and MIL-16400**

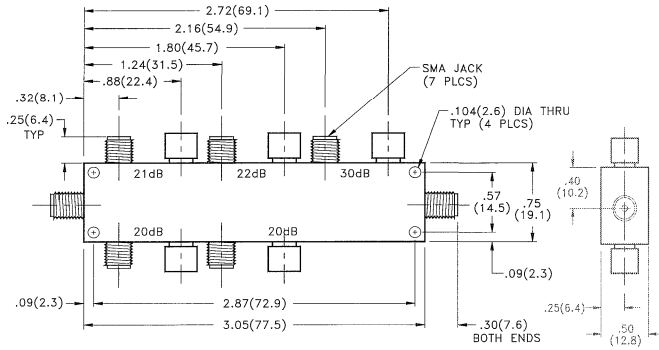


Midwest Microwave offers a wide range of Multi-Couplers that can be custom designed to fit specific applications. By using one primary line and integrating a number of couplers within one circuit, enhanced performance within a smaller package size as well as a reduction in cost can be realized. Lower insertion loss, better frequency sensitivity, and lower VSWR can also be attained because of the reduction of reflective discontinuities and impedance mismatches inherent in a system using several individual couplers.

Model Number: CPL-5027-5P-SMA-79

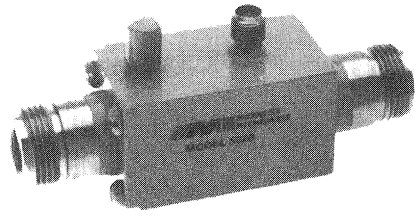
SPECIFICATIONS

Frequency: 3.5-4.5 GHz
VSWR: 1.25 max
Coupling Values: J1: 21 dB J2 : 22 dB J3: 30 dB J4: 20 dB J5 : 20 dB
Coupling Accuracy: ± 0.5 dB
Flatness: ± 0.3 dB
Directivity: 20 dB min
Insertion Loss: 0.6 dB max
Power: 50 Watts avg
Operating Temperature Range: -45 °C to +71 °C
Connectors: Passivated Stainless Steel SMA Female



30 dB Ultra-Broadband Monitor Coupler

- **2.0 - 18.0 GHz Frequency Band**
- **400 Watt Input Power**
- **N, TNC, or SMA Connectors**
- **Small Size, Light Weight**

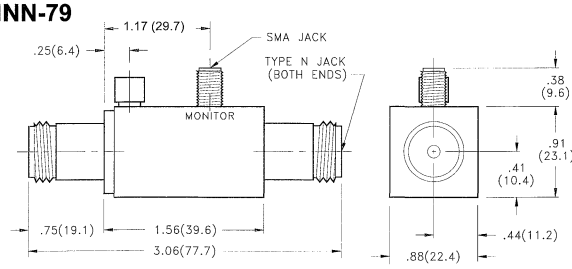


This Ultra-Broadband 30 dB Coupler was designed to provide a simple way to monitor signals over a very wide bandwidth. It is very useful for detecting the prescence of a microwave signal that is present or supposed to be present on the primary line. The primary line can sustain 400 Watt average power levels and 3.2 Kw peak.

Model Number: CPL-5028-30-NNN-79

SPECIFICATIONS

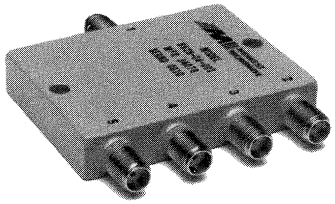
Frequency: 2.0-18.0 GHz
VSWR: 1.50 max
Coupling Value: 30 dB
Coupling Accuracy: ± 5.0 dB @ 2.0-4.0 GHz
± 2.0 dB @ 4.0-18.0 dB
Insertion Loss: 0.6 dB max
Directivity: 10 dB min
Power: 400 Watts avg
Operating Temperature Range: 0 °C to + 55 °C
Connectors: Passivated Stainless Steel SMA,TNC, or N Female or Male



Note: SMA or TypeTNC output connectors are available by substituting "SMA" or "TNC" for "NNN" in the Model Number.

Power Dividers

Wilkinson Isolated • Resisitve



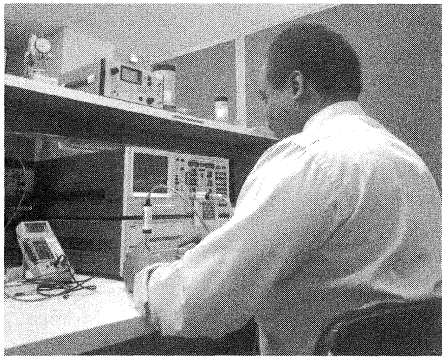
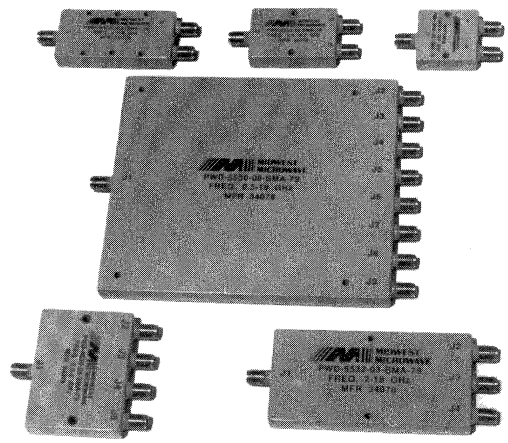


Table of Contents

Power Dividers

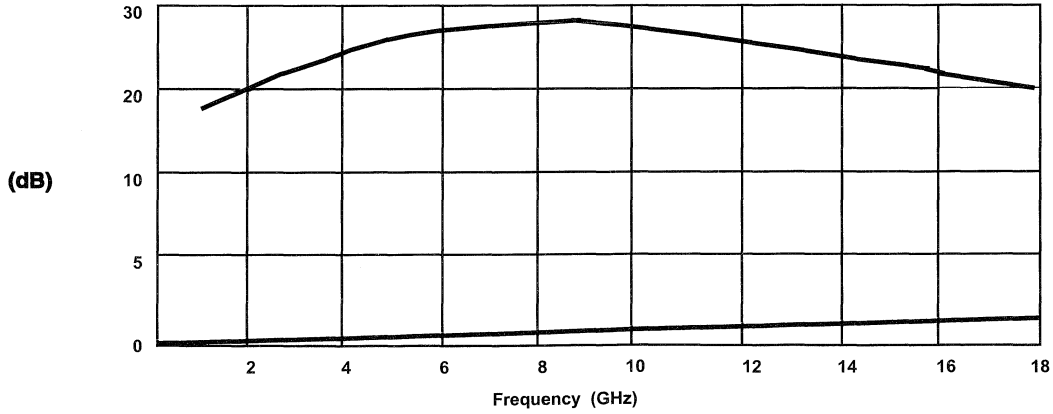
General Information

- **DC - 18 GHz High Performance**
- **Broadband and Ultra-broadband Frequency Coverage**
- **High Isolation - Low Phase and Amplitude Unbalance**
- **Small Size, Light Weight, Rugged Construction**
- **Meets MIL-E-5400 and MIL-16400 Environmental Requirements**



Power Dividers are passive devices that divide an input signal into any number of equal output signals. Conversely Power Combiners are passive devices that combine any number of equal input signals into one output signal. The ability of a power divider to provide identical, phase matched output signals from one input signal is the measure of its design integrity and quality. Attaining these equal output signals is also dependent on the impedance match of the device or microwave system it is being used in conjunction with as well as the level of isolation between output ports. Midwest Microwave manufactures Wilkinson type isolated power dividers covering octave and multi-octave frequency bandwidths as well as ultra-wide frequency bandwidth types. The Wilkinson design types are particularly useful in systems where the divided signals are required to remain in phase with each other and their amplitudes relatively equal. Resistive power dividers are also available that offer very broadband performance. This type is small and very broadband and maintains an equal and consistent VSWR and insertion loss. Standard cataloge units are available with SMA connectors with other connector types available upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accomodate unique system needs. All Midwest Power Dividers are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.

Typical Power Divider Characteristics



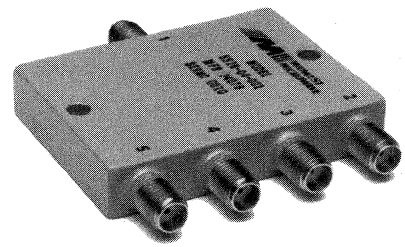
MIDWEST MICROWAVE

Power Dividers

Definition of Parameters

Power Division / Combining - In-Phase power division is accomplished through a network with one signal input and "n" outputs whose phase difference is 0° and resulting signal amplitudes are equal at each output. When combining signals, the relationship between each input signal must also be equal in phase and amplitude so that the combination can be accomplished with the lowest amount of power loss.

VSWR - The input VSWR performance of a power divider is defined as the maximum value measured over the entire specified frequency band when a signal input at the common input port and all output ports are terminated in 50 Ohms.



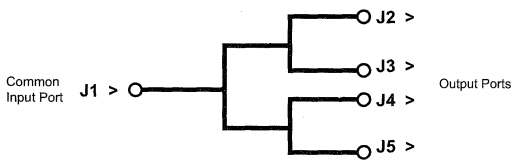


Figure 1

Frequency - Power Dividers, if designed properly, will perform satisfactorily over wide frequency bands. The lower the operating frequency the longer the wavelength and hence the longer the the physical length of the power divider must be. Design goals are continually aimed toward broadening the frequency bandwidth as much as possible while simultaneously maintaining as short and small a unit as possible to satisfy system size and weight requirements.

Insertion Loss - In Power Dividers, insertion loss is defined as the loss measured through the power divider excluding the power division factor. More specifically, it is the ratio of the power output to the power input, with the assumption that the source of power is matched as well as the terminated ports when the measurement was taken. Since transmission line loss increases with frequency, the values shown are minimal at the lowest frequency and increase linearly as the length of the power divider increases.

$$\text{Insertion Loss (dB)} = 10 \text{ Log } \frac{P_2 + P_3 + P_4 + \ldots\ldots P_n}{P_{input}}$$

Loss due to dissipation in the circuit will increase the insertion loss by the amount of power dissipation in dB.

Isolation - Isolation in Power Dividers is defined as the isolation between any two output ports. Expressed in dB, it is the ratio of the output power of one output port to the input power of any other output port, when measured with matched terminations on all other ports. High isolation between ports is a very desireable feature in most power divider applications especially between adjacent ports because it is there that signal interaction is most likely to take place.

Amplitude Balance - The amplitude balance, expressed in dB, is the difference between the amplitude of the signal at each of the output ports. It is the ratio of the level of maximum signal at any output port to the level of the minimum signal at any other output port. Usually this unbalance is quite low in isolated (Wilkinson) two way power dividers and increases as the number of output ports increases.

Phase Balance - The phase unbalance is the difference between the phase of the signals that arrive at each output port. It is expressed in degrees. It is the maximum deviation that is measured between any one output port and any other output port. The average phase unbalance is substantially lower particularly at the lower frequencies.

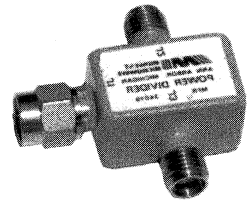
Power, Average - The maximum power that may be applied to the common or input port with all other output ports terminated in 50 Ohm loads that have inherent VSWR's that do not exceed 2.0:1.

Power Dividers

Broadband Resistive Type

Two Way Broadband Power Division

- **DC-12.4 and DC-18.0 GHz bandwidth units**
- **Symmetrical Loss and Phase Balance**
- **Rugged Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**

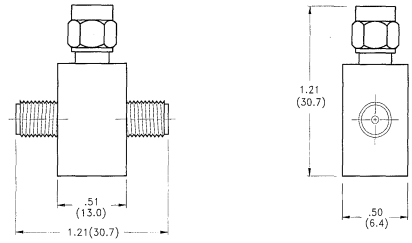


Midwest Microwave's series of Resistive Two Way Power Dividers are very broadband devices that are small, lightweight, ruggedly constructed units that posses consistent VSWR and insertion loss. They also exhibit excellent phase and amplitude tracking. Units are available in wideband frequency bandwidths covering the range of DC-12.4 GHz and DC-18.0 GHz. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.

	DC-12.4 GHz	DC-18.0 GHz
Model Number:	**PWD-2532-02-SMA-79**	**PWD-2533-02-SMA-79**

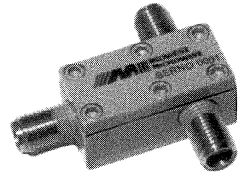
SPECIFICATIONS

Frequency: DC-12.4 GHz and DC - 18.0 GHz
Impedance: 50 Ohms
VSWR: 1.25 @ DC-10 GHz and 1.35 @ 10.0-18.0 GHz
Amplitude Balance: 0.2 dB @ DC-4.0 GHz
0.4 dB @ 4.0-10.0 GHz
0.5 dB @ 10.0-18.0 GHz
Phase Balance: 10 degrees max
Insertion Loss: 6 dB nom +1.2/-0.2 dB @ DC-10 GHz
6 dB nom +1.5/-0.2 dB @ 10-18 GHz
Power (In) : 1 Watt avg
Operating Temperature: -55 °C - +125 °C
Connectors: Passivated Stainless Steel SMA*



R.F. Signal Monitor

- **Bite System Application**
- **Small Size, Light Weight**
- **Rugged Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**

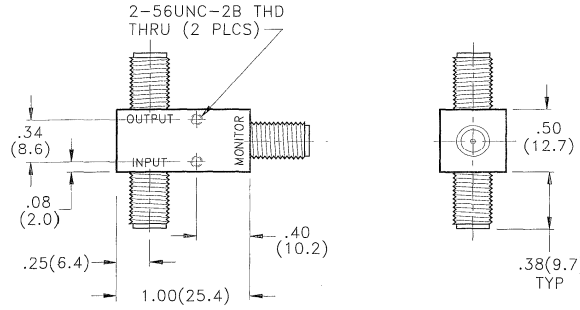


Midwest Microwave offers a wide variety of Signal Monitor components. The unit described here is a passive device that monitors the signal that is flowing in a transmission line. It is a linear device that extracts a very small portion of the energy in the primary line in order to monitor the presence of a signal on that line. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.

Model Number: **RFM-7020-26-SMA-79**

SPECIFICATIONS

Frequency: DC-2.5 GHz
Impedance: 50 Ohms
VSWR: 1.20:1 max
Main RF Path Attenuation: 0.5 ± 0.15 dB
Sampled Port Coupling: 26 ±1.2 dB
Insertion Loss: 6 dB nom +1.2/-0.2 dB
Power (In): 1 Watt avg
Operating Temperature: -55 °C - +125 °C
Connectors: Passivated Stainless Steel SMA*



Note: TNC, BNC, or Type N output connectors are available by substituting "TNC", "BNC", or "NNN" for "SMA" in the Model Number.

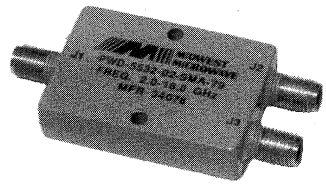
MIDWEST MICROWAVE

Power Dividers

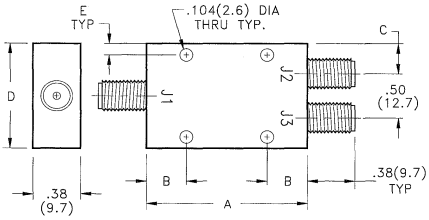
Two Way Isolated

500 MHz - 18.0 GHz High Performance

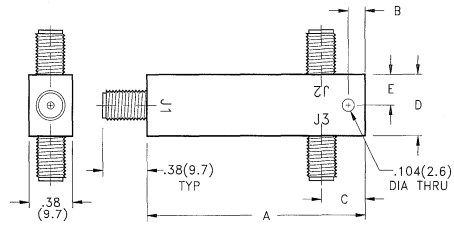
- **Full Octave, Multi-Octave, and Ultra-Wideband Performance**
- **Excellent Phase and Amplitude Tracking**
- **Small Lightweight Rugged Stripline Construction**
- **Meets Mil-E-5400 and Mil-E16400**



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in octave, multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



CASE STYLE 1, 2, & 3



CASE STYLE 4

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE		MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max (W)
IN-LINE TEE**				OCTAVE BANDWIDTH TYPES					
1.0-2.0	2	6	**PWD-5511-02-SMA-79**	0.2	2	0.4	20	1.25	3
2.0-4.0	2	7	**PWD-5512-02-SMA-79**	0.2	2	0.4	20	1.35	3
4.0-8.0	1	5	**PWD-5514-02-SMA-79**	0.2	3	0.5	20	1.35	3
8.0-12.4	1	5	**PWD-5515-02-SMA-79**	0.3	5	0.5	20	1.5	3
12.4-18.0	1	5	**PWD-5517-02-SMA-79**	0.3	5	0.5	20	1.5	3
MULTI-OCTAVE BANDWIDTH TYPES									
.5-2.0	2	8	**PWD-5520-02-SMA-79**	0.2	4	0.5	20	1.25	3
2.0-8.0	2	7	**PWD-5522-02-SMA-79**	0.3	4	0.5	20	1.35	5
6.0-18.0	1	5	**PWD-5526-02-SMA-79**	0.3	5	0.5	18	1.50	3
2.0-18.0	3	N/A	**PWD-5532-02-SMA-79**	0.25	8	1.0	15	1.60	10
2.0-18.0	2	7	**PWD-5533-02-SMA-79**	0.3	5	0.8	17	1.50	10
0.5-18.0	4	9	**PWD-5530-02-SMA-79**	0.3	5	0.3+0.1f	10	1.50	10

** Note: for TEE Type Case Style, substitute "T2" for "02" in Model Number

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	WEIGHT Gr
1	1.00 (25.4)	0.50 (12.7)	0.250(6.35)	1.00 (25.4)	0.08 (1.91)	1.00	27
2	2.00 (50.8)	0.50 (12.7)	0.250 (6.35)	1.00 (25.4)	0.08 (1.91)	1.60	44
3	2.25 (57.1)	0.50 (12.7)	0.250 (6.35)	1.00 (25.4)	0.08 (1.91)	1.70	46
4	5.50 (139.7)	0.75 (19.1)	0.250 (6.35)	1.00 (25.4)	0.20 (5.08)	3.50	96
5	1.00 (25.4)	0.50 (12.7)	0.22 (5.58)	0.050 (12.7)	0.08 (1.91)	0.60	16
6	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	0.070 (17.8)	0.08 (1.91)	1.20	33
7	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	0.050 (12.7)	0.08 (1.91)	1.10	30
8	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	1.00 (25.4)	0.08 (1.91)	1.40	38
9	5.50 (139.7)	0.75 (19.1)	0.40 (10.16)	0.050 (12.7)	0.08 (1.91)	1.80	49

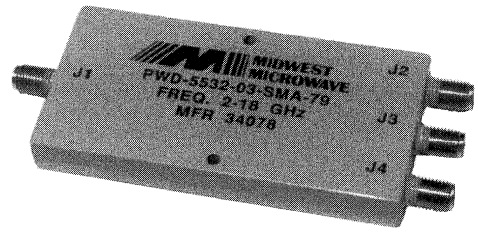
Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

Power Dividers

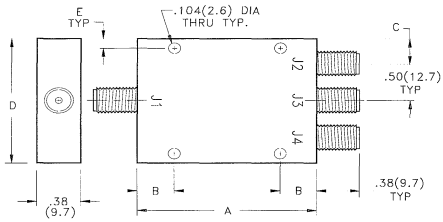
Three Way Isolated

True Three Way Power Division

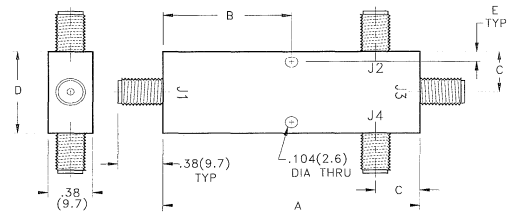
- **Full 2.0 - 18.0 GHz bandwidth units**
- **Low VSWR - High Isolation**
- **Rugged Stripline Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of high performance isolatedThree Way Power Dividers are true three way dividers. They are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in ultra-wideband frequency bandwidths covering the entire range of 2.0 - 18.0 GHz. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.



CASE STYLE 1



CASE STYLE 2

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max(W)
0.5-2.0	1	**PWD-5520-03-SMA-79**	0.5	5	1.0	15	1.50	5
2.0-18.0	2	**PWD-5532-03-SMA-79**	0.5	5	1.0	20	1.50	10
2.0-18.0	1	**PWD-5533-03-SMA-79**	0.5	10	1.2	15	1.80	10

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	WEIGHT Gr
1	3.00 (76.2)	0.63 (16.0)	0.250 (6.35)	1.50 (38.1)	0.080 (2.0)	3.15	89
2	2.50 (63.5)	1.25 (31.8)	0.375 (9.5)	0.75 (19.0)	0.080 (2.0)	1.80	51

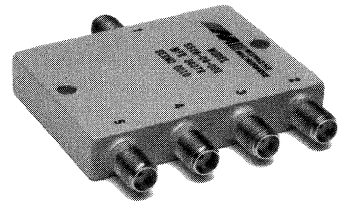
Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

Power Dividers

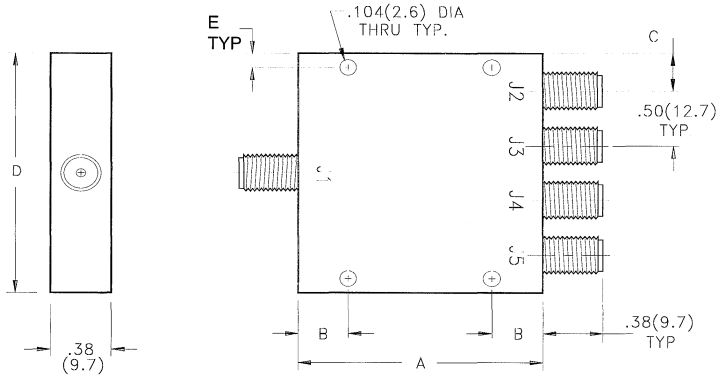
Four Way Isolated

500 MHz - 18.0 GHz High Performance

- **Full 2.0 - 18.0 GHz bandwidth units**
- **Low VSWR - High Isolation**
- **Rugged Stripline Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max(W)
0.5-2.0	1	**PWD-5520-04-SMA-79**	0.5	10	1.0	18	1.50	5
2.0-8.0	1	**PWD-5522-04-SMA-79**	0.5	10	1.0	18	1.50	5
6.0-18.0	2	**PWD-5526-04-SMA-79**	0.5	10	1.0	18	1.50	5
2.0-18.0	1	**PWD-5532-04-SMA-79**	0.5	10	1.5	18	1.50	10
.5-18.0	3	**PWD-5530-04-SMA-79**	0.5	10	1.5	16	1.50	10

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	WEIGHT Gr
1	3.00 (76.2)	0.63 (16.0)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	4.00	115
2	1.46 (37.1)	0.73 (18.5)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	2.05	58
3	5.20 (132.1)	1.00 (25.4)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	7.30	207

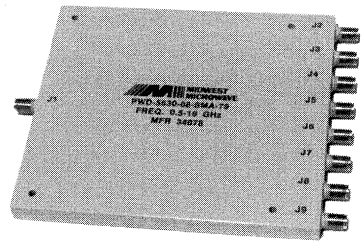
Note:
1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number. Housings thickness will increase to 0.88 to accomodate these larger diameter connectors.

Power Dividers

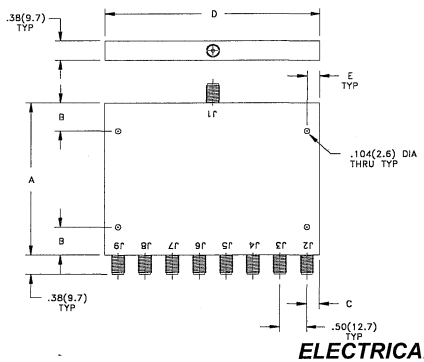
Eight Way • Twelve Way

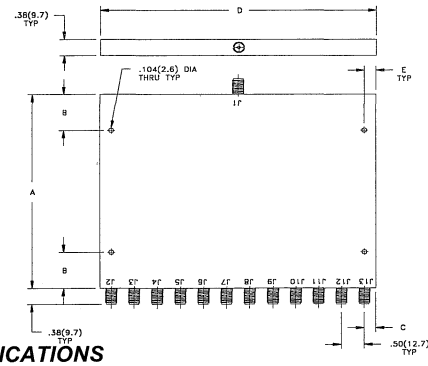
500 MHz - 18.0 GHz High Performance

- **Full 2.0 - 18.0 GHz bandwidth units**
- **Low VSWR - High Isolation**
- **Rugged Stripline Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.





ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max(W)
EIGHT WAY MULTI-OCTAVE TYPES								
0.5-2.0	1	**PWD-5520-08-SMA-79**	0.5	5	1.0	15	1.50	10
2.0-8.0	2	**PWD-5522-08-SMA-79**	0.8	10	1.2	15	1.50	10
6.0-18.0	3	**PWD-5526-08-SMA-79**	0.8	10	0.5+.08f	15	1.50	10
2.0-18.0	2	**PWD-5532-08-SMA-79**	0.6	10	0.7+0.1f	15	1.50	30
0.5-18.0	4	**PWD-5530-08-SMA-79**	0.8	15	1.0+.25f	15	1.50	30
TWELVE WAY MULTI-OCTAVE TYPES								
0.5-2.0	5	**PWD-5520-12-SMA-79**	0.5	5	1.0	15	1.50	10
2.0-8.0	6	**PWD-5522-12-SMA-79**	0.8	10	1.4	15	1.50	10
6.0-18.0	5	**PWD-5526-12-SMA-79**	0.8	10	2.2	15	1.50	10
2.0-18.0	6	**PWD-5532-12-SMA-79**	0.6	10	1.0+.11f	15	1.50	30
0.5-18.0	7	**PWD-5530-12-SMA-79**	0.8	10	1.2+.3f	15	1.50	30

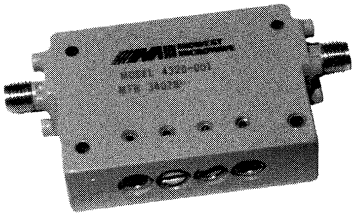
MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	WEIGHT Gr
1	3.00 (76.2)	1.50 (38.1)	0.250 (6.35)	4.00 (101.6)	0.250 (6.35)	8.4	239
2	4.60 (116.8)	0.55 (14.0)	0.250 (6.35)	4.00 (101.6)	0.250 (6.35)	12.3	349
3	3.50 (88.9)	1.75 (44.4)	0.250 (6.35)	4.00 (50.8)	0.250 (6.35)	9.0	273
4	5.25 (133.4)	1.13 (28.6)	0.250 (6.35)	4.00 (101.6	0.250 (6.35)	13.8	390
5	4.60 (116.8)	0.85 (2.2)	0.250 (6.35)	6.00 (152.4)	0.250 (6.35)	18.8	540
6	5.20 (132.1)	1.13 (28.7)	0.250 (6.35)	6.00 (152.4)	0.250 (6.35)	21.2	600
7	7.50 (190.5)	1.50 (38.1)	0.250 (6.35)	6.00 (152.4)	0.250 (6.35)	24.5	700

Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

Equalizers

Fixed • Adjustable • Linear • Parabolic



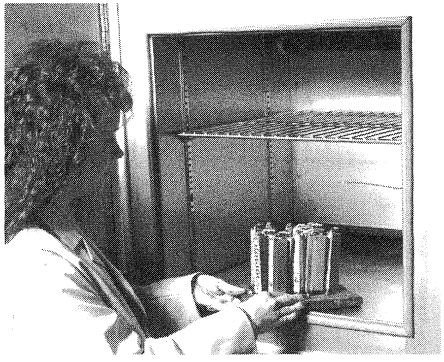


Table of Contents

Equalizers

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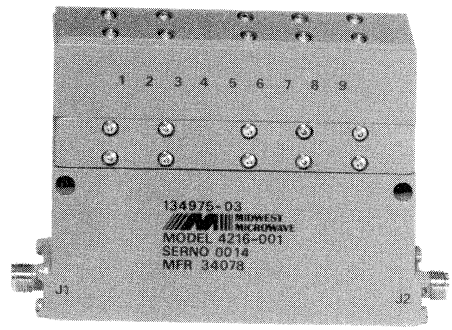
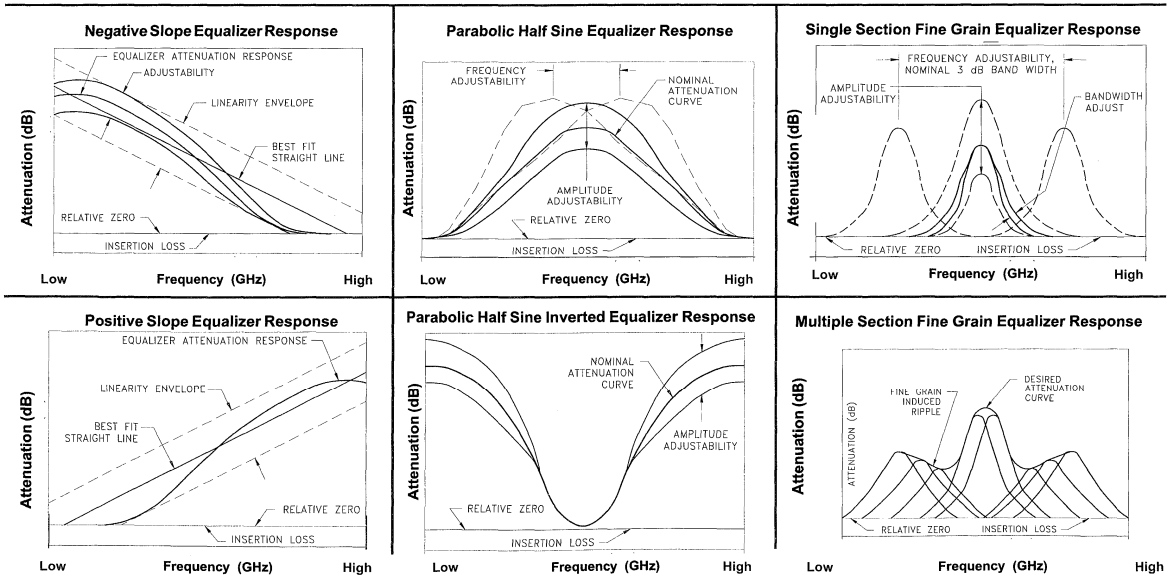
- **DC - 18 GHz High Performance**
- **Broadband or Narrowband Frequency Coverage**
- **Linear Slope - Positiive or Negative**
- **Half Sine or Half Sine Inverted**
- **Linear Slope/Fine Grain and Half Sine/Fine Grain**
- **Meets MIL-E-5400 and MIL-16400 Environmental Requirements**

Gain Equalizers are passive microwave devices that have an insertion loss characteristic that varies as a function of frequency. Midwest Microwave's Equalizers can be supplied with a precisely defined and preset loss characteristic, commonly known as a Fixed Loss Equalizer, or with the additional ability to be loss adjusted to custom fit the particular variable requirements needed to field tune a system. When this added tuning ability is included, the units are known as Adjustable or Tuneable Equalizers. When a Harmonic Phase Shifter is added, usually built-in to the assembly, the device is known as an Optimizer. Further enhancement can be attained by adding Isolators to the assembly to form an Iso-Optimizer. Midwest Microwave manufactures all of the forementioned devices covering a wide range of frequency bands and in a wide variety of configurations and interfaces. Application of these devices usually falls into the following categories:



1. To introduce an insertion loss characteristic that is identical but opposite to the gain characteristic of a traveling wave tube amplifier (TWT) such that the two devices together will exhibit a flat gain characteristic over a specified frequency band. 2. To introduce an insertion loss characteristic that is opposite to the insertion loss characteristic of a fixed length of coaxial cable or waveguide transmission line such that the two components together exhibit a flat loss characteristic over a specified frequency band. 3. To introduce an insertion loss characteristic in a series of microwave components that include both gain and loss such that the resultant loss characteristic is flat over the frequency band.

Typical Gain Equalizer Characteristics



Equalizers

Definition of Parameters

Frequency Range - The operating frequency band specified by the user over which the microwave system or devices must exhibit the desired attenuation vs. frequency response and must otherwise perform to the required specifications. Frequency bandwidths can vary from less than 1% to multi-octave and can occur anywhere over the range of 500MHz to 26.5GHz.

Attenuation - The compensation, adjustment, and shaping of the attenuation vs. frequency response of a singular device or of a complete system of microwave devices such that the resultant power output curve is either flat with frequency or is shaped in the desired way that permits the system to operate efficiently. This is the primary goal of a Gain Equalizer.

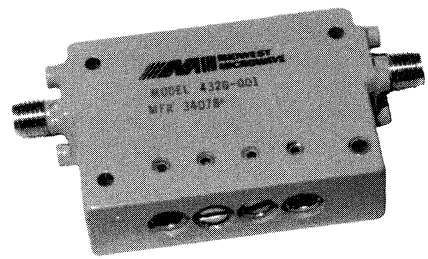
Insertion Loss - in Gain Equalizers, the insertion loss is the sum of both absorbtive and reflective losses, measured at the frequency where minimum attenuation occurs for linear slope Equalizers; at the highest and the lowest operating frequencies for parabolic half sine type Equalizers; and at the band edges for the parabolic inverted half sine type Equalizers. It is clear that the specified attenuation level is always relative to the insertion loss of a Gain Equalizer. A typical method used in selecting an insertion loss specification is to take 10% of the maximum attenuation point and add .25 dB to that value.

VSWR - The input VSWR performance of an Equalizer is defined as the maximum value measured over the entire specified frequency band when a signal is input at the input port and the output ports is terminated in 50 Ohms. VSWR is dependent on such factors as attenuation level, operating frequency range, size, configuratuion and adjustability requirements. Input and output VSWR usually will not exceed 2.0:1.

Linearity - is defined as the deviation from the best fit straight line through the measured attenuation curve. Usually this deviation is less than ±7% of the maximum attenuation level. The allowable loss deviation from the nominal curve can be specified in dB or percent of loss.

Adjustability - Equalizers can be amplitude and frequency adjustable to allow the user to compensate for changes in amplifier gain response. The adjustment range to be built into the Equalizer will determine the number of loss sections both fixed and adjustable required to provide the specified adjustment range. Typically the adjustment range is ± 15% of the maximum attenuation. In the case of parabolic Equalizers, this adjustment can be made over a bandwidth that is approximately ± 5% of the frequency at which the maximum attenuation occurs.

Tuner - User adjustable loss element that is used to adjust loss characteristics and loss curve with frequency.



Tuner Bandwidth - The frequency span measured at the 3 dB loss points of the loss introduced by the tuner.

Fixed Loss Equalizer - Equalizers that are adjusted and pre-set at the factory, sealed, and used as fixed loss devices over their frequency of operation.

Negative Linear Slope - Insertion Loss decreases linearly with frequency, maximum loss occurs at the lowest frequency.

Positive Linear Slope - Insertion Loss increases linearly with frequency, maximum loss occurs at the highest frequency.

Parabolic Half Sine - Attenuation increases from the low frequency band edge reaching its peak at mid-frequency, then decreases from high to low at the upper frequency band edge. This type of Equalizer is used primarily for compensating gain variations in traveling wave tube or solid state amplifiers where the maximum gain is at or near the middle of the frequency band.

Parabolic Inverted Half Sine - Attenuation decreases monotonically with frequency from both band edges to its lowest point at mid-frequency band. This type of Equalizer compensates for accumulative gain variations of a system when the gain is highest at the upper most and lowest operating frequencies.

Connectors - SMA female connectors are standard however other SMA, TNC, N, and other connectors are also available upon request.

Equalizers

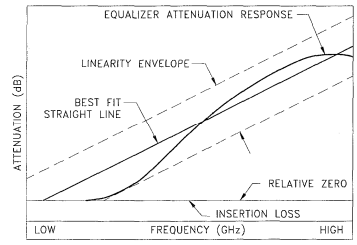
Fixed Loss Linear Slope Types

Linear Slope Positive or Negative

- **2-8 GHz, 2-18 GHz, 6-18 GHz Performance**
- **Maximum VSWR 1.70:1**
- **Rugged Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**

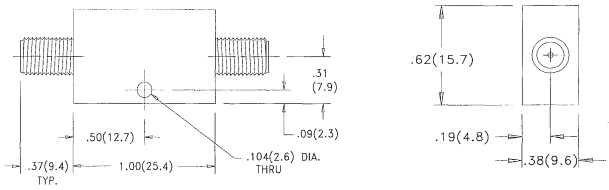
Midwest Microwave's series of linear slope fixed loss Equalizers are very broadband devices that are small, lightweight, ruggedly constructed units that posses consistently low VSWR and linear insertion loss. They also exhibit excellent phase and amplitude tracking. Units are available in wide frequency bandwidths covering the range of 2.0-8.0 GHz, 6.0-18.0GHz, and 2.0-18.0 GHz.

Positive Slope Equalizer Response

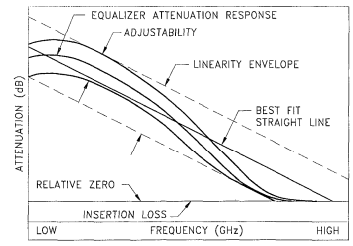


SPECIFICATIONS

Frequency: 2.0-8.0 GHz, 6.0-18.0 GHz, and 2-18.0 GHz
Impedance: 50 Ohms
VSWR: 1.70 max
Insertion Loss: 10% of max attenuation + .25 dB typical - see chart
Operating Temperature: -55 °C - +125 °C
Connectors: Passivated Stainless Steel SMA*



Negative Slope Equalizer Response



Frequency Range (GHz)	Model Number Positive Slope	Model Number Negative Slope	Attenuation max (dB)	Insertion Loss (dB)	Linearity (dB)
2.0 - 8.0	EQL-4424-08-POS-79	EQL-4424-08-NEG-79	8.0 + I.L.	≤ 1.0	± 0.5
6.0 -1 8.0	EQL-4426-12-POS-79	EQL-4426-12-NEG-79	12.0 + I.L .	≤ 1.0	± 0.75
2.0 -1 8.0	EQL-4432-10-POS-79	EQL-4432-10-NEG-79	10.0 + I.L .	≤ 1.2	± 0.75
2.0 - 18.0	EQL-4431-18-POS-79	EQL-4431-18-NEG-79	18.0 + I.L.	≤ 1.5	± 1.0
2.0 - 18.0	EQL-4431-24-POS-79	EQL-4431-24-NEG-79	24.0 + I.L .	≤ 2.0	± 1.0

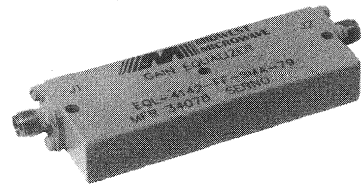
Note: Other SMA , TNC, BNC, or Type N output connectors are available. Please consult the factory for Model Numbers.

Equalizers

Adjustable Loss Linear SlopeTypes

Linear Slope Positive or Negative

- **2-18 GHz Performance**
- **± 0.60 Linearity**
- **Low VSWR and Low Insertion Loss**
- **Meets Mil-E-5400 and Mil-E16400 Environment**

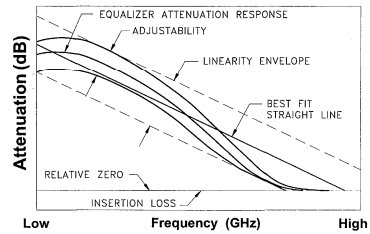


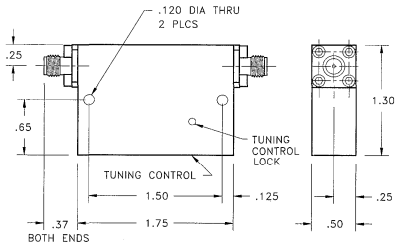
Midwest Microwave's series of Adjustable Loss Linear Slope Equalizers are very broadband devices that are small, lightweight, ruggedly constructed units that posses consistently low VSWR and low insertion loss. Units are available in octave as well as wideband frequency bandwidths. The units will meet or exceed the environmental specifications of MIL-E-5400 and MIL-E-16400.

SPECIFICATIONS

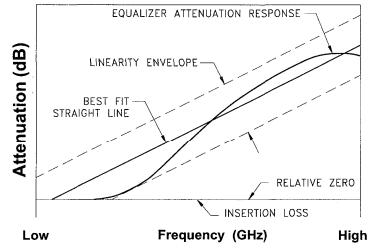
Frequency: **2.0-4.0 GHz, 4.0-8.0 GHz, 8.0-12.4, 12.4-18.0, 8.0-18.0, and 6-18.0 GHz Models Available**
Impedance: **50 Ohms**
VSWR: **See Chart**
Insertion Loss: **See Chart**
Linearity: **See Chart**
Adjustability: **1 dB Typical**
Operating Temperature: **-55 °C - +125 °C**
Connectors: **Passivated Stainless Steel SMA***

Negative Slope Equalizer Response





Positive Slope Equalizer Response



Frequency Range (GHz)	Model Number Positive Slope	Model Number Negative Slope	Attenuation max (dB)	Insertion Loss (dB)	Linearity (dB)	VSWR max
2.0 - 4.0	EQL-4060-05-POS-79	EQL-4060-05-NEG-79	5.0 + I.L.	≤ 0.6	± 0.5	1.50
4.0 - 8.0	EQL-4061-05-POS-79	EQL-4061-05-NEG-79	5.0 + I.L.	≤ 0.8	± 0.5	1.50
8.0 - 12.4	EQL-4062-06-POS-79	EQL-4062-06-NEG-79	6.0 + I.L.	≤ 1.0	± 0.5	1.70
12.4-18.0	EQL-4063-06-POS-79	EQL-4063-06-NEG-79	6.0 + I.L.	≤ 1.0	± 0.5	1.70
8.0 -1 8.0	EQL-4064-08-POS-79	EQL-4064-08-NEG-79	8.0 + I.L.	≤ 1.2	± 0.6	1.70
6.0 -1 8.0	EQL-4065-08-POS-79	EQL-4065-08-NEG-79	8.0 + I.L.	≤ 1.5	± 0.7	1.80

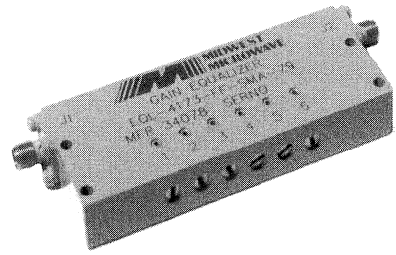
Note: Other SMA , TNC, BNC, or Type N output connectors are available. Please consult the factory for Model Numbers.

Equalizers

Fine Grain Adjustable Loss Linear Slope

Linear Slope Positive or Negative

- **2-18 GHz Performance**
- **± 0.4 dB Linear Slope**
- **Rugged Construction**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of Fine Grain Adjustable Loss Equalizers are very broadband devices that are small, lightweight, ruggedly constructed units that posses consistently low VSWR and low insertion loss. They also exhibit excellent adjustability in both amplitude and frequency. The units meet the environmental requirements of MIL-E-5400 and MIL-E-16400.

SPECIFICATIONS

Frequency: **2.0-4.0 GHz, 4.0-8.0 GHz, 8.0-12.4, 12.4-18.0, 8.0-18.0, and 6-18.0 GHz Models Available**

Adjustability: **6 Amplitude Tuning positions, equally spaced in frequency, each capable of introducing a minimum of 4 dB of loss.**

Operating Bandwidth: **if tuning bandwidth differs, the 3 dB bandwidth of each tuning section must be specified prior to ordering. Common bandwidths are 150MHz, 250MHz, 500MHz, and 1GHz.**

Impedance: **50 Ohms**

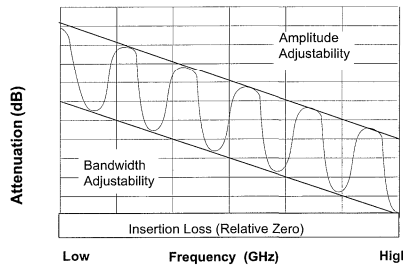
VSWR: **See Chart**

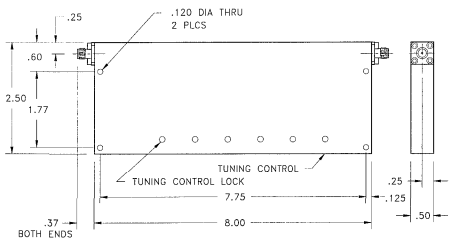
Insertion Loss: **10% of max attenuation + .25 dB typical - See Chart**

Operating Temperature: **-55 °C - +125 °C**

Connectors: **Passivated Stainless Steel SMA female***

Single Section Fine Grain Equalizer Response





Frequency Range (GHz)	Model Number Positive Slope	Model Number Negative Slope	Attenuation max (dB)	Insertion Loss (dB)	Linearity (dB)	VSWR max
2.0 - 4.0	EQL-4070-05-POS-79	EQL-4070-05-NEG-79	5.0 + I.L.	≤ 0.6	± 0.5	1.60
4.0 - 8.0	EQL-4071-05-POS-79	EQL-4071-05-NEG-79	5.0 + I.L.	≤ 0.8	± 0.5	1.70
8.0 - 12.4	EQL-4072-06-POS-79	EQL-4072-06-NEG-79	6.0 + I.L.	≤ 1.0	± 0.5	1.80
12.4-18.0	EQL-4073-06-POS-79	EQL-4073-06-NEG-79	6.0 + I.L.	≤ 1.0	± 0.6	1.80
8.0 -1 8.0	EQL-4074-08-POS-79	EQL-4074-08-NEG-79	8.0 + I.L.	≤ 1.2	± 0.6	2.00
6.0 -1 8.0	EQL-4075-08-POS-79	EQL-4075-08-NEG-79	8.0 + I.L.	≤ 1.5	± 0.7	2.00

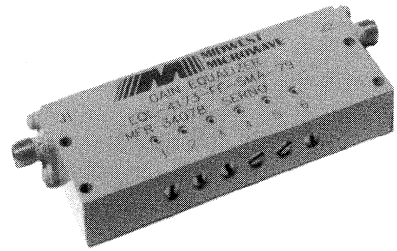
Note: Other SMA , TNC, BNC, or Type N output connectors are available. Please consult the factory for Model Numbers.

Equalizers

Parabolic Adjustable Types

Parabolic Half Sine and Half Sine Inverted

- **500 MHz-18.0 GHz Performance**
- **Amplitude and Frequency Adjustability**
- **Single and Multi-Section Fine Grain Adjustability**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of Parabolic Adjustable Equalizers are very precise devices that are small, lightweight, ruggedly constructed units that posses consistently low VSWR and low insertion loss. The design performance and size details can only be definitized after determination of the particular specifications that are required. The units are designed to meet or exceed the environmental specifications of MIL-E-5400 and MIL-E-16400.

SPECIFICATIONS

Frequency: **2.0-4.0 GHz, 4.0-8.0 GHz, 8.0-12.4, 12.4-18.0, 8.0-18.0, and 6-18.0 GHz Models Available**

Adjustability: **Amplitude Tuning positions, equally spaced in frequency, each capable of introducing a minimum of 4 dB of loss.**

Operating Bandwidth: **If tuning bandwidth differs, the 3 dB bandwidth of each tuning section must be specified prior to ordering. Common bandwidths are 150MHz, 250MHz, 500MHz, and 1GHz.**

Impedance: **50 Ohms**

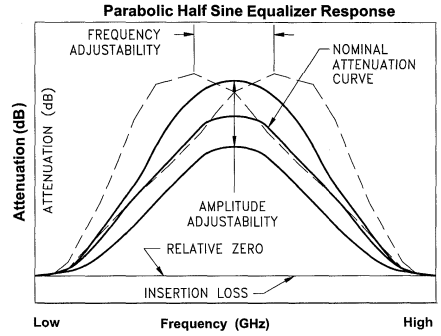
VSWR: **See Chart**

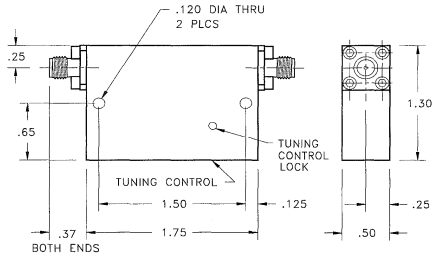
Insertion Loss: **10% of max attenuation + .25 dB typical - See Chart**

Operating Temperature: **-55 °C - +125 °C**

Connectors: **Passivated Stainless Steel SMA female***

Parabolic Half Sine Equalizer Response



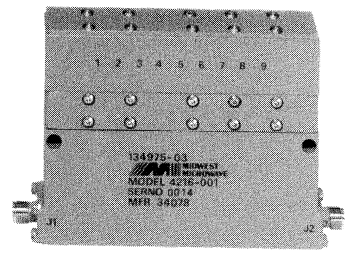


Frequency Range (GHz)	Model Number Half Sine	Model Number Inverted Half Sine	Attenuation max (dB)	Insertion Loss (dB)	Linearity (dB)	VSWR max
2.0 - 4.0	EQL-4080-05-SIN-79	EQL-4080-05-INV-79	5.0 + I.L.	≤ 0.6	N/A	1.50
4.0 - 8.0	EQL-4081-05-SIN-79	EQL-4081-05-INV-79	5.0 + I.L.	≤ 0.8	N/A	1.50
8.0 - 12.4	EQL-4082-06-SIN-79	EQL-4082-06-INV-79	6.0 + I.L.	≤ 1.0	N/A	1.70
12.4-18.0	EQL-4083-06-SIN-79	EQL-4083-06-INV-79	6.0 + I.L.	≤ 1.0	N/A	1.70
8.0 -1 8.0	EQL-4084-08-SIN-79	EQL-4084-08-INV-79	8.0 + I.L.	≤ 1.2	N/A	1.70
6.0 -1 8.0	EQL-4085-08-SIN-79	EQL-4085-08-INV-79	8.0 + I.L.	≤ 1.5	N/A	1.80

Note: Other SMA , TNC, BNC, or Type N output connectors are available. Please consult the factory for Model Numbers.

Built-in Harmonic Phase Shifter and Isolators

- **500 MHz - 18.0 GHz Performance**
- **Harmonic Injection for Gain Enhancement**
- **Eliminates Gain Spikes with Multiple Fine Grain Sections**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



Midwest Microwave's series of Optimizers and Iso-Optimizers include the ability to be inserted anywhere in a system without causing frequency pulling or mismatch distortion. They also exhibit excellent adjustability in both amplitude and frequency and posses low insertion loss. The units meet the environmental requirements of MIL-E-5400 and MIL-E-16400.

SPECIFICATIONS

Frequency: **2.0-4.0 GHz, 4.0-8.0 GHz, 8.0-12.4, 12.4-18.0, 8.0-18.0, and 6-18.0 GHz Models Available**

Adjustability: **Amplitude Tuning positions, equally spaced in frequency, each capable of introducing a minimum of 4 dB of loss.**

Operating Bandwidth: **if tuning bandwidth differs, the 3 dB bandwidth of each tuning section must be specified prior to ordering. Common bandwidths are 150MHz, 250MHz, 500MHz, and 1GHz.**

Impedance: **50 Ohms**

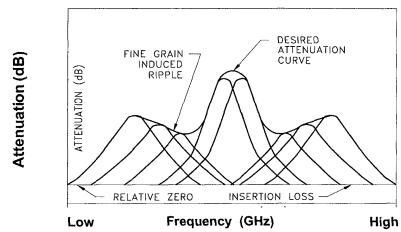
VSWR: **See Chart**

Insertion Loss: **10% of max attenuation + .25 dB typical - See Chart**

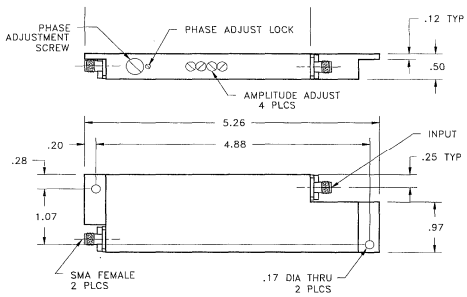
Operating Temperature: **-55 °C - +125 °C**

Connectors: **Passivated Stainless Steel SMA female***

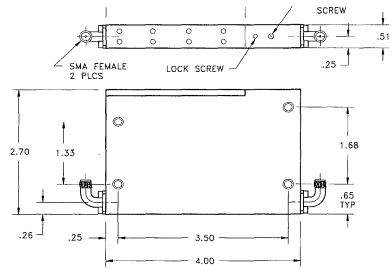
Multiple Section Fine Grain Equalizer Response



Typical Optomizer*



Typical Iso-Optomizer*

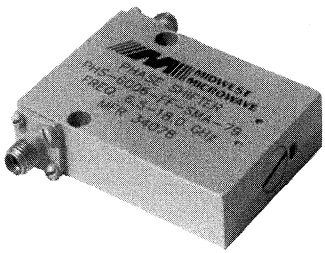


Frequency Range (GHz)	Model Number Optomized	Model Number Iso-Optomized	Attenuation max (dB)	Insertion Loss (dB)	Linearity (dB)	VSWR max
2.0 - 4.0	OPT-4090-05-000-79	OPT-4090-05-ISO-79	5.0 + I.L.	≤ 0.6	N/A	1.60
4.0 - 8.0	OPT-4091-05-000-79	OPT-4091-05-ISO-79	5.0 + I.L.	≤ 0.8	N/A	1.70
8.0 - 12.4	OPT-4092-06-000-79	OPT-4092-06-ISO-79	6.0 + I.L.	≤ 1.0	N/A	1.80
12.4-18.0	OPT-4093-06-000-79	OPT-4093-06-ISO-79	6.0 + I.L.	≤ 1.0	N/A	1.80
8.0 -1 8.0	OPT-4094-08-000-79	OPT-4094-08-ISO-79	8.0 + I.L.	≤ 1.2	N/A	2.00
6.0 -1 8.0	OPT-4095-08-000-79	OPT-4095-08-ISO-79	8.0 + I.L.	≤ 1.5	N/A	2.00

*Note: Drawings and specifications shown are for refrence only, exact dimensions are determined as part of overall design definition to specific specifications. Other SMA , TNC, BNC, or Type N output connectors are available. Please consult the factory for Model Numbers.

Phase Shifters

Harmonic • Line Stretcher



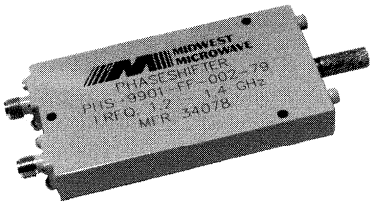


Table of Contents

Phase Shifters

General Information

- **500 MHz to 26.5 GHz Performance**
- **Up to 360° Phase Shift**
- **Broadband or Narrowband Coverage**
- **Field Adjustable**
- **Low VSWR and Insertion Loss**
- **Harmonic and Line Stretcher Types**

Midwest Microwave manufactures two basic types of Phase Shifters. The simplest type is the Line Stretcher type which is a simple coaxial device that provides a mechanical means similar to a trombone to adjust or elongate the electrical distance (phase length) between two microwave components. The other type, Harmonic Phase Shifters, are much more complex in their theoretical approach as well as their precise mechanical construction to perform their special function in the microwave system. Harmonic Phase Shifters provide a differential phase shift between the fundamental operating frequency signal and its harmonically related frequency signal. Harmonic Phase Shifters find particular application when used with Amplifiers where a significant amount of R.F. power is contained in the harmonic frequency band of the output of the Amplifier.

Frequency Range - The fundamental operating frequency band as well as the portion of the harmonic freqency band over which the differential phase shift is to occur must be specified by the user.

Phase Shift - Adjustable phase shifts of up to 360° are available on harmonic type Phase Shifters. The differential (harmonic) phase shift is defined as:

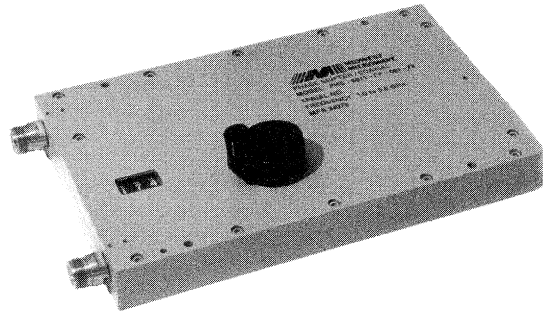
$$\phi_{HPS} = \phi_{2fo} - 2\phi_{fo}$$

where ϕ = Insertion Phase of unit at the fundamental frequency f_o.

and ϕ_{2fo} = Insertion Phase of unit at the harmonic frequency $2 \times f_o$.

A small amount of phase shift will occur initially at the zero reference point, however continued adjustment will provide the required phase shift relative to the zero point as required. For the line stretcher type, three different phase slope models have been made available, 30, 60, and 90 degrees per GHz, in order to minimize insertion loss.

VSWR - The input VSWR performance of a Phase Shifter is dependent on the amount of phase shift required, the frequency badwidth to be covered, the operating frequency range, and the physical size and configuration that it must meet. Despite the many variables affecting VSWR, input and output VSWR's under normal circumstances usually will not exceed 1.75:1 in the fundamental frequency band and 2.00:1 in the harmonic frequency band.



Insertion Loss - in phase shifters is attributable to absorbtive as well as reflective losses measured over the entire band of operation and in the case of harmonic phase shifters includes the harmonic frequency band. Typical insertion loss for a C band 360° harmonic phase shifter is 1.25 dB however, it may vary with different frequency ranges.

Fundamental Bandwidth - The frequency span can vary from less than one percent to more than an octave thereby making the units very versatile and causing a very flexible design approach to be used.

Field Adjustability - Phase Shifters that are easily field adjustable are pre-tested at the factory to ensure that the full range of adjustability is attainable and that the user can optomize their system output with simple mechanical adjustments while the system is operating. Provision is also made for locking the unit at a particular setting after the desired adjustment are accomplished.

Physical Size - Performance requirements relative to operating frequency, frequency bandwidth, differential phase shift, etc. can vary widely for each application, therefore package sizes may only be established after the determination of all of the required specifications.

Connectors - SMA female connectors are standard, however male SMA, TNC, Type N, and other connector interfaces are also available upon special request.

Environmental - The units are normally epoxy sealed and painted with an epoxy based paint to ensure their survival in hostile environments.

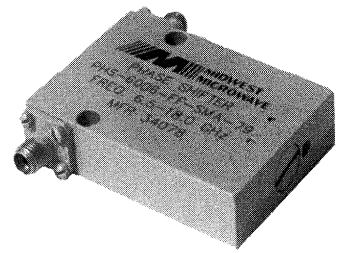
Component Integration - The Phase Shifter is often a useful addition to other components and can be integrated with other components such as Equalizers (see page 117).

Phase Shifters

Harmonic Type

360 ° Field Adjustable Phase Shift

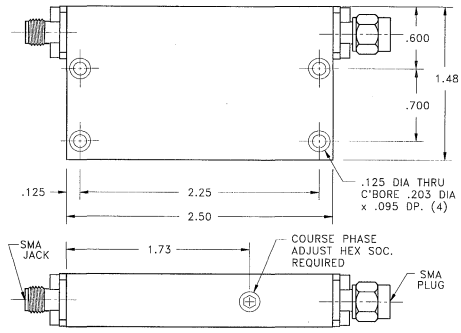
- **Broadband Performance**
- **Low VSWR and Insertion Loss**
- **Smooth Continuous Adjustment**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



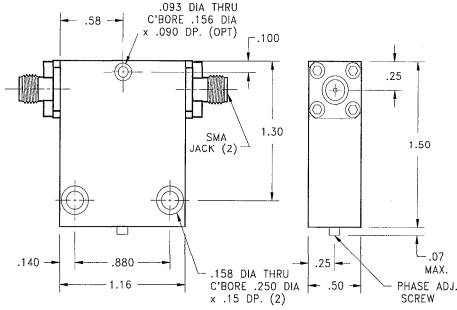
Midwest Microwave's series of Harmonic Phase Shifters are designed to provide maximum harmonic phase shift over very broadband frequency ranges. They are small, lightweight, ruggedly constructed units that posses consistently low VSWR and insertion loss. They also provide smooth, continuous, and easy phase adjustment through the use of a simple mechanical screw and locking arrangement.

SPECIFICATIONS

Fundamental Frequency: **2.5-5.0 GHz and 4.8-5.5 GHz,**
Harmonic Frequency: **5.0- 10.0 and 9.6-11.0 GHz**
Impedance: **50 Ohms**
VSWR: **1.7:1 in Fundamental frequency band typical**
2.0:1 in harmonic frequency band typical
see table below
Insertion Loss: **0.8 dB max in fundamental frequency band**
1.0 dB max in harmonic frequency band
Power: **2 Watts average, 2 Watts Peak**
Operating Temperature: **-55 °C - +125 °C**
Connectors: **Passivated Stainless Steel SMA***



Model No. PHS-6012-FF-SMA-79



Model No. PHS-6017-FF-SMA-79

Frequency (GHz)		Model Number	Harmonic Phase Shift (degrees)	VSWR		Insertion Loss	
Fundamental	Harmonic			Fundamental	Harmonic	Fundamental	Harmonic
2.5 - 5.0	5.0 - 10.0	PHS-6017-FF-SMA-79	360	1.50	1.70	0.80	1.00
4.8 - 5.5	9.6 - 11.0	PHS-6012-FF-SMA-79	360	1.75	2.00	0..80	1.00

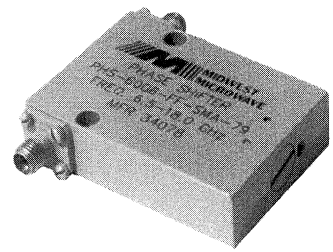
Note: SMA male , TNC, or Type N output connectors, either male or female, are also available by substituting TNC or NNN for SMA in the Model Number. If an interface gender change is desired, substitute MM or MF for FF in the Model Number. Please note that the housing thickness will increase accordingly when larger connectors are selected.

Phase Shifters

Harmonic Type

250 ° Field Adjustable Phase Shift

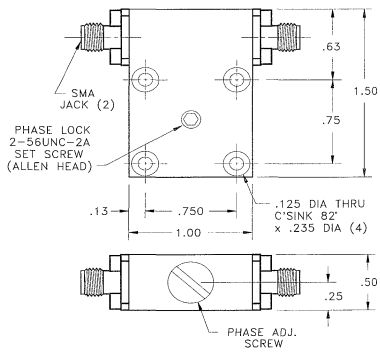
- **High Frequency Harmonic Phase Adjustment**
- **Low VSWR and Insertion Loss**
- **Smooth Continuous Adjustment**
- **Meets Mil-E-5400 and Mil-E16400 Environment**



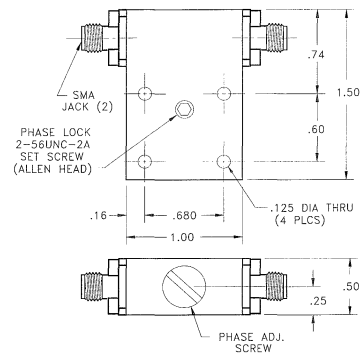
Midwest Microwave's series of higher frequency Harmonic Phase Shifters provide continuous phase adjustability while exhibiting high performance characteristics throughout their operating frequency range. They are small, lightweight, ruggedly constructed units that posses consistently low VSWR and linear insertion loss. They are completely field adjustable through the use of a smooth, and simple mechanical adjustment.

SPECIFICATIONS

Fundamental Frequency: **7.5-9.0 GHz and 6.5-9.0 GHz,**
Harmonic Frequency: **15.0- 17.0, and 13.0-18.0 GHz**
Impedance: **50 Ohms**
VSWR: **1.7:1 in Fundamental frequency band typical**
2.0:1 in harmonic frequency band typical
see table below
Insertion Loss: **0.8 dB max in fundamental frequency band**
1.0 dB max in harmonic frequency band
Power: **2 Watts average, 2 Watts Peak**
Operating Temperature: **-55 °C - +125 °C**
Connectors: **Passivated Stainless Steel SMA***



Model No. PHS-6008-FF-SMA-79



Model No. PHS-6009-FF-SMA-79

Frequency (GHz)		Model Number	Harmonic Phase Shift	VSWR		Insertion Loss	
Fundamental	Harmonic		(degrees)	Fundamental	Harmonic	Fundamental	Harmonic
7.5 - 9.0	15.0 - 17.0	PHS-6008-FF-SMA-79	250	1.60	1.80	0.80	1.00
6.5 - 9.0	13.0 - 18.0	PHS-6009-FF-SMA-79	180	1.60	1.80	0.90	1.00

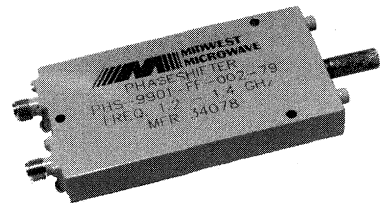
Note: SMA male , TNC, or Type N output connectors, either male or female, are also available by substituting TNC or NNN for SMA in the Model Number. If an interface gender change is desired, substitute MM or MF for FF in the Model Number. Please note that the housing thickness will increase accordingly when larger connectors are selected.

Phase Shifters

Line Stretcher Type

55° Field Adjustable Phase Shift

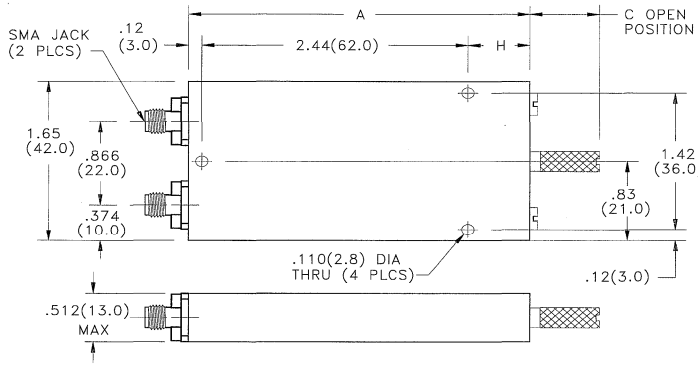
- **Frequency Range - 1.20 - 1.40 GHz**
- **Maximum Insertion Loss - 0.2 dB**
- **Maximum VSWR - 1.15:1**
- **Rugged Construction**



This low frequency, narrow band Line Stretcher type Phase Shifter was designed to provide maximum performance while providing very low VSWR and insertion loss. It is a small, lightweight, ruggedly constructed unit that consistently performs its phase adjustment function through the use of a smooth, continuous, drive mechanism that internally translates a trombone type telescoping line extender that allows precise field phase adjustment and also provides a firm locking arrangement.

SPECIFICATIONS

Frequency Range: **1.20 - 1.40 GHz**
Impedance: **50 Ohms**
VSWR: **1.15:1 max**
Insertion Loss: **0.2 dB max**
Power: **2 Watts average, 2 Watts Peak**
Operating Temperature: **-55 °C - +125 °C**
Connectors: **Passivated Stainless Steel SMA Female***



Frequency (GHz)	Model Number	Phase Shift (deg)	VSWR	Insertion Loss	Dimensions - in (mm)			Weight	
					A	C	H	oz	gm
1.2-1.4	PHS-9901-FF-SMA-79	55	1.15	0.2	3.12 (79.3)	.663 (16.8)	.556 (14.1)	2.5	71.4

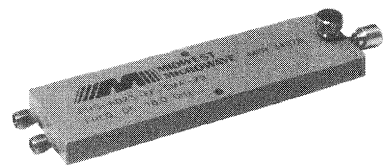
Note: SMA male , TNC, or Type N output connectors, either male or female, are also available by substituting TNC or NNN for SMA in the Model Number. If an interface gender change is desired, substitute MM or MF for FF in the Model Number. Please note that the housing thickness will increase accordingly when larger connectors are selected.

Phase Shifters

Line Stretcher Type

30, 60, & 90° per GHz Phase Shift

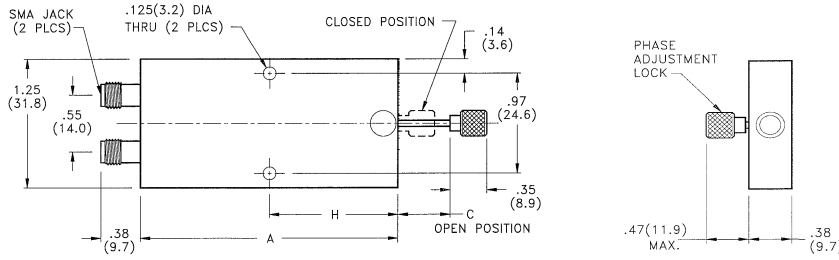
- **DC - 18 GHz Frequency Range**
- **Low Insertion Loss**
- **50 Watts average power**
- **Rugged Construction**



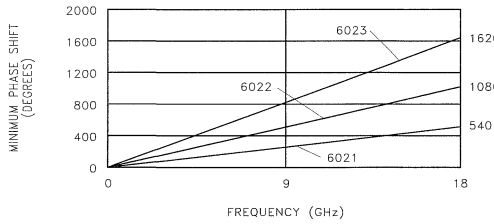
This series of broad band Line Stretcher type Phase Shifters were designed to provide phase slope adjustment in a fixed system of microwave components. They utilize precision internal airline design techniques in small, lightweight, ruggedly constructed units that consistently perform phase slope adjustment functions through the use of a smooth, continuous, trombone type mechanism that allows precise field adjustment and firm locking arrangement.

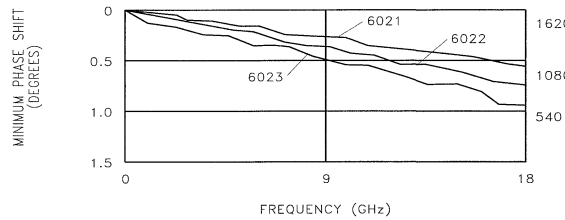
SPECIFICATIONS

Frequency Range: DC - 18.0 GHz
Impedance: 50 Ohms
VSWR: see chart
Insertion Loss: see chart
Power: 50 Watts average, 1kW Peak
Operating Temperature: -55 °C - +125 °C
Connectors: Passivated Stainless Steel SMA Female*



Typical Performance



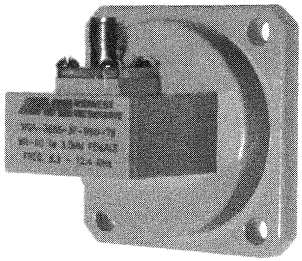


Frequency (GHz)	Model Number	Phase Shift (deg/GHz)	VSWR	Insertion Loss	Dimensions - in (mm)			Weight	
					A	C	H	oz	gm
DC - 18.0	PHS-6021-FF-SMA-79	30	1.3,dc-10 GHz 1.5, 10-18 GHz	0.3 + .025 f	2.50 (63.5)	0.50 (12.7)	1.25 (31.8)	2.5	71.4
DC - 18.0	PHS-6022-FF-SMA-79	60	1.4, dc-10 GHz 1.6, 10-18 GHz	0.3 + .035 f	3.50 (88.9)	1.00 (25.4)	1.75 (44.5)	3.5	100.0
DC - 18.0	PHS-6023-FF-SMA-79	90	1.5, dc-10 GHz 1.7, 10-18 GHz	0.3 + .045 f	4.50 (114.3)	1.50 (38.1)	2.25 (57.2)	4.5	128.6

Note: SMA male , TNC, or Type N output connectors, either male or female, are also available by substituting TNC or NNN for SMA in the Model Number. If an interface gender change is desired, substitute MM or MF for FF in the Model Number. Please note that the housing thickness will increase accordingly when larger connectors are selected.

Waveguide Adapters

SMA • 7mm • N• TNC



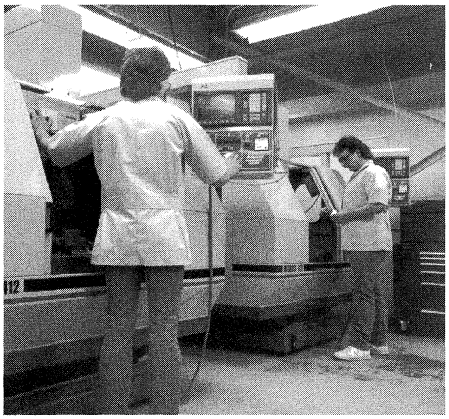
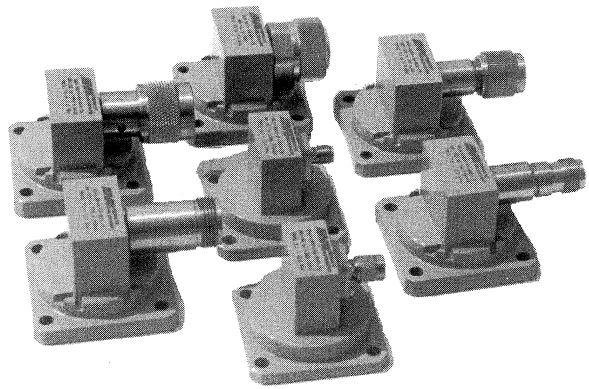


Table of Contents

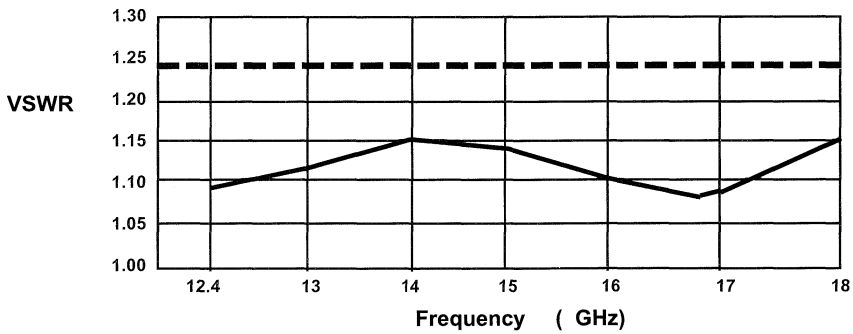
Waveguide Adapters General Information

- **DC - 26.5 GHz High Performance**
- **1.15 Typical VSWR**
- **Male or Female Connectors available**
- **Choke Flange Types available**
- **-65° C to +125° C Operating Temperature**



Midwest Microwave offers a complete product line of Waveguide to Coaxial Adapters. The rectangular waveguide sizes covered are WR-42, WR-62, WR-90, and WR-102. Connector interfaces covered are SMA, 7mm, N Type, and TNC. Either male or female connector configurations are available as standard. The frequency range spanned by these reliable adapters is 7.0 GHz through 26.5 GHz. Above 18.0 GHz only SMA connector interfaces are offered as standard, other connector interfaces are available on special request. Standard units are normally supplied with regular rectangular cover flanges and female connectors, however male connectors and or choke flanges are also available. See the specification charts on the following pages for each type adapter to select the desired configuration.Special units are available with various connector interfaces with other waveguide types and flange types upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accomodate unique system needs. All Midwest Waveguide Adapters are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.

Typical Waveguide Adapter Performance Characteristics



- **Lower Frequency Models**
- **Custom Designs**
- **Special Flanges**
- **Narrow Band Specials**

COMMON SPECIFICATIONS

Impedance: 50 ohms
VSWR: 1.15 typical, 1.25 max
Power Rating: 50 Watts average
Operating Temperature: -50° to +125° C
Connectors: MIL-C-39012 Passivated St. Steel
Housing: Aluminum painted grey
Waveguide Adapter: MIL-A-22641
Flange: MIL-F-3922
Waveguide: MIL-W-85

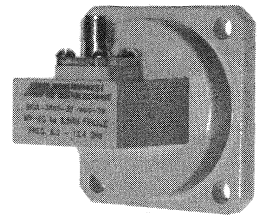
FREQUENCY RANGE (GHz)	WAVEGUIDE TYPE	INSIDE WAVEGUIDE SIZE INCHES (mm)	WAVEGUIDE FLANGE SIZE INCHES (mm)
7.0 - 11.0	WR - 102	1.020 x 0.510 (25.9x13.0)	1.69 sq. (42.9)
8.2 - 12.4	WR - 90	0.900 x 0.400 (22.9x10.2)	1.62 sq. (42.2)
10.0 - 15.0	WR - 75	0.750 x 0.375 (19.1x9.5)	1.50 sq. (38.1)
12.4 - 18.0	WR - 62	0.622 x 0.311 (15.8X7.9)	1.31 sq. (33.3)
18.0 - 26.5	WR - 42	0.420 x 0.170 (10.7x4.3)	0.88 sq. (22.4)

Waveguide Adapters

SMA • 7mm Types

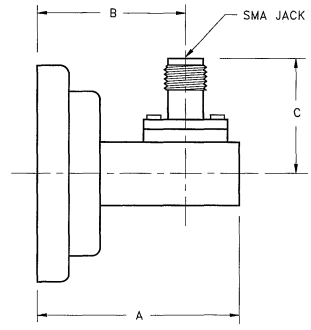
SMA and 3.5mm High Performance

- **7.0 - 26.5 GHz in Full Octave Frequency Bands**
- **Low VSWR - 1.15 Typical, 1.25 max**
- **Light Weight Aluminum Construction**
- **System or Laboratory use**



Midwest Microwave's series of waveguide to SMA coaxial adapters provide a precise and efficient method of accomplishing the transition from waveguide to SMA miniature coaxial line. They possess excellent performance characteristics throughout the frequency bands specified for each waveguide size. They are constructed of lightweight aluminum and utilize passivated stainless steel connectors. The SMA female jack or male plug are standard and each unit is also available with a choke flange if it is so desired.

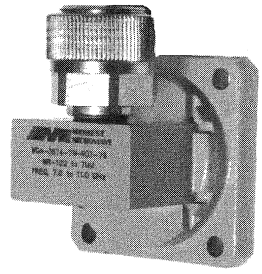
FREQUENCY RANGE (GHz)	MODEL NUMBER	FITS W/G SIZE	W/G FLANGE TYPE	SIZE INCHES (mm) DIM A	DIM B	DIM C
7.0 - 11.0	WGA-3624-SF-W02-79	WR-102	No UG #	1.29 (32.8)	0.90 (22.9)	0.88 (22.4)
8.2 - 12.4	WGA-3625-SF-W90-79	WR-90	UG-135/U	1.29 (32.8)	0.90 (22.9)	0.73 (18.5)
10.0 - 15.0	WGA-3686-3F-W75-79	WR-75	No UG #	1.26 (32.0)	0.90 (22.8)	0.70 (17.7)
12.4 - 18.0	WGA-3627-SF-W62-79	WR-62	UG1665/U	1.20 (30.5)	0.88 (22.4)	0.69 (17.5)
18.0 - 26.5	WGA-3688-3F-W42-79	WR-42	UG595/U	1.00 (25.4)	0.73 (18.5)	0.59 (15.0)



Notes: 1. To designate SMA Male connector, use 3614, 3615, 3696, 3617, and 3698 respectively and substitute "M" for "F" in the ninth digit of the Model No. Dimension "C" will change slightly.
2. 18 - 26.5 GHz Models use 3.5 Precision Connectors compatible with SMA.
3. To designate Choke Flange, substitute "C02" for "W02" etc. in Model No.

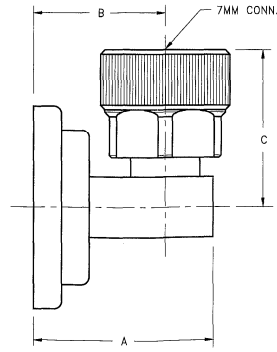
7mm Precision Performance

- **Full Octave Frequency Bands**
- **Low VSWR - 1.15 Typical, 1.25 max**
- **Light Weight Aluminum Construction**
- **System or Laboratory use**



Midwest Microwave's series of waveguide to 7mm coaxial adapters provide a precise method of accomplishing the transition from waveguide to precision 7mm coaxial line. They possess excellent performance characteristics and are totally compatible with all test equipment that utilize the IEEE 7mm standard connector. They are constructed of lightweight aluminum and utilize Midwest Microwaves own precision 7mm connectors that meet that standard.

FREQUENCY RANGE (GHz)	MODEL NUMBER	FITS W/G SIZE	W/G FLANGE TYPE	SIZE INCHES (mm) DIM A	DIM B	DIM C
7.0 - 11.0	WGA-3674-7M-W02-79	WR-102	NO UG#	1.29 (32.8)	0.90 (22.9)	1.10 (27.9)
8.2 - 12.4	WGA-3675-7M-W90-79	WR-90	UG-135/U	1.29 (32.8)	0.90 (22.9)	1.14 (29.0)
12.4 - 18.0	WGA-3677-7M-W62-79	WR-62	UG1665/U	1.20 (30.5)	0.90 (22.9)	1.03 (26.2)

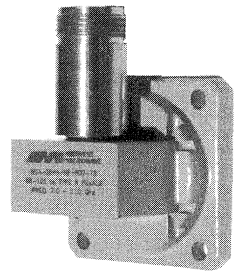


Note: 1. To designate Choke Flange, subsitute "C02" for "W02" etc. in Model No.

Waveguide Adapters

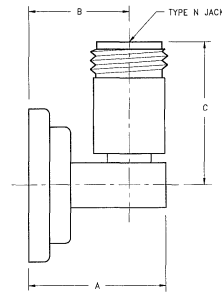
N • TNC Types

N Type Precision Performance



- **7.0 - 18.0 GHz High Performance**
- **Low VSWR - 1.10 Typical, 1.25 max**
- **Light Weight Rugged Aluminum Construction**
- **Choke Flange Types available**

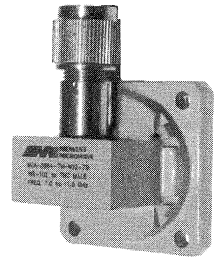
Midwest Microwave's series of Waveguide Adapters to N type coaxial lines are ruggedly constructed using aluminum housings and passivated stainless steel connectors. They exhibit superior performance in both the system or laboratory environment. Units are available with either female or male connectors and with either standard waveguide cover flanges or choke flanges. Special waveguide to coaxial products are also available upon request.



FREQUENCY RANGE (GHz)	MODEL NUMBER	FITS W/G SIZE	W/G FLANGE TYPE	SIZE INCHES (mm) DIM A	DIM B	DIM C
7.0 - 11.0	WGA-3644-NF-W02-79	WR-102	NO UG#	1.29 (32.8)	0.90 (22.9)	1.40 (35.6)
8.2 - 12.4	WGA-3645-NF-W90-79	WR-90	UG-135/U	1.29 (32.8)	0.90 (22.9)	1.37 (34.8)
12.4 - 18.0	WGA-3647-NF-W62-79	WR-62	UG1665/U	1.20 (30.5)	0.90 (22.9)	1.33 (33.8)

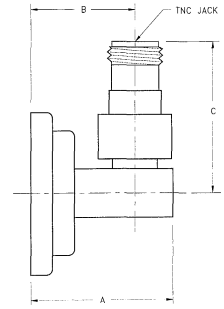
Note: 1. To designate N male connector, use 3634,3635, and 3637 respectively and subsitute "NM" for "NF" in Model No. Dimension "C" will change slightly.
2. To designate Choke Flange, subsitute "C02" for "W02" etc. in Model No.

TNC Precision Performance



- **Full Octave Frequency Bands**
- **Low VSWR - 1.15 Typical, 1.25 max**
- **Light Weight Aluminum Construction**
- **System or Laboratory use**

Midwest Microwave's series of Waveguide to TNC Coaxial Adapters provide a precise and convenient method of accomplishing the transition from waveguide to TNC coaxial line. They possess excellent performance characteristics and help avoid the use of additional adapters to get to the TNC connector interface. They are constructed of lightweight aluminum and are available in either female or male TNC connectors and are also offered with choke flanges.



FREQUENCY RANGE (GHz)	MODEL NUMBER	FITS W/G SIZE	W/G FLANGE TYPE	SIZE INCHES (mm) DIM A	DIM B	DIM C
7.0 - 11.0	WGA-3664-TF-W02-79	WR-102	NO UG#	1.29 (32.8)	0.90 (22.9)	1.52 (38.6)
8.2 - 12.4	WGA-3665-TF-W90-79	WR-90	UG-135/U	1.29 (32.8)	0.90 (22.9)	1.49 (37.9)
12.4 - 18.0	WGA-3667-TF-W62-79	WR-62	UG1665/U	1.20 (30.5)	0.90 (22.9)	1.45 (36.8)

Note: 1. To designate TNC male connector, use 3654,3655, and 3657 respectively and subsitute "TM" for "TF" in Model No. Dimension "C" will change slightly.
2. To designate Choke Flange, subsitute "C02" for "W02" etc. in Model No.

Between-Series Adapters

DC - 18 GHz Performance

- **Low VSWR and Insertion loss**
- **100 % Swept Frequency Tested**
- **MIL-C-39012 Interfaces**
- **Rugged Stainless Steel Construction**

Midwest Microwave offers this complete line of high performance precision Coaxial Adapters. They are available in almost all of the popular connector interfaces including 3.5mm and 7mm. They incorporate design features that provide consistent low VSWR and insertion loss performance in a minimum length compact physical package that operates over a broad frequency range. Special designed adapters are also available in a wide variety of configurations and interfaces upon request.

GENERAL SPECIFICATIONS

Frequency: DC - 18 GHz typical
VSWR: as noted
Impedance: 50 Ohms
Insertion Loss: 0.5 dB max typical
Impedance: 50 Ohms
Operating Temperature Range: -65 to +125 °C

Construction:
Outer Conductor Housings: Passivated Stainless Steel or Nickel Plated Brass as noted
Inner Conductors: Gold Plated Beryllium Copper
Dielectric Insolators: Polytetrafluorethelyne (PTFE)

Selection Guide: Choose Adapter combination desired from the vertical and horizontal columns and find page no. at their intersection.

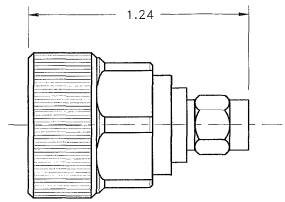
	SMA	SSMA	SMM	BMA	2.9mm	3.5mm	7mm	N	TNC	BNC	SC	HN
SMA	153-154	148	149	150-152	*	*	126-127	134-136 &139	145-146	147 & 160	*	*
SSMA	148						128	137-138 &140	*	*		
SMM	149						*	*				
BMA	150-152						132					
2.9mm	*				156			*				
3.5mm	*					155	127	133				
7mm	126-127	128		132	*	127	162	130	131		131	132
N	134-136	137-138 &140			*	133	130	157 &162	141	142	143	144
TNC	145-146	*					131	141	158	*	*	*
BNC	147	*					*	142	*	159	*	*
SC	*						131	143	*	*	160	
HN	*						132	144	*	*		161

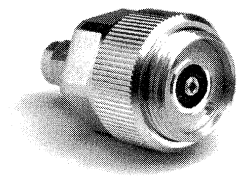
Note: SMA to SMC Adaptersare available on special request.
* Available on request. Contact the factory for availability for those indicated as well as for those desired Adapters that are not indicated.

7mm to SMA Male Plug

Model Number
ADT-2540-7M-SMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

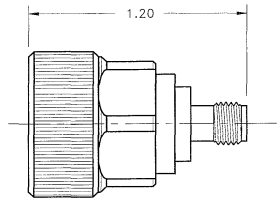


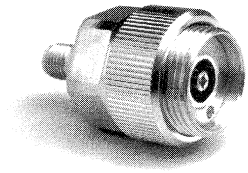


7mm to SMA Female Jack

Model Number
ADT-2541-7M-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

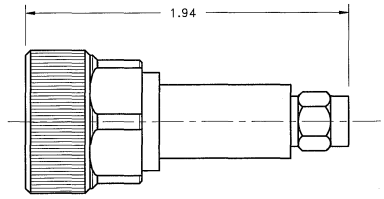


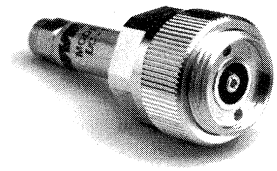


7mm to SMA Male Plug - Long Neck Adapter

Model Number
ADT-2675-7M-SMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

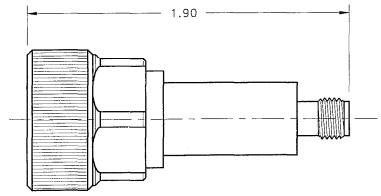


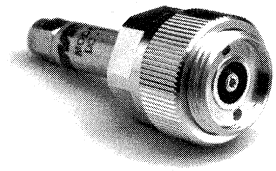


7mm to SMA Female Jack- Long Neck Adapter

Model Number
ADT-2676-7M-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

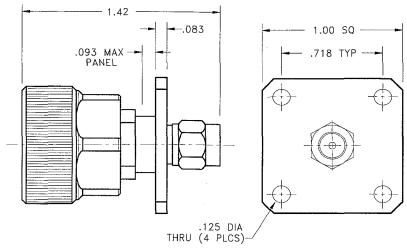


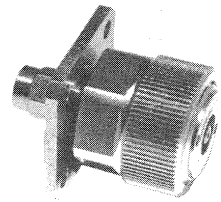


7mm Flange Mount to SMA Male Plug

Model Number
ADT-2655-7M-SMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

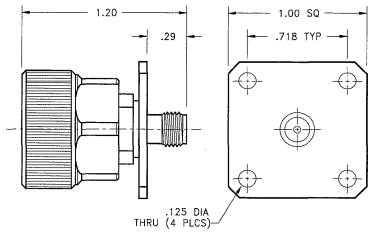


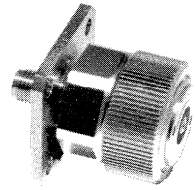


7mm Flange Mount to SMA Female Jack

Model Number
ADT-2653-7M-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

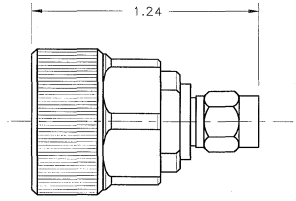


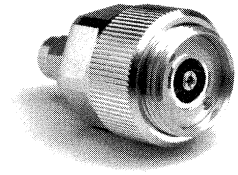


7mm to 3.5mm Male Plug

Model Number
ADT-2701-7M-3MM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

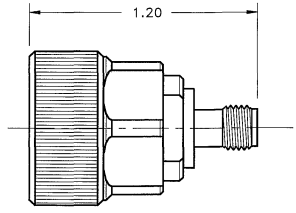


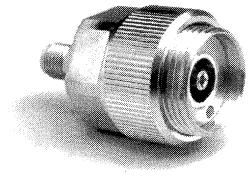


7mm to 3.5mm Female Jack

Model Number
ADT-2702-7M-3MF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

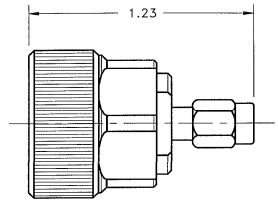


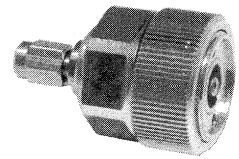


7mm to SSMA Male Plug

Model Number
ADT-2703-7M-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

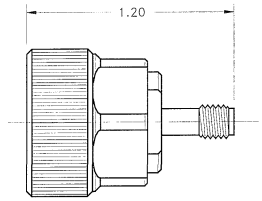


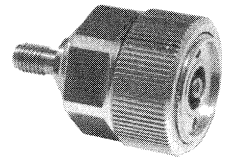


7mm to SSMA Female Jack

Model Number
ADT-2704-7M-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

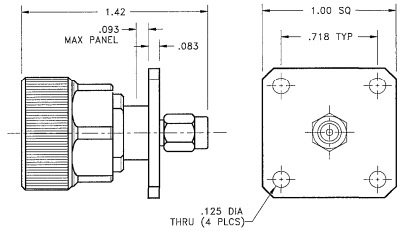


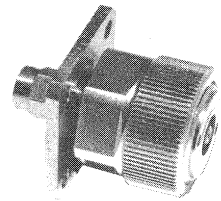


7mm Flange Mount to SSMA Male Plug

Model Number
ADT-2656-7M-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

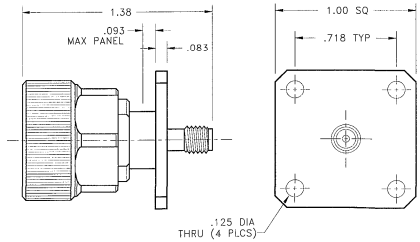


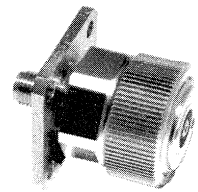


7mm Flange Mount to SSMA Female Jack

Model Number
ADT-2657-7M-SSF-02

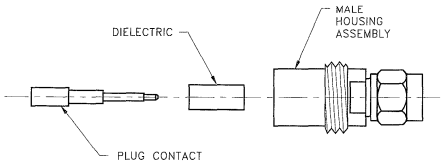
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





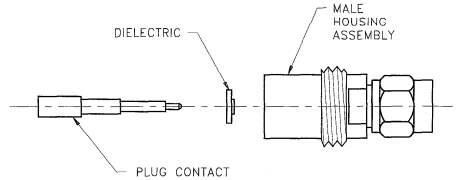
Rebuild Kit for 7mm to SMA Male Plug

Model Number
ADT-2542-7M-SMM-02



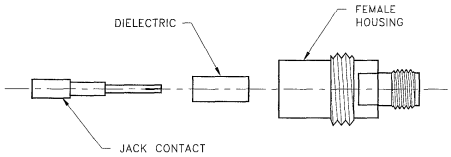
Rebuild Kit for 7mm to 3.5mm Male Plug

Model Number
ADT-2742-7M-3MM-02



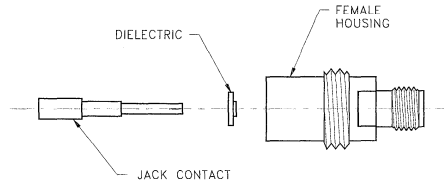
Rebuild Kit for 7mm to SMA Female Jack

Model Number
ADT-2543-7M-SMF-02



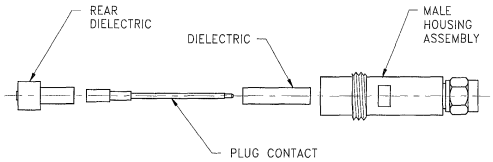
Rebuild Kit for 7mm to 3.5mm Female Jack

Model Number
ADT-2743-7M-3MF-02



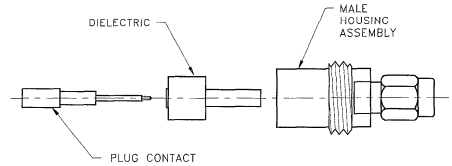
Rebuild Kit for 7mm to SMA Male Plug Long Neck Adapter

Model Number
ADT-2677-7M-SMM-02



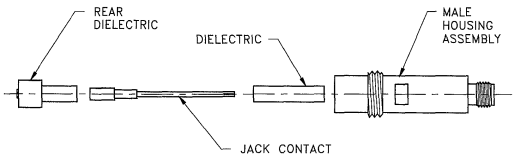
Rebuild Kit for 7mm to SSMA Male Plug

Model Number
ADT-2705-7M-SSM-02



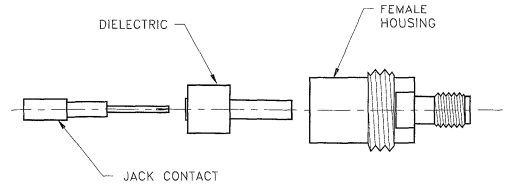
Rebuild Kit for 7mm to SMA Female Jack Long Neck Adapter

Model Number
ADT-2678-7M-SMF-02



Rebuild Kit for 7mm to SSMA Female Jack

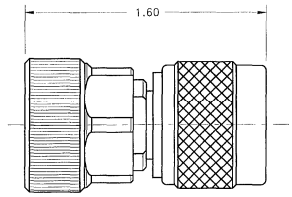
Model Number
ADT-2706-7M-SSF-02

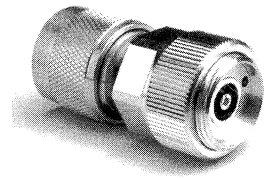


7mm to N Male Plug

Model Number
ADT-2544-7M-NNM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

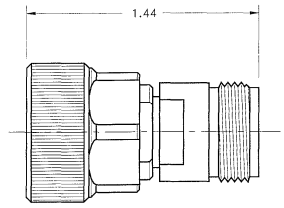


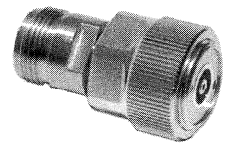


7mm to N Female Jack

Model Number
ADT-2545-7M-NNF-02

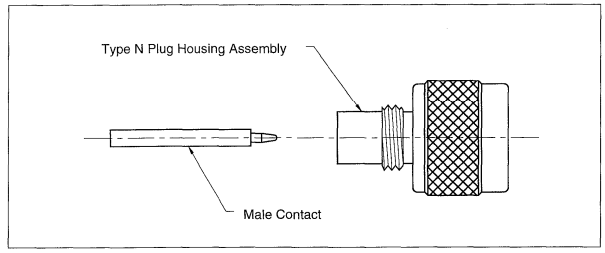
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





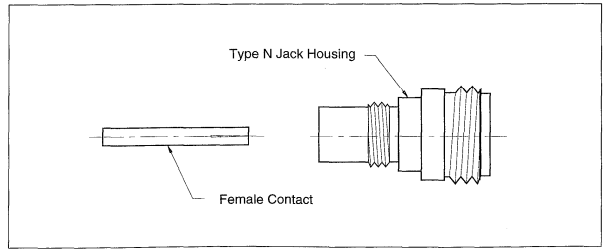
Rebuild Kit for 7mm to N Male Plug

Model Number
ADT-2603-7M-NNM-02



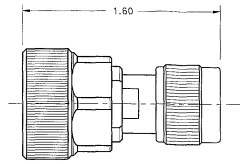
Rebuild Kit for 7mm to N Female Jack

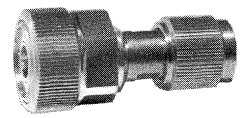
Model Number
ADT-2604-7M-NNF-02



7mm to TNC Male Plug

Model Number
ADT-2546-7M-TNM-02

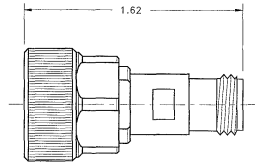


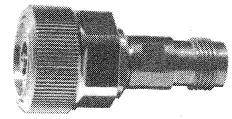


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.02 + .006 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

7mm toTNC Female Jack

Model Number
ADT-2547-7M-TNF-02

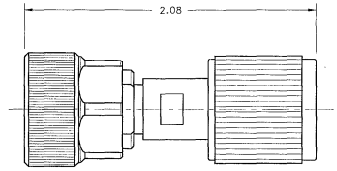


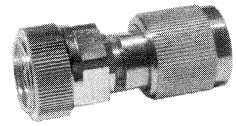


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.02 + .006 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

7mm to SC Male Plug

Model Number
ADT-2591-7M-SCM-02

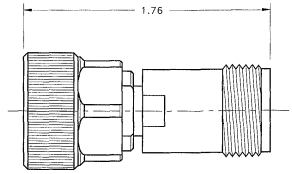


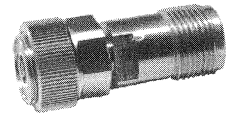


SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.04 max @ DC - 4 GHz
1.07 max @ 4 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

7mm to SC Female Jack

Model Number
ADT-2592-7M-SCF-02



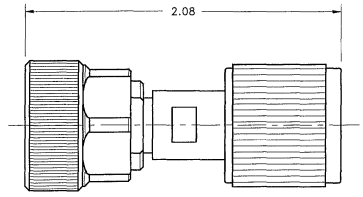


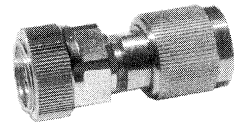
SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.04 max @ DC - 4 GHz
1.07 max @ 4 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

7mm to HN Male Plug

Model Number
ADT-2801-7M-HNM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

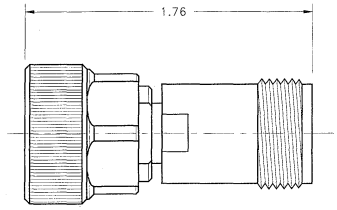


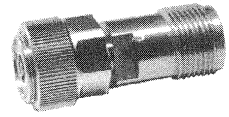


7mm to HN Female Jack

Model Number
ADT-2802-7M-HNF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

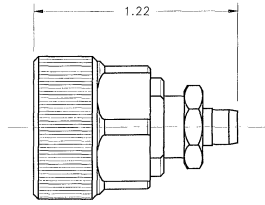


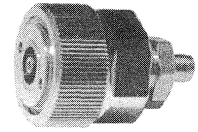


7mm to BMA Male Plug

Model Number
ADT-2761-7M-BMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

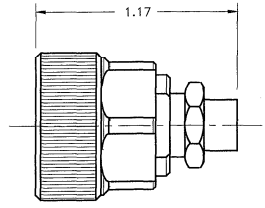


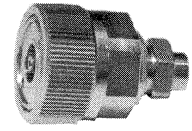


7mm to BMA Female Jack

Model Number
ADT-2762-7M-BMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.09
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

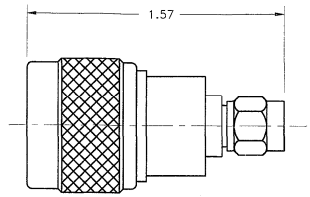


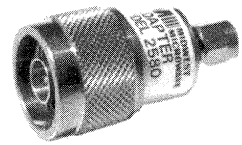


N Male Plug to 3.5mm Male Plug

Model Number
ADT-2712-NM-3MM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

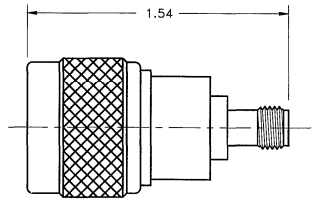


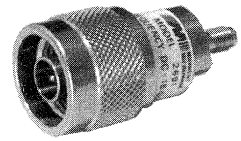


N Male Plug to 3.5mm Female Jack

Model Number
ADT-2713-NM-3MF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

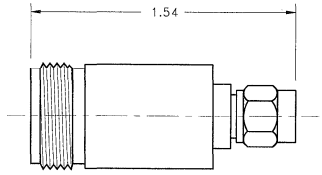




N Female to 3.5mm Male Plug

Model Number
ADT-2714-NF-3MM-02

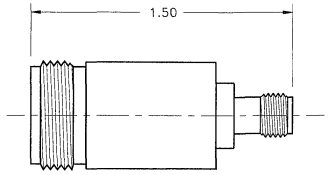
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



N Female to 3.5mm Female Jack

Model Number
ADT-2715-NF-3MF-02

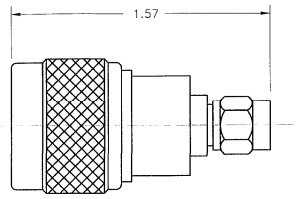
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

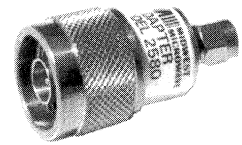


N Male Plug to SMA Male Plug

Model Number
ADT-2580-NM-SMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

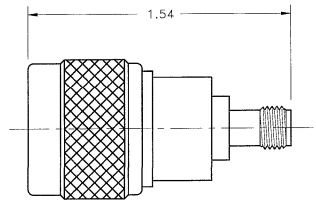




N Male Plug to SMA Female Jack

Model Number
ADT-2581-NM-SMF-02

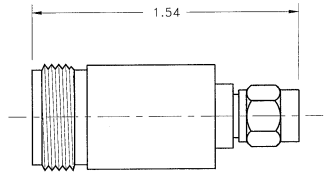
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



N Female Jack to SMA Male Plug

Model Number
ADT-2582-NF-SMM-02

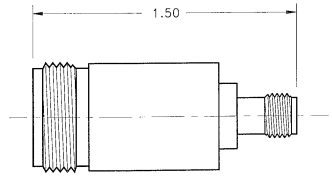
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



N Female Jack to SMA Female Jack

Model Number
ADT-2583-NF-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

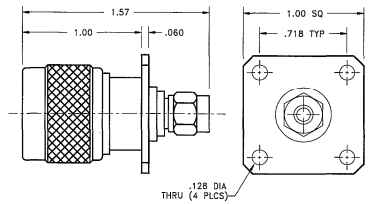


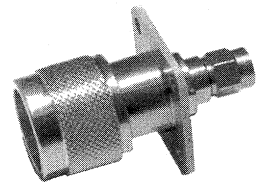
N Flange Mount Male Plug to SMA Male Plug

Model Number
ADT-2576-NM-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



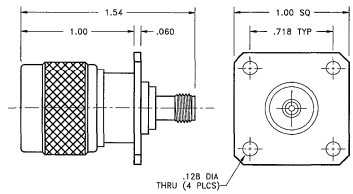


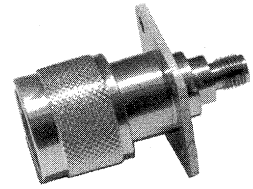
N Flange Mount Male to SMA Female Jack

Model Number
ADT-2577-NM-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



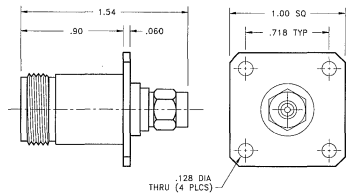


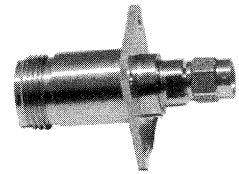
N Flange Mount Female to SMA Male Plug

Model Number
ADT-2578-NF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





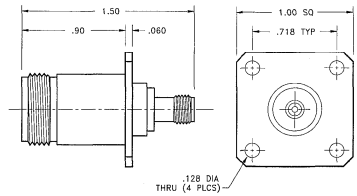
Note: Also available with 1.23 O.A.L. as ADT-2578-MF-009-02

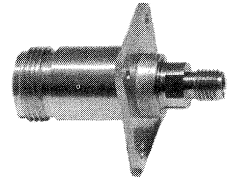
N Flange Mount Female to SMA Female Jack

Model Number
ADT-2579-NF-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





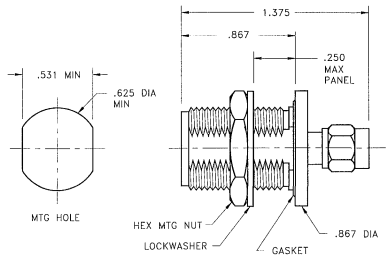
Note: Also available with 1.23 O.A.L. as ADT-2579-FF-012-02

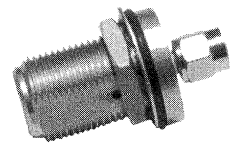
N Bulkhead Female Jack to SMA Male Plug

Model Number
ADT-2810-NF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



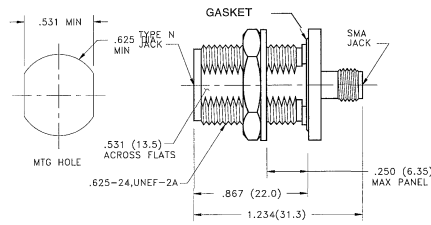


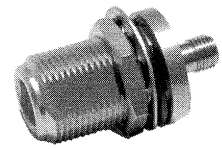
N Bulkhead Female Jack to SMA Female Jack

Model Number
ADT-2840-NF-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



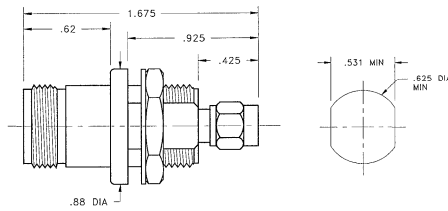


N Rear Mount Bulkhead Female Jack to SMA Male Plug

Model Number
ADT-2599-NF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

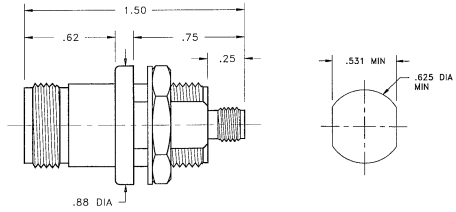


N Rear Mount Bulkhead Female Jack to SMA Female Jack

Model Number
ADT-2599-NF-SMF-02

SPECIFICATIONS

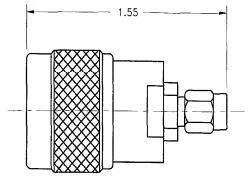
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

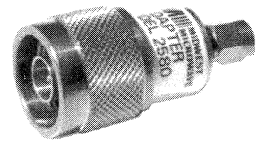


N Male Plug to SSMA Male Plug

Model Number
ADT-2690-NM-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

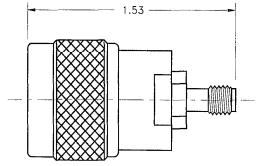


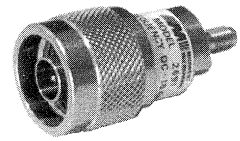


N Male Plug to SSMA Female Jack

Model Number
ADT-2691-NM-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

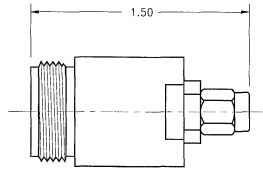




N Female to SSMA Male Plug

Model Number
ADT-2692-NF-SSM-02

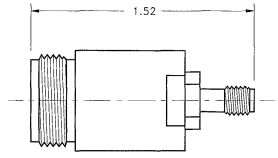
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

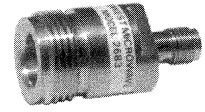


N Female to SSMA Female Jack

Model Number
ADT-2693-NF-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

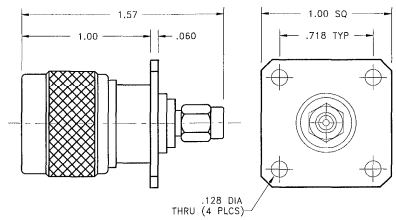


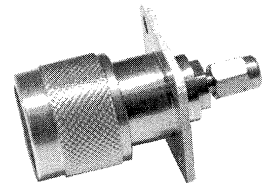


N Flange Mount Male Plug to SSMA Male Plug

Model Number
ADT-2811-NM-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

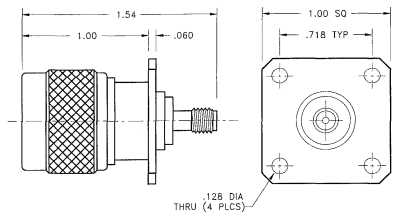


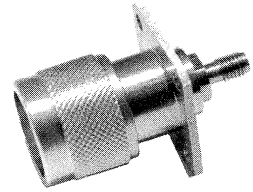


N Flange Mount Male Plug to SSMA Male Plug

Model Number
ADT-2812-NM-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

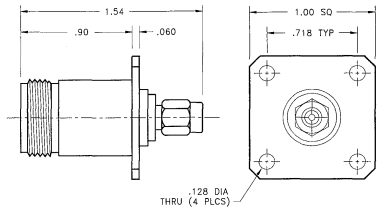


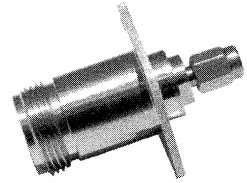


N Flange Mount Female Jack to SSMA Male Plug

Model Number
ADT-2813-NF-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

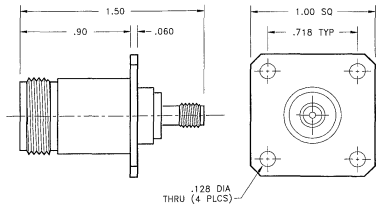


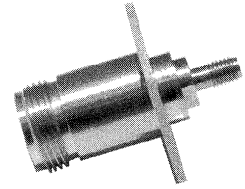


N Flange Mount Female Jack to SSMA Female Jack

Model Number
ADT-2814-NF-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

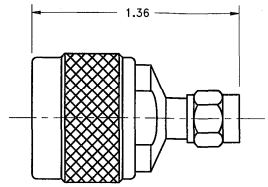


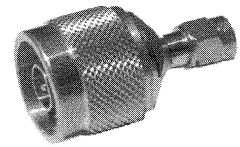


N Male Plug to SMA Male Plug

Model Number
ADT-2680-NM-SMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.25 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

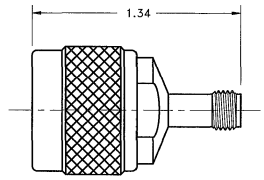


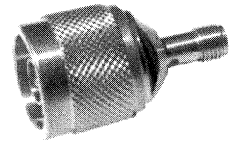


N Male Plug to SMA Female Jack

Model Number
ADT-2681-NM-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.25 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

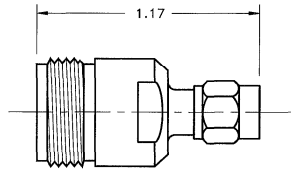




N Female to SMA Male Plug

Model Number
ADT-2682-NF-SMM-02

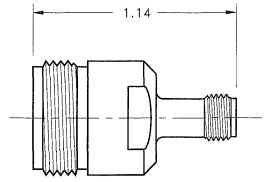
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.25 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



N Female to SMA Female Jack

Model Number
ADT-2683-NF-SMF-02

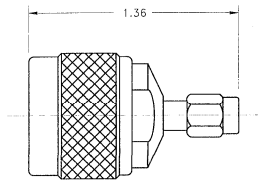
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.25 max
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

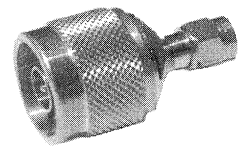


N Male Plug to SSMA Male Plug

Model Number
ADT-2816-NM-SSM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

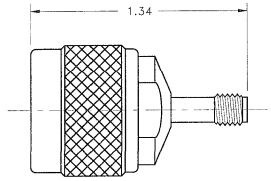


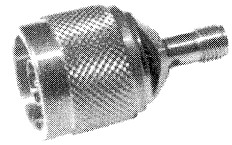


N Male Plug to SSMA Female Jack

Model Number
ADT-2817-NM-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

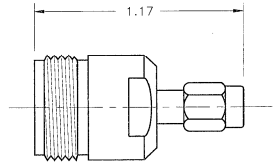




N Female Jack to SSMA Male Plug

Model Number
ADT-2818-NF-SSM-02

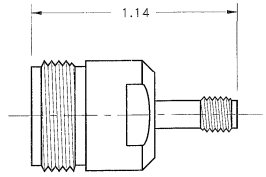
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

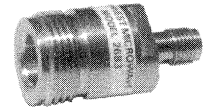


N Female Jack to SSMA Female Jack

Model Number
ADT-2819-NF-SSF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.20
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



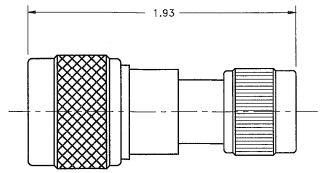


N Male Plug to TNC Male Plug

Model Number
ADT-2584-NM-TNM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

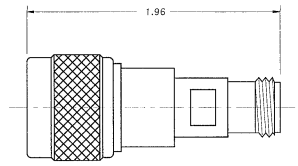


N Male Plug to TNC Female Jack

Model Number
ADT-2585-NM-TNF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

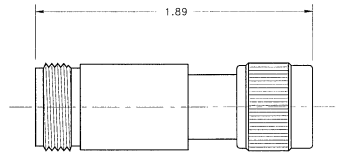


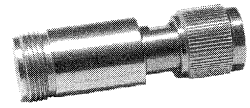
N Female to TNC Male Plug

Model Number
ADT-2586-NF-TNM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



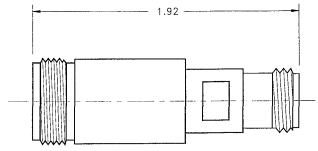


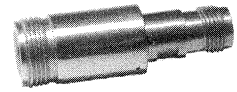
N Female to TNC Female Jack

Model Number
ADT-2587-NF-TNF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC-4.0 GHz
1.07 @ 4.0-8.0 GHz
1.12 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

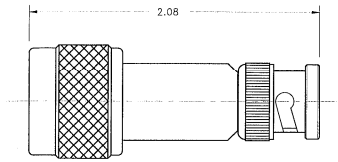


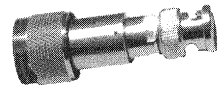


N Male Plug to BNC Male Plug

Model Number
ADT-2613-NM-BNM-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Type N - Passivated Stainless Steel
BNC - Nickel Plated Brass

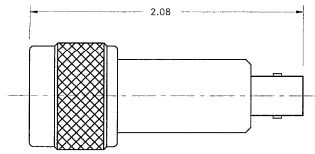


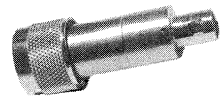


N Male Plug to BNC Female Jack

Model Number
ADT-2614-NM-BNF-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Type N - Passivated Stainless Steel
BNC - Nickel Plated Brass

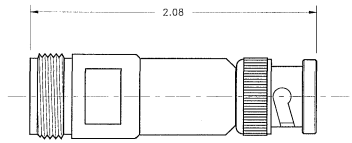




N Female Jack to BNC Male Plug

Model Number
ADT-2615-NF-BNM-02

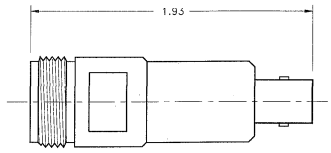
SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Type N - Passivated Stainless Steel
BNC - Nickel Plated Brass



N Female Jack to BNC Female Jack

Model Number
ADT-2616-NF-BNF-02

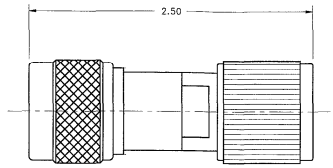
SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Type N - Passivated Stainless Steel
BNC - Nickel Plated Brass

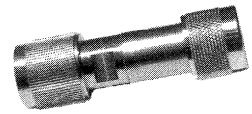


N Male Plug to SC Male Plug

Model Number
ADT-2618-NM-SCM-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

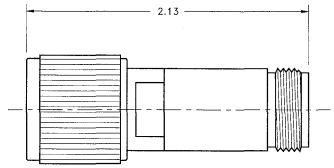


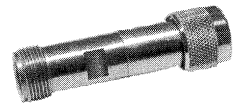


N Femle Jack to SC Male Plug

Model Number
ADT-2619-NF-SCM-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

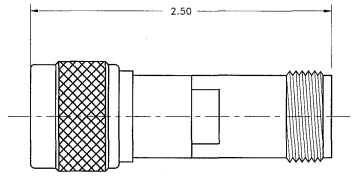




N Male to SC Female Jack

Model Number
ADT-2638-NM-SCF-02

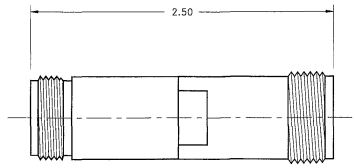
SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

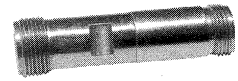


N Female to SC Female Jack

Model Number
ADT-2639-NF-SCF-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

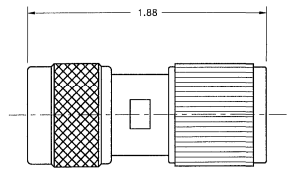


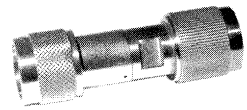


N Male Plug to HN Male Plug

Model Number
ADT-2803-NM-HNM-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

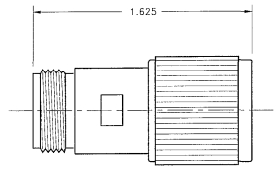


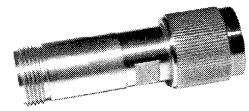


N Female Jack to HN Male Plug

Model Number
ADT-2804-NF-HNM-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

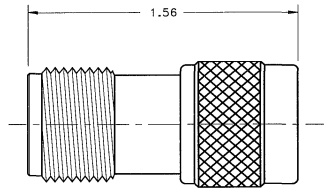


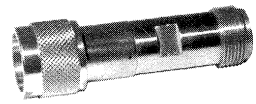


N Male Plug to HN Female Jack

Model Number
ADT-2791-NM-HNF-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

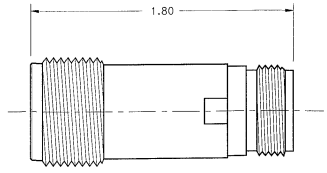


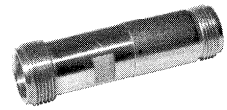


N Female Jack to HN Female Jack

Model Number
ADT-2790-NF-HNF-02

SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



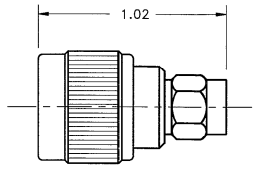


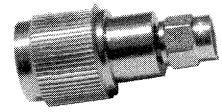
TNC Male Plug to SMA Male Plug

Model Number
ADT-2685-TM-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



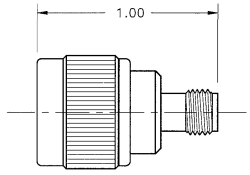


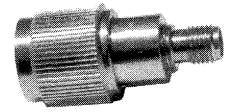
TNC Male Plug to SMA Female Jack

Model Number
ADT-2686-TM-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



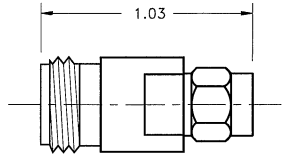


TNC Female Jack to SMA Male Plug

Model Number
ADT-2687-TF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

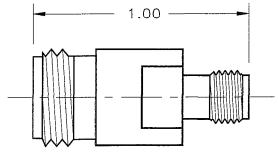


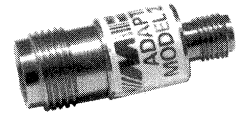
TNC Female Jack to SMA Female Jack

Model Number
ADT-2688-TF-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



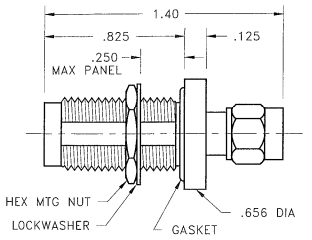


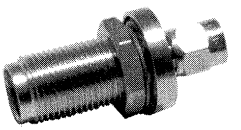
TNC Bulkhead Female Jack to SMA Male Plug

Model Number
ADT-2815-TF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





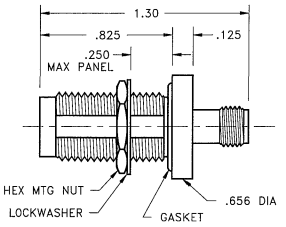
TNC Bulkhead Female Jack to SMA Female Jack

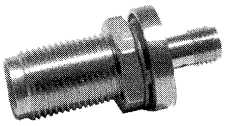
Model Number
ADT-2793-TF-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

Note: A rear mounted bulkhead TNC to SMA female adapter is also available as ADT-2779-TF-SMF-02



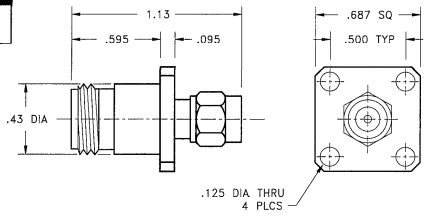


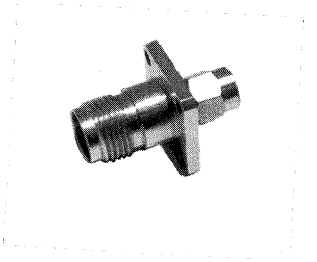
TNC Flange Mount Female Jack to SMA Male Plug

Model Number
ADT-2689-TF-SMM-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





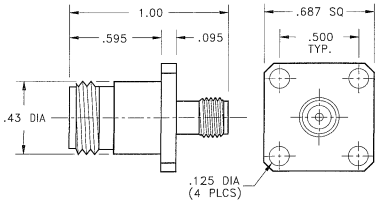
TNC Flange Mount Female Jack to SMA Female Jack

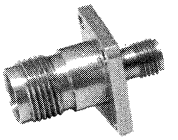
Model Number
ADT-2699-TF-SMF-02

SPECIFICATIONS

Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC-4.0 GHz
1.10 @ 4.0-8.0 GHz
1.15 @ 8.0-18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

Note: Also available with four #3-56 tapped holes in flange as ADT-2699-FF-013-02



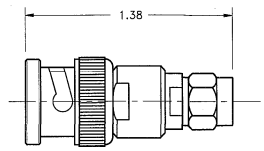


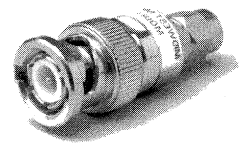
BNC Male Plug to SMA Male Plug

Model Number
ADT-2670-BM-SMM-02

SPECIFICATIONS

Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



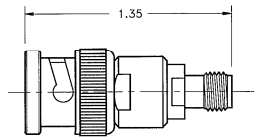


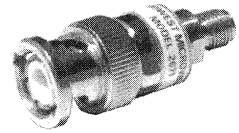
BNC Male Plug to SMA Female Jack

Model Number
ADT-2671-BM-SMF-02

SPECIFICATIONS

Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



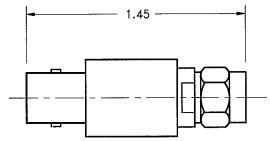


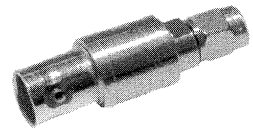
BNC Female to SMA Male Plug

Model Number
ADT-2672-BF-SMM-02

SPECIFICATIONS

Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



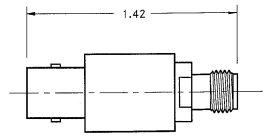


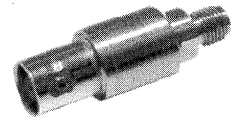
BNC Female to SMA Female Jack

Model Number
ADT-2673-BF-SMF-02

SPECIFICATIONS

Frequency: DC - 8.0 GHz
VSWR: 1.15 @ DC-4.0 GHz
1.25 @ 4.0-8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

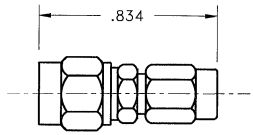


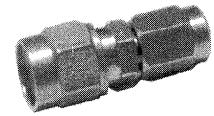


SMA Male Plug to SSMA MalePlug

Model Number
ADT-2695-SM-SSM-02

SPECIFICATIONS
Frequency: DC - 25.0 GHz
VSWR: 1.06 + .009 f (GHz) @ DC-12.4 GHz
1.05 + .01 f (GHz) @ 12.4-25.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

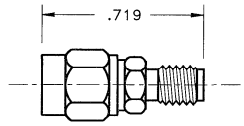


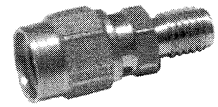


SMA Male Plug to SSMA Female Jack

Model Number
ADT-2696-SM-SSF-02

SPECIFICATIONS
Frequency: DC - 25.0 GHz
VSWR: 1.06 + .009 f (GHz) @ DC-12.4 GHz
1.05 + .01 f (GHz) @ 12.4-25.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

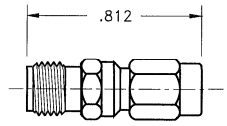


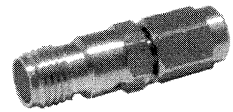


SMA Female Jack to SSMA Male Plug

Model Number
ADT-2697-SF-SSM-02

SPECIFICATIONS
Frequency: DC - 25.0 GHz
VSWR: 1.06 + .009 f (GHz) @ DC-12.4 GHz
1.05 + .01 f (GHz) @ 12.4-25.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

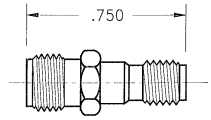


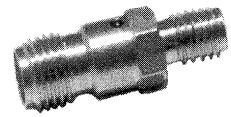


SMA Female Jack to SSMA Female Jack

Model Number
ADT-2698-SF-SSF-02

SPECIFICATIONS
Frequency: DC - 25.0 GHz
VSWR: 1.06 + .009 f (GHz) @ DC-12.4 GHz
1.05 + .01 f (GHz) @ 12.4-25.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

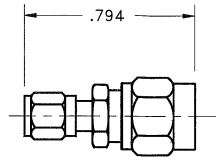


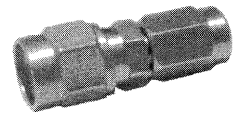


SMA Male Plug to SMM Male Plug

Model Number
ADT-2848-SM-MMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 + .007 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

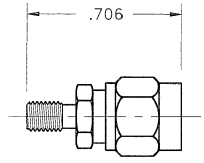


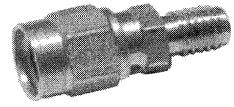


SMA Male Plug to SMM Female Jack

Model Number
ADT-2846-SM-MMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 + .007 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

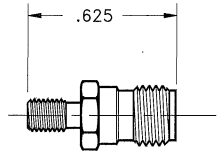


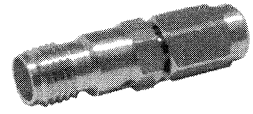


SMA Female Jack to SMM Female Jack

Model Number
ADT-2845-SF-MMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 + .007 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

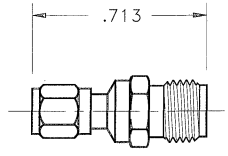


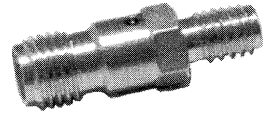


SMA Female Jack to SMM Male Plug

Model Number
ADT-2847-SF-MMM-02

SPECIFICATIONS
Frequency: DC - 10.0 GHz
VSWR: 1.04 + .007 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

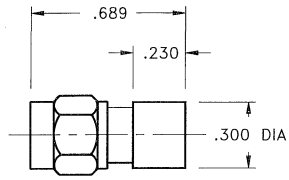




SMA Male Plug to BMA Female Jack

Model Number
ADT-2768-SM-BMF-02

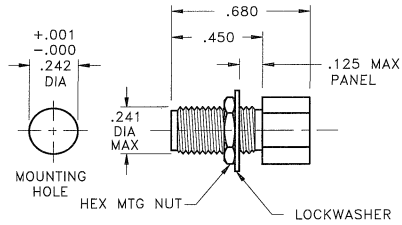
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Bulkhead Female Jack to BMA Female Jack

Model Number
ADT-2805-SF-BMF-02

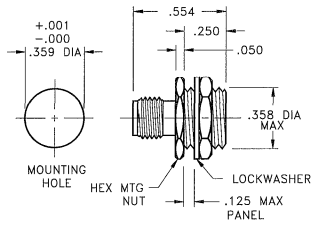
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Female Jack to BMA Female Jack - Bulkhead Mount

Model Number
ADT-2806-SF-BMM-02

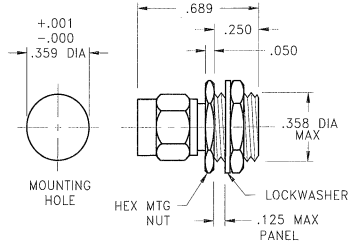
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Male Plug to BMA Female Jack - Bulkhead Mount

Model Number
ADT-2807-SM-BMF-02

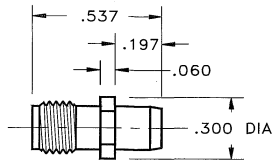
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Female Jack to BMA Male Plug

Model Number
ADT-2769-SF-BMM-02

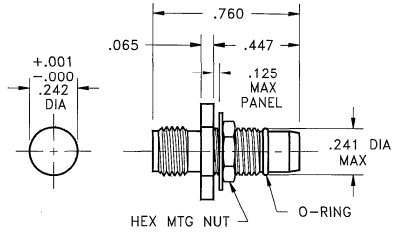
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Female Jack to BMA Male Plug - Bulkhead Mount

Model Number
ADT-2797-SF-BMM-02

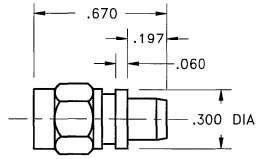
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



SMA Male Plug to BMA Male Plug

Model Number
ADT-2770-SM-BMM-02

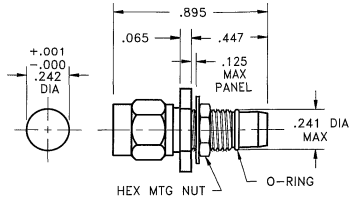
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

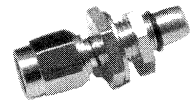


SMA Male Plug to BMA Male Plug - Bulkhead Mount

Model Number
ADT-2798-SM-BMM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

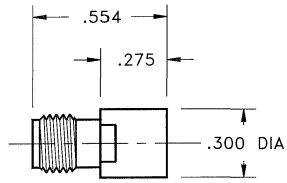




SMA Female Jack to BMA Female Jack

Model Number
ADT-2767-SF-BMF-02

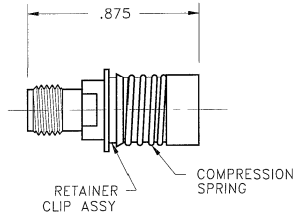
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

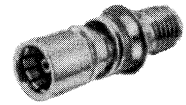


SMA Female Jack to BMA Female Jack - Floating Panel Mount

Model Number
ADT-2808-SF-BMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

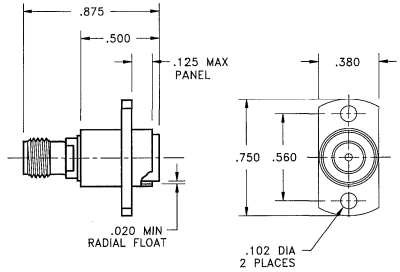


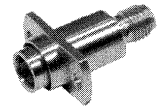


SMA Female Jack to BMA Female Jack - Floating Panel Mount

Model Number
ADT-2809-SF-BMF-02

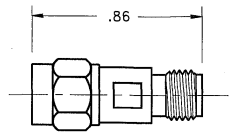
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

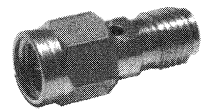




SMA Male Plug to SMA Female Jack

Model Number
ADT-2593-MF-SMA-02



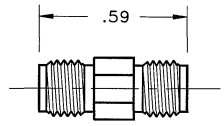


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

Note: Also available in 0.720 (18.2) O.A.L. as ADT-8000-22-SMA-02

SMA Female Jack to SMA Female Jack

Model Number
ADT-2595-FF-SMA-02

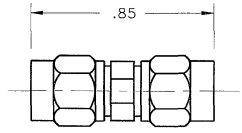


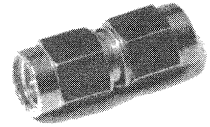
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

Note: Also available with knurled center section (0.875 O.A.L.) as ADT-2841-FF-SMA-02
and in 0.500 (12.7) O.A.L. with fully threaded barrel as ADT-8000-20-SMA-02 as shown in photograph.

SMA Male Plug to SMA Male Plug

Model Number
ADT-2594-MM-SMA-02



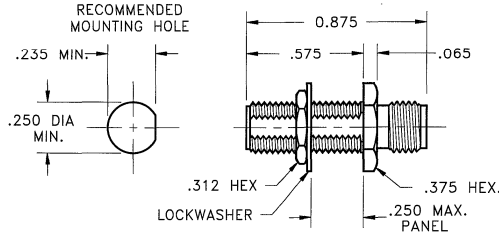


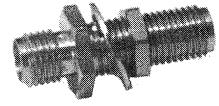
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

Note: Also available in 0.875 (22.2) O.A.L. as ADT-8000-21-SMA-02

SMA Female Jack to SMA Female Jack - Bulkhead Mount

Model Number
ADT-2823-FF-SMA-02





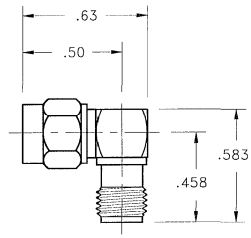
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

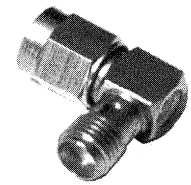
Formerly SMA-024-8000 and SMA-8000-24-000-02

Right Angle SMA Male Plug to SMA Female Jack

Model Number
ADT-8000-MF-SMA-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .010 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



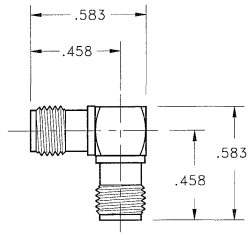


Formerly SMA-028-8000 and SMA-8000-28-000-02

Right Angle SMA Female Jack to SMA Female Jack

Model Number
ADT-8000-FF-SMA-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .010 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

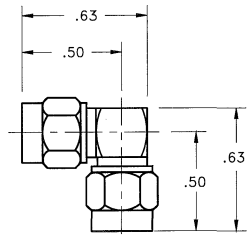


Formerly SMA-026-8000 and SMA-8000-26-000-02

Right Angle SMA Male Plug to SMA Male Plug

Model Number
ADT-8000-MM-SMA-02

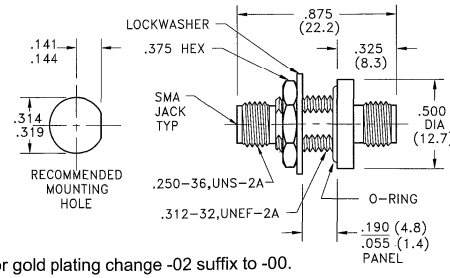
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 + .010 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

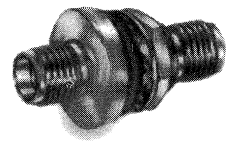


SMA Female Jack to SMA Female Jack - Blkhd Mount - Hermetic

Model Number
ADT-2824-FF-SMA-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.10 + .010 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



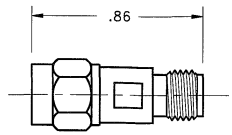


Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

3.5 mm Male Plug to 3.5 mm Female Jack

Model Number
ADT-2733-MF-35M-02

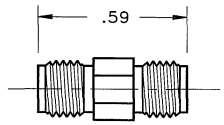
SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



3.5 mm Female Jack to 3.5 mm Female Jack

Model Number
ADT-2735-FF-35M-02

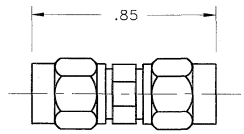
SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

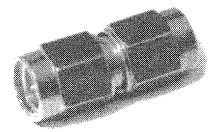


3.5 mm Male Plug to 3.5 mm Male Plug

Model Number
ADT-2734-MM-35M-02

SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

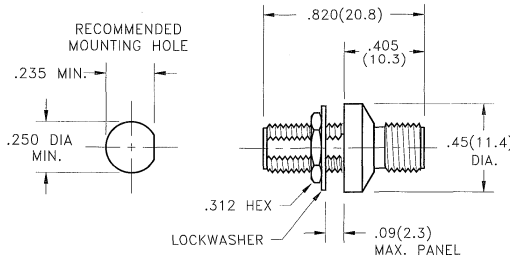


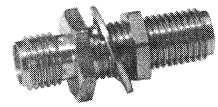


3.5 mm Female Jack to 3.5 mm Female Jack - Bulkhead Mount

Model Number
ADT-2850-FF-35M-02

SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

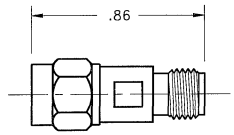


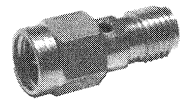


2.9 mm Male Plug to 2.9 mm Female Jack

Model Number
ADT-2851-MF-29M-02

SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

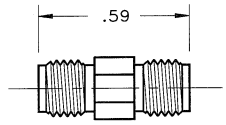


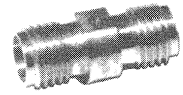


2.9 mm Female Jack to 2.9 mm Female Jack

Model Number
ADT-2852-FF-29M-02

SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

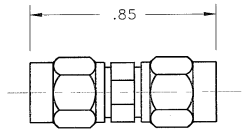


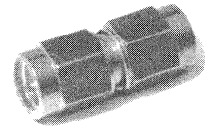


2.9 mm Male Plug to 2.9 mm Male Plug

Model Number
ADT-2853-MM-29M-02

SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

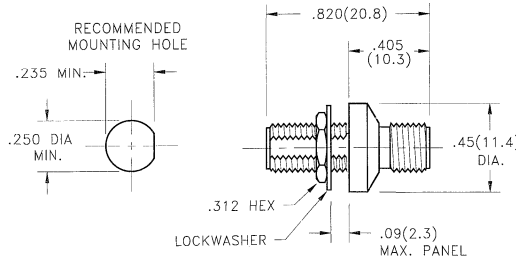


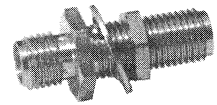


2.9 mm Female Jack to 2.9 mm Female Jack - Bulkhead Mount

Model Number
ADT-2854-FF-29M-02

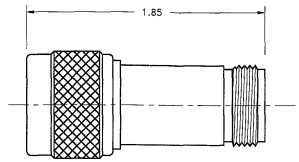
SPECIFICATIONS
Frequency: DC - 26.5 GHz
VSWR: 1.05 + .005 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

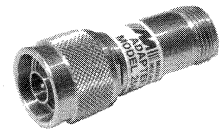




N Male Plug to N Female Jack

Model Number
ADT-2588-MF-NNN-02

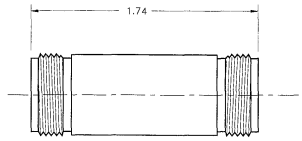




SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC - 4.0 GHz
1.06 @ 4.0 - 8.0 GHz
1.10 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

N Female Jack to N Female Jack

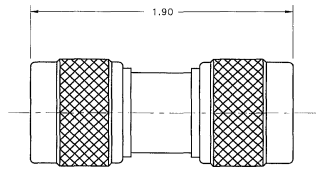
Model Number
ADT-2590-FF-NNN-02

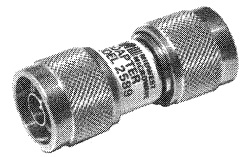


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC - 4.0 GHz
1.06 @ 4.0 - 8.0 GHz
1.10 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

N Male Plug to N Male Plug

Model Number
ADT-2589-MM-NNN-02

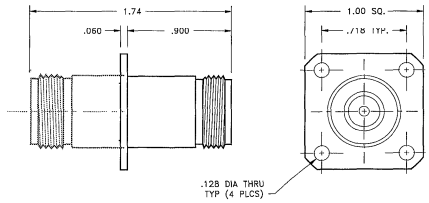


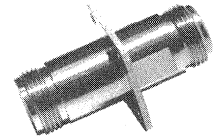


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC - 4.0 GHz
1.06 @ 4.0 - 8.0 GHz
1.10 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

N Female Jack to N Female Jack - Flange Mount

Model Number
ADT-2825-FF-NNN-02



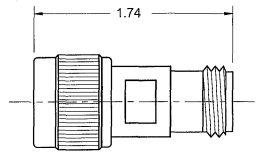


SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.04 @ DC - 4.0 GHz
1.06 @ 4.0 - 8.0 GHz
1.10 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

TNC Male Plug to TNC Female Jack

Model Number
ADT-2596-MF-TNC-02

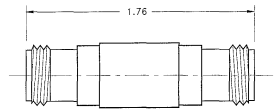
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



TNC Female Jack to TNC Female Jack

Model Number
ADT-2598-FF-TNC-02

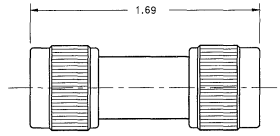
SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

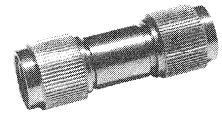


TNC Male Plug to TNC Male Plug

Model Number
ADT-2597-MM-TNC-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

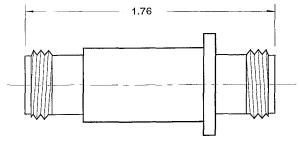


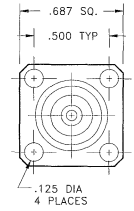


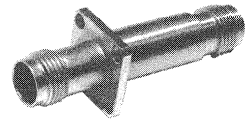
TNC Female Jack to TNC Female Jack - Flange Mount

Model Number
ADT-2826-FF-TNC-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel



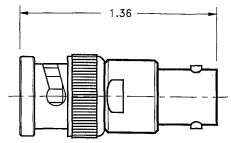


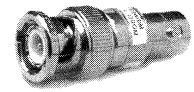


BNC Male Plug to BNC Female Jack

Model Number
ADT-2828-MF-BNC-10

SPECIFICATIONS
Frequency: DC - 4.0 GHz
VSWR: 1.15 @ DC - 4.0 GHz
Impedance: 50 Ohms
Finish: Nickel Plated Brass

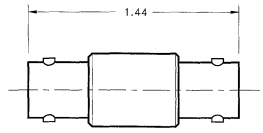




BNC Female Jack to BNC Female Jack

Model Number
ADT-2829-FF-BNC-10

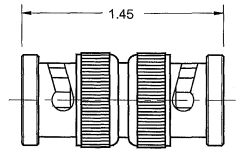
SPECIFICATIONS
Frequency: DC - 4.0 GHz
VSWR: 1.15 @ DC - 4.0 GHz
Impedance: 50 Ohms
Finish: Nickel Plated Brass



BNC Male Plug to BNC Male Plug

Model Number
ADT-2830-MM-BNC-10

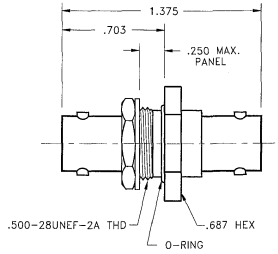
SPECIFICATIONS
Frequency: DC - 4.0 GHz
VSWR: 1.15 @ DC - 4.0 GHz
Impedance: 50 Ohms
Finish: Nickel Plated Brass

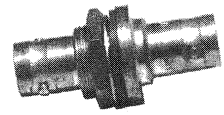


BNC Female Jack to BNC Female Jack - Blkhd Mount

Model Number
ADT-2831-FF-BNC-10

SPECIFICATIONS
Frequency: DC - 4.0 GHz
VSWR: 1.15 @ DC - 4.0 GHz
Impedance: 50 Ohms
Finish: Nickel Plated Brass



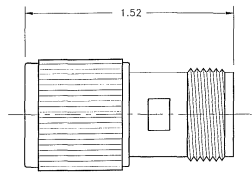


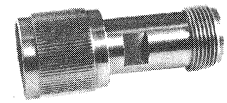
Note: Also available in .687 square flange mount as ADT-2827-FF-BNC-02

SC Male Plug to SC Female Jack

Model Number
ADT-2832-MF-SCO-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.08 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 11.0
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

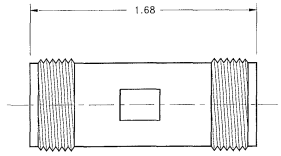


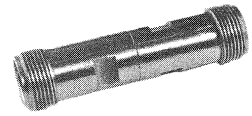


SC Female Jack to SC Female Jack

Model Number
ADT-2833-FF-SCO-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.08 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

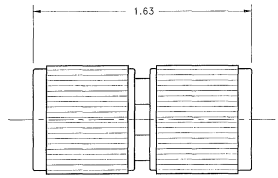


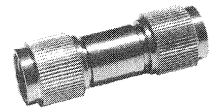


SC Male Plug to SC Male Plug

Model Number
ADT-2834-MM-SCO-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.08 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

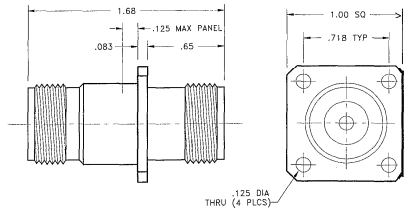


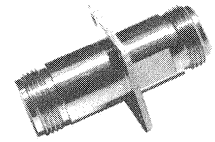


SC Female Jack to SC Female Jack - Flange Mount

Model Number
ADT-2835-FF-SCO-02

SPECIFICATIONS
Frequency: DC - 11.0 GHz
VSWR: 1.08 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
1.15 @ 8.0 - 11.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

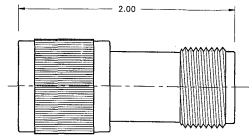


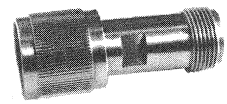


Note: Also available in bulkhead mount as ADT-2836-FF-SCO-02

HN Male Plug to HN Female Jack

Model Number
ADT-2820-MF-HNO-02

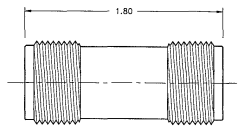


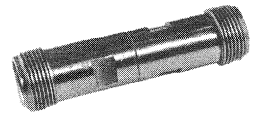


SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.06 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

HN Female Jack to HN Female Jack

Model Number
ADT-2821-FF-HNO-02

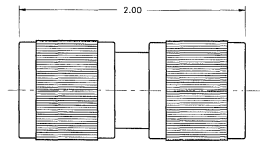


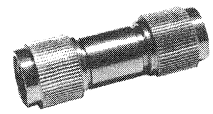


SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.06 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

HN Male Plug to HN Male Plug

Model Number
ADT-2744-MM-HNO-02

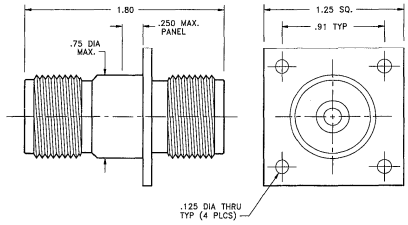


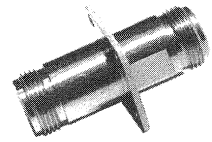


SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.06 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

HN Female Jack to HN Female Jack - Flange Mount

Model Number
ADT-2822-FF-HNO-02





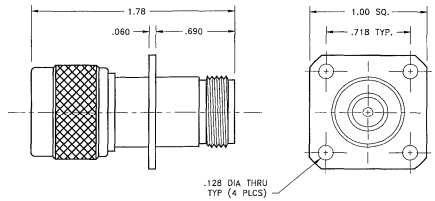
SPECIFICATIONS
Frequency: DC - 8.0 GHz
VSWR: 1.06 @ DC - 4.0 GHz
1.10 @ 4.0 - 8.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

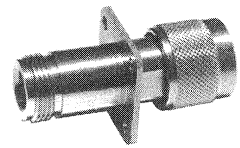
Note: Also available in bulkhead mount as ADT-2823-FF-HNO-02

N Male Plug to N Female Jack - Flange Mount

Model Number
ADT-2694-MF-NNN-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.05 @ DC - 4.0 GHz
1.06 @ 4.0 - 8.0 GHz
1.10 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

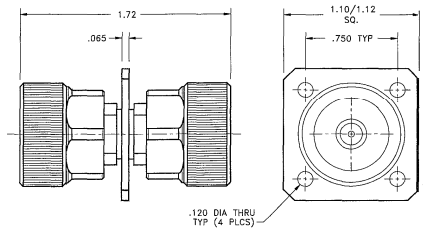


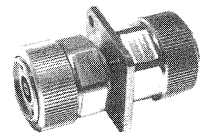


Flange Mount 7mm to 7mm

Model Number
ADT-2667-00-7MM-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.025 + .0025 f (GHz)
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

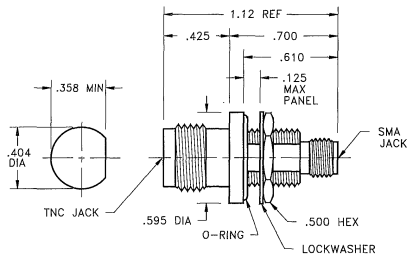


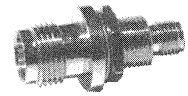


TNC Female Jack to SMA Female Jack - Rear Mount Bulkhead

Model Number
ADT-2837-TF-SMF-02

SPECIFICATIONS
Frequency: DC - 18.0 GHz
VSWR: 1.10 @ DC - 4.0 GHz
1.15 @ 4.0 - 8.0 GHz
1.25 @ 8.0 - 18.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel

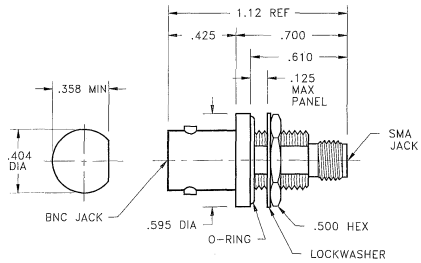


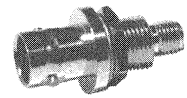


BNC Female Jack to SMA Female Jack- Rear Mount Bulkhead

Model Number
ADT-2838-BF-SMF-02

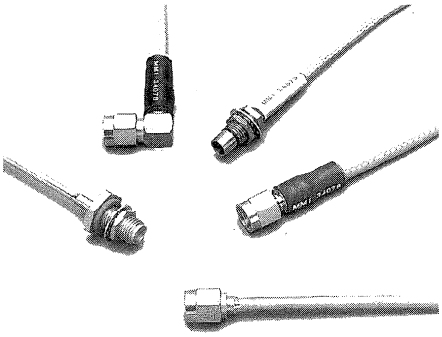
SPECIFICATIONS
Frequency: DC - 4.0 GHz
VSWR: 1.15 @ DC - 4.0 GHz
Impedance: 50 Ohms
Finish: Passivated Stainless Steel





Cable Assemblies

Low Loss • Flexible
Semi-Flexible • Semi-Rigid



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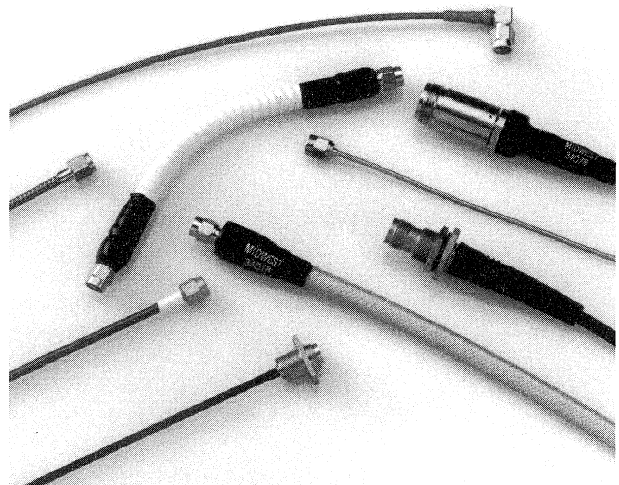
Cable Assemblies

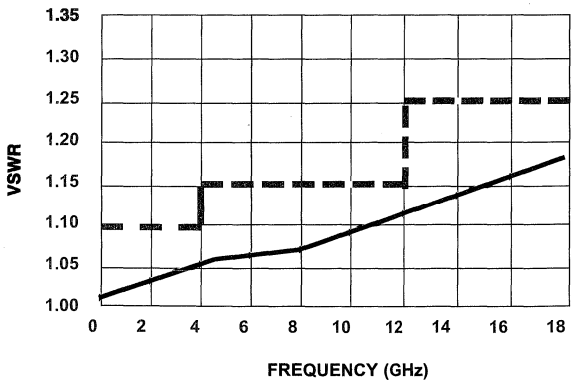
General Information

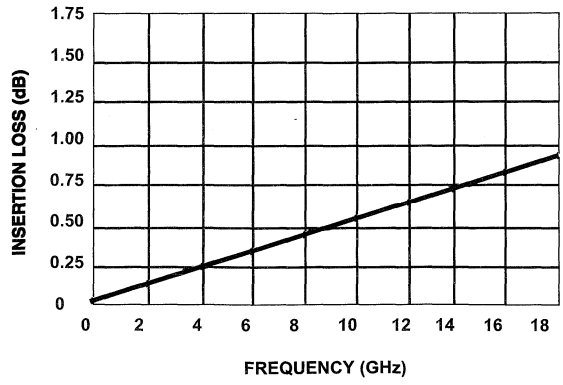
- **Low Loss and Ultra-Low Loss Flexible Cable Assemblies**
- **Semi-Flexible and Semi-Rigid Cable Assemblies**
- **Phase and Temperature Stable**
- **Ruggedized or Armored Abrasion Resistant Construction Available**
- **Meets MIL-E-5400 and MIL-16400 Environmental Requirements**
- **SMA, BMA, N, TNC, BNC, SC, 3.5mm, and 7mm Connector Configurations**



Cable Assemblies are a necessary and important part of a microwave system providing the coaxial transmission lines through which the signals received or transmitted by a system pass as they travel from or to their respective origins or destinations. Insertion Loss in these transmission lines is a very serious consideration as excessive loss can cause the system to operate inefficiently or not at all. Midwest Microwave offers this complete product line of Microwave Coaxial Cable Assemblies, ruggedly designed to provide highly reliable, low loss, phase and temperature stable signal transmission over very broad frequency ranges. These Cable Assemblies are available in a wide selection of cable construction types, each suited to the particular requirements of a system. Simple flexible cable assemblies are available from standard MIL-C-17 cable for many system requirements as well as semi-flexible and semi-rigid cable assemblies. High reliability, low loss, low VSWR, phase matched, and phase stable cable assemblies with repeatable performance over temperature are the top of the range of products offered. Insertion and return loss test data can be supplied with each cable if desired.Cable assemblies using Midwest's standard catalog cable assembled to custom lengths are available in very short delivery schedules. Special assemblies can be custom designed by Midwest's engineering staff to accomodate unique system needs. All Midwest Cable Assemblies are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.

TYPICAL VSWR AND INSERTION LOSS PERFORMANCE
ONE FOOT CABLE ASSEMBLY





MIDWEST MICROWAVE

Impedance - The characteristic impedance equation for a coaxial transmission line is expressed as follows:

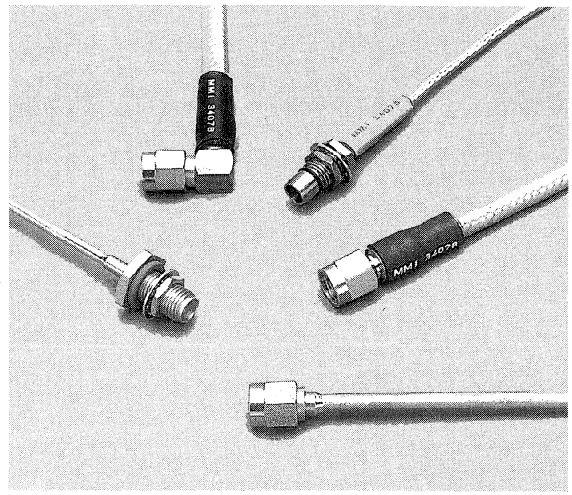
$$\text{Impedance} \equiv Z_o = \frac{138.06}{\sqrt{\varepsilon}} \quad \text{Log}_{10}\ D/d$$

where: D = diameter of outer conductor
d = diameter of center conductor
ε = dielectric constant of insulation material

If the center conductor diameter of a cable is increased to reduce loss, the outer conductor diameter can only be held in check if the dielectric constant of the insulation between the inner and outer conductors is reduced. It is clear then that a lower dielectric constant will yield a smaller diameter cable for an increased center conductor diameter of a lower loss cable of constant impedance.

Frequency - The highest frequency of operation by a cable assembly is determinied by the "TEM" mode frequency (Transverse Electromagnetic Mode) or the frequency at which the electromagnetic field departs from the "TEM" mode. This upper frequency mode limitation is controlled by the transmission line size which means that the higher the frequency of operation desired, the smaller in diameter the coaxial line size must be, for a given dielectric constant of the dielectric insulation between the inner and outer conductor of the cable. The requirement for lower insertion loss in a coaxial cable is unfortunately a driving force toward a larger physical size of the cable (for a given dielectric constant of the insulation), which improves the ability of the cable to dissipate the heat generated by the microwave power being transmitted through it. These opposing forces cause a classic compromise to be made between higher frequency operation and loss characteristics unless a lower dielectric constant insulation material can be used. Physical size and weight restrictions of most microwave systems as well as the requirement for higher frequency operation provide the impetus for smaller diameter cable assemblies that are low in insertion loss.

Insertion Loss - Insertion loss in a cable assembly is the result of a combination of several types of losses; attenuation loss *(dissipative)* or loss attributed to the center conductor size or material, dielectric losses, shield skin effect and shield leakage; and Impedance mismatch loss *(reflective)* , most often referred to as VSWR losses. Mismatch loss, identified with high VSWR measurement is often caused by the attachment of coaxial connectors to the cable. The design of these connectors and their compatibility with the coaxial cable being used are important considerations when attempting to attain loss efficient performance of a cable assembly. In well shielded cable such as semi-rigid or multiple shield flexible cable, skin effect and shield leakage losses are very low but



Cable Assemblies for Laboratory or System

center conductor skin effect losses are significant and dielectric losses increase with increasing signal frequency. For this reason a low dielectric constant insulation serves two important purposes; a larger diameter center conductor may be used for a given diameter cable thereby lowering the loss per unit length as well as the capacitance of the cable; and higher frequency of operation can be achieved because the line size can be kept small while the loss requirements are met.

VSWR - Reflections due to impedance mismatches and other discontinuities in a coaxial cable assembly are most often introduced through the attachment of the connectors to the cable. The proper design of the connector itself as well as the technique used to attach it to the cable are important factors in attaining low VSWR and low insertion loss.

Wave Propogation Velocity - The wave propogation velocity is the measure of the speed that an electromagnetic signal will travel through a given dielectric material as compared to the speed of light through an air dielectric. It is usually expressed in percent (%), 100% being equal to the speed of light through air. As can be seen from the formula below, the propogation velocity increases as the dielectric constant (ε) decreases.

$$\text{Velocity of Propogation} \equiv v = \frac{100}{\sqrt{\varepsilon}} = \%\ v_o$$

where: v_o = Speed of Light through air
ε = Dielectric Constant of material

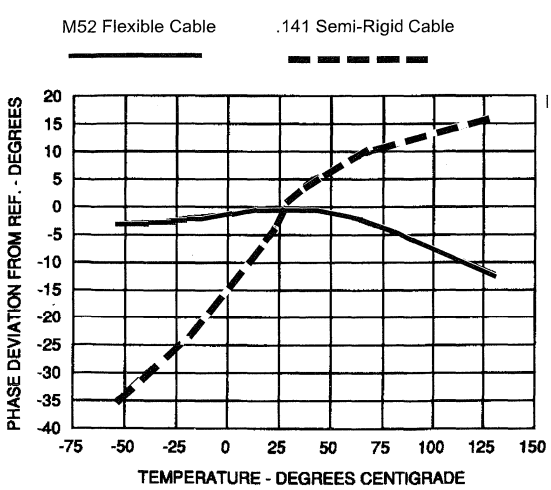
Electrical Length - The electrical length, sometimes referred to as phase length, of a coaxial cable assembly is determined by the number of wavelengths in degrees or radians that the physical length of the cable assembly, (including connectors), contains when measured at a specific frequency. This property is a function of the dielectric constant of the insulation material used between the inner and outer conductor of the cable and the wave propogation velocity attained with that dielectric. This relationship is shown in the expression below.

$$\textbf{Wavelength} \equiv \lambda = \frac{v_o}{f\sqrt{\varepsilon}}$$

where: v_o = speed of light through air
f = frequency of signal
ε = dielectric constant of insulation material

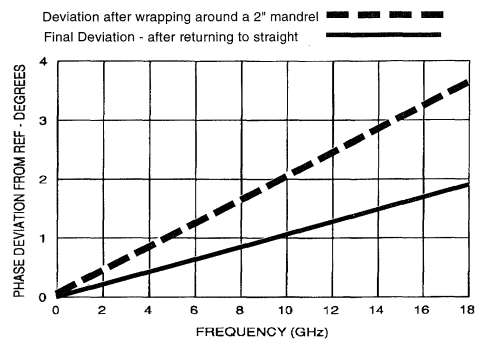
Phase Stability with Temperature - The ability of a cable assembly to maintain its phase relationship over temperature variations is enhanced when low dielectric constant material is used because less mass is present in the dielectric which provides a lower coefficient of thermal expansion thereby relieving the problem of physical length and phase changes over temperature. In addition the cable can be pre-conditioned before assembly by temperature cycling it repeatedly through the temperature range of desired operation such that it becomes stable when exposed to those same temperature variations.

PHASE STABILITY VS. TEMPERATURE
6 Ft. Assembly with 3.5 Ft. Inside Temp Chamber
Frequency = 5.5 GHz



Phase Stability with Flexure - The ability of a cable assembly to maintain its phase length with flexure is the result of mechanical techniques used in providing the shielding which controlls the reflections and other impedance discontinuities that cause phase variations and can also be enhanced by pre-conditioning the cable before assembly by subjecting it to repeated flexing such that it becomes stress relieved and is not as effected by flexure. The ability of a cable assembly to remain stable with flexure can be demonstrated by making four phase measurements of the cable assembly; the first when initially measuring the phase of the assembly in a straight configuration; the second after wrapping it one full turn clockwise around a 2 inch mandrel and measuring its phase length in that configuration; the third after wrapping it one full turn counterclockwise around the mandrel; and the fourth after returning to a straight configuration. The data is then compared to determine the amount of deviation that occurred between states to evaluate the phase stability of the assembly.

PHASE STABILITY WITH FLEXURE
Low Loss M52 0.225 Dia Cable
2 Inch Mandrel Test



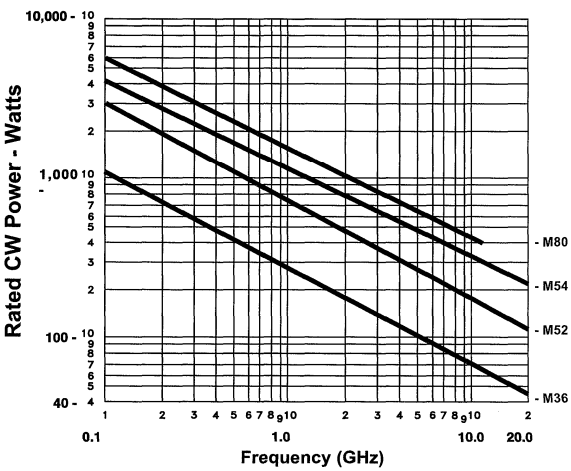
Shielding Effectiveness - The solid sheath shield of semi-rigid cable is by far the most efficient shielding method yet attained. In order to accomplish effective shielding for flexible cable that approaches this efficiency, various techniques using combinations of helically wound flat foil and flat and round braid have been developed. These techniques have been largely successful in providing excellent shielding for flexible cable that exceeds -100 dB. The requirement of MIL-T-81490 (using the cavity technique) is -90dB through the frequency range of 2.0-18.0 GHz.

Vibration and Shock - The ability of a cable assembly to withstand the abusive environment of high vibration and shock is very important in all types of microwave systems. Semi-rigid cable assemblies sometimes experience cracking of the solder joints during exposure to extreme shock and vibration and under these conditions flexible cable assemblies should be employed.

Power - The ability of a cable assembly to transmit power in a system is primarily a function of temperature. Heat generation is directly related to the resistive losses caused by the center conductor resistance and the VSWR resulting from discontinuities and impedance mismatches. In most cases the limiting factor is the connectors being used and the integrity of the interface between connector and cable, and not the cable itself. When determining the power performance of a cable assembly, the connector should be a key item that should be examined carefully for power performance characteristics.

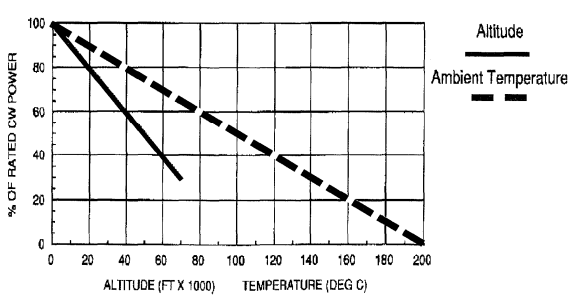
CW Power

Temperature = 25 Degrees at Sea Level
Max Load VSWR = 1.25:1



Temperature and Altitude - The graph shown above describes the approximate power rating of two of the low loss cables, at 25o ambient at sea level and and an assumed maximum load VSWR of 1.25:1. As temperature and altitude increase, a percentage derating factors must be applied. The graphical illustration shown below provides approximate percentage derating factors that can be applied for other temperatures and altitudes.

Altitude and Temperature % Derating



Humidity and Moisture Resistance - Microwave coaxial cable assemblies must be capable of withstanding exposure to moisture and humidity. Moisture absorbtion due to variations in temperature can affect VSWR, insertion loss, insulation resistance, and dielectric withstanding voltage. Testing to MIL-STD-202 and MIL-STD-810 will assure that the assemblies are capable of meeting the required environmental specifications.

Weight - System weight is always a factor that must be considered, especially in an airborne microwave system. Low dielectric constant cable can improve the loss performance by 6 to 10% over larger and heavier cable and will simultaneously provide as much as a 50% weight savings.

Ruggedization - There are many different environmental situations that flexible cable assemblies must be able to cope with in the wide variety of microwave systems that they are used in. Some of them require more physical protection than others. Surprisingly the laboratory environment is almost as hostile as an airport ramp because when used in test systems the cable assemblies are engaged and disengaged many times over and are bent, stretched and crushed as much or more than they would be in most systems. There are four basic types of ruggedization that are provided to protect the cable assemblies from external damage during use; the first is the "Standard" type that simply provides a thick extruded FEP jacket over the outer braid that suffices for most applications and it is what normally is supplied; an optional additional protective polyurethane jacket over the FEP jacket falls within this level of protection and is called "J" type; another is called "A" type for "Armored" which provides an additional stainless steel conduit type jacket assembled over the FEP jacket to further protect the cable from pinching and crushing when used in extremely hostile field applications; another is called "B" type that uses a "Thermoflex" sheath over the FEP jacket for situations that call for severe abrasion protection where possible continual rubbing against other objects is likely; the fourth type is called "C" type for "Crushproof" and in this case a stainless steel spring is provided over the FEP jacket covered by polyurethane shrink sleeving and offers moderate crush protection.

Electrically Matched Cable Assembly Sets - Cable assemblies are sometimes required to be matched electrically. Matching can also be required in more than just one characteristic. They can be matched for either phase, insertion loss, or time delay and in some instances they can be matched in any combiation of all three characteristics. In addition cable assemblies can be "Relatively" matched to each other using one of the assemblies as a comparitive standard or "Absolutely" matched to a specific specification with specific controlling tolerances for each characteristic. In all cases the cable assemblies must use the same type cable and the exact same connectors in order to conform.

Cable Assemblies

General Specifications

General - To define and specify the cable assembly required to meet a particular specification and to allow it to be manufactured efficiently and economically, the user and the manufacturer must be in agreement with each other on exactly what the parameters of the specification are and what limitations exist such that the resulting product will satisfy the requirements of the user and the product will in fact be able to be produced efficiently and economically. Midwest Microwave maintains an experienced staff of engineers that are ready and willing to assist in this process.

Cable Type - In selecting the type of cable to be used on a cable assembly, the user should carefully evaluate the requirements of the system that the assemblies are going to be used in. Operating frequency, insertion loss, VSWR, phase, power, connector type, physical space and weight, and all environmental exposures should be considered. Midwest Microwave offers a wide variety of cable types and ruggedization options that were designed to fit the needs of most microwave systems. The section on cable specifications describe in detail the different cable choices available.

Length Measurement and Tolerances - The overall length of a cable assembly is measured from connector end to connector end, however phase length measurements are usually from connector interface reference plane to connector interface reference plane in the case of straight connectors and in the case where a right angle connector is used, the connector center pin centerline is the measurement point. Standard length tolerances are as listed below:

LENGTH TOLERANCES

Nominal Length	Tolerance
Up to 10 Feet	± 0.250 Inch
10 to 20 Feet	± 0.500 Inch
20 to 30 Feet	± 1.0 Inch
30 to 40 Feet	± 1.5 Inch
40 to 50 Feet	± 2.0 Inch
> 50 Feet	Consult Factory

Note: Length tolerance is typically +3% -0, however tighter tolerances are available at additional cost on special request.

Connector Selection - The connectors selected should be compatible with the cable size selected so that the resulting performance of the assembly will be acceptable and will not degrade system performance. The connectors selected are most often controlled by the compatibility requirements of the system and the components used in it, however this should be kept in mind when selecting cable so that the resulting performance/cost ratio is reasonable.

Connector Orientation - For semi-rigid cable assemblies and flexible cable assemblies where "D" hole mounting connectors (and or right angle connectors) are used, the relative angular orientation must be specified such that the resulting assembly will mount and mate satisfactorily in the system. Standard tolerance for angular orientation is ± 20° for flexible assemblies and ± 5° for semi-rigid assemblies.

Cable Assembly Insertion Loss - The insertion loss of the total assembly including the connectors is an important consideration when specifying a cable assembly and it must take into consideration the operating frequency, cable size and loss characteristics, length of the cable assembly and the type and configuration of the connectors to be used. The insertion loss curves for each type of cable available are shown in the respective cable specification section. To determine the anticipated insertion loss of a cable assembly, add the loss for the length of cable used, (per the charts in the cable specification section), to the estimated loss for each connector per the table below and then add the loss attributable to VSWR (mismatch loss) as shown in table below.

TYPICAL CONNECTOR INSERTION LOSS

Frequency Range (GHz)	SMA Straight Connector	SMA Right Angle Connector	Type N, TNC and 7mm Connectors
2.0	0.03	0.08	0.05
4.0	0.05	0.10	0.08
6.0	0.06	0.12	0.10
8.0	0.07	0.14	0.11
10.0	0.08	0.16	0.13
12.0	0.09	0.18	0.14
14.0	0.10	0.20	0.15
16.0	0.11	0.22	0.16
18.0	0.12	0.25	0.18
20.0	0.13	N/A	N/A
22.0	0.14	N/A	N/A
24.0	0.15	N/A	N/A
26.5	0.16	N/A	N/A

Note: Insertion Loss is for each connector

TYPICAL MISMATCH INSERTION LOSS

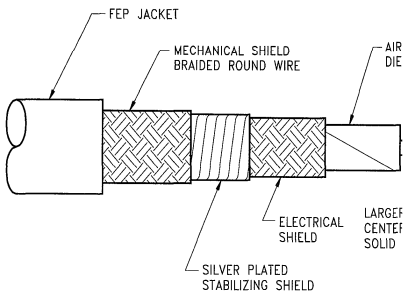
VSWR	Insertion Loss
1.20 : 1	0.04
1.25 : 1	0.06
1.30 : 1	0.07
1.35 : 1	0.10
1.40 : 1	0.12
1.45 : 1	0.15
1.50 : 1	0.18

Note: Typical VSWR shown is for SMA connectors only.

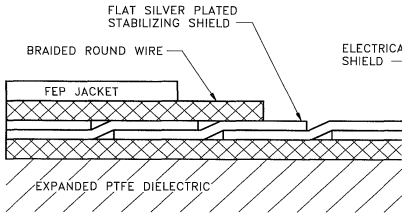
Cable Assembly VSWR - The VSWR of a cable assembly depends on the cable, connectors, signal frequency, assembly length, the termination used, and the test method and equipment used to measure it. The following table may be used as a guide in specifying VSWR:

TYPICAL CABLE ASSEMBLY VSWR

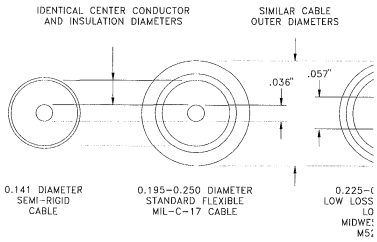
Frequency Range (GHz)	Cable Assembly with Straight Connectors	Cable Assembly with two angle Connectors	Cable Assembly with mixed Connectors
DC - 2	1.10	1.20	1.20
2 - 4	1.10	1.25	1.25
4 - 8	1.15	1.35	1.35
8 - 12	1.20	1.45	1.45
12 - 16	1.25	1.45	1.45
16 - 18	1.25	1.50	1.45
18 - 26	1.35	(N/A)	(N/A)



Low Loss Cable Design - Midwest Microwave Low Loss Cable is designed to take advantage of air-enhanced PTFE dielectrics that lower the dielectric constant and allow a flexible, phase and temperature stable high performance coaxial cable to be made available to produce high quality cable assemblies with excellent performance characteristics. In addition substantial size and weight savings are also realized because of the use of the lower dielectric constant material. Center conductors are available in both solid or stranded form depending on whether loss or flexibility is of primary concern.



Shielding Technique - The unique and efficient shield construction technique used in Midwest Microwave cable is a key reason for the excellent phase and temperature stability that it is able to attain. This is accomplished by providing a unique flat shield over the dielectric which is then further stabilized by another sheath which not only provides additional leakage protection but adds considerably to the mechanical and electrical stability characteristics of the cable. Following this, another layer of round braided shield is provided adding strength and further leakage protection. The final cover is the FEP jacket which provides resiliency as well as moisture protection.

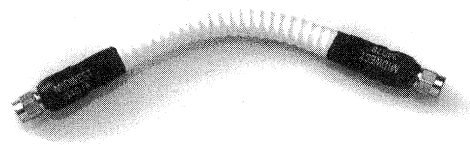


Center Conductor Size - The largest and single most effective deterrent to cable loss is the introduction of a larger diameter for the center conductor. The more surface area per unit length that a center conductor can provide, the lower the loss of the coaxial cable. In order to use a larger center conductor, but still retain the outer diameter, lower dielectric contsant insulation must be used. Flexibility and temperature stability is enhanced by the use of the lower density dielectric. Ultra low loss is attained by using a larger diameter solid center conductor while low loss with improved flexibility is accomplished by using a larger diameter stranded center conductor.

Ruggedization for Extreme Environments

- **Standard Tough FEP Jacket**
- **Crush Proof Protection**
- **Abrasion Proof Protection**
- **Armored Protection**

Midwest Microwave offers three types of additional ruggedization that can be added over the standard FEP cable jacket. Each type is designed to provide the maximum protection for the environmental situation that may be encountered. There is no degradation in performance when ruggedization of any level is selected and strain relief boots are provided on all assemblies.



Type S = Standard FEP Jacket

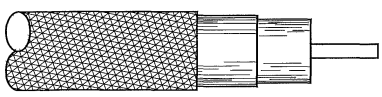
Type J = Added Polyolefin Jacket over Standard FEP Jacket

The tough, resilient extruded FEP jacket is Standard on all Midwest Microwave Cable Assemblies. It provides an excellent moisture seal and stands up to most environments. It is resistant to abrasion and most solvents. It provides the primary covering of the mechanical shield under all of the additional ruggedization schemes.

The Type J ruggedization is the provision of an additional polyurethane shrink jacket over the standard FEP jacket for additional protection from wear and abrasion.

Type A = Armored Ruggedization

Cable Assembly Armor consists of stainless steel conduit placed over the standard FEP jacket that protects the assembly from severe pinching and crushing of up to 300 lbs per linear inch. A polyolefin heat shrink jacket is provided covering the armor. This type of harsh environmental protection is often required on flight lines and on board naval ships where the assemblies are very exposed and are apt to have vehicles ride over them.



Type B = Thermoflex Abraison Ruggedization

This very tough abrasion proof outer covering provides extremely good protection to cable assemblies that are exposed to constant abrasion from rubbing repeatedly against other objects or moving or translating mechanisms. It consists of a Thermoflex sheath placed over the standard FEP jacket with standard strain-relief boots. Thermoflex is a high temperature (650°C) abrasion proof material.

Type C = Crushproof Ruggedization

Cable assemblies are often subjected to moderately severe treatment, even in the laboratory where reliability and repeatability is crucial. This Crushproof type of ruggedization consists of a stainless steel spring placed over the standard FEP jacket and covered with a polyolefin shrink jacket. Strain relief boots are also applied and this combination will withstand 100 lbs per linear inch of abuse.

Cable Assemblies

Low Loss Cable Characteristics

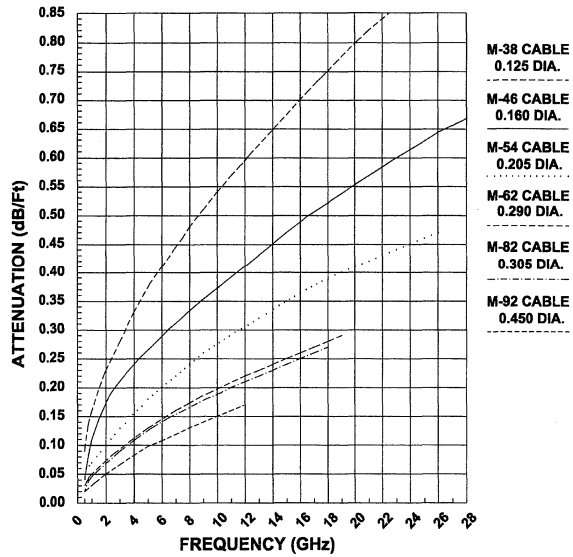
High Performance Cable Assemblies

- **Ultra-Low Insertion Loss**
- **DC - 26.5 GHz Performance**
- **Phase and Temperature Stable**
- **Highly Flexible**

The unique construction characteristics of this product line of Midwest Microwave low loss and ultra-low loss cables provides the highest stability available for loss, phase, VSWR, and time delay over temperature and flexure exposure. The high degree of linearity over the frequency spectrum makes them especially suited for cable assemblies with high reliability performance requiring phase, VSWR, and time delay matching.

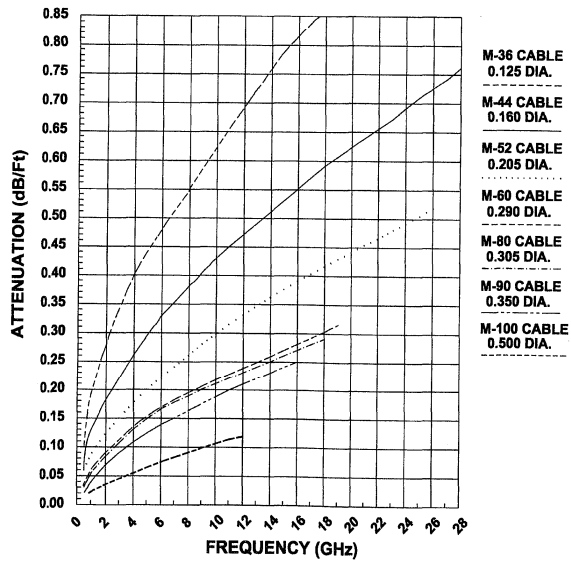
Ultra Low Loss Cables - Solid Center Conductor

M-38 0.125 Dia **M-46** 0.160 Dia	Designed to replace 0.141 semi-rigid cable. This cable is ideal for low loss applications where size, weight, and performance are critical criteria. These cable will operate up to 40 and 50GHz respectively.
M-54 0.205 Dia **M-62** 0.290 Dia	Designed for low loss applications where low loss is critical and high signal frequency is desired. An excellent balance of loss and size.
M-82 0.305 Dia **M-92** 0.450 Dia	Designed for unsurpassed low loss with reasonable flexibility in a moderate diameter. These cables will operate to 12 and 18 GHz and exhibit extremely good phase stability characteristics.



Low Loss Cables - Stranded Center Conductor

M-36 0.125 Dia **M-44** 0.160 Dia	Designed for small size, light weight high frequency applications where small size and low loss is a priority and high frequency ability is necessary. These cables are ideal to replace .141 semi-rigid cable.
M-52 0.205 Dia **M-60** 0.290 Dia	Designed for applications where low loss is a priority and flexibility and phase stability is necessary. This cable is the optimum choice for loss, size, and weight considerations.
M-80 0.305 Dia **M-90** 0.350 Dia	Designed for very low loss applications where a stable, relatively flexible cable is critical to the application.
M-100 0.500 Dia	Designed for very low loss applications up to 10.4 GHz where high power is anticipated.



Note: For detail cable specifications refer to pages 172 and 173.

Cable Assemblies

Low Loss Cable Specifications

Maximum Performance Selection

- **Match Size and Loss Requirements**
- **DC - 26.5 GHz Frequency Performance**
- **Select Ruggedization Option**
- **SMA, BMA, 3.5mm,7mm, N, TNC, BNC**

The unique construction characteristics of this product line of Midwest Microwave low loss and ultra-low loss cables provides the highest stability available for loss, phase, VSWR, and time delay over temperature and flexure exposure. The high degree of performance linearity over the frequency spectrum makes them especially suited for cable assemblies with high reliability performance requiring phase, VSWR, and time delay matching. Cable with stranded center conductors are slightly more flexible than those with solid center conductors, however as can be seen from the specifications, the solid center conductor cables are slightly better in loss characteristics.

ULTRA-LOW LOSS CABLE SPECIFICATIONS

Midwest Cable No.	M-38	M-46	M-54	M-62	M-82	M-92
Impedance (Ohms)	50	50	50	50	50	50
Center Conductor Type	Solid	Solid	Solid	Solid	Solid	Solid
Outside Diameter -inches (mm)	0.125 (3.2)	0.160 (4.1)	0.205 (5.2)	0.290 (7.4)	0.305(7.8)	0.450 (11.4)
Frequency Cutoff (GHz)	55	40	28	19	18	12
Insertion Loss (dB)	See Chart	See Chart	See Chart	See Chart	See Chart	See Chart
CW Power (kW) @ 5 GHz	0.13	0.25	0.85	1.85	1.85	3.15
RF Leakage (dB) @ 5 GHz	- 90	- 90	- 90	-90	-90	-90
Capacitance (pF/ft)	27	27	27	27	27	27
Velocity of Propogation (%)	75	76	76.5	76.5	76.5	76.5
Time Delay (nS/ft)	1.35	1.34	1.33	1.33	1.33	1.33
Temperature Range (°C)	-65 to+200	-65 to+200	-65 to+200	-65 to+200	-65 to+200	-65 to+200
Minimum Bend Radius (In.)	0.6	0.9	1.1	1.6	1.8	2.5
Weight (Lbs/ft)	0.02	0.04	0.05	0.08	0.09	0.20

LOW LOSS CABLE SPECFICATIONS

Midwest Cable No.	M-36	M-44	M-52	M-60	M-80	M-90	M-100
Impedance (Ohms)	50	50	50	50	50	50	50
Center Conductor Type	Stranded	Stranded	Stranded	Stranded	Stranded	Stranded	Stranded
Outside Diameter -inches (mm)	0.125 (3.2)	0.160 (4.1)	0.205 (5.2)	0.290 (7.4)	0.305 (7.8)	0.350(8.9)	0.500(12.7)
Frequency Cutoff (GHz)	55	40	28	19	18	16.4	10.4
Insertion Loss (dB)	See Chart	See Chart	See Chart	See Chart	See Chart	See Chart	See Chart
CW Power (kW) @ 5 GHz	0.13	0.25	0.85	1.85	1.85	3.15	5.75
RF Leakage (dB) @ 5 GHz	- 90	- 90	- 90	-90	-90	-90	-90
Capacitance (pF/ft)	27	27	27	27	27	27	27
Velocity of Propogation (%)	75%	76%	76.5%	76.5%	76.5%	76.5%	76.5%
Time Delay (nS/ft)	1.33	1.33	1.33	1.33	1.33	1.33	1.33
Temperature Range (°C)	-65 to+200	-65 to+200	-65 to+200	-65 to+200	-65 to+200	-65 to+200	-65 to+200
Minimum Bending Radius (In.)	0.5	0.8	1.0	1.5	1.7	2.0	2.8
Weight (Lbs/ft)	0.02	0.04	0.05	0.08	0.09	0.12	0.24

Materials and Finishes

Center Conductors - Silver-coated copper per ASTM-B-298 40 micro-inches min thick per MIL-C-17.

Electrical Shields - Silver-coated flat copper per IPC-FC-221 40 micro-inches thick min per MIL-C-17.

Mechanical Shields - Silver-coated copper per ASTM-B-298. 40 micro-inches thick min per MIL-C-17.

Dielectric Core - Air-Enhanced poytetrafluoroethylene (PTFE), tape wrapped per MIL-C-17.

Jacket - Extruded fluorinated ethylene propoylene (FEP), per MIL-C-17, Type IX.

Armor - Stainless Steel per ASTM-A-582 and ASTM-A-484

Note: Select desired Midwest Cable No. designation and substitute in Cable Assembly Model No. designation as shown on page 174.

Cable Assemblies

Low Loss Cable Specifications

Cable Insertion Loss per Foot

Frequency (GHz)	M-36	M-38	M-44	M-46	M-52	M-54	M-60	M-62	M-80	M-82	M-90	M-92	M-100
0.5	0.10	0.09	0.06	0.04	0.06	0.05	0.03	0.03	0.03	0.02	0.02	0.02	0.02
1.0	0.19	0.16	0.13	0.11	0.09	0.07	0.06	0.05	0.06	0.05	0.05	0.04	0.02
2.0	0.27	0.23	0.18	0.20	0.12	0.10	0.09	0.07	0.07	0.08	0.07	0.05	0.03
3.0	0.33	0.28	0.22	0.23	0.15	0.13	0.12	0.10	0.10	0.09	0.08	0.07	0.03
4.0	0.40	0.33	0.26	0.26	0.18	0.15	0.13	0.12	0.13	0.11	0.11	0.08	0.04
5.0	0.43	0.38	0.30	0.27	0.20	0.18	0.15	0.13	0.15	0.13	0.12	0.09	0.05
6.0	0.45	0.41	0.32	0.28	0.22	0.20	0.17	0.15	0.17	0.15	0.14	0.10	0.06
7.0	0.52	0.44	0.35	0.31	0.24	0.22	0.18	0.16	0.18	0.16	0.15	0.12	0.07
8.0	0.55	0.48	0.38	0.33	0.26	0.24	0.19	0.17	0.19	0.17	0.16	0.13	0.08
9.0	0.60	0.51	0.40	0.35	0.28	0.26	0.20	0.18	0.20	0.18	0.17	0.14	0.09
10.0	0.63	0.54	0.43	0.37	0..30	0.29	0.21	0.19	0.21	0.19	0.18	0.15	0.10
11.0	0.66	0.57	0.45	0.39	0.31	0.30	0.22	0.21	0.22	0.20	0.19	0.16	0.11
12.0	0.70	0.59	0.47	0.41	0.33	0.31	0.23	0.22	0.23	0.21	0.21	0.17	0.12
13.0	0.72	0.63	0.49	0.43	0.34	0.32	0.24	0.23	0.24	0.22	0.22		
14.0	0.76	0.66	0.51	0.45	0.36	0.33	0.25	0.24	0.25	0.23	0.23		
15.0	0.79	0.68	0.53	0.47	0.37	0.34	0.26	0.25	0.26	0.24	0.24		
16.0	0.81	0.70	0.55	0.49	0.39	0.36	0.27	0.26	0.27	0.25	0.25		
17.0	0.84	0.73	0.57	0.50	0.40	0.38	0.29	0.27	0.28	0.26			
18.0	0.87	0.75	0.59	0.52	0.41	0.39	0.30	0.28	0.29	0.27			
19.0	0.90	0.78	0.60	0.53	0.43	0.40	0.32	0.29					
20.0	0.92	0.80	0.63	0.55	0.44	0.41							
21.0	0.95	0.82	0.64	0.56	0.45	0.42							
22.0	0.97	0.84	0.66	0.58	0.46	0.43							
23.0	0.99	0.87	0.67	0.60	0.48	0.44							
24.0	1.02	0.89	0.69	0.61	0.49	0.45							
25.0	1.05	0.91	0.71	0.63	0.50	0.46							
26.0	1.07	0.93	0.72	0.64	0.52	0.47							
27.0	1.10	0.95	0.74	0.65									
28.0	1.13	0.97	0.76	0.67									
29.0	1.14	0.99	0.77	0.68									
30.0	1.16	1.02	0.79	0.70									
31.0	1.18	1.03	0.81	0.71									
32.0	1.20	1.06	0.82	0.72									
33.0	1.23	1.07	0.83	0.73									
34.0	1.25	1.09	0.84	0.74									
35.0	1.27	1.11	0.86	0.76									
36.0	1.29	1.13	0.87	0.77									
37.0	1.31	1.15	0.89	0.78									
38.0	1.33	1.17	0.90	0.80									
39.0	1.35	1.18	0.92	0.82									
40.0	1.37	1.20	0.93	0.84									
41.0	1.39	1.22											
42.0	1.41	1.24											
43.0	1.43	1.26											
44.0	1.45	1.28											
45.0	1.47	1.30											
46.0	1.49	1.32											
47.0	1.51	1.34											
48.0	1.53	1.35											
49.0	1.55	1.37											
50.0	1.57	1.38											

Average Power Rating (Watts)

Cable Type	Frequency (GHz) .05	1.0	4.0	10.0	18.0
M-52	3,000	2,000	1,000	600	420
M-60	8,000	4,100	2,000	1,200	830
M-80	8,000	4,100	2,000	1,200	830
M-90	7,400	5,100	2,400	1,400	
M-92	12,000	8,200	3,800	2,200	
M-100	18,000	13,000	5,500	3,300	

Connector Peak Power (Recomended - including safety factor)

Connector Type	DC Test Voltage (KV)	Peak Power (KW)
SMA	1.0	1.2
BNC, TNC	1.5	2.8
N	2.0	4.9
HN	2.25	5.5
SC	2.50	6.0

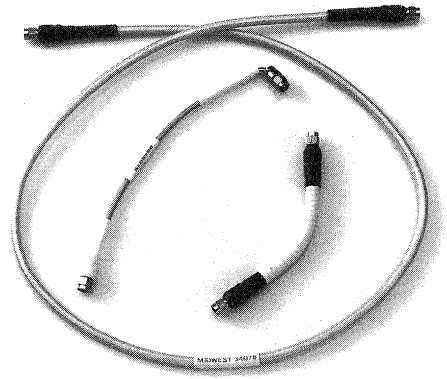
Cable Assemblies

Defining Low Loss and other Cable Assemblies

Low Loss - High Performance

- **Six Low Loss Cable options**
- **Wide Connector Selection**
- **Phase Matching available**
- **Crush Proof Armored Protection options**

Midwest Microwave offers six types of low loss and ultra low loss cables as well as three types of improved MIL-C-17 flexible cable and several types of conformable and semi-rigid cable. Solid center conductor types offering the lowest loss capability and stranded center conductor types offering a well balanced combination of low loss and flexibility. Most of the choices allow additional ruggedization that can be added over the standard cable jacket.



MODEL NUMBER DESIGNATION

CSY- □□□□-□□-□□□-□□

RUGGEDIZATION AND OTHER SPECIAL DESIGNATIONS

S = Standard Cable Jacket
A = Armored
B = Thermoflex Abrasion Proof
C = Crushproof
T = Tin Plated cable jacket
M = Special Cable Markers required
H = Hybrid combination of ruggedization types
J = Added polyolefin shrink jacket over standard jacket
L = Silver Plated cable jacket

UNIT OF MEASURE

I = inches
F = Feet
M = Meters
P = Phase Matched Assembly
S = Special Requirements Apply*(see cust dwg.)
H = Add 0.5 inches to length (length is in. only)

LENGTH OF CABLE ASSEMBLY
(Alpha-Numeric coded for formed and special requirements)

CABLE TYPE
Low Loss Type 36, 52, 80, or 100 for stranded center conductor
Ultra-Low-Loss Type 38, 54, 82, or 92 for solid center conductor
See pages 171-172, 175-176, and 181-184 for other Midwest Cable Type designations.

CONNECTOR - J2
SM = SMA male
SP = SMA panel mount female
3M = 3.5 mm male
TF = TNC female
NM = Type N male plug
7M = 7mm connector
See Connector Selection pages 178-179 and 184-185 for complete connector designations.

CONNECTOR - J1
SA = SMA right angle male - cube type
SS = SMA right angle male - swept type
MF = BMA Blind Mate female plug
TP = TNC panel mounted female
CM = S C male plug
BM = BNC male plug
See Connector Selection pages for complete designation list.

BASIC CABLE ASSEMBLY PRODUCT LINE PREFIX

LOW LOSS CABLE ASSEMBLY PERFORMANCE SPECIFICATIONS

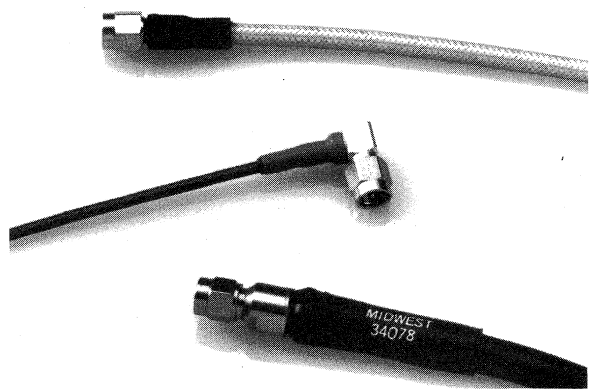
Insertion Loss vs Flexure ..... < ± .1 dB/Ft
Insertion Loss vs Temperature ..... 0.5% per °C
Insertion Loss Matching ..... ± 0.2 dB @ 18GHz
Insertion Loss Fine Grain Variation ..... < .1 dB per 50 MHz
Phase Matching ..... ± 1.0 ° per GHz
Phase Tracking ..... ± 0.1 ° per GHz
Phase Stability vs Flexure ..... < ± 0.1% per GHz per Ft.
Phase Stability vs Temperature .....< 25 ppm per ° C

Cable Assemblies

Improved MIL-C-17 Cable Characteristics

Improved MIL-C-17 Performance Cable

- **Lower Loss MIL-C-17 Cable Assemblies**
- **Improved VSWR Performance**
- **Improved Phase and Temperature Stability**
- **Excellent Cost / Performance Ratio**



Midwest Microwave offers these improved versions of the more popular sizes of MIL-C-17 cables in the form of improved performance cable assemblies. By improving the quality of the basic construction of these extruded dielectric cables and carefully designing connectors that are closely compatible to them, a very high cost / performance ratio cable assembly has been achieved. Useable on many applications where the standard cables were not acceptable, these new improved versions allow the performance criteria to be met for a much more reasonable price than other higher cost options.

Cable Type
M - 16
0.120 Dia

Improved RG-316/U

Designed to replace conventional RG316/U cable, this cable is an excellent cost/performance value. It is ideal for system applications where size, weight, and performance for a reasonable price are critical criteria.

Cable Type
M - 42
0.180 Dia

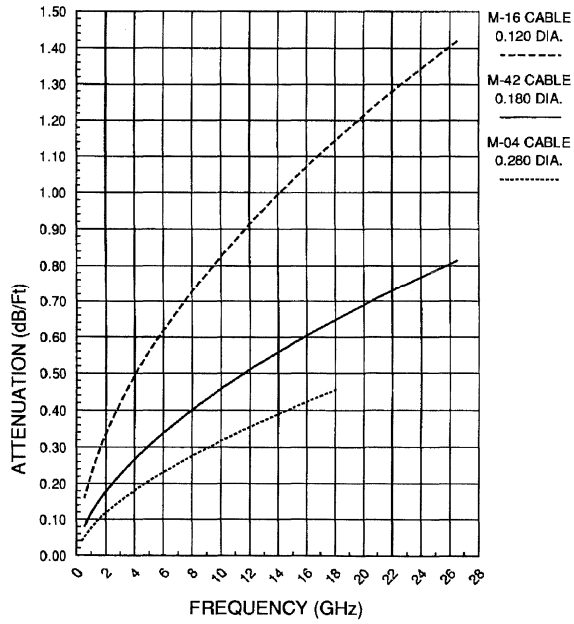
Improved SF142

Designed for moderate low loss applications where the cost/performance ratio is critical and high signal frequency is desired. A well balanced cable of loss vs size it is an improved version of SF142, a very popular cable in all types of systems both military and commercial.

Cable Type
M - 04
0.280 Dia.

Improved RG-304/U

Designed as an improved version of RG304/U this cable offers some attractive performance characteristics. It posses loss characteristics that are quite acceptable for many systems both military and commercial. This cable operates for applications up to 18 GHz.



Note: To specify a cable assembly using the above cable, refer to page 174 and substitute the appropriate two digit numeric cable type number. Connectors can be selected from the connector section, simply substitute the appropriate alpha or alpha-numeric connector designations.

Cable Assemblies

Improved MIL-C-17 Cable Specifications

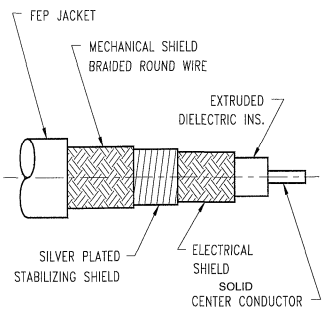
Improved Performance

- **Relative Low Loss for Low Cost**
- **Improved Stability**
- **DC - 26.5 GHz Frequency Performance**
- **SMA, BMA, 3.5mm,7mm, N, TNC, BNC**

The unique construction characteristics of this product line of Midwest Microwave Improved MIL-C-17 cables provide the highest stability available for this category of cable for loss, phase, VSWR, performance over temperature and flexure exposure. The high degree of performance over the frequency spectrum makes them particularly suited for lower cost cable assemblies with high reliability performance requiring phase and VSWR performance.

IMPROVED MIL-C-17 CABLE SPECIFICATIONS

Midwest Cable No.	**M-16**	**M-42**	**M-04**
MIL-C-17 Designation	**RG 316/U**	**SF 142**	**RG 304/U**
Impedance	50 ± 2 Ohms	50 ± 2 Ohms	50 ± 2 Ohms
Center Conductor Type	Solid	Solid	Solid
Outside Diameter -inches (mm)	0.120 (3.0)	0.180 (4.6)	0.280 (7.1)
Frequency Cutoff (GHz)	20.0	26.0	18.0
Insertion Loss (dB)	See Chart	See Chart	See Chart
CW Power (Watts) @ 5 GHz	130	400	500
RF Leakage (dB) @ 5 GHz	- 90	- 90	- 90
Capacitance (pF/ft)	29	29	29
Velocity of Propogation (%)	70	70	70
Time Delay (nS/ft)	1.45	1.45	1.45
Temperature Range (°C)	-55 to +200	-55 to +200	-55 to +200



MIDWEST CABLE No.	16	42	04
JACKET MATERIAL	FEP	FEP	FEP
OUTSIDE DIA - in(mm)	0.120 (3.0)	0.180 (4.6)	0.280 (7.1)
DIA OVER MECHANICAL SHIELD - in(mm)	0.098 (2.5)	0.156 (4.0)	0.235 (6.0)
DIA OVER STABALIZING SHIELD - in(mm)	0.080 (2.0)	0.140 (3.6)	0.205 (5.2)
DIA OVER ELECTRICAL SHIELD - in(mm)	0.072(1.8)	0.130 (3.3)	0.197 (5.0)
DIELECTRIC DIA - in(mm)	0.060 (1.5)	0.118 (3.0)	0.185 (4.7)
CENTER CONDUCTOR DIA - in(mm)	0.20 (0.51)	0.36 (9.1)	0.59 (15.0)
MIN BEND RADIUS - in(mm)	1.25 (31.8)	1.4 (35.6)	1.6 (40.6)
WEIGHT (oz per ft)	0.50	0.75	1.30

Note: Select desired Midwest Cable No. designation and substitute in Cable Assembly Model No. designation as shown on page 174.

Materials and Finishes

Center Conductors - Silver-coated copper clad steel per ASTM-B-298 40 micro-inches min thick per MIL-C-17.

Electrical Shields - Silver-coated flat copper per IPC-FC-221 40 micro-inches thick min per MIL-C-17.

Mechanical Shields - Silver-coated copper per ASTM-B-298. 40 micro-inches thick min per MIL-C-17.

Dielectric Core - Extruded poytetrafluoroethylene (PTFE), per MIL-C-17.

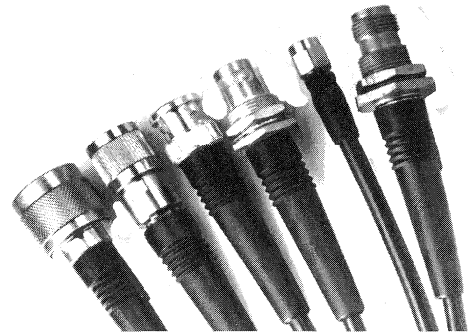
Jacket - Extruded fluorinated ethylene propoylene (FEP), per MIL-C-17, Type IX.

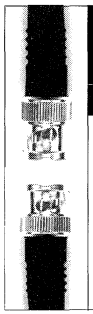
Armor - Stainless Steel per ASTM-A-582 and ASTM-A-484

Standard Cable Assemblies

- **BNC Test Patch Cord Assemblies**
- **Standard RG 58C/U Cable**
- **Fast Delivery**
- **BNC, N, TNC, and SMA Connectors**

Midwest Microwave offers these standard cable assemblies for use in the laboratory or the microwave system. These low cost, quick delivery assemblies provide a simple approach to meeting the immediate need for standard cable assemblies. Normally standard MIL-C-17 RG58C/U cable is used with standard off the shelf connectors however other types of cable can be designated by using a selected Midwest cable type No. in the Model No.





BNC Male to BNC Male

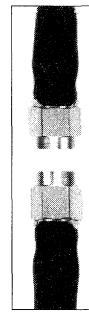
XX = Select Cable Type

Model No.	Length
CSY-BMBM-XX-012-IS	12"
CSY-BMBM-XX-024-IS	24"
CSY-BMBM-XX-036-IS	36"
CSY-BMBM-XX-048-IS	48"
CSY-BMBM-XX-060-IS	60"
CSY-BMBM-XX-072-IS	72"
CSY-BMBM-XX-084-IS	84"
CSY-BMBM-XX-096-IS	96"

BNC Male to SMA Male

XX = Select Cable Type

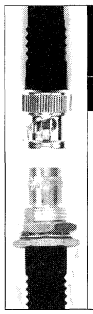
Model No.	Length
CSY-BMSM-XX-012-IS	12"
CSY-BMSM-XX-024-IS	24"
CSY-BMSM-XX-036-IS	36"
CSY-BMSM-XX-048-IS	48"
CSY-BMSM-XX-060-IS	60"
CSY-BMSM-XX-072-IS	72"
CSY-BMSM-XX-084-IS	84"
CSY-BMSM-XX-096-IS	96"



SMA Male to SMA Male

XX = Select Cable Type

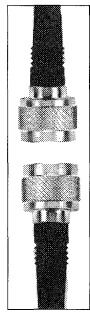
Model No.	Length
CSY-SMSM-XX-012-IS	12"
CSY-SMSM-XX-024-IS	24"
CSY-SMSM-XX-036-IS	36"
CSY-SMSM-XX-048-IS	48"
CSY-SMSM-XX-060-IS	60"
CSY-SMSM-XX-072-IS	72"
CSY-SMSM-XX-084-IS	84"
CSY-SMSM-XX-096-IS	96"



BNC Male to BNC Blkhd Female

XX = Select Cable Type

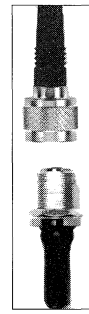
Model No.	Length
CSY-BMBB-XX-012-IS	12"
CSY-BMBB-XX-024-IS	24"
CSY-BMBB-XX-036-IS	36"
CSY-BMBB-XX-048-IS	48"
CSY-BMBB-XX-060-IS	60"
CSY-BMBB-XX-072-IS	72"
CSY-BMBB-XX-084-IS	84"
CSY-BMBB-XX-096-IS	96"



N Male to N Male

XX = Select Cable Type

Model No.	Length
CSY-NMNM-XX-012-IS	12"
CSY-NMNM-XX-024-IS	24"
CSY-NMNM-XX-036-IS	36"
CSY-NMNM-XX-048-IS	48"
CSY-NMNM-XX-060-IS	60"
CSY-NMNM-XX-072-IS	72"
CSY-NMNM-XX-084-IS	84"
CSY-NMNM-XX-096-IS	96"



N Male to N Blkhd Female

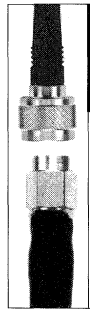
XX = Select Cable Type

Model No.	Length
CSY-NMNB-XX-012-IS	12"
CSY-NMNB-XX-024-IS	24"
CSY-NMNB-XX-036-IS	36"
CSY-NMNB-XX-048-IS	48"
CSY-NMNB-XX-060-IS	60"
CSY-NMNB-XX-072-IS	72"
CSY-NMNB-XX-084-IS	84"
CSY-NMNB-XX-096-IS	96"

BNC Male to N Male

XX = Select Cable Type

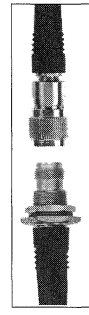
Model No.	Length
CSY-BMNM-XX-012-IS	12"
CSY-BMNM-XX-024-IS	24"
CSY-BMNM-XX-036-IS	36"
CSY-BMNM-XX-048-IS	48"
CSY-BMNM-XX-060-IS	60"
CSY-BMNM-XX-072-IS	72"
CSY-BMNM-XX-084-IS	84"
CSY-BMNM-XX-096-IS	96"



N Male to SMA Male

XX = Select Cable Type

Model No.	Length
CSY-NMSM-XX-012-IS	12"
CSY-NMSM-XX-024-IS	24"
CSY-NMSM-XX-036-IS	36"
CSY-NMSM-XX-048-IS	48"
CSY-NMSM-XX-060-IS	60"
CSY-NMSM-XX-072-IS	72"
CSY-NMSM-XX-084-IS	84"
CSY-NMSM-XX-096-IS	96"



TNC Male to TNC BlkhdFemale

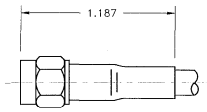
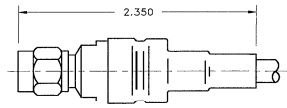
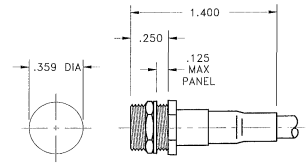
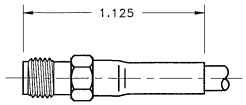
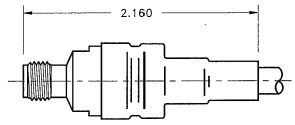
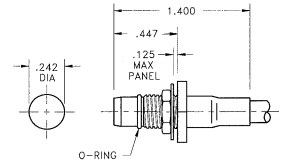
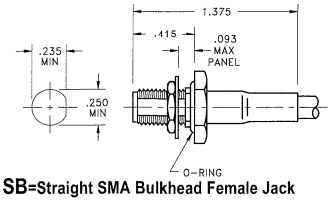
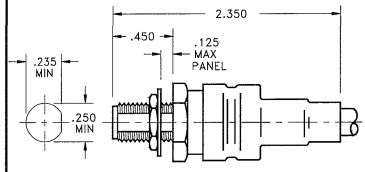
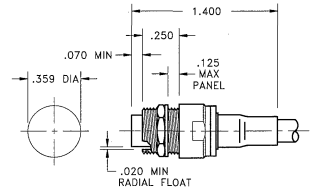
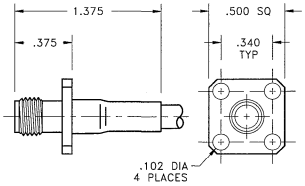
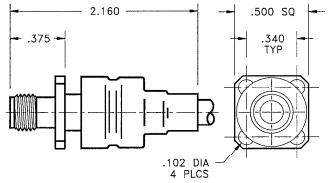
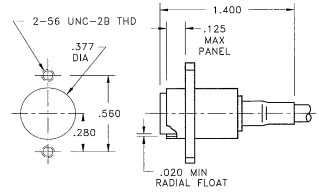
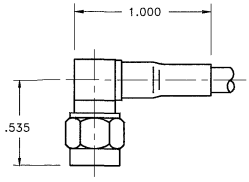
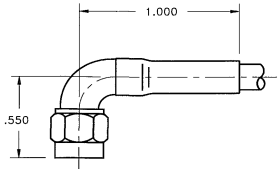
XX = Select Cable Type

Model No.	Length
CSY-TMTB-XX-012-IS	12"
CSY-TMTB-XX-024-IS	24"
CSY-TMTB-XX-036-IS	36"
CSY-TMTB-XX-048-IS	48"
CSY-TMTB-XX-060-IS	60"
CSY-TMTB-XX-072-IS	72"
CSY-TMTB-XX-084-IS	84"
CSY-TMTB-XX-096-IS	96"

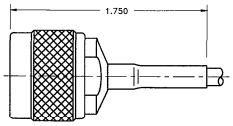
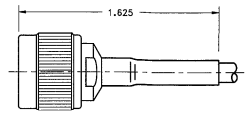
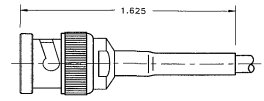
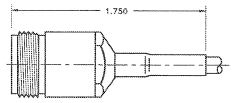
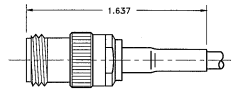
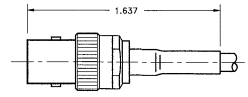
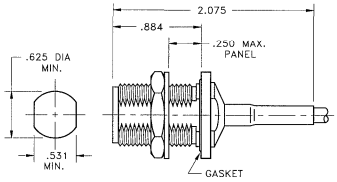
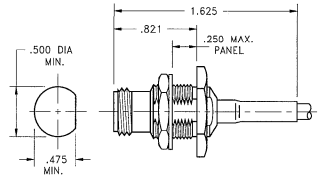
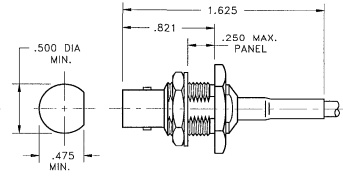
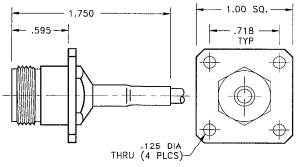
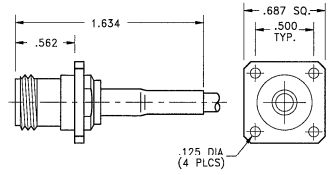
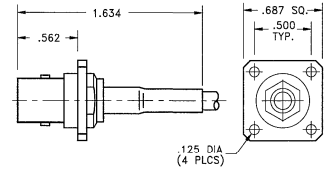
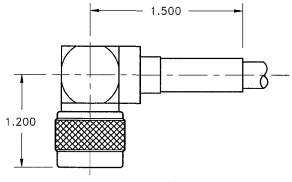
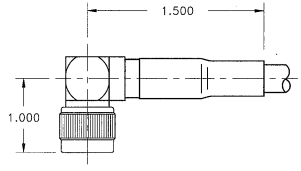
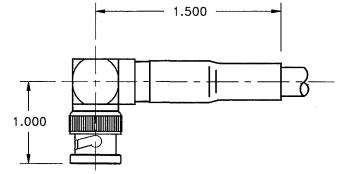
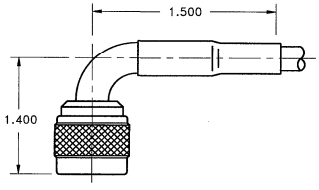
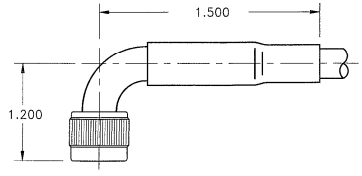
Notes: 1. "XX" = "58" for RG58/U. To designate a desired cable type, select a Midwest Cable Type No. and substitute for "XX' in the Model No.
2. If a connector combination other than those shown is required, refer to page 178 and 179 and modify the Model No. as required.

Cable Assemblies

Connector Selection
Flexible Cable Assemblies

SMA	3.5mm	BMA
 **SM**=Straight SMA Male Plug	 **3M**=Straight 3.5mm Male Plug	 **MF**=Straight BMA Female Jack
 **SF**=Straight SMA Female Jack	 **3F**=Straight 3.5mm Female Jack	 **MM**=Straight BMA Male Plug
 **SB**=Straight SMA Bulkhead Female Jack	 **3B**=Straight 3.5mm Female Bulkhead Jack	 **MB**=Straight BMA Bulkhead Female Jack
 **SP**=Straight SMA Female Panel Jack	 **3P**=Straight 3.5mm Female Panel Jack	 **MB**=Straight BMA Female Panel Jack
 **SA**=Right Angle SMA Male Plug	**N/A**	**N/A**
 **SS**=Swept Right Angle SMA Male Plug	**N/A**	**N/A**

Note: Select desired Connectors and use the two letter designators in Model No. for J1 and J2 as shown on page 174.

Type N	TNC	BNC
 **NM**=Straight N Male Plug	 **TM**=Straight TNC Male Plug	 **BM**=Straight BNC Male Plug
 **NF**=Straight N Female Jack	 **TF**=Straight TNC Female Jack	 **BF**=Straight BNC Female Jack
 **NB**=Straight N Bulkhead Female Jack	 **TB**=Straight TNC Female Bulkhead Jack	 **BB**=Straight BNC Bulkhead Female Jack
 **NP**=Straight N Female Panel Jack	 **TP**=Straight TNC Female Panel Jack	 **BP**=Straight BNC Female Panel Jack
 **NA**=Right Angle N Male Plug	 **TA**=Right Angle TNC Male Plug	 **BA**=Right Angle BNC Male Plug
 **NS**=Swept Right Angle N Male Plug	 **TS**=Swept Right Angle TNC Male Plug	**N/A**

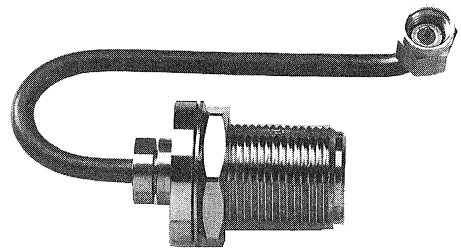
Note: 7mm, SC, and HN series and other connectors are also available, consult factory for designations and dimensions.

Cable Assemblies

Conformable Cable Specifications

Improved Hand Formable/Reformable

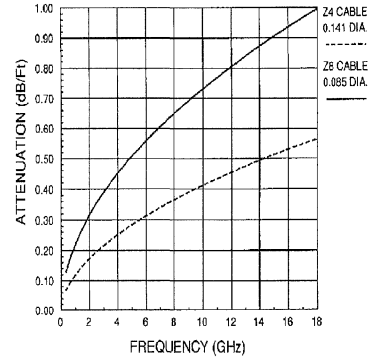
- **100% Effective Shielding**
- **Avoid Expensive Bending Tolerances**
- **Low VSWR and Loss Performance**
- **Excellent Cost / Performance Ratio**
- **SMA, BMA, 3.5mm,7mm, N, TNC, BNC**



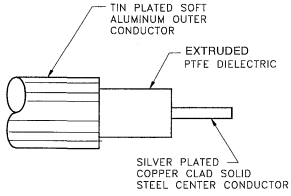
Midwest Microwave offers improved versions of Conformable Cable Assemblies that are low in cost and use standard connectors. By improving the flexibility of the outer conductor construction of these conformable cables a very high level of conformability has been achieved. Because it uses standard off the shelf connectors, a very good cost / performance ratio cable assembly can be accomplished. Useable on many applications where standard bent semi-rigid cables (RG402/U and RG405/U) were not acceptable, these new conformable versions allow the performance criteria to be met for a much more reasonable price than other higher cost options.

CONFORMABLE CABLE SPECIFICATIONS

Midwest Cable No.	Z4	Z8
Outside Diameter -inches (mm)	0.141 (3.6)	0.085 (2.2)
Impedance	50 ± 2 Ohms	50 ± 2 Ohms
Center Conductor Type	Solid	Solid
Frequency Cutoff (GHz)	36.0	40.0
Attenuation (dB/ft)	See Chart	See Chart
CW Power (Watts) @ 5 GHz	120	35
RF Leakage (dB) @ 5 GHz	- 90	- 90
Capacitance (pF/ft)	29	29
Velocity of Propogation (%)	70	70
Time Delay (nS/ft)	1.43	1.43
Temperature Range (°C)	-40 to +125	-40 to +125



Note: Select desired Cable designation and substitute in Cable Assembly Model No. designation as shown on page 174.



MIDWEST CABLE No.	Z4	Z8
JACKET MATERIAL	Al / Sn	Al / Sn
OUTSIDE DIA - in(mm)	0.141 (3.6)	0.085 (2.2)
DIELECTRIC DIA - in(mm)	0.1175 (3.0)	0.066 (1.7)
CENTER CONDUCTOR DIA - in(mm)	0.0362 (0.92)	0.0201 (0.51)
MIN BEND RADIUS - in(mm)	0.100 (2.5)	0.50 (1.3)
WEIGHT (oz per ft)	0.32	0.128

Materials and Finishes

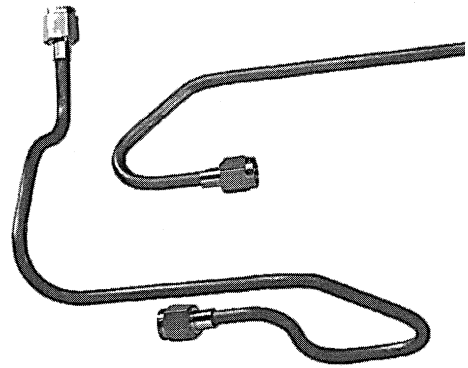
Center Conductor - Silver-coated copper clad steel per ASTM-B-298 40 micro-inches min thick per MIL-C-17.
Dielectric Core - Extruded Polytetrafluoroethylene (PTFE), per MIL-C-17.
Outer Jacket - Aluminum-Tin Composite

Cable Assemblies

Conformable Cable Specifications

Improved Conformable Cable

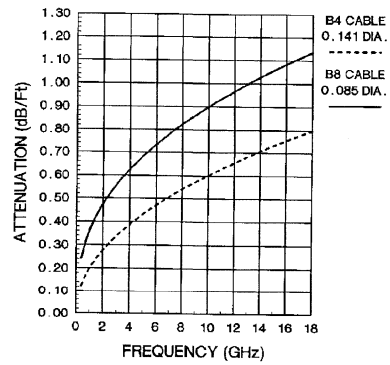
- **Hand Formable-Reformable**
- **Low Cost-High Performance**
- **Avoid Expensive Bending Tolerances**
- **Excellent Cost / Performance Ratio**
- **SMA, BMA, 3.5mm,7mm, N, TNC, BNC**



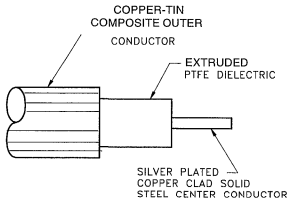
Midwest Microwave offers improved versions of Conformable Cable Assemblies that are low in cost and use standard connectors. By improving the quality of the basic construction of these air-enhanced dielectric conformable cables and selecting standard connectors that are closely compatible to them, a very high cost / performance ratio cable assembly has been achieved. Useable on many applications where standard bent semi-rigid cables were not acceptable, these new conformable versions allow the performance criteria to be met for a much more reasonable price than other higher cost options.

CONFORMABLE CABLE SPECIFICATIONS

Midwest Cable No.	B4	B8
Outside Diameter -inches (mm)	0.141 (3.6)	0.085 (2.2)
Impedance	50 ± 2 Ohms	50 ± 2 Ohms
Center Conductor Type	Solid	Solid
Frequency Cutoff (GHz)	36.0	40.0
Attenuation (dB/ft)	See Chart	See Chart
CW Power (Watts) @ 5 GHz	120	35
RF Leakage (dB) @ 5 GHz	- 90	- 90
Capacitance (pF/ft)	29	29
Velocity of Propogation (%)	70	70
Time Delay (nS/ft)	1.43	1.43
Temperature Range (°C)	-40 to +200	-40 to +200



Note: Select desired Midwest Cable No. and substitute in Cable Assembly Model No. designation as shown on page 174.



MIDWEST CABLE No.	B4	B8
JACKET MATERIAL	Cu / Sn	Cu / Sn
OUTSIDE DIA - in(mm)	0.141 (3.6)	0.085 (2.2)
DIELECTRIC DIA - in(mm)	0.1175 (3.0)	0.066 (1.7)
CENTER CONDUCTOR DIA - in(mm)	0.0362 (0.92)	0.0201 (0.51)
MIN BEND RADIUS - in(mm)	0.100 (2.5)	0.50 (1.3)
WEIGHT (oz per ft)	0.5	0.16

Materials and Finishes

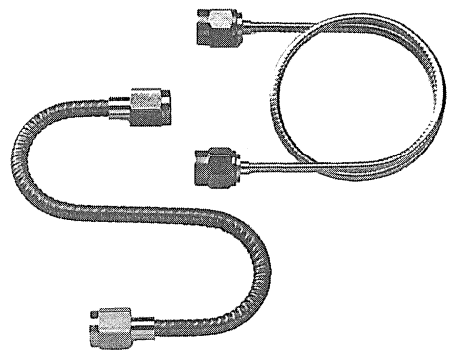
Center Conductor - Silver-coated copper clad steel per ASTM-B-298 40 micro-inches min thick per MIL-C-17.
Dielectric Core - Extruded Polytetrafluoroethylene (PTFE), per MIL-C-17.
Outer Jacket - Copper-Tin Composite

Cable Assemblies

Flexiform Hand Formable Cable Specifications

Hand Formable / Reformable Cable

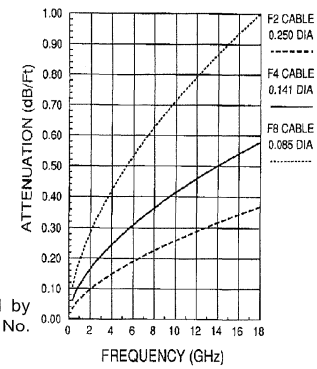
- **Helically Formed Stainless Steel Jacket**
- **Replaces Semi-Rigid Cable**
- **Phase and Temperature Stable**
- **Fits Standard Connectors**



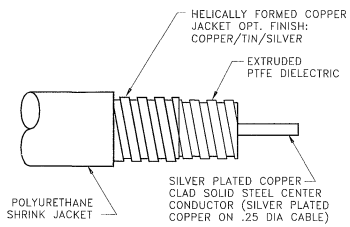
Midwest Microwave offers these hand formable and reformable semi-flexible cable in three popular diameter sizes; 0.250, 0.141 and 0.085. It can be hand formed to almost any shape required and re-formed, if necessary, eliminating the need for complex drawings and costly dimensional inspections. The special construction of Flexiform cable provides superior phase amplitude stability, high impact strength, and excellent stability over temperature. Flexiform I has an outer conductor of helically formed copper, a solid PTFE dielectric, and a silver plated copper clad steel center conductor (copper on .250 dia.). Flexiform II differs in that it has a copper plated helically formed stainless steel outer conductor.

FLEXIFORM I & II CABLE SPECIFICATIONS*

Midwest Cable No.	F2	F4	F8
Outside Diameter -inches (mm)	0.250 (6.4)	0.141 (3.6)	0.085 (2.2)
Impedance	50 ± 2 Ohms	50 ± 2 Ohms	50 ± 2Ohms
Center Conductor Type	Solid	Solid	Solid
Frequency Cutoff (GHz)	19.0	36.0	40.0
Attenuation (dB/ft)	See Chart	See Chart	See Chart
CW Power (Watts) @ 5 GHz	300	120	35
RF Leakage (dB) @ 5 GHz	- 90	- 90	- 90
Capacitance (pF/ft)	29	29	29
Velocity of Propogation (%)	70	70	70
Time Delay (nS/ft)	1.43	1.43	1.43
Temperature Range (°C)	-40 to +125	-40 to +125	-40 to +125



Notes:
1. * Flexiform II with helically formed copper coated stainless steel outer jacket can be designated by specifying "F1" for 0.141 Dia. and "F5 for 0.085 Dia. when defining the Cable Assembly Model No.
2. An optional Polyurethane shrink jacket to protect the outer conductor can be designated by indicating a "J" for Ruggedization selection in the Model No. (see page 174).



MIDWEST CABLE No.	F2	F4	F8
JACKET MATERIAL	Copper	Copper	Copper
OUTSIDE DIA - in(mm)	0.250 (6.4)	0.141 (3.6)	0.085 (2.2)
DIELECTRIC DIA - in(mm)	0.209 (5.3)	0.1175 (2.3)	0.066 (1.7)
CENTER CONDUCTOR DIA - in(mm)	0.641 (1.6)	0.0362 (0.92)	0.0201 (0.51)
MIN BEND RADIUS - in(mm)	0.394 (10.0)	0.100 (2.5)	0.50 (1.3)
WEIGHT (oz per ft)	1.6	0.61	0.24

Materials and Finishes

Center Conductor - Silver-coated copper clad steel per ASTM-B-298 40 micro-inches min thick per MIL-C-17.
Dielectric Core - Extruded Polytetrafluoroethylene (PTFE), per MIL-C-17.
Outer Jacket - Flexiform I- Helically Formed Copper
Flexiform II - Helically Formed Copper Plated Stainless Steel

MIDWEST MICROWAVE

Cable Assemblies

.250, .141 and .085 Semi-Rigid Cable Specifications

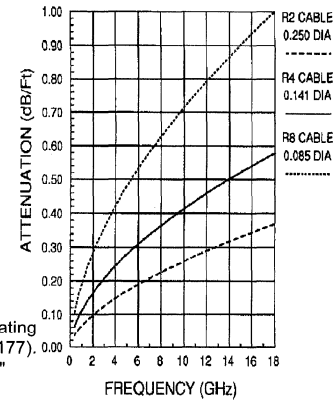
Custom Precision Bent Cable Assemblies

- **.085, .141, and .250 Dia Semi-Rigid Cable**
- **Custom Bent Cofigurations**
- **Electrically Tested**
- **SMA, BMA, 3.5mm, N, TNC, and SC Connectors**

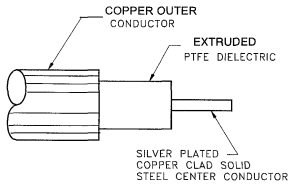
Midwest Microwave offers a complete assortment of custom bent precision formed semi-rigid cable assemblies to fit your system requirements. They are available in a wide choice of compatible connector interface types and are custom formed to user specifications. They can be supplied in a number of finishes with custom identification markers. Phase matched and time delay assemblies can also be supplied to specific specifications upon request.

SEMI-RIGID CABLE SPECIFICATIONS

Midwest Cable No.	R2	R4	R8
Outside Diameter -inches (mm)	0.250 (6.4)	0.141 (3.6)	0.085 (2.2)
Impedance	50 ± 2 Ohms	50 ± 2 Ohms	50 ± 2 Ohms
Center Conductor Type	Solid	Solid	Solid
Frequency Cutoff (GHz)	19.0	36.0	40.0
Attenuation (dB/ft)	See Chart	See Chart	See Chart
CW Power (Watts) @ 5 GHz	300	120	35
RF Leakage (dB) @ 5 GHz	- 90	- 90	-90
Capacitance (pF/ft)	29	29	29
Velocity of Propogation (%)	70	70	70
Time Delay (nS/ft)	1.43	1.43	1.43
Temperature Range (°C)	-40 to +125	-40 to +125	-40 to +125



Notes: 1. Tin or Silver plating of outer jacket can be designated by substituting "T2", "T4", or "T8" for tin plating or "S2", "S4", or "S8" for silver plating when defining the Cable Assembly Model No. (see page 177).
2. A Polyurethane shrink jacket to protect the outer conductor can be designated by indicating a "J" for Ruggedization selection in the Model No. (see page 174).



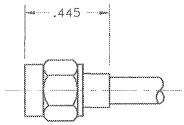
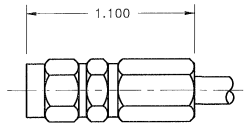
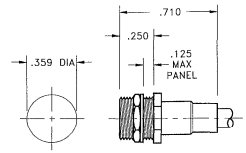
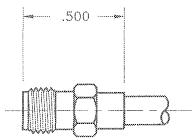
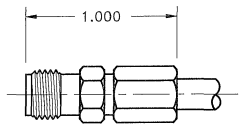
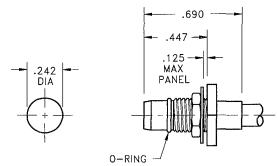
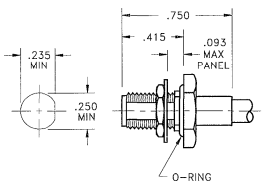
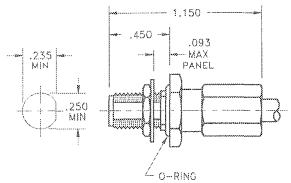
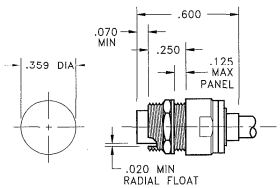
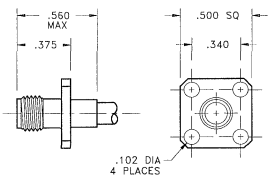
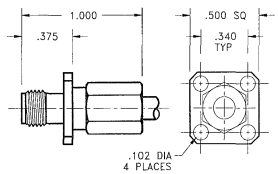
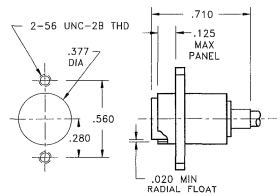
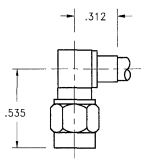
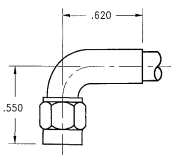
MIDWEST CABLE No.	R2	R4	R8
JACKET MATERIAL	Copper	Copper	Copper
OUTSIDE DIA - in(mm)	0.250 (6.4)	0.141 (3.6)	0.085 (2.2)
DIELECTRIC DIA - in(mm)	0.209 (5.3)	0.1175 (2.3)	0.066 (1.7)
CENTER CONDUCTOR DIA - in(mm)	0.0641 (1.6)	0.0362 (0.92)	0.0201 (0.51)
MIN BEND RADIUS - in(mm)	0.375 (9.5)	0.250 (6.4)	0.125 (3.2)
WEIGHT (oz per ft)	1.6	0.61	0.24

Materials and Finishes

Center Conductor - Silver-coated copper clad steel per ASTM-B-298 40 micro-inches min thick per MIL-C-17.
Dielectric Core - Extruded Polytetrafluoroethylene (PTFE), per MIL-C-17.
Outer Jacket - Copper

Cable Assemblies

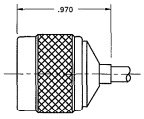
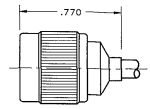
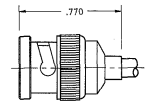
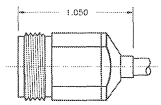
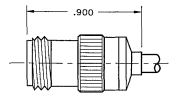
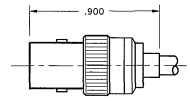
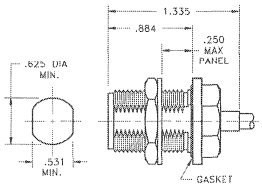
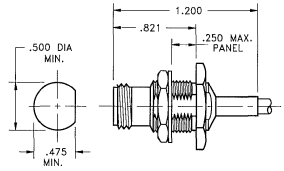
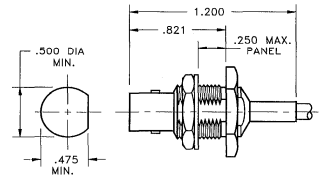
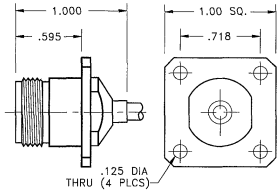
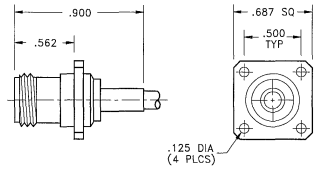
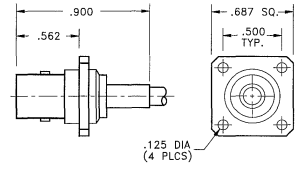
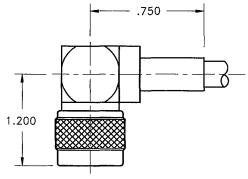
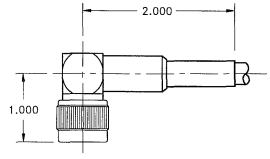
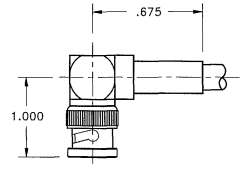
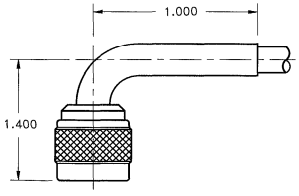
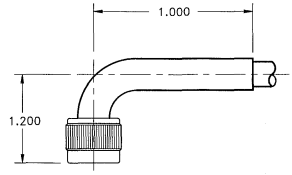
Connector Selection
Semi-rigid and Formable Cable

SMA	3.5mm	BMA
		
SM=Straight SMA Male Plug	**3M**=Straight 3.5mm Male Plug	**MF**=Straight BMA Female Jack
		
SF=Straight SMA Female Jack	**3F**=Straight 3.5mm Female Jack	**MM**=Straight BMA Male Plug
		
SB=Straight SMA Bulkhead Female Jack	**3B**=Straight 3.5mm Female Bulkhead Jack	**MB**=Straight BMA Bulkhead Female Jack
		
SP=Straight SMA Female Panel Jack	**3P**=Straight 3.5mm Female Panel Jack	**MB**=Straight BMA Female Panel Jack
	N/A	N/A
SA=Right Angle SMA Male Plug		
	N/A	N/A
SS=Swept Right Angle SMA Male Plug		

Note: Select Connector designation letters and substitute in Cable Assembly Model No. designation as shown on page 174.

Cable Assemblies

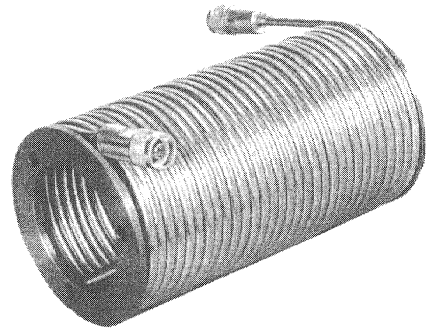
Connector Selection
Semi-rigid and Formable Cable

Type N	TNC	BNC
		
NM=Straight N Male Plug	**TM**=Straight TNC Male Plug	**BM**=Straight BNC Male Plug
		
NF=Straight N Female Jack	**TF**=Straight TNC Female Jack	**BF**=Straight BNC Female Jack
		
NB=Straight N Bulkhead Female Jack	**TB**=Straight TNC Female Bulkhead Jack	**BB**=Straight BNC Bulkhead Female Jack
		
NP=Straight N Female Panel Jack	**TP**=Straight TNC Female Panel Jack	**BP**=Straight BNC Female Panel Jack
		
NA=Right Angle N Male Plug	**TA**=Right Angle TNC Male Plug	**BA**=Right Angle BNC Male Plug
		N/A
NS=Swept Right Angle N Male Plug	**TS**=Swept Right Angle TNC Male Plug	

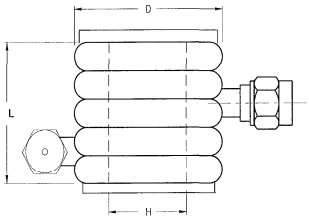
Note: 7mm, SC, and HN series connectors are also available, consult factory for designations and dimensions.

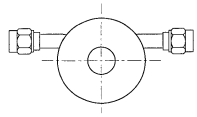
Custom Delay Line Assemblies

- **5, 10, 25, 50, and 100 nanosecond Delay**
- **Calibration Standards**
- **Spooled, Encapsulated or Packaged**
- **N, TNC, and SMA Connectors**

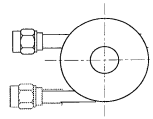


Midwest Microwave offers standard as well as custom coaxial delay lines that are a very reliable way of providing short interval delays for a wide variety of applications. These coaxial delay line assemblies are ideal for use in the laboratory or the microwave system. They can be supplied in open coil form or epoxy encapsulated and housed in an enclosure that can be rack mounted in a system or test instrumentation.

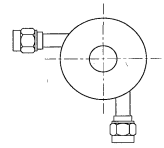




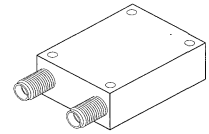
L = In-Line Outputs



P = Paralell Outputs



A = Right Angle Outputs



H = Housing Enclosure

MODEL NUMBER DESIGNATION

DLY- □□□□–□□–□□□–□□

Connector J1

Connector J2

Cable Type

Delay (nS)

Delay Line Product Prefix

Y = Enclosure Option
- **S** = Standard Spool
- **H** = Housing Enclosure
- **E** = Epoxy Encapsulated
- **C** = Custom Enclosure

X = Output Configuration
- **L** = In-Line outputs
- **P** = Paralell Outputs
- **A** = Right Angle Outputs
- **E**= Outputs at one end
- **B**= Outputs at both ends

Delay Formulas

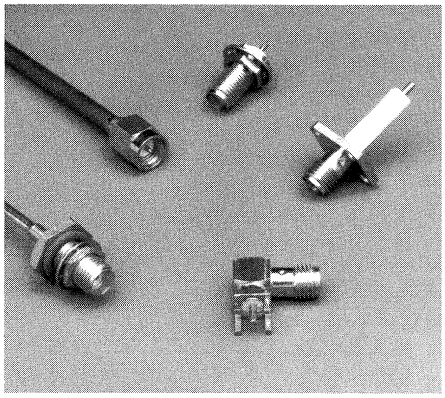
Delay $\equiv T = 1.016\sqrt{\varepsilon}$ = nS/ft.

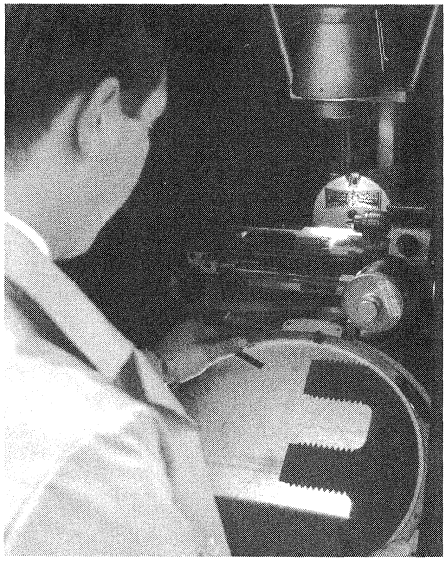
$$\text{Length}_{\text{cable}} = \frac{0.984\,T}{\sqrt{\varepsilon}}$$

Delay Line Type	Delay (ns)	Model Number	DIMENSIONS in (mm) L	D	H	Weight Oz (gr)	Cable Length Ft (m)
Subminiature 0.085 Diameter Cable	5	**DLY-J1J2-R8-005-XY**	1.25 (31.8)	1.75 (44.5)	1.00 (25.4)	2.5 (70.9)	3.5 (0.457)
	10	**DLY-J1J2-R8-010-XY**	1.25 (31.8)	1.75 (44.5)	1.00 (25.4)	3.5 (99.2)	7.0 (0.610)
	25	**DLY-J1J2-R8-025-XY**	2.25 (57.2)	1.75 (44.5)	1.00 (25.4)	7.0 (198.5)	17.5 (5.334)
	50	**DLY-J1J2-R8-050-XY**	2.25 (57.2)	2.25 (57.2)	1.00 (25.4)	14.0 (396.9)	35.0 (10.67)
Miniature 0.141 Diameter Cable	5	**DLY-J1J2-R8-005-XY**	1.75 (44.5)	2.25 (57.2)	1.50 (38.1)	4.0 (113.4)	3.5 (0.457)
	10	**DLY-J1J2-R8-010-XY**	3.00 (76.2)	2.25 (57.2)	1.50 (38.1)	8.0 (226.8)	7.0 (0.610)
	25	**DLY-J1J2-R8-025-XY**	4.75 (120.7)	2.50 (63.5)	1.50 (38.1)	14.0 (396.9)	17.5 (5.334)
	50	**DLY-J1J2-R8-050-XY**	5.00 (127.0)	3.00 (76.2)	1.50 (38.1)	20.0 (567.0)	35.0 (10.67)
	100	**DLY-J1J2-R4-100-XY**	6.25 (158.8)	3.00 (76.2)	1.50 (38.1)	35.0 (992.3)	70.0 (21.34)
Low Loss 0.250 Diameter Cable	5	**DLY-J1J2-R8-005-XY**	2.00 (50.8)	5.50 (139.7)	4.00 (101.6)	8.0 (226.8)	3.5 (0.457)
	10	**DLY-J1J2-R8-010-XY**	3.00 (76.2)	5.50 (139.7)	4.00 (101.6)	14.0 (396.8)	7.0 (0.610)
	25	**DLY-J1J2-R8-025-XY**	3.50 (98.9)	5.50 (139.7)	4.00 (101.6)	32.0 (907.2)	17.5 (5.334)
	50	**DLY-J1J2-R8-050-XY**	5.00 (127.2)	5.50 (139.7)	4.00 (101.6)	60.0 (1701.0)	35.0 (10.67)
	100	**DLY-J1J2-R8-100-XY**	9.00 (228.6)	5.50 (139.7)	4.00 (101.6)	125 (3543.8)	70.0 (21.34)

Note: Connectors may be selected from pages 184 and 185 and their two letter designations substituted for "J1" and "J2" in the Model No.

Connectors SMA • SSMA • BMA • 7mm • N • TNC • BNC





Midwest Microwave offers this complete product line of coaxial connectors that include most all of the popular interfaces. They are constructed using rugged stainless steel for the ultimate in wear resistant reliability and conform to the requirements of MIL-C-39012 with the SMA series listed on the Qualified Parts List (QPL). The selection of catalog standard items is broad and provides the flexibility for custom engineered designs to meet unique system requirements. Connectors for semi-rigid and flexible cable in a wide variety of configurations are offered as well as a complete assortment of panel and bulkhead mounted receptacles. SMA, SSMA, SMM, BMA, N, TNC, BNC, SC, and precision 2.9mm, 3.5mm, and 7mm connectors provide a full spectrum of interface types. In addition, field replaceable hermetic launchers with drop-in hermetic seals are available to fulfill the growing requirement for field replaceable connectors on integrated microwave circuit packages.

Table of Contents

Connectors

General Information

- **MIL-C-39012 Qualified (QPL)**
- **SMA, BMA, N, TNC, BNC, 3.5mm, 7mm Interfaces**
- **Semi-Rigid and Flexible Cable Accommodation**
- **Panel, Bulkhead, and Printed Circuit Mount**

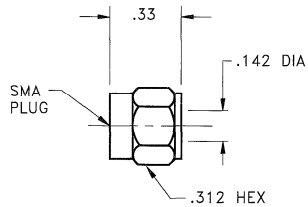
GENERAL SPECIFICATIONS

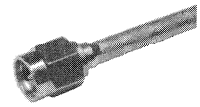
Specification Requirement	MIL-C-39012 Paragraph	Detail Information
General		
Material	3.3	StainlessSteel, corrosion resistant per ASTM-A-582 and ASTM-A-484, Type 303. Brass, half hard per ASTM-B16. Beryllium Copper per ASTM-B196. PTFE Fluorocarbon per ASTM-D-1457.
Finish	3.31	Center contacts shall be gold plated to a minimum thickness of .0001 inch per MIL-G-45204, Type I, Grade C. All other metal parts shall be finished so as to provide the required protection to meet the corrosion specification requirements.
Design	3.4	The design of the connectors herein shall be such that the outline drawings shown in this catalog and the coaxial interface mating dimensions shown in the Appendix meet the requirements of MIL-STD-348.
Electrical		
Insulation Resistance	3.11	Insulation Resistance shall not be less than 5,000 megohms.
Corona Level	3.22	Refer to the applicable military slash sheet or consult factory if one does not exist.
Dielectric Withstanding Voltage	3.17	Refer to the applicable military slash sheet or consult factory if one does not exist..
RF High Potential	3.23	Refer to the applicable military slash sheet or consult factory if one does not exist..
Contact Resistance	3.16	Refer to the applicable military slash sheet or consult factory if one does not exist..
VSWR	3.14	Refer to the applicable military slash sheet or consult factory if one does not exist.. Frequency range is dependent on the type and size cable used.
RF Leakage	3.26	Refer to the applicable military slash sheet or consult factory if one does not exist..
Insertion Loss	3.27	Refer to the applicable military slash sheet or consult factory if one does not exist.. Frequency range is dependent on the type and size cable used.
Mechanical		
Force to Engage	3.5.1	Torque required to engage and disengage shall not exceed: SMA - 2 in-lbs SMM - 1 in-lbs N&SC - 6 in-lbs TNC - 2 in-lbs BNC - 2.5 in-lbs Longitudinal Force not applicable except for BNC = 3 lbs max. BMA - Engage=3 lbs max. Disengage= 1.5 lbs max
Coupling Nut Retention	3.25	SMA - 60 lbs min. SSM - 40 lbs min. N, TNC, BNC, & SC - 100 lbs min.
Coupling Proof Torque (min.)	3.6	SMA - 15 in-lbs SSM - 4 in-lbs N - 30 in-lbs TNC & SC - 15 in-lbs
Cable Retention	3.24	Refer to the applicable military slash sheet or consult factory if one does not exist..
Mating Characteristics	3.7	
Connector Durability	3.15	
Recommended Mating Torque	-	SMA - 7-10 in-lbs SSM - 2 in-lbs N, TNC, & SC - 12-15 in-lbs BNC&BMA - N/A
Environmental		
Vibration	3.18	per Specification MIL-STD-202, method 204, test condition D
Shock	3.19	per Specification MIL-STD-202, method 213, test condition I
Thermal Shock	3.20	Refer to the applicable military slash sheet or consult factory if one does not exist..
Corrosion (Salt Spray)	3.13	per Specification MIL-STD-202, method 101, test condition B
Moisture Resistance	3.21	per Specification MIL-STD-202, method 106, no measurements at high humidity. Insulation resistance shall be 200 megohms minimum within 5 minutes of humidity.

	SMA	SSM	BMA	N	TNC	BNC	SC
Oversize Test Pin min.:	.0375	.0165	.0372	.067	.055	.055	.093
Insertion Depth:	.045	.045	.045	.125	.125	.125	.125
Insertion Force max.:	2 lbs	2 lbs	2 lbs	2 lbs	2 lbs	2 lbs	2 lbs
Insertion Pin Dia min.:	.0370	.0163	.0370	.0658	.054	.054	.092
Withdrawal Force min.:	1 oz.	.5 oz.	1 oz.	2 oz.	2 oz.	1 oz.	2 oz.
Withdrawal Pin Dia max.:	.0355	.015	.0355	.0645	.052	.052	.090

Straight Male Cable Plug - without center contact

Cable Diameter	Model Number
.141 (RG402)	**SMA-0141-92-000-02**

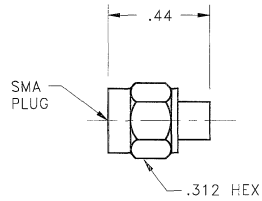


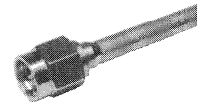


Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.

Straight Male Cable Plug - with separate solder center contact

Cable Dia.	Model Number
.141 (RG402)	**SMA-0141-79-000-02**
.085 (RG405)	**SMA-0085-79-000-02**

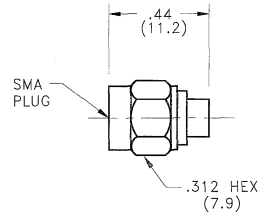


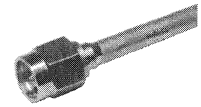


Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.

Straight Male Cable Plug - with separate captured spring center contact

Cable Dia.	Model Number
.141 (RG402)	**SMA-4141-89-000-02**
.085 (RG405)	**SMA-4085-89-000-02**

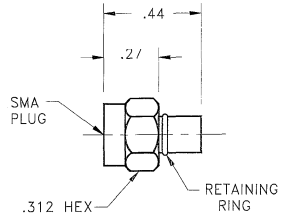


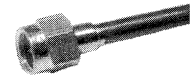


Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.

Straight Male Cable Plug - with retractable coupling nut and captured spring center contact

Cable Dia.	Model Number
.141 (RG402)	**SMA-5141-89-000-02**
.085 (RG405)	**SMA-5085-89-000-02**

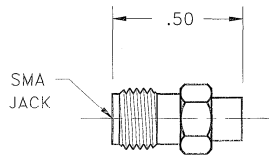




Note: Also available with solder type center contact as SMA-5141-79-000-02 and SMA-5085-79-000-02
Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Female Cable Jack

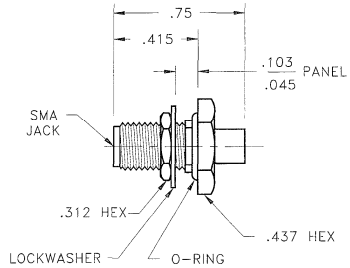
Cable Dia.	Model Number
.141 (RG402)	**SMA-0141-81-000-00**
.085 (RG405)	**SMA-0085-81-000-00**



Note: Also available with spring type center contact as SMA-4141-82-000-02 and SMA-4085-82-000-02.
Standard finish is gold plating for direct soldering to semi-rigid cable.

Straight Bulkhead Female Cable Jack

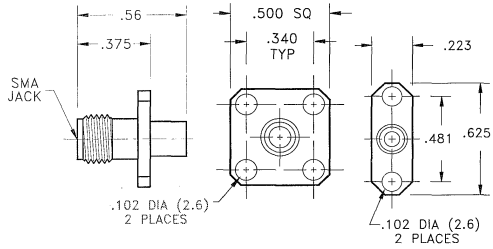
Cable Dia.	Model Number
.141 (RG402)	**SMA-0141-83-000-00**
.085 (RG405)	**SMA-0085-83-000-00**

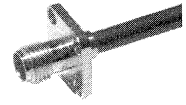


Note: Also available with spring type center contact as SMA-4141-83-000-02 and SMA-4085-83-000-02

Straight Panel Mount Female Cable Jack - 2 Hole and 4 Hole

Cable Dia.	Model Number
.141 (RG402)	**SMA-0141-84-4HL-00**
.085 (RG405)	**SMA-0085-84-4HL-00**
.141 (RG402)	**SMA-0141-82-2HL-00**
.085 (RG405)	**SMA-0085-82-2HL-00**

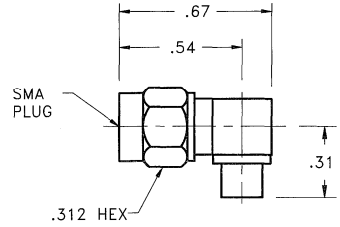




Note: Also available with spring type center contact as SMA-4141-84-4HL-02 and SMA-4085-82-4HL-0 for 4 hole type and as SMA-4141-84-2HL and SMA-4085-82-2HL-02 for two hole type.

Right Angle Male Cable Plug

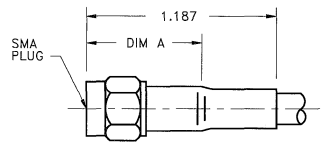
Cable Dia.	Model Number
.141 (RG402)	**SMA-0141-80-000-02**
.085 (RG405)	**SMA-0085-80-000-02**



Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.
Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Male Cable Plug

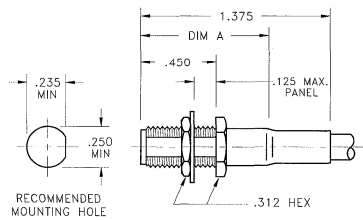
Cable Type (RG/U)	Model Number	Dim A
55; 58; 141; 142; 223; 303; 400	**SMA-0142-55-000-02**	.775 (19.7)
174; 179; 188; 316	**SMA-0188-55-000-02**	.690 (17.5)



Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.

Straight Bulkhead Feedthru Female Cable Jack

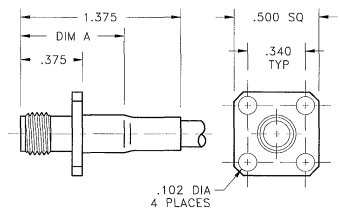
Cable Type (RG/U)	Model Number	Dim A
55; 58; 141; 142; 223; 303; 400	**SMA-0142-59-000-00**	.945 (24.0)
174; 179; 188; 316	**SMA-0188-59-000-00**	.825 (21.0)

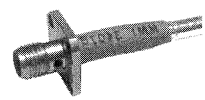


Note: Standard finish is gold plate.

Straight Panel Mount Female Cable Jack - 4 Hole and 2 Hole

Cable Type (RG/U)	Model Number	Dim A
55; 58; 141; 142; 223; 303; 400	**SMA-0142-54-4HL-00**	.870 (19.7)
174; 179; 188; 316	**SMA-0188-54-4HL-00**	.825 (17.5)
55; 58; 141; 142; 223; 303; 400	**SMA-0142-58-2HL-00**	.870 (19.7)
174; 179; 188; 316	**SMA-0188-58-2HL-00**	.825 (17.5)

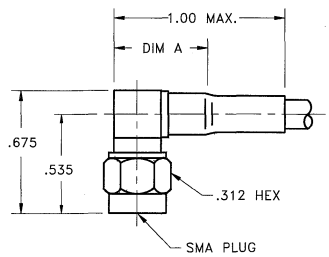




Note: Standard finish is gold plate.

Right Angle Male Cable Plug

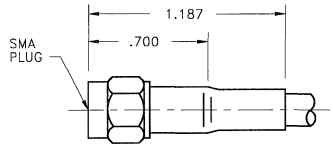
Cable Type (RG/U)	Model Number	Dim A
55; 58; 141; 142; 223; 303; 400	**SMA-0142-56-000-02**	.630 (16.0)
174; 179; 188; 316	**SMA-0188-56-000-02**	.440 (11.2)



Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.
Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Male Cable Plug

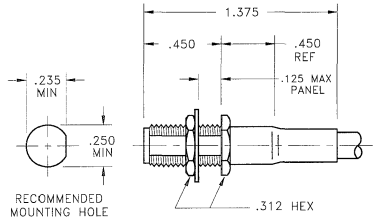
Cable Type (RG/U)	Model Number
55; 142; 223; 400	**SMA-1055-55-000-02**
58; 141; 303	**SMA-1058-55-000-02**
174; 179; 188; 316	**SMA-1188-55-000-02**



Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.

Straight Bulkhead Feedthru Female Cable Jack

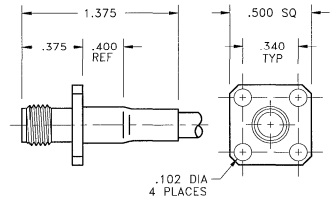
Cable Type (RG/U)	Model Number
55; 142; 223; 400	**SMA-1055-59 -000-02**
58; 141; 303	**SMA-1058-59 -000-02**
174; 179; 188; 316	**SMA-1188-59-000-02**

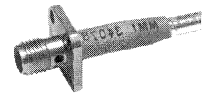


Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to -00.

Straight Panel Mount Female Cable Jack - 4 Hole and 2 Hole

Cable Type (RG/U)	Model Number
55; 142; 223; 400	**SMA-1055-54-4HL-02**
58; 141; 303	**SMA-1058-54-4HL-02**
174; 179; 188; 316	**SMA-1188-54-4HL-02**
55; 142; 223; 400	**SMA-1055-58-2HL-02**
58; 141; 303	**SMA-1058-58-2HL-02**
174; 179; 188; 316	**SMA-1188-58-2HL-02**

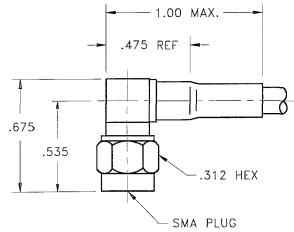




Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to -00.

Right Angle Male Cable Plug

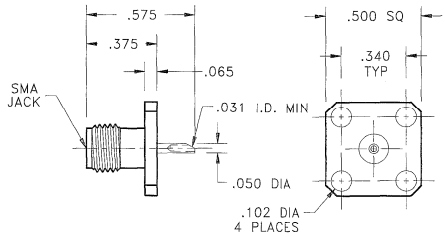
Cable Type (RG/U)	Model Number
55; 142; 223; 400	**SMA-1055-56-000-02**
58; 141; 303	**SMA-1058-56-000-02**
174; 179; 188; 316	**SMA-1188-56-000-02**

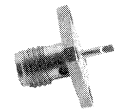


Note: Standard finish is passivated stainless steel, for gold plated coupling nut change -02 suffix to -00.
Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Flange Mount Female Jack Receptacle - 4 Hole

Model Number
SMA-5540-15-POT-02

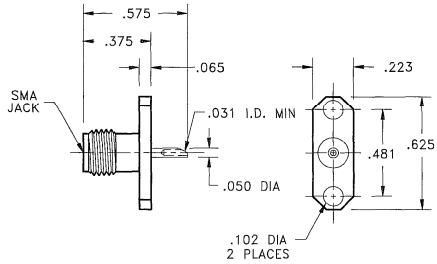




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - 2 Hole

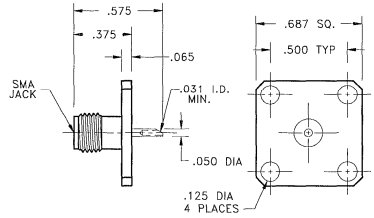
Model Number
SMA-5240-15-POT-02

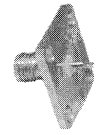


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - .687 sq. flange

Model Number
SMA-5640-15-POT-02

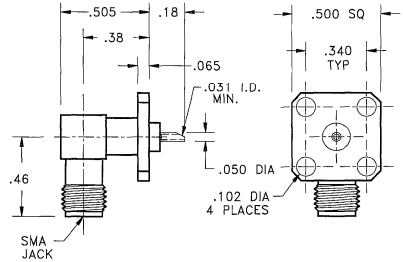




Note: Also available in 1 inch square flange size as SMA-5140-15-POT-02
Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Right Angle Flange Mount Female Jack Receptacle

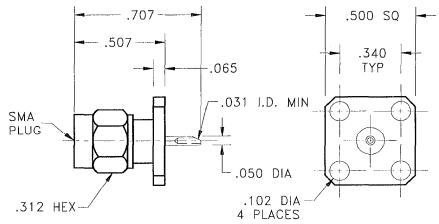
Model Number
SMA-5540-16-POT-02

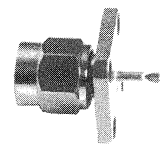


Note: Standard finish is passivated stainless steel, for gold plaing change -02 suffix to -00.
Detail interface dimension information can be found in the appendix.

Straight Flange Mount Male Plug Receptacle - 4 Hole

Model Number
SMA-5540-14-POT-02

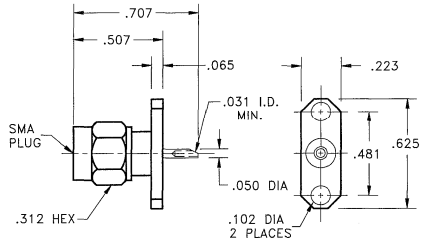


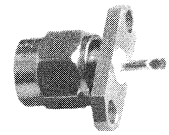


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Male Plug Receptacle - 2 Hole

Model Number
SMA-5240-14-POT-02

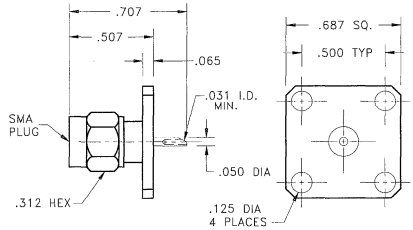


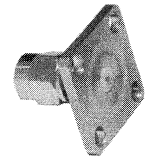


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Male Plug Receptacle - .687 sq. flange

Model Number
SMA-5640-14-POT-02

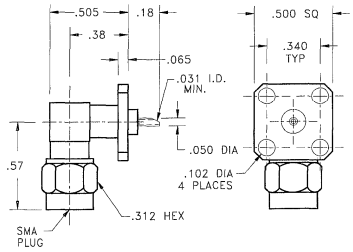


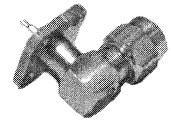


Note: Also available in 1 inch square flange size as SMA-5140-14-POT-02
Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Right Angle Flange Mount Male Plug Receptacle

Model Number
SMA-5540-17-POT-02

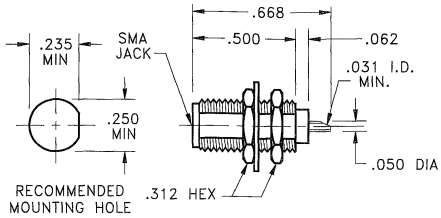




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Detail interface dimension information can be found in the appendix.

Straight Bulkhead Feedthru Female Jack Receptacle - Adjustable

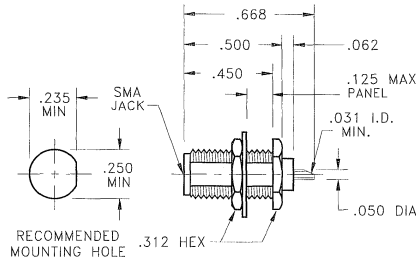
Model Number
SMA-5940-12-POT-02

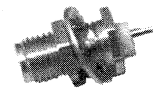


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Feedthru Female Jack Receptacle - Rear Mount

Model Number
SMA-5040-11-POT-02

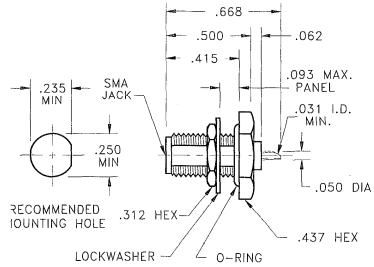


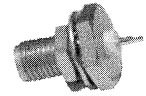


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Mount Female Jack Receptacle - Gasket Seal

Model Number
SMA-5040-18-POT-02

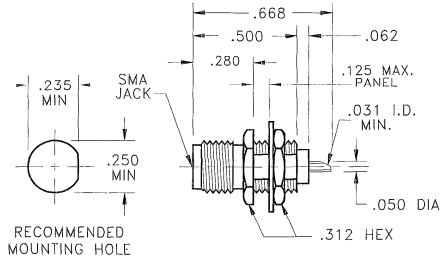


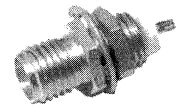


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Mount Female Jack Receptacle - Front Mount

Model Number
SMA-5040-12-POT-02

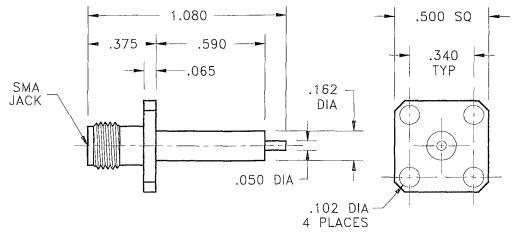


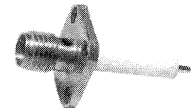


Note:Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Detail interface dimension information can be found in the appendix.

Straight Flange Mount Female Jack Receptacle - 4 Hole

Model Number
SMA-5510-15-TRM-02

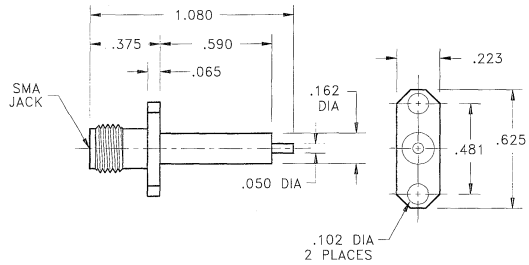


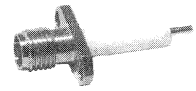


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - 2 Hole

Model Number
SMA-5210-15-TRM-02

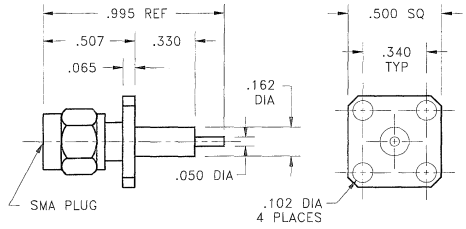


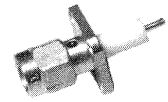


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Male Plug Receptacle - 4 Hole

Model Number
SMA-5510-14-TRM-02

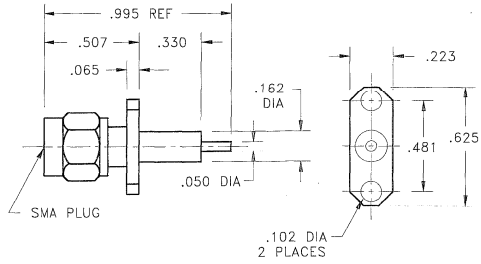


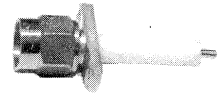


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Male Plug Receptacle - 2 Hole

Model Number
SMA-5210-14-TRM-02

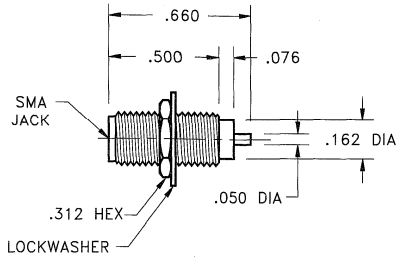




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Feedthru Female Jack Receptacle - Adjustable

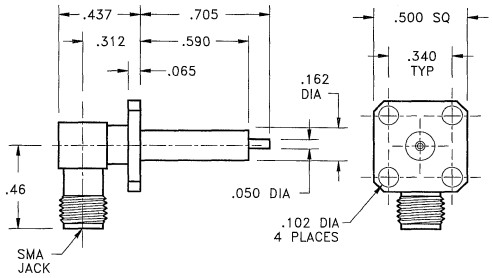
Model Number
SMA-5910-12-TRM-02

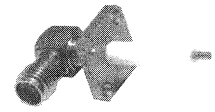


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Right Angle Panel Mount Female Jack Receptacle

Model Number
SMA-5510-16-TRM-02

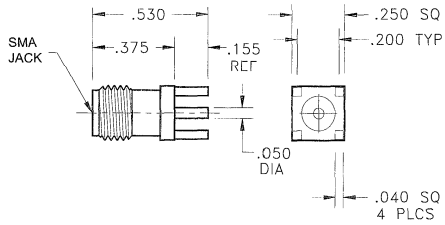


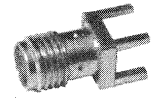


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Printed Circuit Board Mount Female Jack Receptacle

Model Number
SMA-5010-93-PCB-00

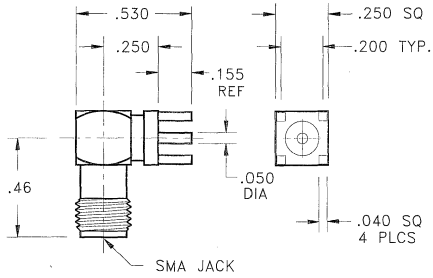




Note: Standard finish is gold plating for direct soldering to circuit board.

Right Angle Printed Circuit Mount Female Jack Receptacle

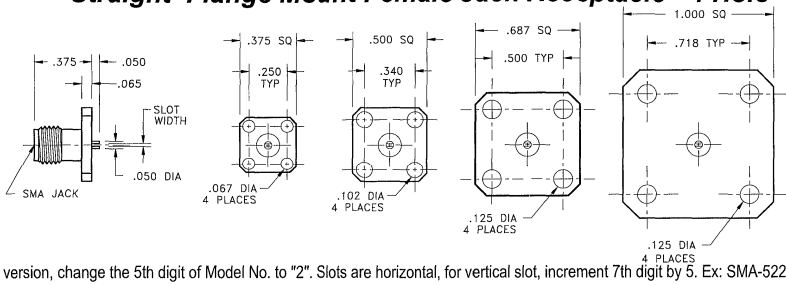
Model Number
SMA-5010-94-PCB-00

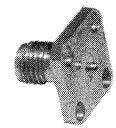


Note: Standard finish is gold plating for direct soldering to circuit board. Detail interface dimension information can be found in the appendix.

SMA Panel Mount Receptacles
Slotted Terminal Type

*Straight Flange Mount Female Jack Receptacle - 4 Hole **



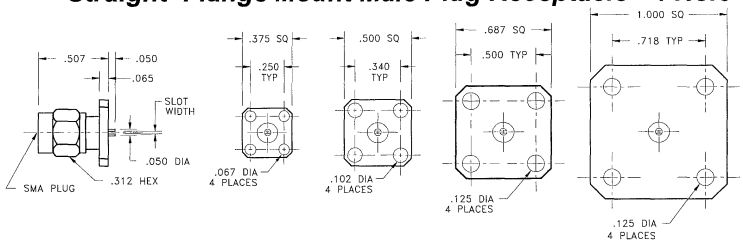


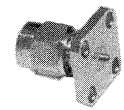
* For two hole version, change the 5th digit of Model No. to "2". Slots are horizontal, for vertical slot, increment 7th digit by 5. Ex: SMA-5225-15-SLT-02.
** For non-captive center contact, change 4th digit of Model No. from "5" to "6". Example: SMA-6320-15-SLT-02

Captured Center Contact **					
Model Number	**Slot Width** Inches (mm)	**Flange Size** Square Inches (mm)	**Model Number**	**Slot Width** Inches (mm)	**Flange Size** Square Inches (mm)
SMA-5320-15-SLT-02	.012 (0.3)	.375 (9.5)	**SMA-5620-15-SLT-02**	.012 (0.3)	.687 (17.5)
SMA-5321-15-SLT-02	.018 (0.5)		**SMA-5621-15-SLT-02**	.018 (0.5)	
SMA-5322-15-SLT-02	.028 (0.7)		**SMA-5622-15-SLT-02**	.028 (0.7)	
SMA-5323-15-SLT-02	.036 (0.9)		**SMA-5623-15-SLT-02**	.036 (0.9	
SMA-5520-15-SLT-02*	.012 (0.3)	.500 (12.7) * Two Hole Version is .625 x .223	**SMA-5120-15-SLT-02**	.012 (0.3)	1.000 (25.4)
SMA-5521-15-SLT-02*	.018 (0.5)		**SMA-5121-15-SLT-02**	.018 (0.5)	
SMA-5522-15-SLT-02*	.028 (0.7)		**SMA-5122-15-SLT-02**	.028 (0.7)	
SMA-5523-15-SLT-02*	.036 (0.9)		**SMA-5123-15-SLT-02**	.036 (0.9)	

Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

*Straight Flange Mount Male Plug Receptacle - 4 Hole **





* For two hole version, change the 5th digit of Model No. to "2". Slots are horizontal, for vertical slot, increment 7th digit by 5. Ex:SMA-5225-14-SLT-02.
** For non-captive center contact, change 4th digit of Model No. from "5" to "6". Example: SMA-6320-14-SLT-02.

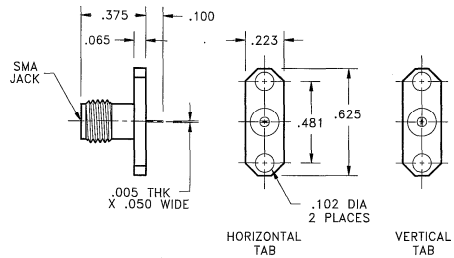
Captured Center Contact **					
Model Number	**Slot Width** Inches (mm)	**Flange Size** Square Inches (mm)	**Model Number**	**Slot Width** Inches (mm)	**Flange Size** Square Inches (mm)
SMA-5320-14-SLT-02	.012 (0.3)	.375 (9.5)	**SMA-5620-14-SLT-02**	.012 (0.3)	.687 (17.5)
SMA-5321-14-SLT-02	.018 (0.5)		**SMA-5621-14-SLT-02**	.018 (0.5)	
SMA-5322-14-SLT-02	.028 (0.7)		**SMA-5622-14-SLT-02**	.028 (0.7)	
SMA-5323-14-SLT-02	.036 (0.9)		**SMA-5623-14-SLT-02**	.036 (0.9	
SMA-5520-14-SLT-02*	.012 (0.3)	.500 (12.7) * Two Hole Version is .625 x .223	**SMA-5120-14-SLT-02**	.012 (0.3)	1.000 (25.4)
SMA-5521-14-SLT-02*	.018 (0.5)		**SMA-5121-14-SLT-02**	.018 (0.5)	
SMA-5522-14-SLT-02*	.028 (0.7)		**SMA-5122-14-SLT-02**	.028 (0.7)	
SMA-5523-14-SLT-02*	.036 (0.9)		**SMA-5123-14-SLT-02**	.036 (0.9)	

Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

SMA Bulkhead Mount Receptacles
Tab Terminal Type

Straight Panel Mount Female Jack Receptacle - Two Hole

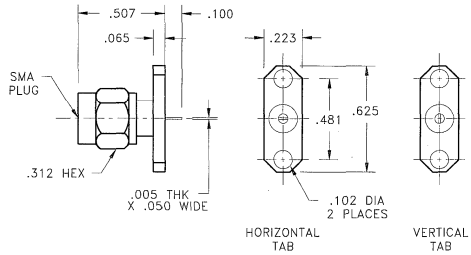
Model Number	Tab Position
SMA-5230-15-TAB-02	Horizontal
SMA-5232-15-TAB-02	Vertical

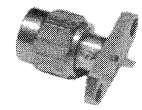


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Panel Mount Male Plug Receptacle - Two Hole

Model Number	Tab Position
SMA-5230-14-TAB-02	Horizontal
SMA-5232-14-TAB-02	Vertical

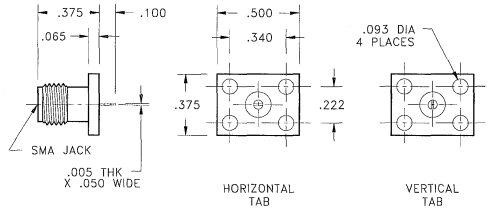


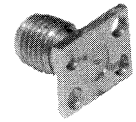


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Panel Mount Female Jack Receptacle - Rectangular Flange

Model Number	Tab Position
SMA-5430-15-TAB-02	Horizontal
SMA-5432-15-TAB-02	Vertical

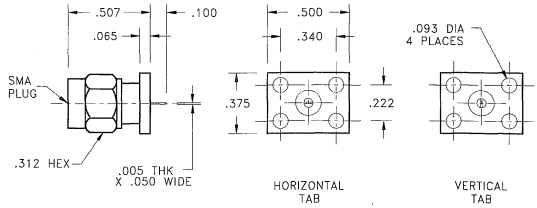


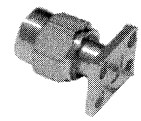


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Panel Mount Male Plug Receptacle - Rectangular Flange

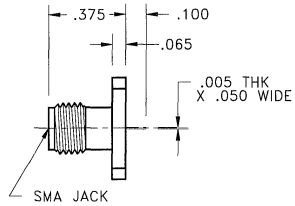
Model Number	Tab Position
SMA-5430-14-TAB-02	Horizontal
SMA-5432-14-TAB-02	Vertical

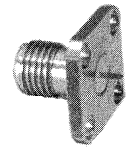




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00. See Appendix for detail interface dimension information.

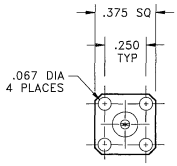
Straight Flange Mount Female Jack Receptacle - 4 Hole



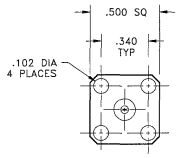


* For non-captive center contact, change fourth digit of Model No.from "5" to "6". Example: SMA-6330-15-TAB-02.

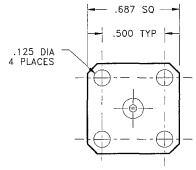
Captured Center Contact*			
Model Number	**Flange Size** Square Inches (mm)	**Model Number**	**Flange Size** Square Inches (mm)
SMA-5330-15-TAB-02	.375 (9.5)	**SMA-5630-15-TAB-02**	.687 (17.5)
SMA-5530-15-TAB-02	.500 (12.7)	**SMA-5130-15-TAB-02**	1.000 (25.4)



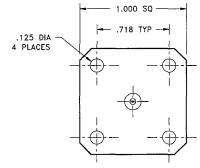
.375 Square



.500 Square

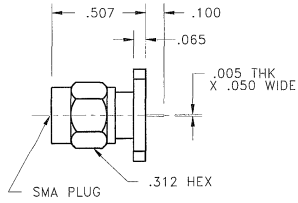


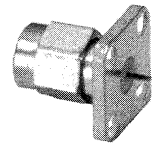
.687 Square



1.000 Square

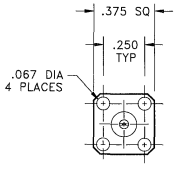
Straight Flange Mount Male Plug Receptacle - 4 Hole



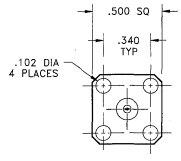


* For non-captive center contact, change fourth digit of Model No.from "5" to "6". Example: SMA-6330-14-TAB-02.

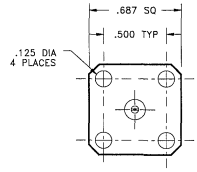
Captured Center Contact *			
Model Number	**Flange Size** Square Inches (mm)	**Model Number**	**Flange Size** Square Inches (mm)
SMA-5330-14-TAB-02	.375 (9.5)	**SMA-5630-14-TAB-02**	.687 (17.5)
SMA-5530-14-TAB-02	.500 (12.7)	**SMA-5130-14-TAB-02**	1.000 (25.4)



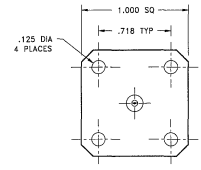
.375 Square



.500 Square



.687 Square

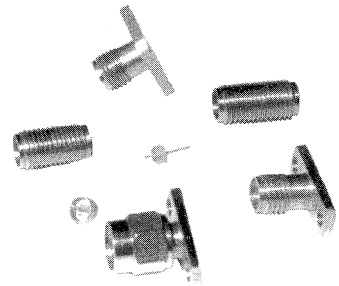


1.000 Square

Connectors

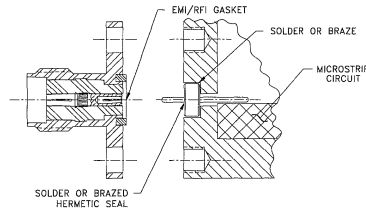
SMA Field Replaceable Launchers
Drop-in Hermetic Seals

- **Replace Connectors without the loss of hermeticity**
- **Low VSWR and EMI/RFI Leakage**
- **Center Conductor Diameters of .012, .015, .018, and .020**

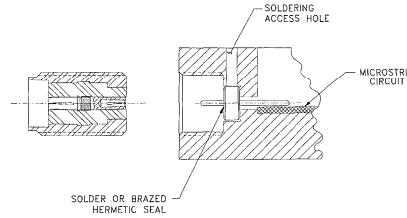


Hermetically sealed microwave components that are required to meet the specifications of MIL-STD-883B and MIL-M-38510 must retain their seal integrity when subjected to a myriad of environmental tests which usually require an extensive amount of post electrical testing. During these tests, the connector(s) can become worn or damaged and it is often necessary to replace them. Midwest Microwave offers this series of Field Replaceable Drop-in Hermetically Sealed Connectors to satisfy the need for a connector that can be replaced without violating the hermeticity of the package and that will work efficiently together with a supplied hermetic seal that the user can solder or braze simply and directly into their microwave package. In addition, the connectors should be designed such that they will provide the maximum amount of EMI/RFI protection possible. Connectors in this series include a hermetic seal that is available in four different center conductor diameter sizes (.012, .015, .018, .020). The user must select the center conductor launch diameter depending on the microstrip line width and dielectric constant of the board material being used in the particular application.

Performance Characteristics		
Connector Element	VSWR to 18 GHz	EMI/RFI Leakage (dB)
Connector Only	1.04 + .006 f	- (70 - f GHz)
Seal Only	1.02 + .003 f	- (70 - f GHz)
Connector + Seal	1.06 + .01 f	- (70 - f GHz)



Drop-in Assembly - Flanged Connector

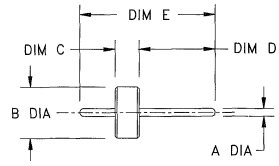


Drop-in Assembly - Feedthru Connector

Note: BMA (Blind Mate), 3.5mm, and 2.9mm Field Replaceable Drop-in Hermetic Receptacles are shown on pages 223, 224, and 225.

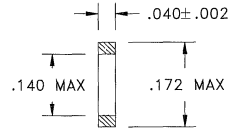
Hermetic Seal - Solder/Braze

Model Number	Dimensions - inches				
	A	B	C	D	E
HRM-0001-95-DRP-00	.012	.100	.063	.180	.315
HRM-0002-95-DRP-00	.015	.100	.063	.180	.315
HRM-0003-95-DRP-00	.018	.112	.063	.180	.315
HRM-0004-95-DRP-00	.020	.158	.069	.070	.220

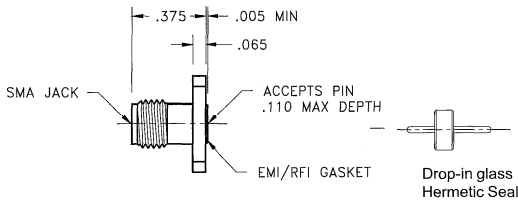


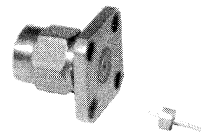
Gasket - EMI/RFI

Model Number
GSK-0054-99-DRP-54



Straight Flange Mount Female Jack Launcher with EMI/RFI Gasket



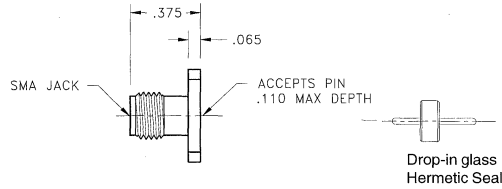


Mechanically Captured Center Contact							
Model Number ** Connector and Seal **	Seal Pin Dia. Inches (mm)	Flange Size	Mounting Hole Detail	Model Number ** Connector Only **	Accepts Pin Dia. Inches (mm)	Flange Size	Mounting Hole Detail
SMA-5372-15-DRP-02	.012 (0.3)	.375 (9.5) Square	II	SMA-5362-15-DRP-02	.012 (0.3)	.375 (9.5) Square	II
SMA-5373-15-DRP-02	.015 (0.5)			SMA-5363-15-DRP-02	.015 (0.5)		
SMA-5374-15-DRP-02	.018 (0.7)		III	SMA-5364-15-DRP-02	.018 (0.7)		III
SMA-5572-15-DRP-02	.012 (0.3)	.500 (12.7) Square	IV	SMA-5562-15-DRP-02	.012 (0.3)	.500 (12.7) Square	IV
SMA-5573-15-DRP-02	.015 (0.3)			SMA-5563-15-DRP-02	.015 (0.5)		
SMA-5574-15-DRP-02	.018 (0.5)		V	SMA-5564-15-DRP-02	.018 (0.7)		V
SMA-5672-15-DRP-02	.012 (0.3)	.625 (15.9) Two Hole	VI	SMA-5662-15-DRP-02	.012 (0.3)	.625 (15.9) Two Hole	VI
SMA-5673-15-DRP-02	.015 (0.5)			SMA-5663-15-DRP-02	.015 (0.5)		
SMA-5674-15-DRP-02	.018 (0.7)		VII	SMA-5664-15-DRP-02	.018 (0.7)		VII
SMA-5872-15-DRP-02	.012 (0.3)	.550 (14.0) Two Hole	VIII	SMA-5862-15-DRP-02	.012 (0.3)	.550 (14.0) Two Hole	VIII
SMA-5873-15-DRP-02	.015 (0.5)			SMA-5863-15-DRP-02	.015 (0.5)		
SMA-5874-15-DRP-02	.018 (0.7)		IX	SMA-5864-15-DRP-02	.018 (0.7)		IX

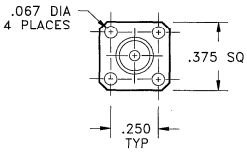
Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Mounting Hole Details II thru XI appear on page 204.

Straight Flange Mount Female Jack Launcher - without EMI/RFI Gasket

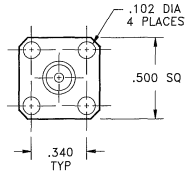
Model Number	Seal Pin Dia.	Flange Size	Mounting Hole Detail
SMA-5561-15-DRP-02	.020	.500 Square	X
SMA-5261-15-DRP-02	.020	.625 Two Hole	XI



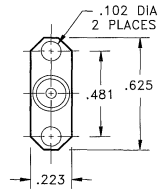
Flange Size Details



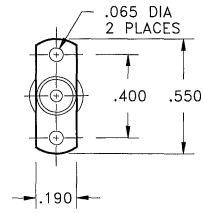
.375 Square



.500 Square



.625 Two Hole

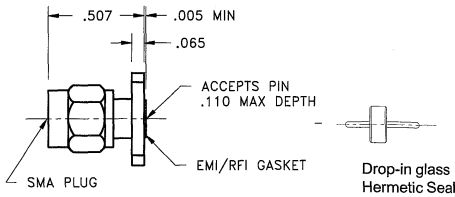


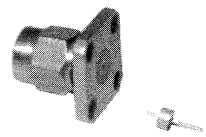
.550 Two Hole

Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

SMA Field Replaceable Launchers
Drop-in Hermetic Seals

Straight Flange Mount Male Plug Launcher with EMI/RFI Gasket



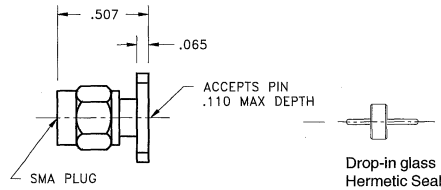


Mechanically Captured Center Contact							
Model Number **Connector and Seal**	Seal Pin Dia. Inches (mm)	Flange Size	Mounting Hole Detail	Model Number ** Connector Only **	Accepts Pin Dia. Inches (mm)	Flange Size	Mounting Hole Detail
SMA-5372-14-DRP-02	.012 (0.3)	.375 (9.5) Square	II	SMA-5362-14-DRP-02	.012 (0.3)	.375 (9.5) Square	II
SMA-5373-14-DRP-02	.015 (0.5)			SMA-5363-14-DRP-02	.015 (0.5)		
SMA-5374-14-DRP-02	.018 (0.7)		III	SMA-5364-14-DRP-02	.018 (0.7)		III
SMA-5572-14-DRP-02	.012 (0.3)	.500 (12.7) Square	IV	SMA-5562-14-DRP-02	.012 (0.3)	.500 (12.7) Square	IV
SMA-5573-14-DRP-02	.015 (0.5)			SMA-5563-14-DRP-02	.015 (0.5)		
SMA-5574-14-DRP-02	.018 (0.7)		V	SMA-5564-14-DRP-02	.018 (0.7)		V
SMA-5672-14-DRP-02	.012 (0.3)	.625 (15.9) Two Hole	VI	SMA-5662-14-DRP-02	.012 (0.3)	.625 (15.9) Two Hole	VI
SMA-5673-14-DRP-02	.015 (0.5)			SMA-5663-14-DRP-02	.015 (0.5)		
SMA-5674-14-DRP-02	.018 (0.7)		VII	SMA-5664-14-DRP-02	.018 (0.7)		VII
SMA-5872-14-DRP-02	.012 (0.3)	.550 (14.0) Two Hole	VIII	SMA-5862-14-DRP-02	.012 (0.3)	.550 (14.0) Two Hole	VIII
SMA-5873-14-DRP-02	.015 (0.5)			SMA-5863-14-DRP-02	.015 (0.5)		
SMA-5874-14-DRP-02	.018 (0.7)		IX	SMA-5864-14-DRP-02	.018 (0.7)		IX

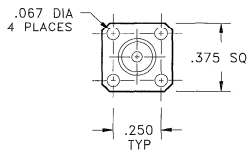
Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Mounting Hole Details II thru XI appear on page 204.

Straight Flange Mount Male Plug Launcher - without EMI/RFI Gasket

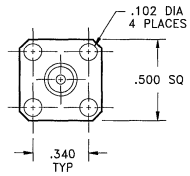
Model Number	Seal Pin Dia.	Flange Size	Mounting Hole Detail
SMA-5561-14-DRP-02	.020	.500 Square	X
SMA-5261-14-DRP-02	.020	.625 Two Hole	XI



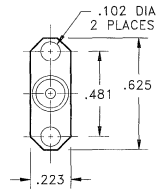
Flange Size Details



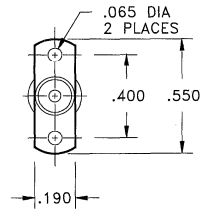
.375 Square



.500 Square



.625 Two Hole



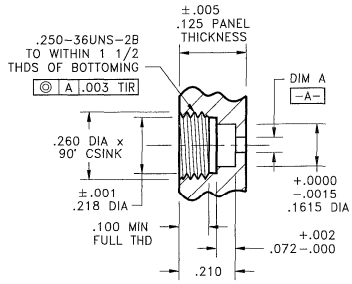
.550 Two Hole

Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

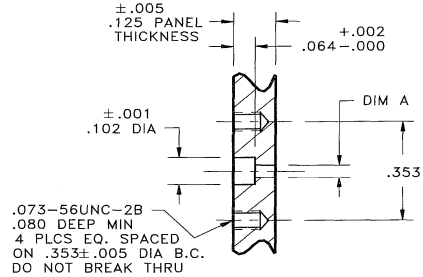
Connectors

Recommended Mounting Hole Detail
For Field Replaceable Hermetic Launchers

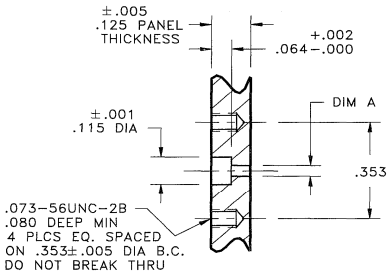
Pin Dia	Dia A
.012	.027
.015	.034
.018	.041
.020	.046



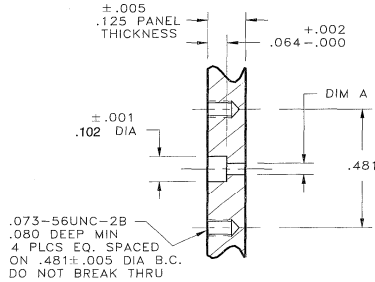
Detail I



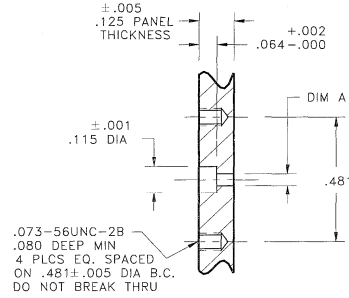
Detail II



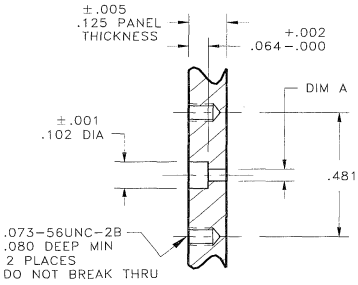
Detail III



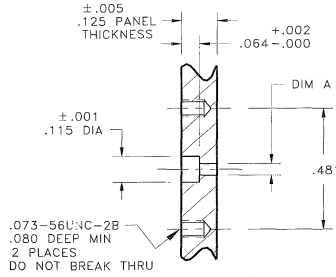
Detail IV



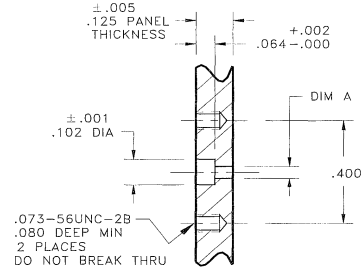
Detail V



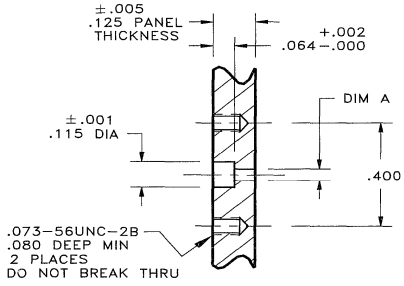
Detail VI



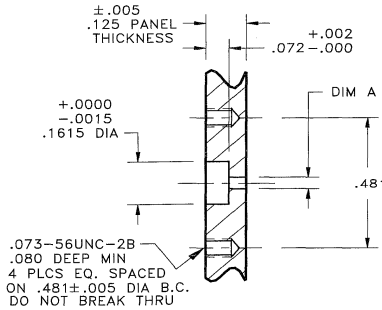
Detail VII



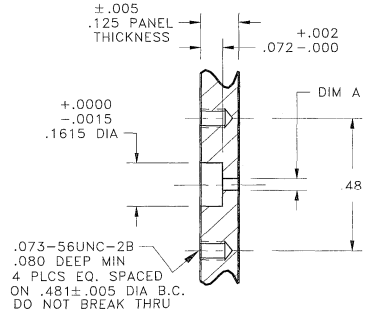
Detail VIII



Detail IX



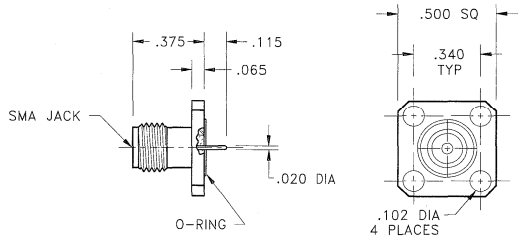
Detail X

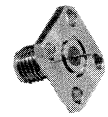


Detail XI

Straight Flange Mount Female Jack Receptacle - Flush Mount

Model Number
SMA-5512-35-HRM-02

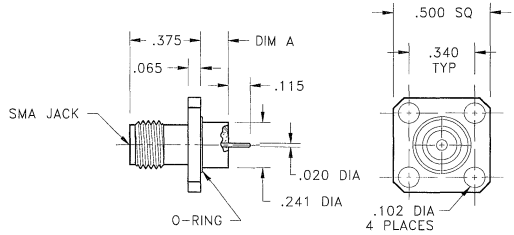




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - Boss Mount

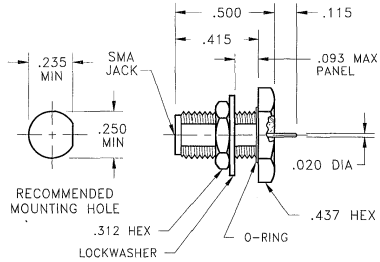
Model Number	Dim A
SMA-5581-35-HRM-02	.089 (2.3)
SMA-5582-35-HRM-02	.121 (3.1)
SMA-5583-35-HRM-02	.183 (4.6)

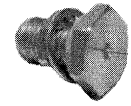


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Feedthru Female Jack Receptacle - Rear Mount

Model Number
SMA-5012-31-HRM-02

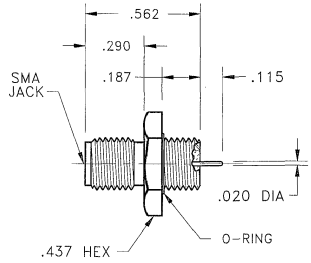


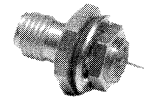


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Feedthru Female Jack Receptacle - Front Mount

Model Number
SMA-5012-32-HRM-02

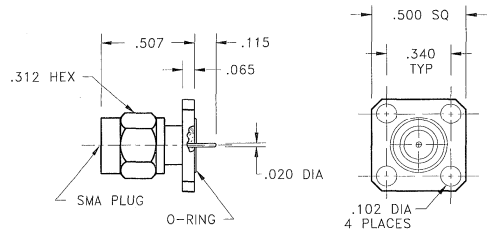


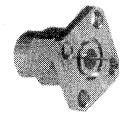


Note:Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Detail interface dimension information can be found in the appendix.

Straight Flange Mount Male Plug Receptacle - Flush Mount

Model Number
SMA-5512-34-HRM-02

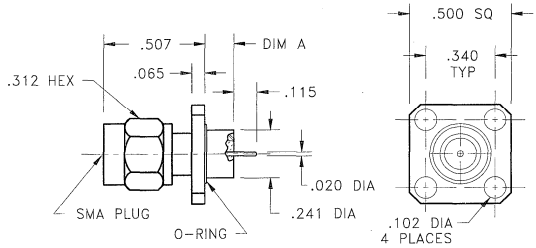


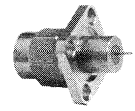


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Male Plug Receptacle - Boss Mount

Model Number	Dim A
SMA-5581-34-HRM-02	.089 (2.3)
SMA-5582-34-HRM-02	.121 (3.1)
SMA-5583-34-HRM-02	.183 (4.6)

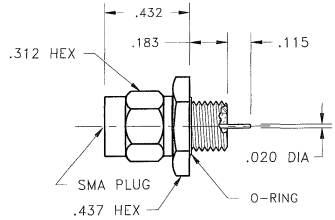


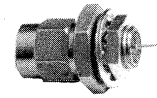


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Bulkhead Feedthru Male Plug Receptacle - Front Mount

Model Number
SMA-5012-39-HRM-02

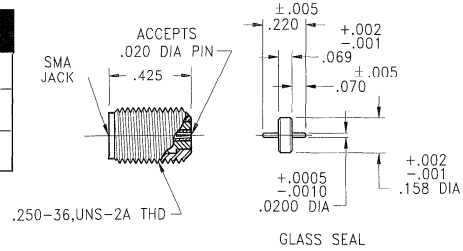




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Detail interface dimensional information can be found in the appendix.

Straight Panel Feedthru Female Jack Receptacle - Field Replaceable

Model Number	Product
SMA-5974-12-DRP-02	Connector and Seal
SMA-5961-12-DRP-02	Connector only
HRM-0004-95-DRP-02	Seal only



Note: Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Male Cable Plug

Cable Type (RG/U)	Model Number	Fig.
405 (.085 Dia.)	**SSM-0085-92-000-02**	I
405 (.085 Dia.)	**SSM-0085-79-000-02**	II

Fig I = uses center conductor of cable

Fig II = uses solder type center contact

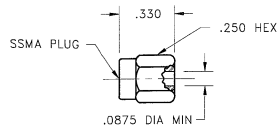


FIG I

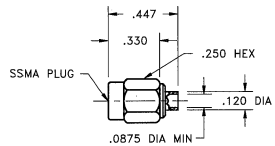
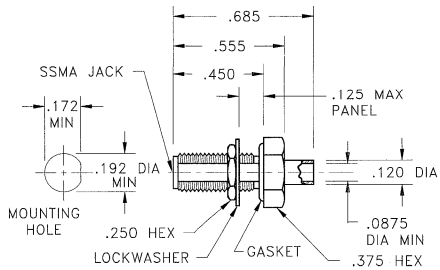


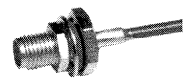
FIG II

Note: Standard finish is gold plating on housing for direct solder to cable and passivated coupling nut.

Straight Bulkhead Feedthru Female Cable Jack

Cable Type (RG/U)	Model Number
405 (.085 Dia.)	**SSM-0085-83-000-00**

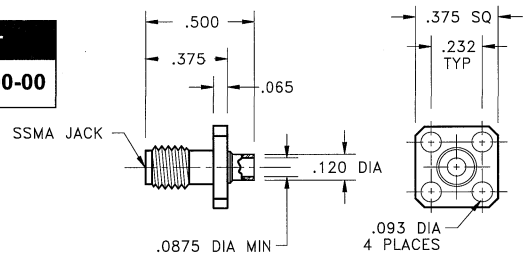


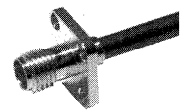


Note: Standard finish is gold plating for direct soldering to cable.

Straight Panel Mount Female Cable Jack - 4 Hole

Cable Type (RG/U)	Model Number
405 (.085 Dia.)	**SSM-0085-84-000-00**

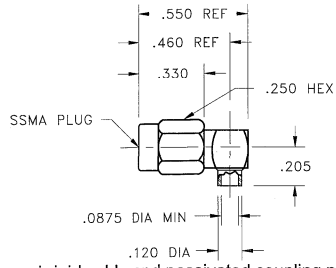


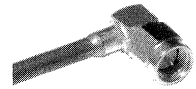


Note: Standard finish is gold plating for direct soldering to semi-rigid cable.

Right Angle Male Cable Plug

Cable Type	Model Number
405 (.085 Dia.)	**SSM-0085-80-000-02**

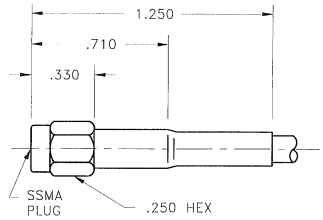




Note: Standard finish is gold plating on housing for direct solder to semi-rigid cable and passivated coupling nut.
Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Male Cable Plug

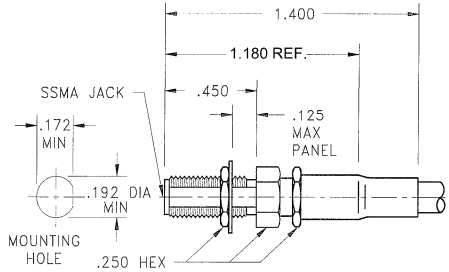
Cable Type (RG/U)	Model Number
174; 179; 187; 188; 316	**SSM-1188-55-000-02**
178; 196	**SSM-1196-55-000-02**



Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to-00.

Straight Bulkhead Feedthru Female Cable Jack

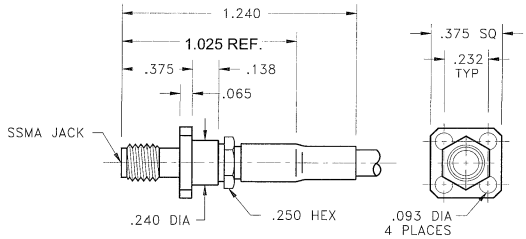
Cable Type (RG/U)	Model Number
174; 179; 187; 188; 316	**SSM-1188-59-000-02**
178; 196	**SSM-1196-59-000-02**

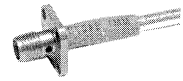


Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to-00.

Straight Panel Mount Female Cable Jack

Cable Type (RG/U)	Model Number
174; 179; 187; 188; 316	**SSM-1188-54-000-02**
178; 196	**SSM-1196-54-000-02**

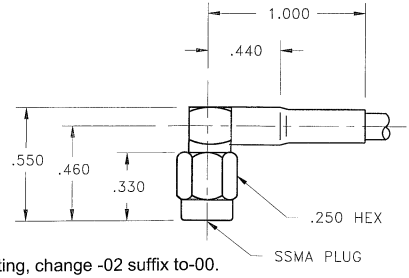




Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to-00.

Right Angle Male Cable Plug

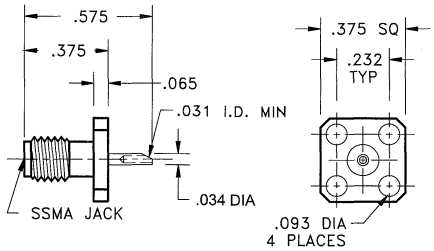
Cable Type (RG/U)	Model Number
174; 179; 187; 188; 316	**SSM-1188-56-000-02**
178; 196	**SSM-1196-56-000-02**



Note: Standard finish is passivated stainless steel, for gold plating, change -02 suffix to-00.

Straight Flange Mount Female Jack Receptacle - 4 Hole

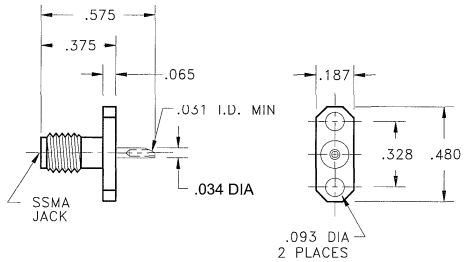
Model Number
SSM-5340-15-POT-02



Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - 2 Hole

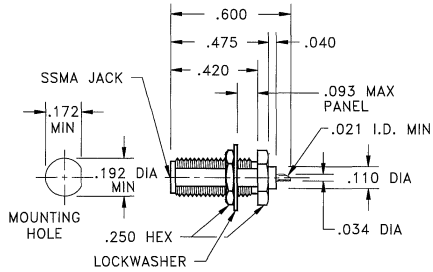
Model Number
SSM-5240-15-POT-02



Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Bulkhead Feedthru Female Jack Receptacle - Rear Mount

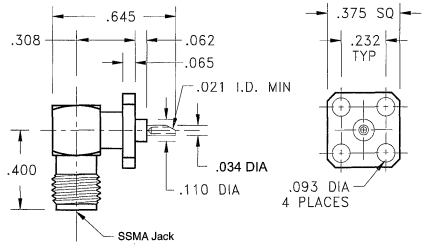
Model Number
SSM-5040-11-POT-02



Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Right Angle Flange Mount Female Jack Receptacle

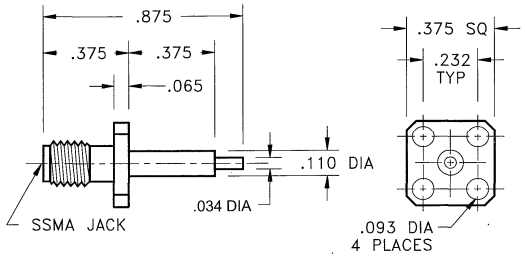
Model Number
SSM-5340-16-POT-02

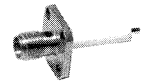


Note:Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.
Detail interface dimension information can be found in the appendix.

Straight Flange Mount Female Jack Receptacle - 4 Hole

Model Number
SSM-5310-15-TRM-02

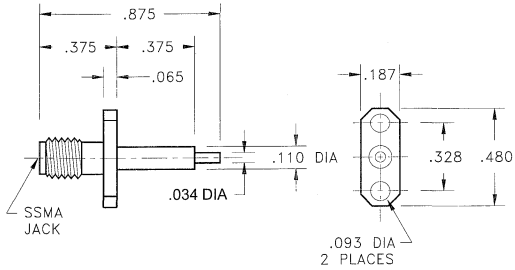




Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle - 2 Hole

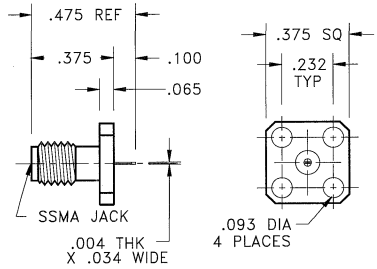
Model Number
SSM-5210-15-TRM-02

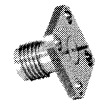


Note: Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Flange Mount Female Jack Receptacle

Model Number
SSM-5330-15-TAB-02

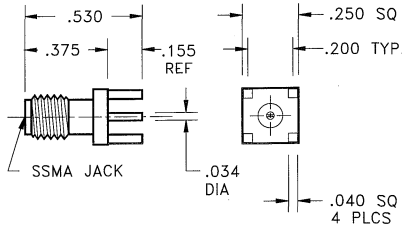




Note:Standard finish is passivated stainless steel, for gold plating change -02 suffix to -00.

Straight Printed Circuit Board Mount Female Jack Receptacle

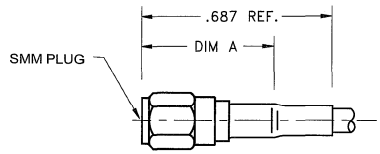
Model Number
SSM-5010-93-PCB-00



Note: Standard finish is gold plating for direct solder to circuit board. Detail interface dimension information can be found in the Appendix.

Straight Male Cable Plug

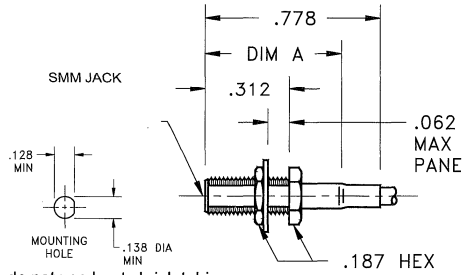
Cable Type	Model Number	Dim A
RG196/U	**SMM-1196-55-000-00**	0.450
.034 Semi-rigid	**SMM-0034-79-000-00**	0.360
.047 Semi-rigid	**SMM-0047-79-000-00**	0.360



Note:Standard finish is gold plating for passivated stainless steel coupling nut change -00 suffix to -02. Semi-rigid connectors do not use shrink tubing. Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Bulkhead Feedthru Female Cable Jack

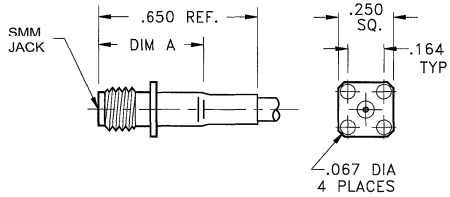
Cable Type	Model Number	Dim A
RG196/U	**SMM-1196-59-000-00**	0.565
.034 Semi-rigid	**SMM-0034-83-000-00**	0.458
.047 Semi-rigid	**SMM-0047-83-000-00**	0.458



Note: Standard finish is gold plate, semi-rigid cable connectors do not use heat shrink tubing.

Straight Panel Mount Female Cable Jack - 4 Hole

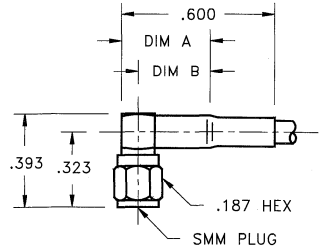
Cable Type	Model Number	Dim A
RG196/U	**SMM-1196-54-000-00**	0.440
.034 Semi-rigid	**SMM-0034-84-000-00**	0.330
.047 Semi-rigid	**SMM-0047-84-000-00**	0.330



Note: Standard finish is gold plate, semi-rigid cable connectors do not use heat shrink tubing.

Right Angle Male Cable Plug

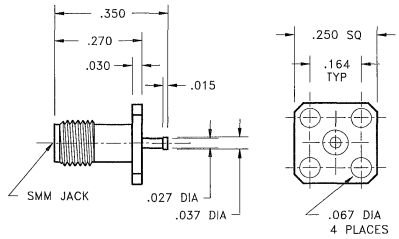
Cable Type	Model Number	Dim A	Dim B
RG196/U	**SMM-1196-56-000-00**	0.360	0.280
.034 Semi-rigid	**SMM-0034-80-000-00**	0.260	0.180
.047 Semi-rigid	**SMM-0047-80-000-00**	0.260	0.180



Note: Standard finish is gold plating for passivated stainless steel coupling nut change -00 suffix to -02. Semi-rigid connectors do not use shrink tubing. Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Flange Mount Female Jack Receptacle - 4 Hole

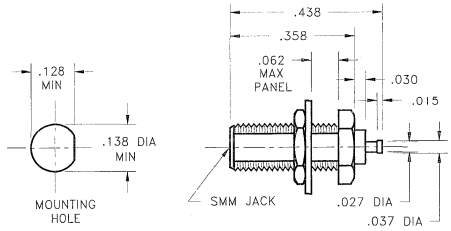
Model Number
SMM-5819-15-TRM-00



Note: Standard finish is gold plating, for passivared stainless steel change -00 suffix to -02.

Straight Bulkhead Feedthru Female Jack Receptacle- Rear Mount

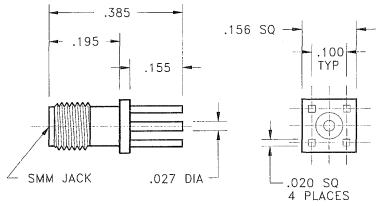
Model Number
SMM-5019-11-TRM-00



Note: Standard finish is gold plating, for passivared stainless steel change -00 suffix to -02.

Straight Printed Circuit Board Mount Female Jack Receptacle

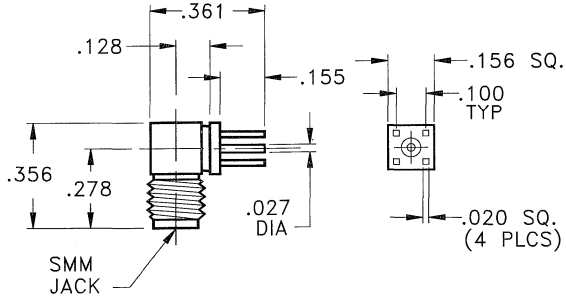
Model Number
SMM-5010-93-PCB-00

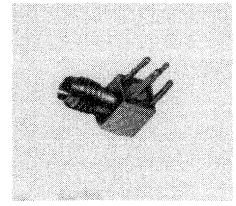


Note: Standard finish is gold plating for direct soldering to printed circuit board.

Right Angle Printed Circuit Board Mount Female Jack Receptacle

Model Number
SMM-5010-94-PCB-00

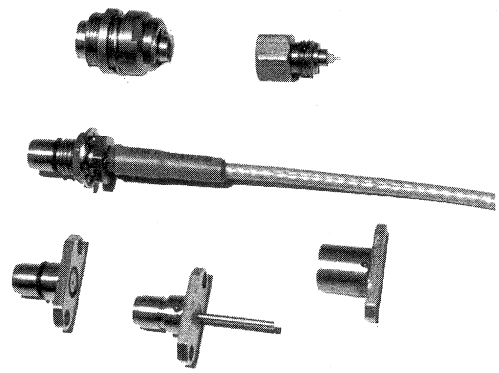




Note: Standard finish is gold plating for direct soldering to printed circuit board.

BMA
Blind Mate Connectors

- ***Modular Interconnection System***
- ***Save Space and Weight***
- ***Eliminate Excessive Cable Assemblies***
- ***Module to Motherboard and Rack and Panel***



Midwest Microwave's series of BMA blind mate connectors were designed to provide a solution to a number of microwave and R.F. interconnect problems. Through their use connections between R.F. or microwave modules and a motherboard can be accomplished with a minimum amount cable interconnections that use space and add weight. The motherboard could be the base of a drawer or rack containing a portion of the system that in turn plugs into a back plane that receives a series of these module filled drawers that comprise the complete rack and panel R.F. or microwavesystem. The connectors provide both rigid or floating type interconnect arrangements and take into consideration the need for axial and radial misalignment.

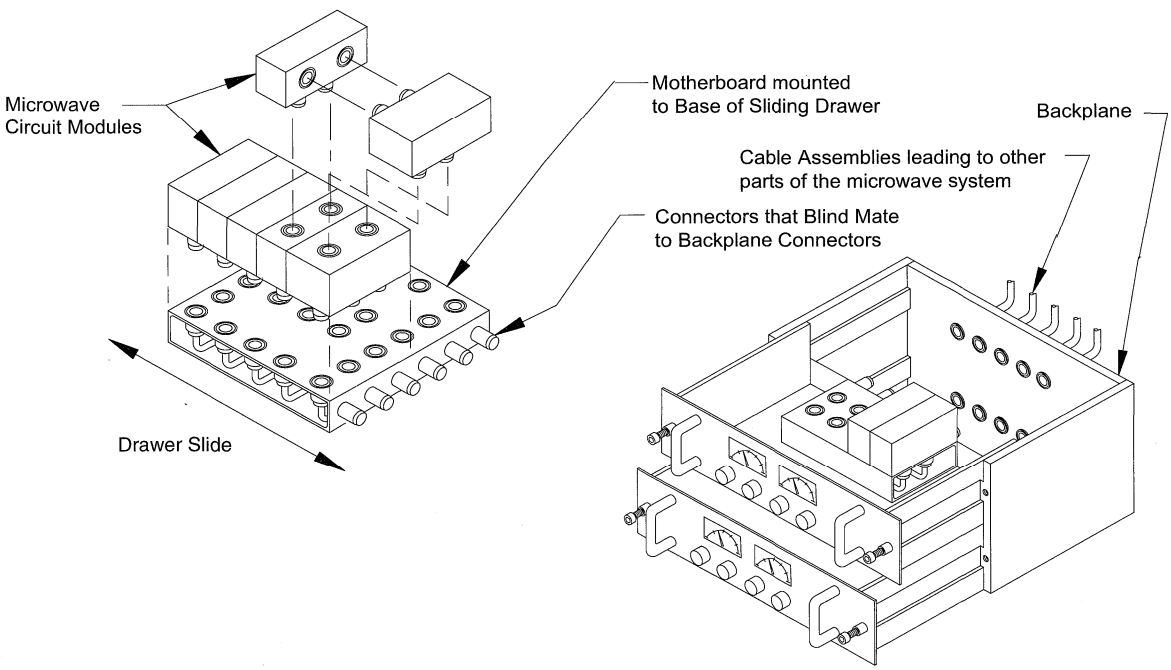
Specifications

Impedance: 50 Ohms
Frequency: DC to 22 GHz
Temperature Range: -65 to + 125°C

VSWR:	RG 402 (.141) Semi-rigid	RG 405 (.085) Semi-rigid
DC-18.0 GHz	1.02 + .005 f (GHz)	1.05 + .005 f (GHz)
18.0-22.0 GHz	1.02 + .008 f (GHz)	1.05 + .009 f (GHz)
Transmission Loss:	.003 √f (GHz)	.003 √f (GHz)
Insulation Resistance:	5000 megohms	5000 megohms

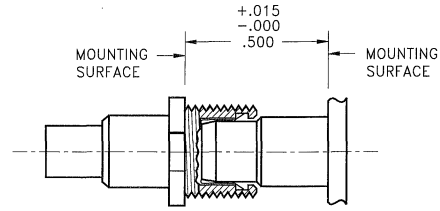
Dielectric Withstanding Voltage:	1500 volts RMS	1500 volts RMS
Corona Ext Voltage:	375 volts @70M ft.	335 volts @ 70M ft.
RF Leakage @ Interface:	-(90-fGHz) dB min	-(90-fGHz) dB min
RF High Potential-5MHz :	1,000 volts RMS	670 volts RMS
Power:	300 Watts at 3 GHz (sea level) at room temp.	

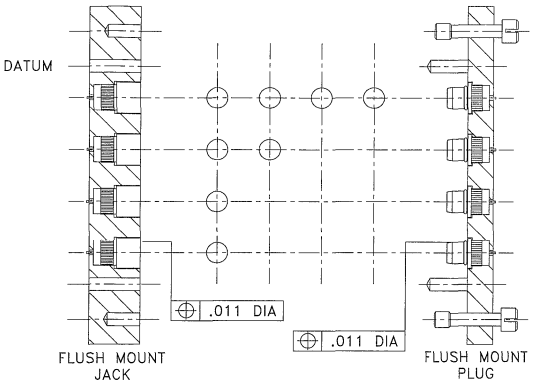
Note: See page 189 for other related general, mechanical, and environmental specifications.



Rigid Mount BMA Connectors

Rigid Mount Blind Mate Connectors are usually used for applications involving microwave modules and microwave integrated circuit components where space and close tolerances are important considerations. Because BMA connectors can accomodate a small amount of axial and radial misalignment, they are a favorable choice for a multi-module package arrangement. Interlocking modules should use jack screws to keep them together for proper performance. A typical dimensional layout of an array of rigid mount BMA connectors showing tolerance considerations is shown below.





Axial Misalignment

BMA rigid mount blind mate connector interfaces can accomodate a limited amount of axial misalignment . The recommended design limits and maximum allowable interface separation are shown below.

BMA Interface	Maximum Separation	Recommended Design Limit
Male/Female	.030 (0.762)	.015 (0.381)

Radial Misalignment

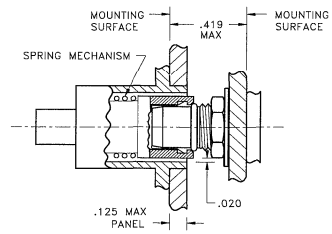
BMArigid mount blind mate connector interfaces can accomodate a limited amount of radial misalignment without performance degradation. The design limits are shown below.

BMA Interface	True Position Mounting Hole Centerline Tolerance	Total Connector Misalignment per Mated Pair
Male/Female	.003 (0.076)	.008 (0.203)

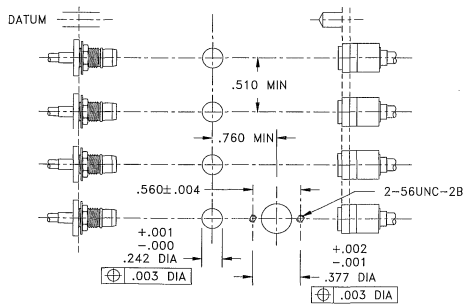
Float Mount BMA Connectors

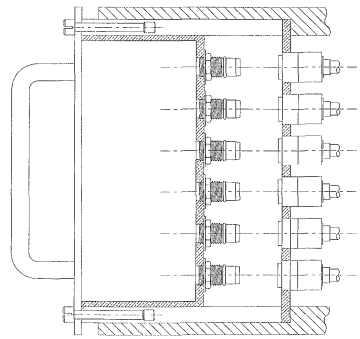
Float Mount Blind Mate Connectors are very useful for applications involving rack and panel assemblies and multiple connector mating arrangements where the maximum of axial and radial misalignment tolerance is required. Midwest Microwave's BMA float mount jack connectors provide an additional external float mechanism that when added to the normal misalignment tolerance of the BMA interface, provides the necessary misalignment tolerance to allow successful mating of the interfaces.

A Mating Preload is recommended



BMA Interface	Axial Misalignment	Radial Misalignment*
Male/Female	.050 (1.270)	.020 (0.508)



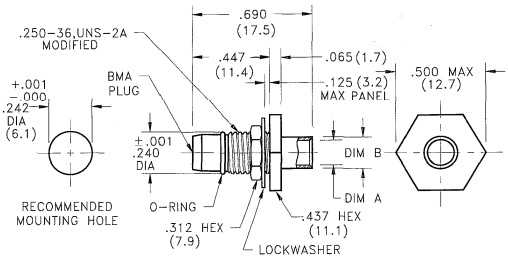


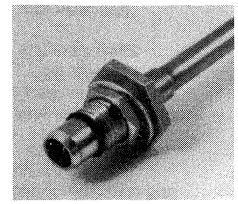
* Note: With mounting hole centerline dimensioned from a pre-designated datum of .006 DIA.

Bulkhead Feedthru Cable Plug - Rear Mount

Cable Type	Model Number		
141 (RG402)	**BMA-0141-86-000-00**		
Dim A	.143 (3.6)	**Dim B**	.180 (4.6)

Cable Type	Model Number		
085 (RG405)	**BMA-0085-86-000-00**		
Dim A	.089 (2.2)	**Dim B**	.120 (3.0)

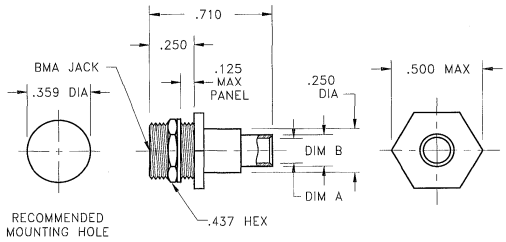


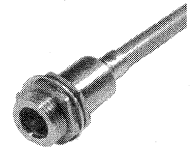


Bulkhead Feedthru Cable Jack - Rigid Rear Mount

Cable Type	Model Number		
141 (RG402)	**BMA-0141-83-000-00**		
Dim A	.143 (3.6)	**Dim B**	.180 (4.6)

Cable Type	Model Number		
085 (RG405)	**BMA-0085-83-000-00**		
Dim A	.089 (2.2)	**Dim B**	.120 (3.0)

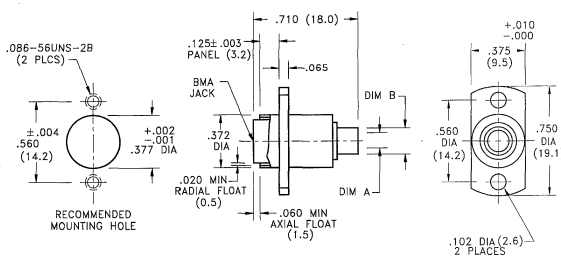


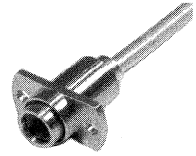


Flange Mount Cable Jack - Floating Rear Mount

Cable Type	Model Number		
141 (RG402)	**BMA-0141-87-000-02**		
Dim A	.143 (3.6)	**Dim B**	.180 (4.6)

Cable Type	Model Number		
085 (RG405)	**BMA-0085-87-000-02**		
Dim A	.089 (2.2)	**Dim B**	.120 (3.0)

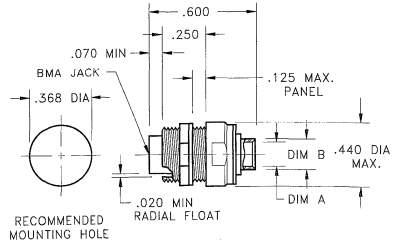


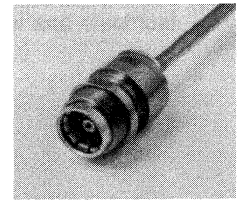


Low Profile Bulkhead Feedthru Cable Jack - Floating Rear Mount

Cable Type	Model Number		
141 (RG402)	**BMA-0141-85-000-02**		
Dim A	.143 (3.6)	**Dim B**	.180 (4.6)

Cable Type	Model Number		
085 (RG405)	**BMA-0085-85-000-02**		
Dim A	.089 (2.2)	**Dim B**	.120 (3.0)

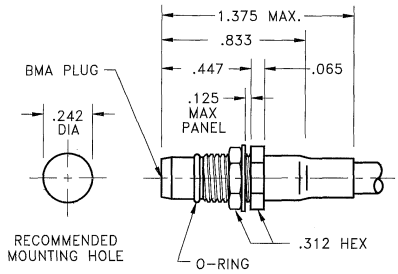




Note: Detail interface dimensions and RG/U cable information can be found in the appendix.

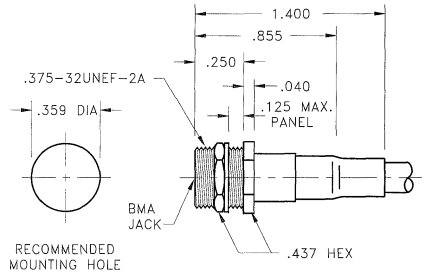
Bulkhead Feedthru Male Cable Plug - Rear Mount

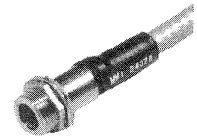
Cable Type RG/U	Model Number
55; 142; 223; 400	**BMA-1055-51-000-02**
174, 179 187, 188, 316	**BMA-1188-51-000-02**



Bulkhead Feedthru Female Cable Jack - Rigid Rear Mount

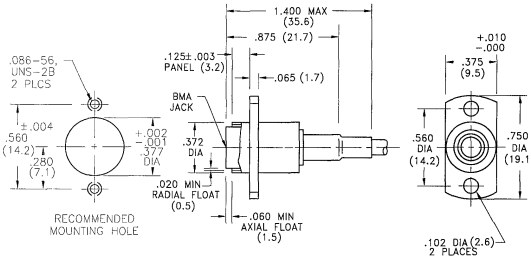
Cable Type RG/U	Model Number
55; 142; 223; 400	**BMA-1055-59-000-02**
174, 179 187, 188, 316	**BMA-1188-59-000-02**





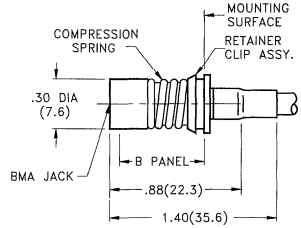
Flange Mount Female Cable Jack - Floating Rear Mount

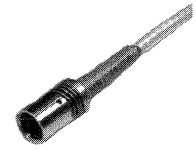
Cable Type RG/U	Model Number
55; 142; 223; 400	**BMA-1055-61-000-02**
174, 179 187, 188, 316	**BMA-1188-61-000-02**



*Low Profile Panel Feedthru Female Cable Jack - Floating Rear Mount **

Cable Type RG/U	Model Number
55; 142; 223; 400	**BMA-1055-53-000-02**
174, 179 187, 188, 316	**BMA-1188-53-000-02**

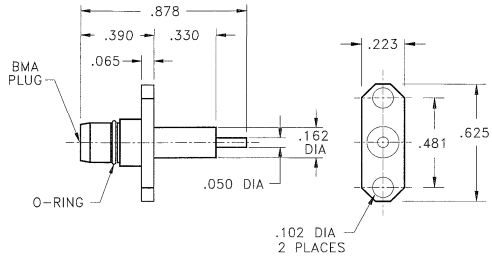


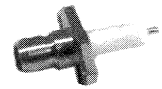


Note:. * The unit immediately above is also available for direct solder semi-rigid cable as BMA-0141-53-000-00 and BMA-0085-53-000-00.
Detail mounting information is on the individual outline drawings. Detail interface dimensions and RG/U cable information can be found in the appendix.

Flange Mount Male Plug - Two Hole

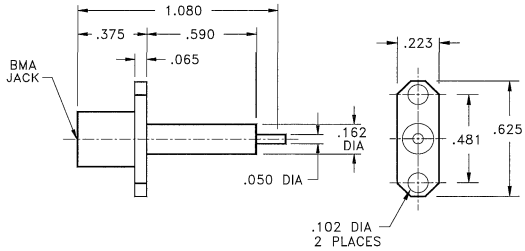
Model Number
BMA-5210-14-TRM-02

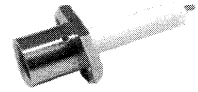




Flange Mount Female Jack - Two Hole

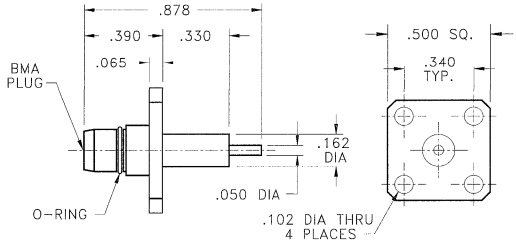
Model Number
BMA-5210-15-TRM-02

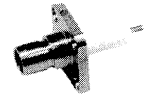




Flange Mount Male Plug - Four Hole

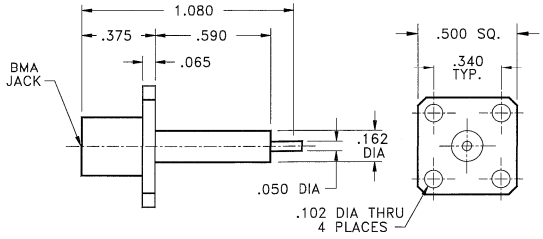
Model Number
BMA-5510-14-TRM-02

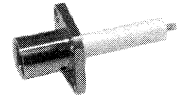




Flange Mount Female Jack - Four Hole

Model Number
BMA-5510-15-TRM-02

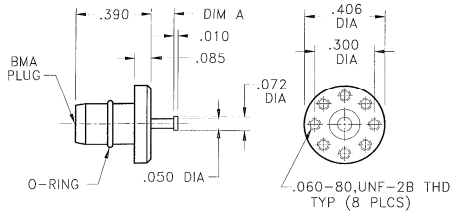


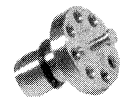


Note: Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Surface Launched Male Plug - Non-Captured Contact

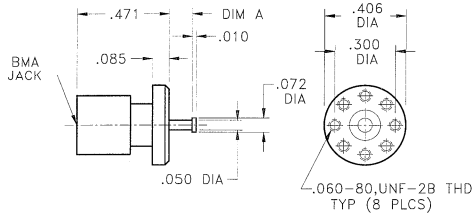
Model Number	Dim A
BMA-6858-44-STR-02	.062
BMA-6859-44-STR-02	.125
BMA-6856-44-STR-02	.250





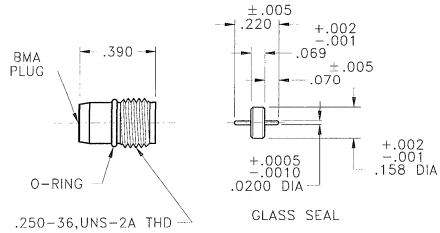
Straight Surface Launched Female Jack - Non-captured Contact

Model Number	Dim A
BMA-6858-43-STR-02	.062
BMA-6859-43-STR-02	.125
BMA-6856-43-STR-02	.250



Straight Panel Feedthru Male Plug - Drop-in Hermetic

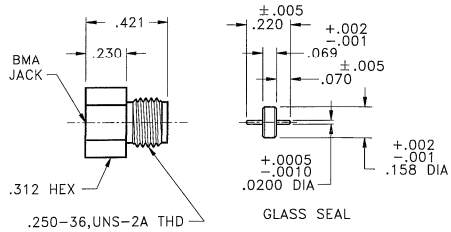
Model Number	Product
BMA-5975-19-DRP-02	Connector and Seal
BMA-5961-19-DRP-02	Connector only
HRM-0004-95-DRP-02	Seal only



Note: Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Panel Feedthru Female Jack - Drop-in Hermetic

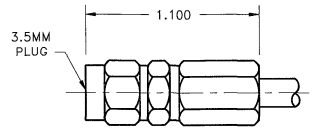
Model Number	Product
BMA-5075-12-DRP-02	Connector and Seal
BMA-5061-12-DRP-02	Connector only
HRM-0004-95-DRP-02	Seal only

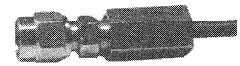


Note: Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Male Cable Plug for .141 Dia. Semi-rigid Cable

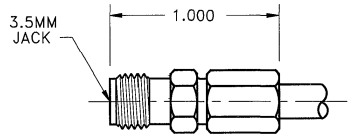
Cable Type	Model Number
.141 Semi-rigid	**35M-2725-79-141-02**

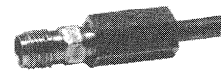




Straight Bulkhead Female Cable Jack for .141 Dia. Semi-rigid Cable

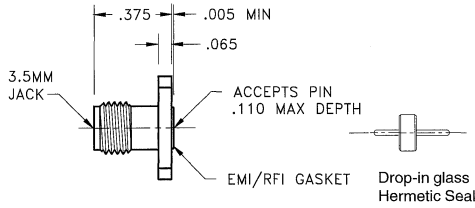
Cable Type	Model Number
.141 Semi-rigid	**35M-2726-83-141-02**





Straight Flange Mount Female Jack - Field Replaceable Drop-in Hermetic - 4 Hole

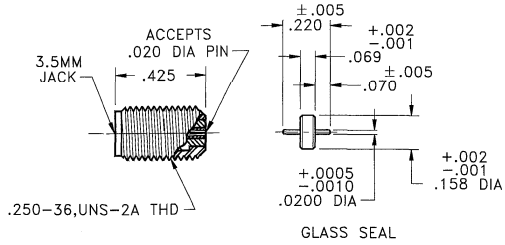
Model Number	Accepts Pin Dia 'A'
35M-5572-15-DRP-02	.012
35M-5573-15-DRP-02	.015
35M-5574-15-DRP-02	.018
35M-5575-15-DRP-02	.020



Note: Two Hole flange versions are also available. To specify, change fifth digit from "5" to "2". Example: 35M-5272-15-DRP-02.
Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Panel Feedthru Female Jack - Field Replaceable Drop-in Hermetic

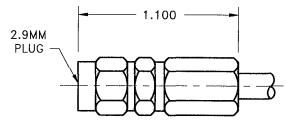
Model Number	Accepts Pin Dia 'A'
35M-5972-12-DRP-02	.012
35M-5973-12-DRP-02	.015
35M-5974-12-DRP-02	.018
35M-5975-12-DRP-02	.020

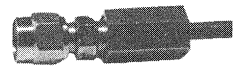


Note: Standard finish for all models on this page is passivated stainless steel. For gold plating, change -02 suffix to -00.
Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Male Cable Plug for .085 and .095 Dia. Semi-rigid Cable

Cable Type	Model Number
.085 Semi-rigid	**29M-0085-79-000-02**
.118 Semi-rigid	**29M-0095-79-000-02**

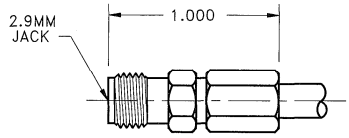


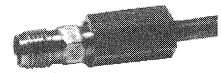


*Note: 0.118 diameter semi-rigid cable is a special low loss cable. Detail specifications of this cable are available on request.

Straight Bulkhead Female Cable Jack for .085 and .095 Dia. Semi-rigid Cable

Cable Type	Model Number
.085 Semi-rigid	**29M-0085-89-000-02**
.118 Semi-rigid	**29M-0095-89-000-02**

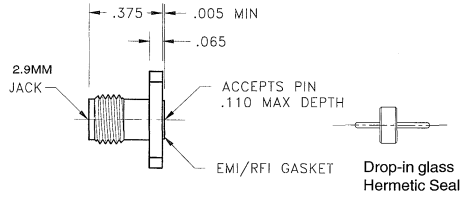


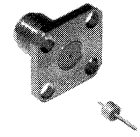


*Note: 0.118 diameter semi-rigid cable is a special low loss cable. Detail specifications of this cable are available on request.

Straight Flange Mount Female Jack - Field Replaceable Drop-in Hermetic

Model Number	Accepts Pin Dia 'A'
29M-5572-15-DRP-02	.012
29M-5573-15-DRP-02	.015
29M-5574-15-DRP-02	.018
29M-5575-15-DRP-02	.020

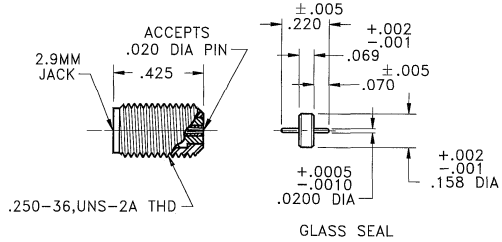


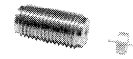


Note: Two Hole flange versions are also available. To specify, change fifth digit from "5" to "2". Example: 29M-5272-15-DRP-02.
Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

Straight Panel Feedthru Female Jack - Field Replaceable Drop-in Hermetic

Model Number	Accepts Pin Dia 'A'
29M-5972-12-DRP-02	.012
29M-5973-12-DRP-02	.015
29M-5974-12-DRP-02	.018
29M-5975-12-DRP-02	.020

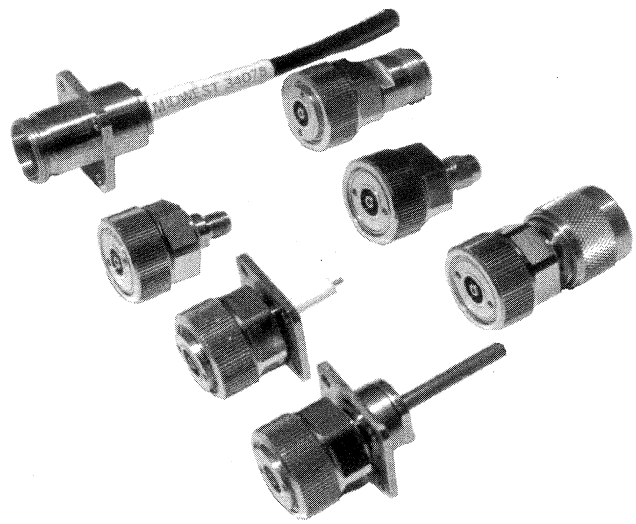




Note: Standard finish for all models on this page is passivated stainless steel. For gold plating, change -02 suffix to -00.
Recomended Mounting Hole Detail I on page 207. Detail interface dimensions can be found in the appendix.

7 mm Precision Connectors

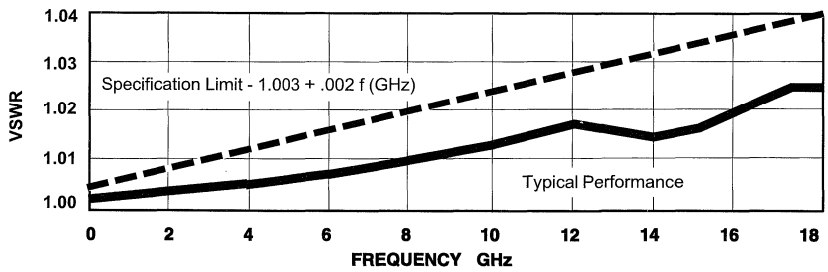
The 7mm Precision Connector is a well known and well used international standard in the microwave industry. It is hermaphroditic (sexless) and is found on many types of precision microwave and R.F. test equipment. Because of this, it is offered on a wide variety of precision adapters shown in the "Between Series" adapter section of this catalog to facilitate the testing of a broad spectrum of products with other types of connector interfaces. It is provided here for the user who chooses to construct either a precision component, a custom piece of test equipment, or sets of precision test cable assemblies for laboratory use. Units are available for use on 7mm (.2756 I.D.) air lines as well as .141 Dia. semi-rigid cable and other standard or low loss, phase stable, flexible cables (see Cable Assembly Section on page 164). A more economical sexed (outer conductor only) version is also offered in threaded plug and jack versions that are completely compatible with the sexless type without any degradation of performance.



Precision 7 mm Connectors are ideal for a wide assortment of applications

Specifications

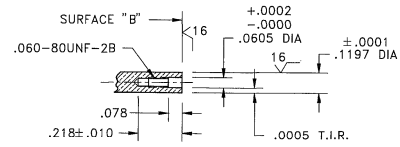
Impedance: 50 Ohms
Frequency Range: 0 - 18 GHz
VSWR: 1.003 + .002 f (GHz)
Construction:
Coupling Mechanism: Stainless Steel
Outer Housing: Beryllium Copper
Center Conductor: Berillium Copper six contact type



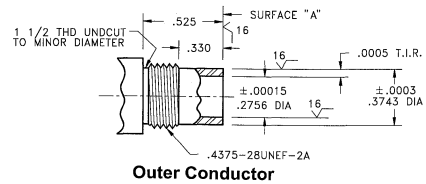
Note: An Assembly Tool Kit, Model No. TLS-0050-98-7MM-54, is offered separately and is shown in the Tool Section.

Preparation of Precision Airline Mounting

Careful ahderence to the mounting dimensions indicated for the outer and inner conductor elements is required for the attainment of precision performance.



Inner Conductor

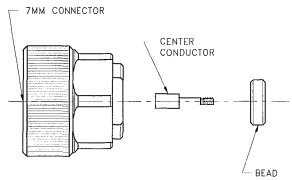


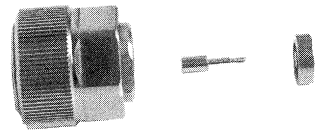
Outer Conductor

Notes:
1. Surface "A" to be perpendicular to .2756 and .3743 diameters within .0005 T.I.R.
2. Surface "B" to be perpendicular to .1197 and .0605 diameters within .0005 T.I.R.
3. Surface "B" to be flush to .0005 below face of outer conductor surface "A".

7mm Precision Connector for Airline

Model Number
7MM-2602-7M-HEX-02

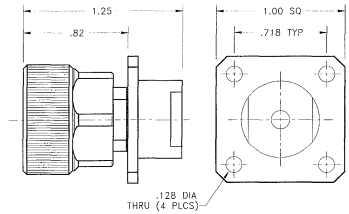


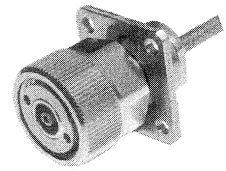


Note: 'Precision N' Male and Female Connectors for 7mm precision airline are also available as PCN-2679-NM-AIR-02 and PCN-2679-NF-AIR-02.

7mm Flange Mount Cable Connectors

Model Number	Cable Type (RG/U)
7MM-2708-00-141-02	402 (.141 Dia. Semi-rigid)
7MM-2842-00-250-02	401 (.250 Dia. Semi-rigid)

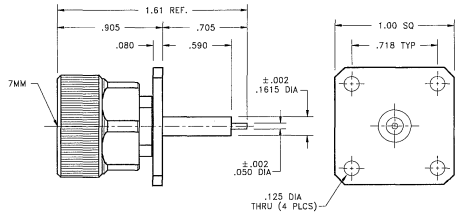


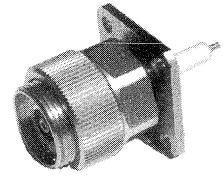


Note: See Cable Assembly Section for 7mm Connectors mounted on Low Loss Cable.

7 mm Flanged Terminal Receptacle

Model Number
7MM-2711-15-TRM-02



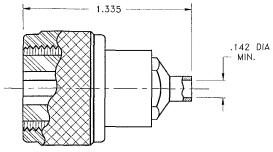


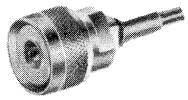
Note: Other 7mm cable connectors are available upon request.

7 mm Male — *7 mm Cable Connectors - Sexed Type* — *7 mm Female*

Model Number	Cable Type
7MM-2141-88-SEX-02	.141 Dia.
7MM-2325-88-SEX-02	.325 Dia.

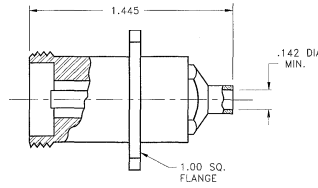
Female Outer Conductor

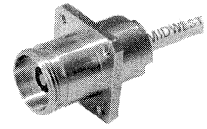




Model Number	Cable Type
7MM-2141-89-SEX-02	.141 Dia.
7MM-2325-89-SEX-02	.325 Dia.

Male Outer Conductor





Note: Connectors for 0.325 Dia. cable not shown, contact the factory for outline drawing with dimensional details.

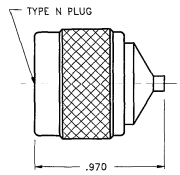
Connectors

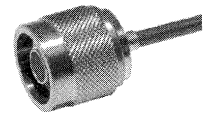
Type N for Semi-rigid Cable
.085 and .141 Direct Solder Attachment

Straight Male Cable Plug

Cable Dia.	Model Number
.141 (RG402)	**NNN-0141-79-000-02**
.085 (RG405)	**NNN-0085-79-000-02**

See previous page for precision N connectors for precision 7mm airline.

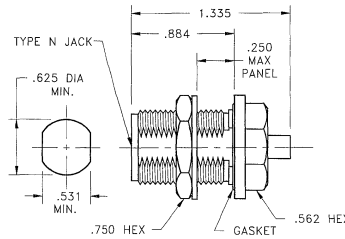


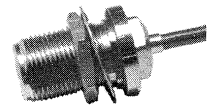


Note: Standard finish is passivated stainless steel with housing plated gold for direct soldering to semi-rigid cable.

Straight Bulkhead Female Cable Jack

Cable Dia.	Model Number
.141 (RG402)	**NNN-0141-83-000-02**
.085 (RG405)	**NNN-0085-83-000-02**

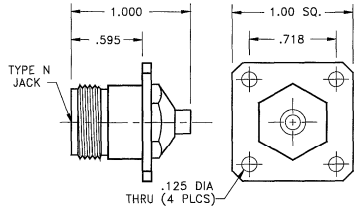




Note: Standard finish is passivated stainless steel with housing plated gold for direct soldering to semi-rigid cable.

Panel Mount Female Cable Jack

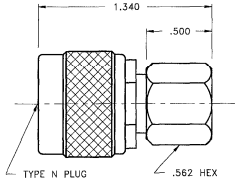
Cable Dia.	Model Number
.141 (RG402)	**NNN-0141-84-000-02**
.085 (RG405)	**NNN-0085-84-000-02**

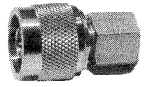


Note: Standard finish is passivated stainless steel with housing plated gold for direct soldering to semi-rigid cable.

Male CablePlug — *.250 Dia. Semi-rigid Cable*

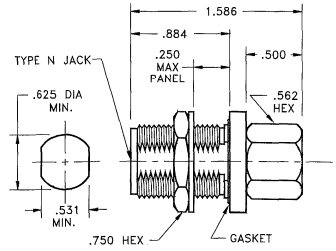
Model Number	NNN-2250-79-000-02

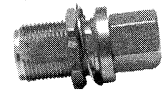




Bulkhead Female Jack

Model Number	NNN-2250-83-000-02



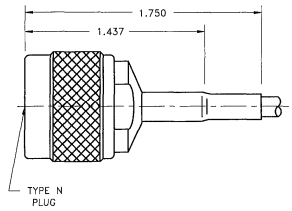


Note: Standard finish is passivated stainless steel. Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Male Cable Plug

Cable Type (RG/U)	Model Number
55; 142; 223; 400	**NNN-3055-55-000-02**
58; 141; 303	**NNN-3058-55-000-02**
174; 179; 188; 316	**NNN-3188-55-000-02**

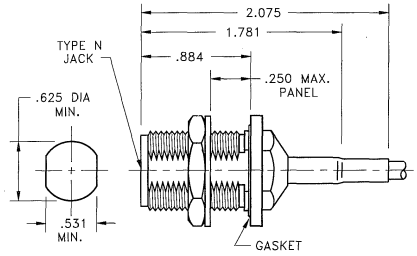
Note: Standard finish is Passivated Stainless Steel.

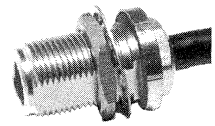


Straight Bulkhead Female Cable Jack

Cable Type (RG/U)	Model Number
55; 142; 223; 400	**NNN-3055-59-000-02**
58; 141; 303	**NNN-3058-59-000-02**
174; 179; 188; 316	**NNN-3188-59-000-02**

Note: Standard finish is Passivated Stainless Steel.

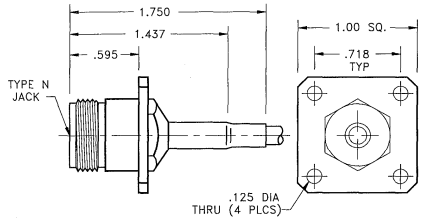


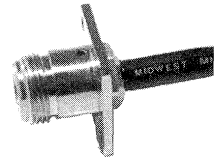


Panel Mount Female Cable Jack

Cable Type (RG/U)	Model Number
55; 142; 223; 400	**NNN-3055-54-000-02**
58; 141; 303	**NNN-3058-54-000-02**
174; 179; 188; 316	**NNN-3188-54-000-02**

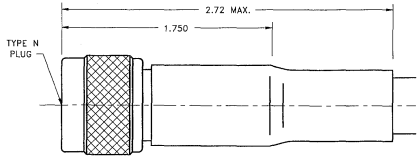
Note: Standard finish is Passivated Stainless Steel.



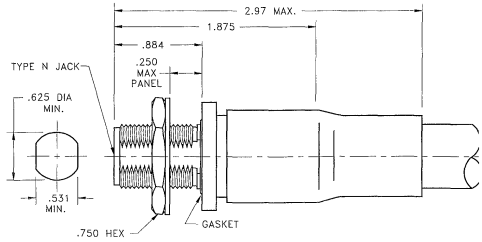


Male Cable Plug — *.250 and .500 Dia. Heliax Cable* — *Bulkhead Female Cable Jack*

Model Number	Cable Type
NNN-2250-79-HEL-10	.250 Dia. Heliax*
NNN-2500-79-HEL-10	.500 Dia. Heliax*



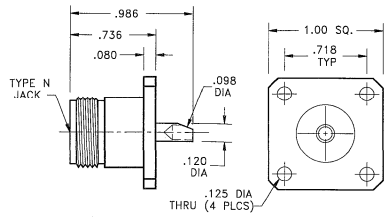
Model Number	Cable Type
NNN-2250-83-HEL-10	.250 Dia. Heliax*
NNN-2500-83-HEL-10	.500 Dia. Heliax*

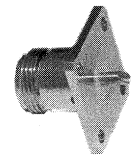


Note: Standard finish is Nickel plated brass.
"Heliax" is a registered trademark of Andrew Corporation.

Panel Mount Female Jack - Solder Pot Type

Model Number
NNN-5140-15-POT-02

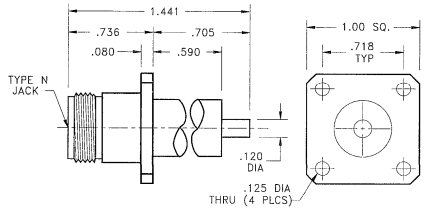


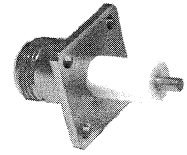


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Female Jack - Terminal Type

Model Number
NNN-5110-15-TRM-02

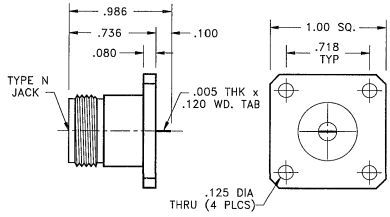


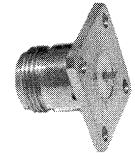


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Female Jack - Tab Terminal Type

Model Number
NNN-5130-15-TAB-02

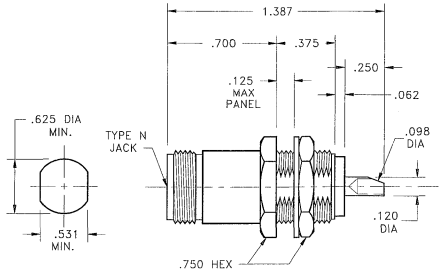




Note: Standard finish is Passivated Stainless Steel.

Bulkhead Female Jack - Front Mount

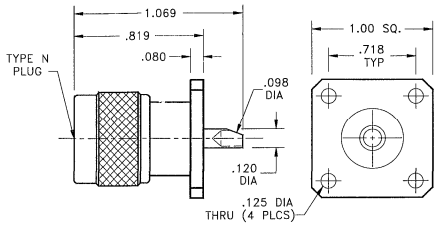
Model Number
NNN-5040-12-POT-02

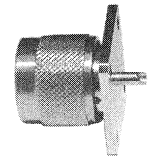


Note: Standard finish is Passivated Stainless Steel. Detail interface dimensional information can be found in the appendix.

Panel Mount Male Plug - Solder Pot Type

Model Number
NNN-5140-14-POT-02

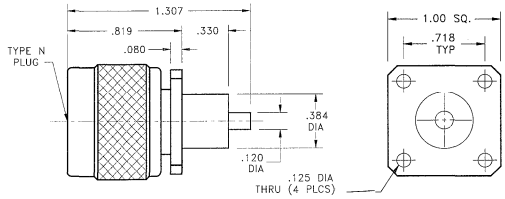


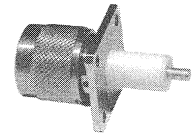


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Male Plug - Terminal Type

Model Number
NNN-5110-14-TRM-02

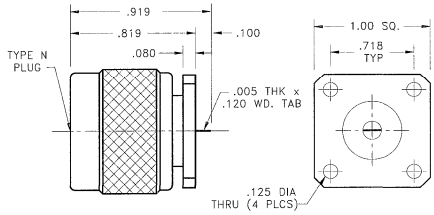


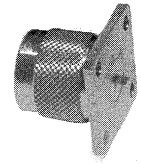


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Male Plug - Tab Type

Model Number
NNN-5130-14-TAB-02

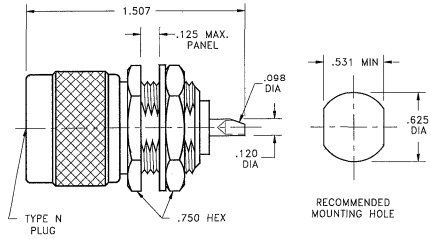




Note: Standard finish is Passivated Stainless Steel.

Bulkhead Male Plug - Front Mount

Model Number
NNN-5040-19-POT-02



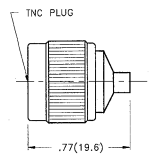
Note: Standard finish is Passivated Stainless Steel.
Detail interface dimensions and RG/U cable information can be found in the appendix.

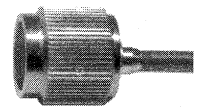
Connectors

TNC for Semi-rigid Cable
.085 and .141 Direct Solder Attachment

Straight Male Cable Plug

Cable Dia.	Model Number
.141 (RG402)	**TNC-0141-79-000-02**
.085 (RG405)	**TNC-0085-79-000-02**

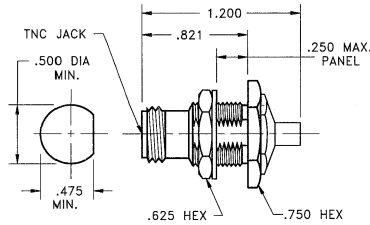


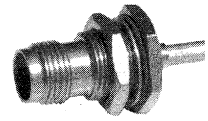


Note: Standard finish is passivated stainless steel. Gold pating is provided on housing to allow direct soldering to semi-rigid cable.

Straight Bulkhead Female Cable Jack

Cable Dia.	Model Number
.141 (RG402)	**TNC-0141-83-000-02**
.085 (RG405)	**TNC-0085-83-000-02**

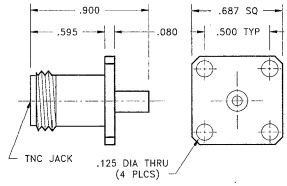


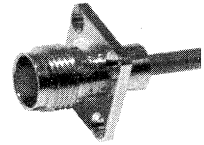


Note: Standard finish is passivated stainless steel. Gold pating is provided on housing to allow direct soldering to semi-rigid cable.

Panel Mount Female Cable Jack

Cable Dia.	Model Number
.141 (RG402)	**TNC-0141-84-000-00**
.085 (RG405)	**TNC-0085-84-000-00**

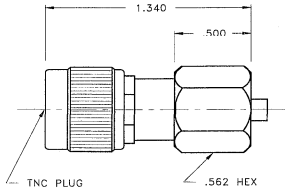




Note: Standard finish is passivated stainless steel. Gold pating is provided on housing to allow direct soldering to semi-rigid cable.

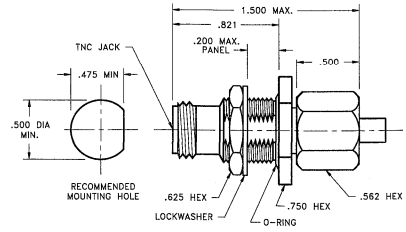
Male CablePlug — *.250 Dia. Semi-rigid Cable*

Model Number
TNC-2250-79-000-02



Bulkhead Female Cable Jack

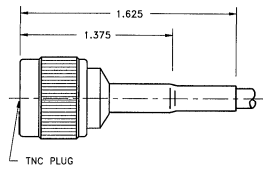
Model Number
TNC-2250-83-000-02



Note: Standard finish is passivated stainless steel. Detail interface dimensions and RG/U cable information can be found in the appendix.

Straight Male Cable Plug

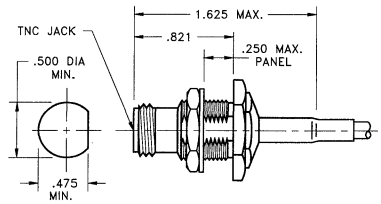
Cable Type (RG/U)	Model Number
55; 142; 223; 400	TNC-3055-55-000-02
58; 141; 303	TNC-3058-55-000-02
174; 179; 188; 316	TNC-3188-55-000-02



Note: Standard finish is Passivated Stainless Steel.

Straight Bulkhead Female Cable Jack

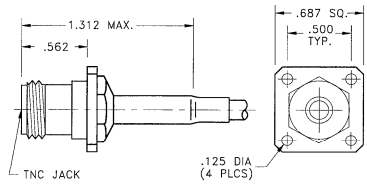
Cable Type (RG/U)	Model Number
55; 142; 223; 400	TNC-3055-59-000-02
58; 141; 303	TNC-3058-59-000-02
174; 179; 188; 316	TNC-3188-59-000-02

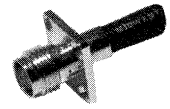


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Female Cable Jack

Cable Type (RG/U)	Model Number
55; 142; 223; 400	TNC-3055-54-000-02
58; 141; 303	TNC-3058-54-000-02
174; 179; 188; 316	TNC-3188-54-000-02

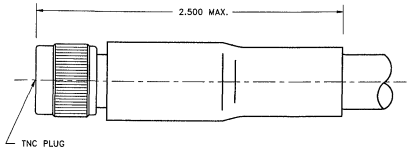




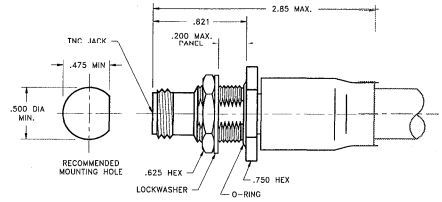
Note: Standard finish is Passivated Stainless Steel.

Male Cable Plug — *.250 and .500 Dia. Heliax* Cable* — *Bulkhead Female Cable Jack*

Model Number	Cable Type
TNC-2250-79-HEL-10	.250 Dia. Heliax*
TNC-2500-79-HEL-10	.500 Dia. Heliax*



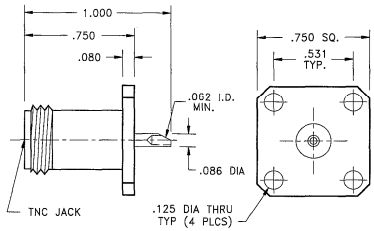
Model Number	Cable Type
TNC-2250-83-HEL-10	.250 Dia. Heliax*
TNC-2500-83-HEL-10	.500 Dia. Heliax*

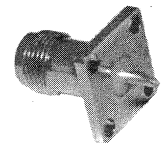


*Note: "Heliax" is a registered trademark of Andrew Corporation.

Panel Mount Female Jack - Solder Pot Type

Model Number
TNC-5740-15-POT-02

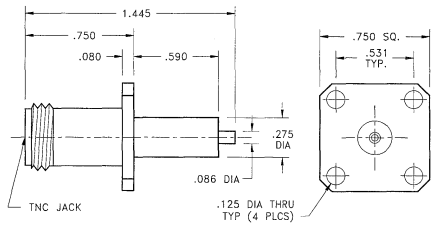


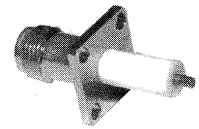


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Female Jack - Terminal Type

Model Number
TNC-5710-15-TRM-02

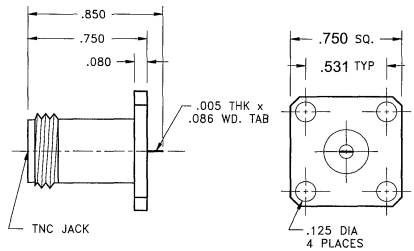


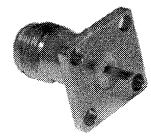


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Female Jack - Tab Terminal Type

Model Number
TNC-5730-15-TAB-02

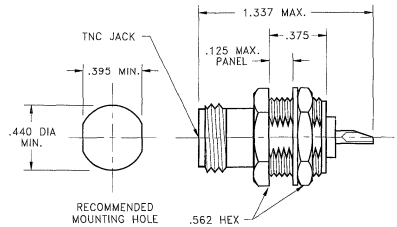




Note: Standard finish is Passivated Stainless Steel.

Bulkhead Female Jack - Front Mount

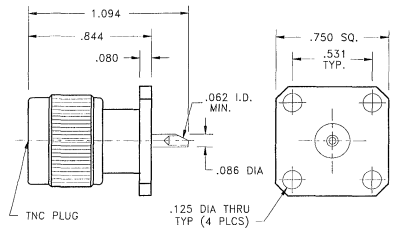
Model Number
TNC-5040-12-POT-02

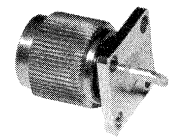


Note: Standard finish is Passivated Stainless Steel. Detail interface dimensional information can be found in the appendix.

Panel Mount Male Plug - Solder Pot Type

Model Number
TNC-5740-14-POT-02

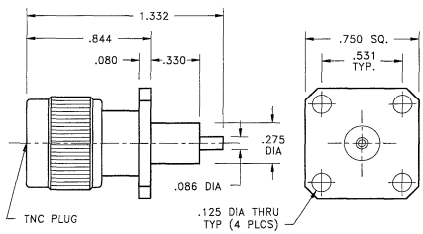


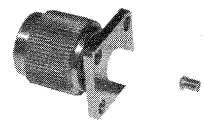


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Male Plug - Terminal Type

Model Number
TNC-5710-14-TRM-02

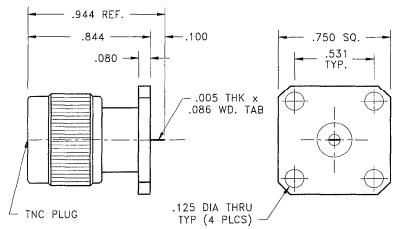


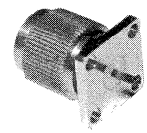


Note: Standard finish is Passivated Stainless Steel.

Panel Mount Male Plug - Tab Type

Model Number
TNC-5730-14-TAB-02

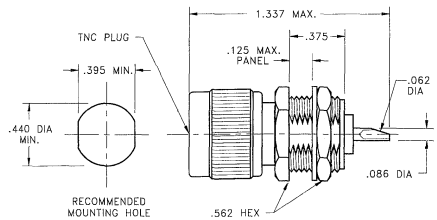




Note: Standard finish is Passivated Stainless Steel.

Bulkhead Male Plug - Front Mount

Model Number
TNC-5040-19-POT-02



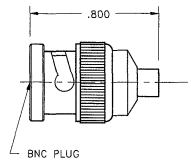
Note: Standard finish is Passivated Stainless Steel.
Detail interface dimensions and RG/U cable information can be found in the appendix.

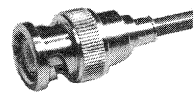
Connectors

BNC for Semi-rigid Cable
.085 and .141 Direct Solder Attachment

Male Cable Plug

Cable Dia.	Model Number
.141 (RG402)	**BNC-0141-79-000-10**
.085 (RG405)	**BNC-0085-79-000-10**

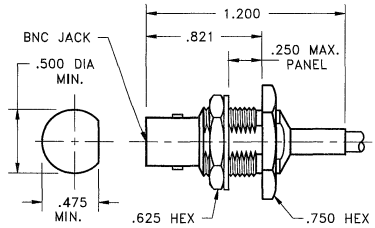


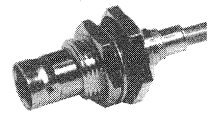


Note: Standard finish is Nickel plated brass.

Bulkhead Female Jack

Cable Dia.	Model Number
.141 (RG402)	**BNC-0141-83-000-10**
.085 (RG405)	**BNC-0085-83-000-10**

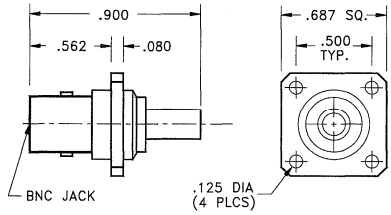


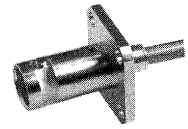


Note: Standard finish is Nickel plated brass.

Flanged Mount Cable Jack

Cable Dia.	Model Number
.141 (RG402)	**BNC-0141-84-000-10**
.085 (RG405)	**BNC-0085-84-000-10**

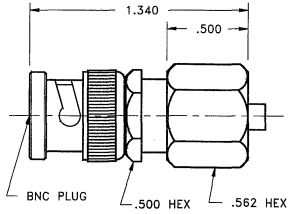




Note: Standard finish is Nickel plated brass.

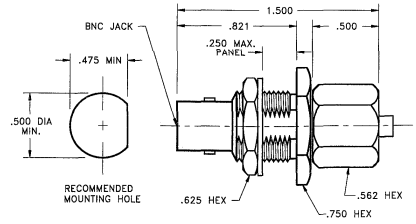
Male Cable Plug *.250 Dia. Semi-rigid Cable*

Model Number	BNC-2250-79-000-10



Bulkhead Female Jack

Model Number	BNC-2250-83-000-10



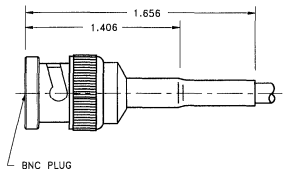
Note: Standard finish is Nickel plated brass. Detail interface dimensions and RG/U cable information can be found in the appendix.

Connectors

BNC for Flexible Cable
Crimp Attachment Type

Straight Male Cable Plug

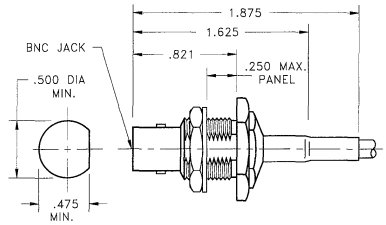
Cable Type (RG/U)	Model Number
55; 142; 223; 400	**BNC-3055-55-000-10**
58; 141; 303	**BNC-3058-55-000-10**
174; 179; 188; 316	**BNC-3188-55-000-10**



Note: Standard finish is Nickel plated brass.

Straight Bulkhead Female Cable Jack

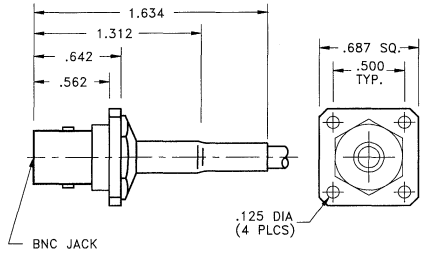
Cable Type (RG/U)	Model Number
55; 142; 223; 400	**BNC-3055-59-000-10**
58; 141; 303	**BNC-3058-59-000-10**
174; 179; 188; 316	**BNC-3188-59-000-10**

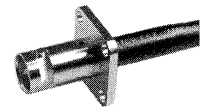


Note: Standard finish is Nickel plated brass.

Panel Mount Female Cable Jack

Cable Type (RG/U)	Model Number
55; 142; 223; 400	**BNC-3055-54-000-10**
58; 141; 303	**BNC-3058-54-000-10**
174; 179; 188; 316	**BNC-3188-54-000-10**

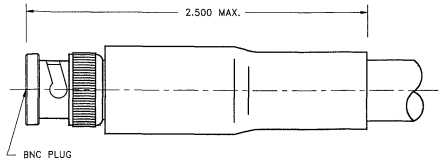




Note: Standard finish is Nickel plated brass.

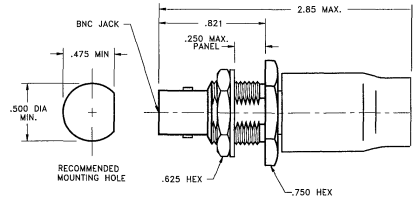
Male Cable Plug — *.250 and .500 Dia. Heliax* Cable*

Model Number	Cable Type
BNC-2250-79-HEL-10	.250 Dia. Heliax*
BNC-2500-79-HEL-10	.500 Dia. Heliax*



Bulkhead Female Cable Jack

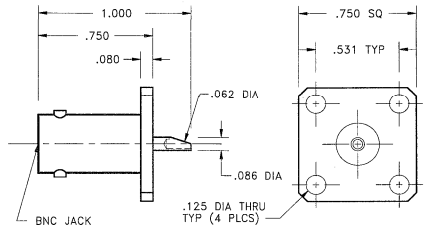
Model Number	Cable Type
BNC-2250-83-HEL-10	.250 Dia. Heliax*
BNC-2500-83-HEL-10	.500 Dia. Heliax*

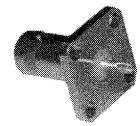


*Note: "Heliax" is a registered trademark of Andrew Corporation. Standard finish is Nickel plated brass.

Panel Mount Female Jack - Solder Pot Type

Model Number
BNC-5740-15-POT-10

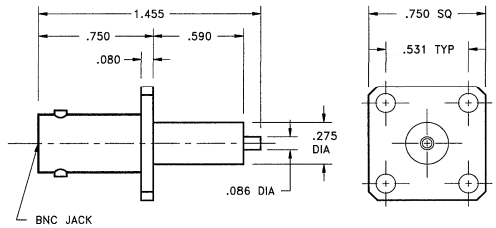


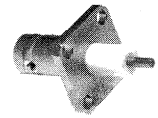


Note: Standard finish is Nickel plated brass.

Panel Mount Female Jack - Terminal Type

Model Number
BNC-5710-15-TRM-10

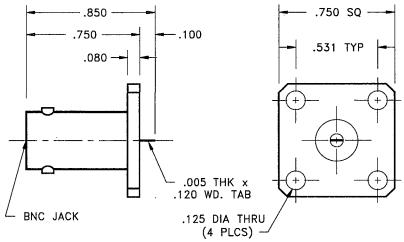


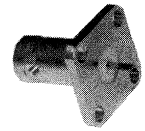


Note: Standard finish is Nickel plated brass.

Panel Mount Female Jack - Tab Terminal Type

Model Number
BNC-5730-15-TAB-10

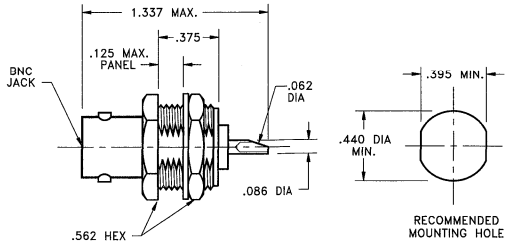




Note: Standard finish is Nickel plated brass.

Bulkhead Female Jack - Front Mount

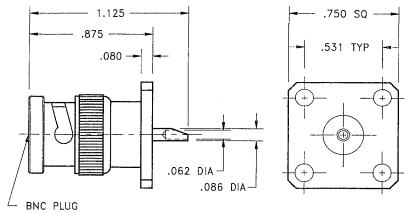
Model Number
BNC-5040-12-POT-10

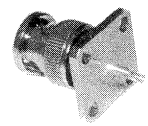


Note: Standard finish is Nickel plated brass. Detail interface dimensional information can be found in the appendix.

Panel Mount Male Plug - Solder Pot Type

Model Number
BNC-5740-14-POT-10

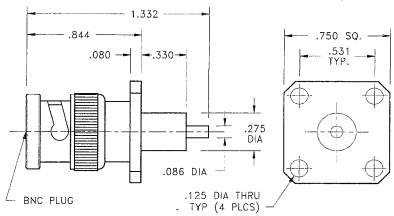


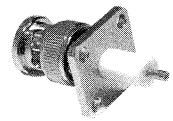


Note: Standard finish is Nickel plated brass.

Panel Mount Male Plug - Terminal Type

Model Number
BNC-5710-14-TRM-10

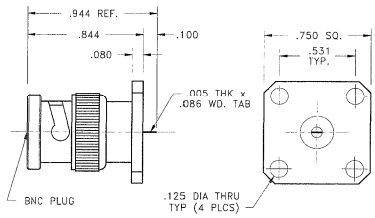


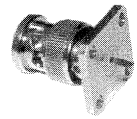


Note: Standard finish is Nickel plated brass.

Panel Mount Male Plug - Tab Type

Model Number
BNC-5730-14-TAB-10

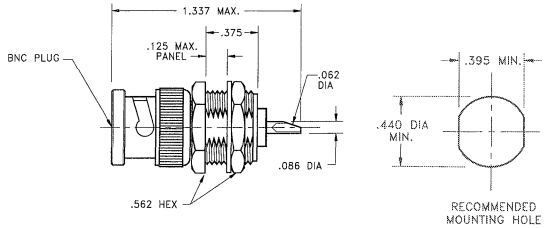




Note: Standard finish is Nickel plated brass.

Bulkhead Male Plug - Front Mount

Model Number
BNC-5040-19-POT-10



Note: Standard finish is Nickel plated brass. Detail interface dimensions and RG/U cable information can be found in the appendix.

QPL

Qualified Parts List Products

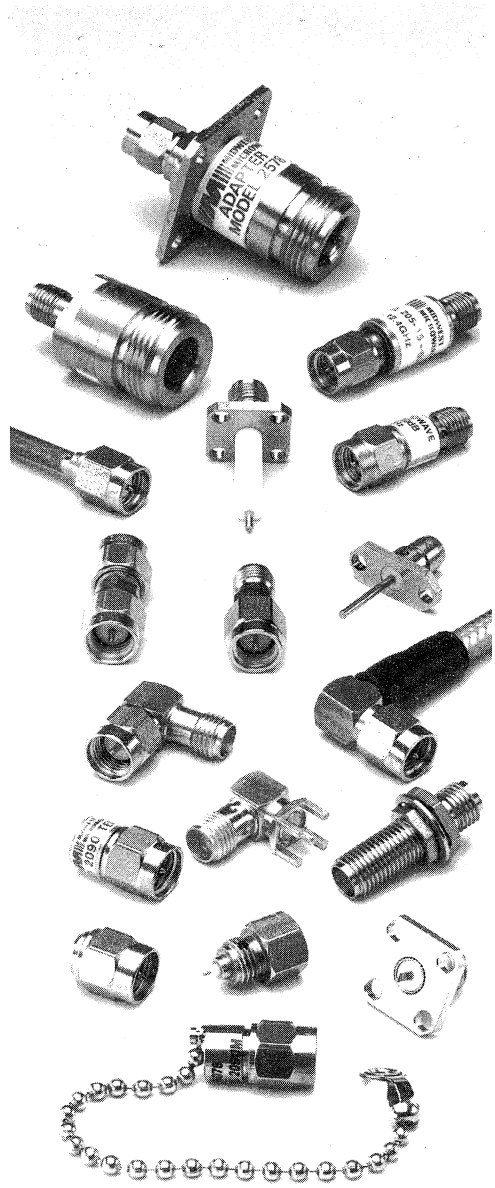
MIL-A-3933 ATTENUATORS | **MIL-A-55339 ADAPTERS** | **MIL-C-39012 CONNECTORS** | **MIL-D-39030 TERMINATIONS**

The Qualified Parts Listing (QPL) is a list compiled by the U.S. Government of products that are used by the Government and are covered by military specifications. The purpose of the list is to provide a simple way of accessing identification of those products and the vendors that have been qualified to manufacture them such that procurement may be easily accomplished. All products listed on a particular QPL have been tested and have qualified to the requirements for that product, as specified in the latest effective issue of the applicable military specification. By using a part that appears on the QPL list, a user is assured that the part will meet or exceed the performance specifications set forth in the MIL Specification as a minimum standard of performance.

Midwest Microwave is a leading manufacturer of Attenuators, Terminations, Adapters,and Connectors and is the originator of the "Minipad" Attenuator around which the military specifications were written.

Midwest Microwave's technical leadership and extensive experience combined with it's broad product capability provide the user with a reliable, high quality source for high performance QPL coaxial microwave components.

Midwest Microwave is qualified for Attenuators covering 0 - 30 dB over the frequency range of dc to 18 GHz under MIL-A-3933, SMA Connectors under MIL-C-39012, Coaxial Adapters under MIL-A-55339, and Coaxial Terminations (Dummy Loads) under MIL-D-39030.`



DESC Approved Products

SMA Connectors
SSMA Connectors
BMA Blind Mate Connectors
Adapters - Between Series

The Defense Electronics Supply Center (DESC) continuosly reviews products that are being used in military systems that are not covered by a military QPL with the purpose of approving suppliers for those products. Midwest Microwave has consistantly been selected by (DESC) as an approved supplier for many of these products.

The (DESC) approved product section lists the military numbers as well as the Midwest Microwave part numbers.

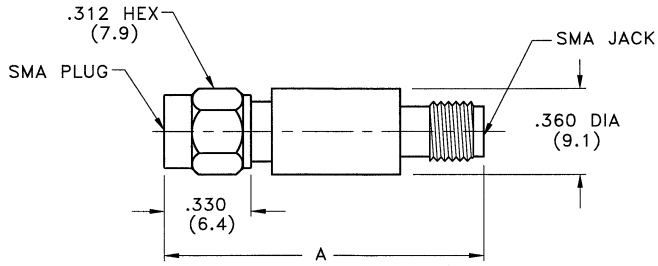
Table of Contents

QPL Approved Products

(DESC) Approved Products

Cable Category Definition

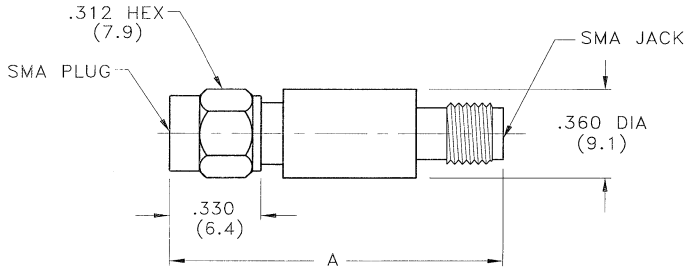
MIL-A-3933/14



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB) (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/14-01N	1.20 (30.5)	3	DC - 12.4	ATT-0205-03-SMA-02
- 02	M3933/14-02N	1.20 (30.5)	6	DC - 12.4	ATT-0205-06-SMA-02
- 03	M3933/14-03N	1.20 (30.5)	10	DC - 12.4	ATT-0205-10-SMA-02
- 04	M3933/14-04N	1.20 (30.5)	20	DC - 12.4	ATT-0205-20-SMA-02
- 05	M3933/14-05N	1.20 (30.5)	15	DC - 12.4	ATT-0205-15-SMA-02
- 06	M3933/14-06N	1.20 (30.5)	1	DC - 12.4	ATT-0205-01-SMA-02
- 07	M3933/14-07N	1.20 (30.5)	2	DC - 12.4	ATT-0205-02-SMA-02
- 08	M3933/14-08N	1.20 (30.5)	4	DC - 12.4	ATT-0205-04-SMA-02
- 09	M3933/14-09N	1.20 (30.5)	5	DC - 12.4	ATT-0205-05-SMA-02
- 10	M3933/14-10N	1.20 (30.5)	7	DC - 12.4	ATT-0205-07-SMA-02
- 11	M3933/14-11N	1.20 (30.5)	8	DC - 12.4	ATT-0205-08-SMA-02
- 12	M3933/14-12N	1.20 (30.5)	9	DC - 12.4	ATT-0205-09-SMA-02
- 13	M3933/14-13N	1.50 (38.1)	30	DC - 12.4	ATT-0205-30-SMA-02
- 14	M3933/14-14N	1.50 (38.1)	40	DC - 12.4	ATT-0205-40-SMA-02
- 15	M3933/14-15N	1.50 (38.1)	60	DC - 12.4	ATT-0205-60-SMA-02
- 17	M3933/14-17N	1.50 (38.1)	28	DC - 12.4	ATT-0205-28-SMA-02
- 18	M3933/14-18N	1.20 (30.5)	16	DC - 12.4	ATT-0205-16-SMA-02
- 19	M3933/14-19N	1.20 (30.5)	14	DC - 12.4	ATT-0205-14-SMA-02
- 20	M3933/14-20N	1.20 (30.5)	13	DC - 12.4	ATT-0205-13-SMA-02
- 21	M3933/14-21N	1.20 (30.5)	12	DC - 12.4	ATT-0205-12-SMA-02
- 22	M3933/14-22N	1.20 (30.5)	11	DC - 12.4	ATT-0205-11-SMA-02
- 23	M3933/14-23N	1.20 (30.5)	1.5	DC - 12.4	ATT-0205-72-SMA-02
- 24	M3933/14-24N	1.50 (38.1)	31	DC - 12.4	ATT-0205-31-SMA-02

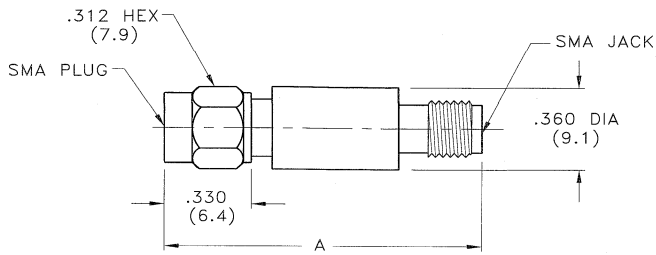
Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-A-3933/16



MILITARY PART NO.	MIDWEST PART NO	DIMENSION A INCHES (max)	(mm)	ATTENUATION VALUE (dB) (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/16-01N	1.20	(30.5)	3	DC - 18.0	ATT-0263-03-SMA-02
- 02	M3933/16-02N	1.20	(30.5)	6	DC - 18.0	ATT-0263-06-SMA-02
- 03	M3933/16-03N	1.20	(30.5)	10	DC - 18.0	ATT-0263-10-SMA-02
- 04	M3933/16-04N	1.20	(30.5)	20	DC - 18.0	ATT-0263-20-SMA-02
- 05	M3933/16-05N	1.20	(30.5)	1	DC - 18.0	ATT-0263-01-SMA-02
- 06	M3933/16-06N	1.20	(30.5)	2	DC - 18.0	ATT-0263-02-SMA-02
- 07	M3933/16-07N	1.20	(30.5)	4	DC - 18.0	ATT-0263-04-SMA-02
- 08	M3933/16-08N	1.20	(30.5)	5	DC - 18.0	ATT-0263-05-SMA-02
- 09	M3933/16-09N	1.20	(30.5)	7	DC - 18.0	ATT-0263-07-SMA-02
- 10	M3933/16-10N	1.20	(30.5)	8	DC - 18.0	ATT-0263-08-SMA-02
- 11	M3933/16-11N	1.20	(30.5)	9	DC - 18.0	ATT-0263-09-SMA-02
- 12	M3933/16-12N	1.50	(38.1)	30	DC - 18.0	ATT-0263-30-SMA-02
- 13	M3933/16-13N	1.49	(37.8)	40	DC - 18.0	ATT-0263-40-SMA-02
- 16	M3933/16-16N	1.20	(30.5)	0	DC - 18.0	ATT-0263-00-SMA-02
- 17	M3933/16-17N	1.20	(30.5)	.5	DC - 18.0	ATT-0263-70-SMA-02
- 18	M3933/16-18N	1.20	(30.5)	1.5	DC - 18.0	ATT-0263-71-SMA-02
- 19	M3933/16-19N	1.20	(30.5)	2.5	DC - 18.0	ATT-0263-72-SMA-02
- 20	M3933/16-20N	1.20	(30.5)	3.5	DC - 18.0	ATT-0263-73-SMA-02
- 21	M3933/16-21N	1.20	(30.5)	4.5	DC - 18.0	ATT-0263-74-SMA-02
- 22	M3933/16-22N	1.20	(30.0)	5.5	DC - 18.0	ATT-0263-75-SMA-02
- 23	M3933/16-23N	1.20	(30.5)	6.5	DC - 18.0	ATT-0263-76-SMA-02
- 24	M3933/16-24N	1.20	(30.5)	7.5	DC - 18.0	ATT-0263-77-SMA-02
- 25	M3933/16-25N	1.20	(30.5)	8.5	DC - 18.0	ATT-0263-78-SMA-02
- 26	M3933/16-26N	1.20	(30.5)	9.5	DC - 18.0	ATT-0263-79-SMA-02
- 27	M3933/16-27N	1.20	(30.5)	10.5	DC - 18.0	ATT-0263-80-SMA-02
- 28	M3933/16-28N	1.20	(30.5)	11	DC - 18.0	ATT-0263-11-SMA-02

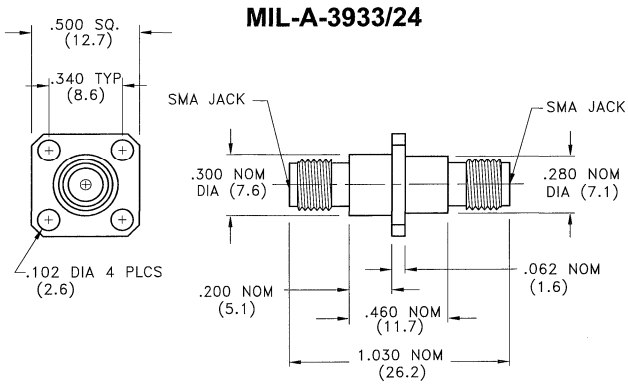
MIL-A-3933/16



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB) (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 29	M3933/16-29N	1.20 (30.5)	11.5	DC - 18.0	ATT-0263-81-SMA-02
- 30	M3933/16-30N	1.20 (30.5)	12	DC - 18.0	ATT-0263-12-SMA-02
- 31	M3933/16-31N	1.20 (30.5)	12.5	DC - 18.0	ATT-0263-82-SMA-02
- 32	M3933/16-32N	1.20 (30.5)	13	DC - 18.0	ATT-0263-13-SMA-02
- 33	M3933/16-33N	1.20 (30.5)	13.5	DC - 18.0	ATT-0263-83-SMA-02
- 34	M3933/16-34N	1.20 (30.5)	14	DC - 18.0	ATT-0263-14-SMA-02
- 35	M3933/16-35N	1.20 (30.5)	14.5	DC - 18.0	ATT-0263-84-SMA-02
- 36	M3933/16-36N	1.20 (30.0)	15	DC - 18.0	ATT-0263-15-SMA-02
- 37	M3933/16-37N	1.20 (30.5)	15.5	DC - 18.0	ATT-0263-85-SMA-02
- 38	M3933/16-38N	1.20 (30.5)	16	DC - 18.0	ATT-0263-16-SMA-02
- 39	M3933/16-39N	1.20 (30.5)	16.5	DC - 18.0	ATT-0263-86-SMA-02
- 40	M3933/16-40N	1.20 (30.5)	17	DC - 18.0	ATT-0263-17-SMA-02
- 41	M3933/16-41N	1.20 (30.5)	17.5	DC -18.0	ATT-0263-87-SMA-02
- 42	M3933/16-42N	1.20 (30.5)	18	DC - 18.0	ATT-0263-18-SMA-02
- 43	M3933/16-43N	1.20 (30.5)	18.5	DC - 18.0	ATT-0263-88-SMA-02
- 44	M3933/16-44N	1.20 (30.5)	19	DC - 18.0	ATT-0263-19-SMA-02
- 45	M3933/16-45N	1.20 (30.5)	19.5	DC - 18.0	ATT-0263-89-SMA-02
- 46	M3933/16-46N	1.20 (30.5)	20.5	DC - 18.0	ATT-0263-90-SMA-02
- 47	M3933/16-47N	1.20 (30.5)	21	DC - 18.0	ATT-0263-21-SMA-02
- 48	M3933/16-48N	1.20 (30.5)	21.5	DC - 18.0	ATT-0263-91-SMA-02
- 49	M3933/16-49N	1.20 (30.5)	22	DC - 18.0	ATT-0263-22-SMA-02
- 50	M3933/16-50N	1.20 (30.5)	22.5	DC - 18.0	ATT-0263-92-SMA-02
- 51	M3933/16-51N	1.20 (30.5)	23	DC - 18.0	ATT-0263-23-SMA-02
- 52	M3933/16-52N	1.20 (30.5)	23.5	DC - 18.0	ATT-0263-93-SMA-02
- 53	M3933/16-53N	1.20 (30.5)	24	DC - 18.0	ATT-0263-24-SMA-02
- 54	M3933/16-54N	1.20 (30.5)	24.5	DC - 18.0	ATT-0263-94-SMA-02
- 55	M3933/16-55N	1.20 (30.5)	25	DC - 18.0	ATT-0263-25-SMA-02
- 56	M3933/16-56N	1.20 (30.5)	28	DC - 18.0	ATT-0263-28-SMA-02
- 57	M3933/16-56N	1.49 (37.8)	32	DC - 18.0	ATT-0263-32-SMA-02
- 58	M3933/16-58N	1.49 (37.8)	36	DC - 18.0	ATT-0263-36-SMA-02

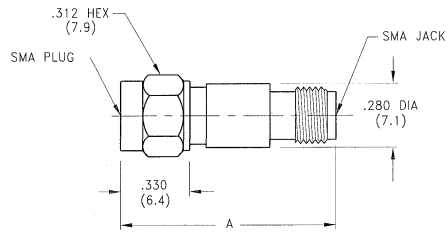
Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-A-3933/24



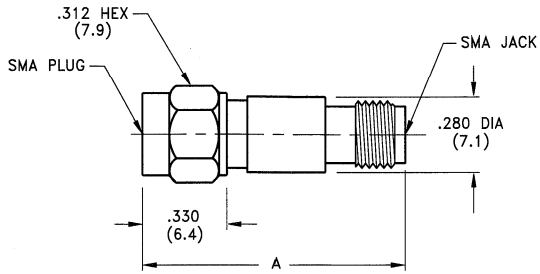
MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/24-01N	1.03 (26.2)	10	2.0 - 12.4	ATT-523F-10-000-02
- 02	M3933/24-02N	1.03 (26.2)	15	2.0 - 12.4	ATT-523F-15-000-02
- 03	M3933/24-03N	1.03 (26.2)	20	2.0 - 12.4	ATT-523F-20-000-02

MIL-A-3933/25



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/25-01N	0.86 (21.9)	1	DC - 2.0	ATT-0294-01-SMA-02
- 02	M3933/25-02N	0.86 (21.9)	2	DC - 2.0	ATT-0294-02-SMA-02
- 03	M3933/25-03N	0.86 (21.9)	3	DC - 2.0	ATT-0294-03-SMA-02
- 04	M3933/25-04N	0.86 (21.9)	4	DC - 2.0	ATT-0294-04-SMA-02
- 05	M3933/25-05N	0.86 (21.9)	5	DC - 2.0	ATT-0294-05-SMA-02
- 06	M3933/25-06N	0.86 (21.9)	6	DC - 2.0	ATT-0294-06-SMA-02
- 07	M3933/25-07N	0.86 (21.9)	7	DC - 2.0	ATT-0294-07-SMA-02
- 08	M3933/25-08N	0.86 (21.9)	8	DC - 2.0	ATT-0294-08-SMA-02
- 09	M3933/25-09N	0.86 (21.9)	9	DC - 2.0	ATT-0294-09-SMA-02
- 10	M3933/25-10N	0.86 (21.9)	10	DC - 2.0	ATT-0294-10-SMA-02
- 11	M3933/25-11N	0.86 (21.9)	11	DC - 2.0	ATT-0294-11-SMA-02
- 12	M3933/25-12N	0.86 (21.9)	12	DC - 2.0	ATT-0294-12-SMA-02
- 13	M3933/25-13N	1.02 (26.0)	13	DC - 2.0	ATT-0294-13-SMA-02
- 14	M3933/25-14N	1.02 (26.0)	14	DC - 2.0	ATT-0294-14-SMA-02
- 15	M3933/25-15N	1.02 (26.0)	15	DC - 2.0	ATT-0294-15-SMA-02

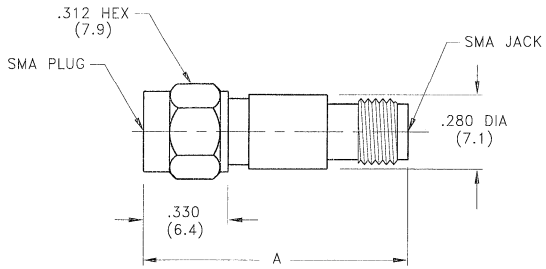
MIL-A-3933/25



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB) (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 16	M3933/25-16N	1.02 (26.0)	16	DC - 2.0	ATT-0294-16-SMA-02
- 17	M3933/25-17N	1.02 (26.0)	17	DC - 2.0	ATT-0294-17-SMA-02
- 18	M3933/25-18N	1.02 (26.0)	18	DC - 2.0	ATT-0294-18-SMA-02
- 19	M3933/25-19N	1.02 (26.0)	19	DC - 2.0	ATT-0294-19-SMA-02
- 20	M3933/25-20N	1.02 (26.0)	20	DC - 2.0	ATT-0294-20-SMA-02
- 21	M3933/25-21N	1.02 (26.0)	21	DC - 2.0	ATT-0294-21-SMA-02
- 22	M3933/25-22N	1.02 (26.0)	22	DC - 2.0	ATT-0294-22-SMA-02
- 23	M3933/25-23N	1.02 (26.0)	23	DC - 2.0	ATT-0294-23-SMA-02
- 24	M3933/25-24N	1.02 (26.0)	24	DC - 2.0	ATT-0294-24-SMA-02
- 25	M3933/25-25N	1.02 (26.0)	25	DC - 2.0	ATT-0294-25-SMA-02
- 26	M3933/25-26N	1.02 (26.0)	30	DC - 2.0	ATT-0294-30-SMA-02
- 27	M3933/25-27N	0.86 (21.9)	1	DC - 12.4	ATT-0291-01-SMA-02
- 28	M3933/25-28N	0.86 (21.9)	2	DC - 12.4	ATT-0291-02-SMA-02
- 29	M3933/25-29N	0.86 (21.9)	3	DC - 12.4	ATT-0291-03-SMA-02
- 30	M3933/25-30N	0.86 (21.9)	4	DC - 12.4	ATT-0291-04-SMA-02
- 31	M3933/25-31N	0.86 (21.9)	5	DC - 12.4	ATT-0291-05-SMA-02
- 32	M3933/25-32N	0.86 (21.9)	6	DC - 12.4	ATT-0291-06-SMA-02
- 33	M3933/25-33N	0.86 (21.9)	7	DC - 12.4	ATT-0291-07-SMA-02
- 34	M3933/25-34N	0.86 (21.9)	8	DC - 12.4	ATT-0291-08-SMA-02
- 35	M3933/25-35N	0.86 (21.9)	9	DC - 12.4	ATT-0291-09-SMA-02
- 36	M3933/25-36N	0.86 (21.9)	10	DC - 12.4	ATT-0291-10-SMA-02
- 37	M3933/25-37N	0.86 (21.9)	11	DC - 12.4	ATT-0291-11-SMA-02
- 38	M3933/25-38N	0.86 (21.9)	12	DC - 12.4	ATT-0291-12-SMA-02
- 39	M3933/25-39N	0.94 (23.9)	13	DC - 12.4	ATT-0291-13-SMA-02
- 40	M3933/25-40N	0.94 (23.9)	14	DC - 12.4	ATT-0291-14-SMA-02

Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-A-3933/25

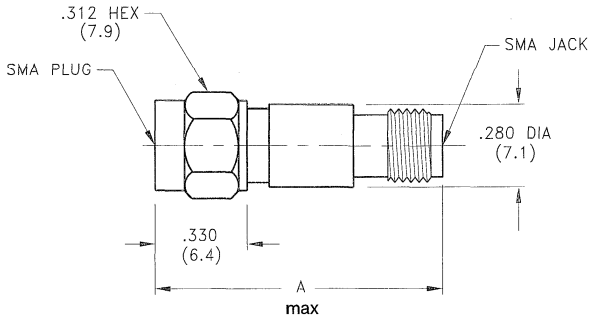


MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm) (max)	ATTENUATION VALUE (dB (nom)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 41	M3933/25-41N	0.94 (23.9)	15	DC - 12.4	ATT-0291-15-SMA-02
- 42	M3933/25-42N	0.94 (23.9)	16	DC - 12.4	ATT-0291-16-SMA-02
- 43	M3933/25-43N	0.94 (23.9)	17	DC - 12.4	ATT-0291-17-SMA-02
- 44	M3933/25-44N	0.94 (23.9)	18	DC - 12.4	ATT-0291-18-SMA-02
- 45	M3933/25-45N	0.94 (23.9)	19	DC - 12.4	ATT-0291-19-SMA-02
- 46	M3933/25-46N	1.02 (26.0)	20	DC - 12.4	ATT-0291-20-SMA-02
- 47	M3933/25-47N	1.02 (26.0)	21	DC - 12.4	ATT-0291-21-SMA-02
- 48	M3933/25-48N	1.02 (26.0)	22	DC - 12.4	ATT-0291-22-SMA-02
- 49	M3933/25-49N	1.02 (26.0)	23	DC - 12.4	ATT-0291-23-SMA-02
- 50	M3933/25-50N	1.02 (26.0)	24	DC - 12.4	ATT-0291-24-SMA-02
- 51	M3933/25-51N	1.02 (26.0)	25	DC - 12.4	ATT-0291-25-SMA-02
- 52	M3933/25-52N	1.02 (26.0)	30	DC - 12.4	ATT-0291-30-SMA-02
- 53	M3933/25-53N	1.02 (26.0)	35	DC - 12.4	ATT-0291-35-SMA-02
- 54	M3933/25-54N	1.02 (26.0)	40	DC - 12.4	ATT-0291-40-SMA-02
- 58	M3933/25-58N	0.86 (21.9)	0	DC - 18.0	ATT-0290-00-SMA-02
- 59	M3933/25-59N	0.86 (21.9)	.5	DC - 18.0	ATT-0290-70-SMA-02
- 60	M3933/25-60N	0.86 (21.9)	1	DC - 18.0	ATT-0290-01-SMA-02
- 61	M3933/25-61N	0.86 (21.9)	1.5	DC - 18.0	ATT-0290-71-SMA-02
- 62	M3933/25-62N	0.86 (21.9)	2	DC - 18.0	ATT-0290-02-SMA-02
- 63	M3933/25-63N	0.86 (21.9)	2.5	DC - 18.0	ATT-0290-72-SMA-02
- 64	M3933/25-64N	0.86 (21.9)	3	DC - 18.0	ATT-0290-03-SMA-02
- 65	M3933/25-65N	0.86 (21.9)	3.5	DC - 18.0	ATT-0290-73-SMA-02
- 66	M3933/25-66N	0.86 (21.9)	4	DC - 18.0	ATT-0290-04-SMA-02
- 67	M3933/25-67N	0.86 (21.9)	4.5	DC - 18.0	ATT-0290-74-SMA-02
- 68	M3933/25-68N	0.86 (21.9)	5	DC - 18.0	ATT-0290-05-SMA-02
- 69	M3933/25-69N	0.86 (26.0)	5.5	DC - 18.0	ATT-0290-75-SMA-02

Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

Attenuators - SMA Type - Fixed Coaxial

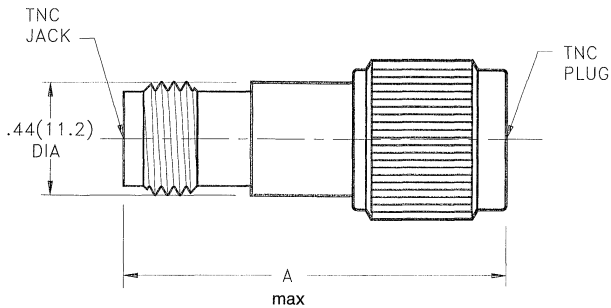
MIL-A-3933/25



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A INCHES (mm)	ATTENUATION VALUE (dB	FREQUENCY RANGE (GHZ)	COMMERCIAL ALTERNATE
- 70	M3933/25-70N	0.86 (21.9)	6	DC - 18.0	ATT-0290-06-SMA-02
- 71	M3933/25-71N	0.86 (21.9)	6.5	DC - 18.0	ATT-0290-76-SMA-02
- 72	M3933/25-72N	0.86 (21.9)	7	DC - 18.0	ATT-0290-07-SMA-02
- 73	M3933/25-73N	0.86 (21.9)	7.5	DC - 18.0	ATT-0290-77-SMA-02
- 74	M3933/25-74N	0.86 (21.9)	8	DC - 18.0	ATT-0290-08-SMA-02
- 75	M3933/25-75N	0.86 (21.9)	8.5	DC - 18.0	ATT-0290-78-SMA-02
- 76	M3933/25-76N	0.86 (21.9)	9	DC - 18.0	ATT-0290-09-SMA-02
- 77	M3933/25-77N	0.86 (21.9)	9.5	DC - 18.0	ATT-0290-79-SMA-02
- 78	M3933/25-78N	0.86 (21.9)	10	DC - 18.0	ATT-0290-10-SMA-02
- 79	M3933/25-79N	0.86 (21.9)	11	DC - 18.0	ATT-0290-11-SMA-02
- 80	M3933/25-80N	0.86 (21.9)	12	DC - 18.0	ATT-0290-12-SMA-02
- 81	M3933/25-81N	0.94 (23.9)	13	DC - 18.0	ATT-0290-13-SMA-02
- 82	M3933/25-82N	0.94 (23.9)	14	DC - 18.0	ATT-0290-14-SMA-02
- 83	M3933/25-83N	1.02 (26.0)	15	DC - 18.0	ATT-0290-15-SMA-02
- 84	M3933/25-84N	1.02 (26.0)	16	DC - 18.0	ATT-0290-16-SMA-02
- 85	M3933/25-85N	1.02 (26.0)	17	DC - 18.0	ATT-0290-17-SMA-02
- 86	M3933/25-86N	1.02 (26.0)	18	DC - 18.0	ATT-0290-18-SMA-02
- 87	M3933/25-87N	1.02 (26.0)	19	DC - 18.0	ATT-0290-19-SMA-02
- 88	M3933/25-88N	1.02 (26.0)	20	DC - 18.0	ATT-0290-20-SMA-02
- 89	M3933/25-89N	1.02 (26.0)	25	DC - 18.0	ATT-0290-25-SMA-02
- 90	M3933/25-90N	1.02 (26.0)	30	DC - 18.0	ATT-0290-30-SMA-02
- 91	M3933/25-91N	1.02 (26.0)	35	DC - 18.0	ATT-0290-35-SMA-02
- 92	M3933/25-92N	1.02 (26.0)	40	DC - 18.0	ATT-0290-40-SMA-02

Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

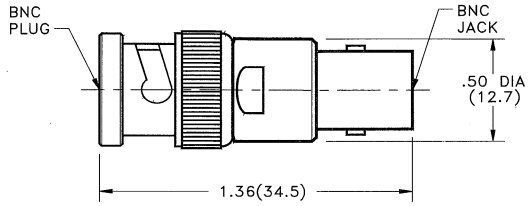
MIL-A-3933/17



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A Inches (mm)	ATTENUATION VALUE (dB)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/17-01N	1.57 (39.9)	1	DC - 4.5	ATT-0224-01-TNC-02
- 02	M3933/17-02N	1.57 (39.9)	2	DC - 4.5	ATT-0224-02-TNC-02
- 03	M3933/17-03N	1.57 (39.9)	3	DC - 4.5	ATT-0224-03-TNC-02
- 04	M3933/17-04N	1.57 (39.9)	4	DC - 4.5	ATT-0224-04-TNC-02
- 05	M3933/17-05N	1.57 (39.9)	5	DC - 4.5	ATT-0224-05-TNC-02
- 06	M3933/17-06N	1.57 (39.9)	6	DC - 4.5	ATT-0224-06-TNC-02
- 07	M3933/17-07N	1.57 (39.9)	20	DC - 18.0	ATT-0225-20-TNC-02
- 08	M3933/17-08N	1.84 (46.7)	30	DC - 18.0	ATT-0225-30-TNC-02
- 09	M3933/17-09N	1.57 (39.9)	1	DC - 18.0	ATT-0225-01-TNC-02
- 10	M3933/17-10N	1.57 (39.9)	2	DC - 18.0	ATT-0225-02-TNC-02
- 11	M3933/17-11N	1.57 (39.9)	3	DC - 18.0	ATT-0225-03-TNC-02
- 12	M3933/17-12N	1.57 (39.9)	4	DC - 18.0	ATT-0225-04-TNC-02
- 13	M3933/17-13N	1.57 (39.9)	5	DC - 18.0	ATT-0225-05-TNC-02
- 14	M3933/17-14N	1.57 (39.9)	6	DC - 18.0	ATT-0225-06-TNC-02
- 15	M3933/17-15N	1.57 (39.9)	7	DC - 18.0	ATT-0225-07-TNC-02
- 16	M3933/17-16N	1.57 (39.9)	8	DC - 18.0	ATT-0225-08-TNC-02
- 17	M3933/17-17N	1.57 (39.9)	10	DC - 18.0	ATT-0225-10-TNC-02
- 18	M3933/17-18N	1.57 (39.9)	12	DC - 18.0	ATT-0225-12-TNC-02
- 19	M3933/17-19N	1.57 (39.9)	15	DC - 18.0	ATT-0225-15-TNC-02
- 20	M3933/17-20N	1.84 (46.7)	25	DC - 18.0	ATT-0225-25-TNC-02
- 21	M3933/17-21N	1.84 (46.7)	35	DC - 18.0	ATT-0225-35-TNC-02
- 22	M3933/17-22N	1.84 (46.7)	40	DC - 18.0	ATT-0225-40-TNC-02

Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

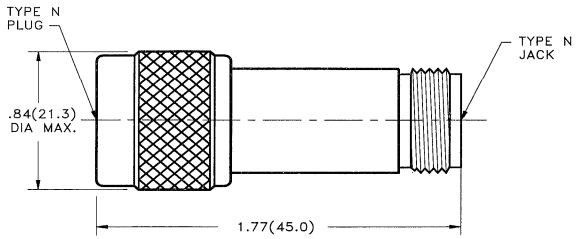
MIL-A-3933/19



MILITARY PART NO.	MIDWEST PART NO.	ATTENUATION VALUE (dB)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/19-01N	1	DC - 4.5	ATT-0313-01-BNC-10
- 02	M3933/19-02N	2	DC - 4.5	ATT-0313-02-BNC-10
- 03	M3933/19-03N	3	DC - 4.5	ATT-0313-03-BNC-10
- 04	M3933/19-04N	4	DC - 4.5	ATT-0313-04-BNC-10
- 05	M3933/19-05N	5	DC - 4.5	ATT-0313-05-BNC-10
- 06	M3933/19-06N	6	DC - 4.5	ATT-0313-06-BNC-10
- 07	M3933/19-07N	8	DC - 4.5	ATT-0313-08-BNC-10
- 08	M3933/19-08N	10	DC - 4.5	ATT-0313-10-BNC-10
- 09	M3933/19-09N	11	DC - 4.5	ATT-0313-11-BNC-10
- 10	M3933/19-10N	12	DC - 4.5	ATT-0313-12-BNC-10
- 11	M3933/19-11N	15	DC - 4.5	ATT-0313-15-BNC-10
- 12	M3933/19-12N	20	DC - 4.5	ATT-0313-20-BNC-10
- 18	M3933/19-18N	13	DC - 4.5	ATT-0313-13-BNC-10

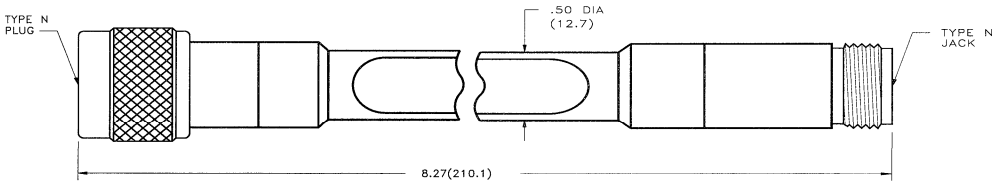
Notes:
1. Midwest Microwave Part No. reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-A-3933/18



MILITARY PART NO.	MIDWEST PART NO.	ATTENUATION VALUE (dB)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 21	M3933/18-21N	3	DC - 18.0	ATT-0219-03-NNN-02
- 22	M3933/18-22N	6	DC - 18.0	ATT-0219-06-NNN-02
- 23	M3933/18-23N	10	DC - 18.0	ATT-0219-10-NNN-02
- 24	M3933/18-24N	20	DC - 18.0	ATT-0219-20-NNN-02

MIL-A-3933/26



MILITARY PART NO.	MIDWEST PART NO.	ATTENUATION VALUE (dB)	FREQUENCY RANGE (GHz)	COMMERCIAL ALTERNATE
- 01	M3933/26-01N	1	0.4 - 18.0	ATT-0340-01-NNN-02
- 02	M3933/26-02N	2	0.5 - 18.0	ATT-0340-02-NNN-02
- 03	M3933/26-03N	3	0.6 - 18.0	ATT-0340-03-NNN-02
- 04	M3933/26-04N	4	1.0 - 18.0	ATT-0340-04-NNN-02
- 05	M3933/26-05N	5	1.0 - 18.0	ATT-0340-05-NNN-02
- 06	M3933/26-06N	6	1.0 - 18.0	ATT-0340-06-NNN-02
- 07	M3933/26-07N	7	1.0 - 18.0	ATT-0340-07-NNN-02
- 08	M3933/26-08N	8	1.0 - 18.0	ATT-0340-08-NNN-02
- 09	M3933/26-09N	9	1.0 - 18.0	ATT-0340-09-NNN-02
- 10	M3933/26-10N	10	1.0 - 18.0	ATT-0340-10-NNN-02
-11	M3933/26-11N	20	2.0 - 18.0	ATT-0340-20-NNN-02

Notes:
1. Midwest Microwave Part No. reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-C-39012/55

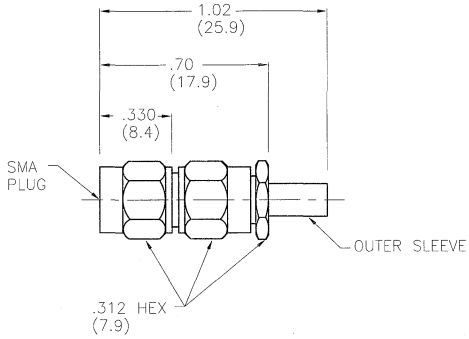


FIGURE 1

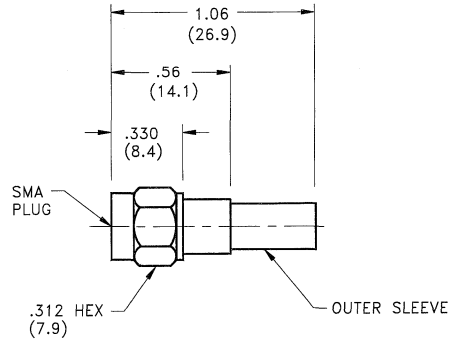


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3006	M39012/55-3006	1	SMA -051	A	I	SMA-0196-55-000-02
- 3007	M39012/55-3007	1	SMA -051	A	II	SMA-0188-55-000-02
- 3008*	M39012/55-3008	2	SMA -027	A	III	SMA-0122-55-000-02
- 3009	M39012/55-3009	2	SMA -027	A	IV	SMA-0142-55-000-02
- 3010	M39012/55-3010	2	SMA -027	A	V	SMA-0142-55-000-02
- 3025	M39012/55-3025	1	SMA -051	C	I	SMA-1196-55-000-02
- 3026	M39012/55-3026	1	SMA -051	C	II	SMA-1188-55-000-02
- 3027*	M39012/55-3027	2	SMA -027	C	III	SMA-1122-55-000-02
- 3028	M39012/55-3028	2	SMA -027	C	IX	SMA-1055-55-000-02
- 3029	M39012/55-3029	2	SMA -027	C	X	SMA-1058-55-000-02
- 3030	M39012/55-3030	1	SMA -051	A	XV	SMA-0316-55-000-02
- 3106	M39012/55-3106	1	SMA -051	A	I	SMA-0196-55-000-02
- 3107	M39012/55-3107	1	SMA -051	A	II	SMA-0188-55-000-02
- 3108*	M39012/55-3108	2	SMA -027	A	III	SMA-0122-55-000-02
- 3109	M39012/55-3109	2	SMA -027	A	IV	SMA-0142-55-000-02
- 3110	M39012/55-3110	2	SMA -027	A	V	SMA-0142-55-000-02
- 3125	M39012/55-3125	1	SMA -051	C	I	SMA-1196-55-000-02
- 3126	M39012/55-3126	1	SMA -051	C	II	SMA-1188-55-000-02
- 3127*	M39012/55-3127	2	SMA -027	C	III	SMA-1122-55-000-02
- 3128	M39012/55-3128	2	SMA -027	C	IX	SMA-1055-55-000-02
- 3129	M39012/55-3129	2	SMA -027	C	X	SMA-1058-55-000-02
- 3130	M39012/55-3130	1	SMA -051	A	XV	SMA-0316-55-000-02
- 3502	M39012/55-3502	2	SMA -027	D	XI	SMA-1055-55-000-02
- 3602	M39012/55-3602	2	SMA -027	D	XI	SMA-1055-55-000-02

Notes:
1. Coupling nut is passivated and lockwire safety holes are not used on - 3100 and - 3600 series part numbers.
2. Connector housings are gold plated for soldering of cable outer conductor (Mil-C-39012/55D Amendment 1, Note 9).
3. Category A: solder sleeve; Categories B, C, and D: crimp sleeve.
4. See Appendix for description of connector interfaces, categories and cable types.
5. *Qualification for these items was in process at time of printing, please contact Midwest Microwave for current status.

MIL-C-39012/56*

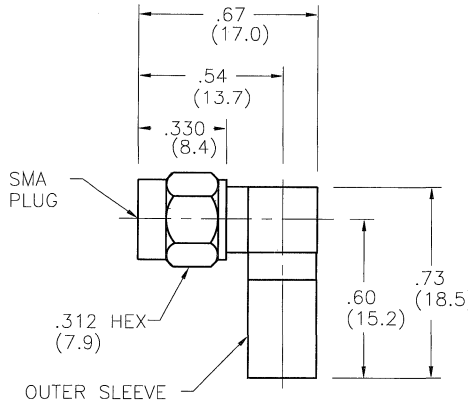


FIGURE 1

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3006	M39012/56-3006	1	SMA -028	A	I	SMA-0196-56-000-02
- 3007	M39012/56-3007	1	SMA -028	A	II	SMA-0188-56-000-02
- 3008	M39012/56-3008	1	SMA -028	A	III	SMA-0122-56-000-02
- 3009	M39012/56-3009	1	SMA -028	A	IV	SMA-0142-56-000-02
- 3010	M39012/56-3010	1	SMA -028	A	V	SMA-0142-56-000-02
- 3025	M39012/56-3025	1	SMA -028	C	I	SMA-1196-56-000-02
- 3026	M39012/56-3026	1	SMA -028	C	II	SMA-1188-56-000-02
- 3027	M39012/56-3027	1	SMA -028	C	III	SMA-1122-56-000-02
- 3028	M39012/56-3028	1	SMA -028	C	IX	SMA-1055-56-000-02
- 3029	M39012/56-3029	1	SMA -028	C	X	SMA-1058-56-000-02
- 3106	M39012/56-3106	1	SMA -028	A	I	SMA-0196-56-000-02
- 3107	M39012/56-3107	1	SMA -028	A	II	SMA-0188-56-000-02
- 3108	M39012/56-3108	1	SMA -028	A	III	SMA-0122-56-000-02
- 3109	M39012/56-3109	1	SMA -028	A	IV	SMA-0142-56-000-02
- 3110	M39012/56-3110	1	SMA -028	A	V	SMA-0142-56-000-02
- 3125	M39012/56-3125	1	SMA -028	C	I	SMA-1196-56-000-02
- 3126	M39012/56-3126	1	SMA -028	C	II	SMA-1188-56-000-02
- 3127	M39012/56-3127	1	SMA -028	C	III	SMA-1122-56-000-02
- 3128	M39012/56-3128	1	SMA -028	C	IX	SMA-1055-56-000-02
- 3129	M39012/56-3129	1	SMA -028	C	X	SMA-1058-56-000-02

Notes:
1. Coupling nut is passivated and lockwire safety holes are not used on - 3100 series part numbers.
2. Connector housings are gold plated for soldering of cable outer conductor (Mil-C-39012/55D Amendment 1, Note 9).
3. Category A: solder sleeve; Categories B, C, and D: crimp sleeve.
4. See Appendix for description of connector interfaces, categories and cable types.
5. *Qualification for MIL-C-39012/56 was in process at time of printing, please contact Midwest Microwave for current status.

MIL-C-39012/57

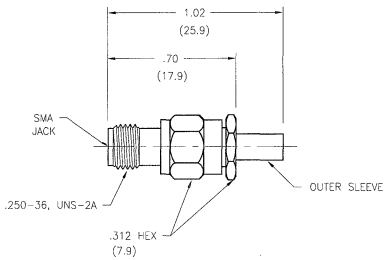


FIGURE 1

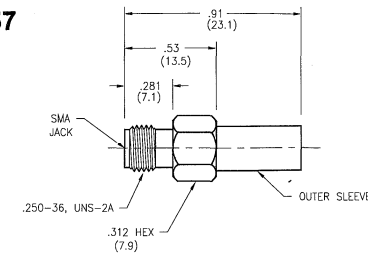


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3006	M39012/57-3006	1	SMA -052	A	I	SMA-0196-57-000-02
- 3007	M39012/57-3007	1	SMA -052	A	II	SMA-0188-57-000-02
- 3008*	M39012/57-3008	2	SMA -026	A	III	SMA-0122-57-000-02
- 3009	M39012/57-3009	2	SMA -026	A	IV	SMA-0142-57-000-02
- 3010	M39012/57-3010	2	SMA -026	A	V	SMA-0142-57-000-02
- 3025	M39012/57-3025	1	SMA -052	C	I	SMA-1196-57-000-02
- 3026	M39012/57-3026	1	SMA -052	C	II	SMA-1188-57-000-02
- 3027*	M39012/57-3027	2	SMA -026	C	III	SMA-1122-57-000-02
- 3028	M39012/57-3028	2	SMA -026	C	IX	SMA-1055-57-000-02
- 3029	M39012/57-3029	2	SMA -026	C	X	SMA-1058-57-000-02
- 3030	M39012/57-3030	1	SMA -052	A	XV	SMA-0316-57-000-02
- 3502	M39012/57-3502	2	SMA -026	D	XI	SMA-1055-57-000-02

MIL-C-39012/58

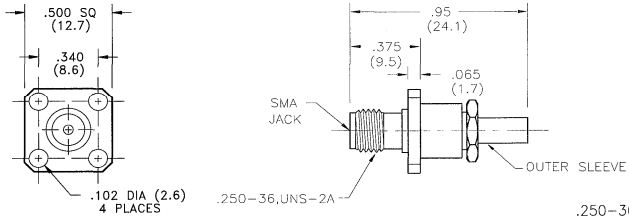


FIGURE 3

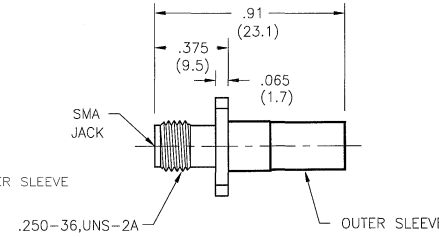


FIGURE 4

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3006	M39012/58-3006	3	SMA -053	A	I	SMA-0196-58-000-02
- 3007	M39012/58-3007	3	SMA -053	A	II	SMA-0188-58-000-02
- 3008*	M39012/58-3008	4	SMA -054	A	III	SMA-0122-58-000-02
- 3009	M39012/58-3009	4	SMA -054	A	IV	SMA-0142-58-000-02
- 3010	M39012/58-3010	4	SMA -054	A	V	SMA-0142-58-000-02
- 3025	M39012/58-3025	3	SMA -053	C	I	SMA-1196-58-000-02
- 3026	M39012/58-3026	3	SMA -053	C	II	SMA-1188-58-000-02
- 3027*	M39012/58-3027	4	SMA -054	C	III	SMA-1122-58-000-02
- 3028	M39012/58-3028	4	SMA -054	C	IX	SMA-1055-58-000-02
- 3029	M39012/58-3029	4	SMA -054	C	X	SMA-1058-58-000-02
- 3030	M39012/58-3030	3	SMA -053	A	XV	SMA-0316-58-000-02
- 3502	M39012/58-3502	4	SMA -054	D	XI	SMA-1055-58-000-02

Note: * Qualification for these items was in process at time of printing, please contact Midwest Microwave for current status.

MIL-C-39012/59

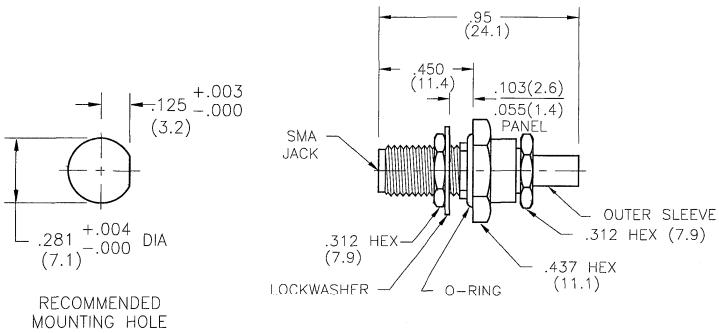


FIGURE 1

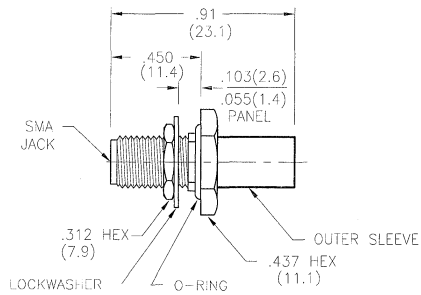


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3006	M39012/59-3006	1	SMA -055	A	I	SMA-0196-59-000-02
- 3007	M39012/59-3007	1	SMA -055	A	II	SMA-0188-59-000-02
- 3008	M39012/59-3008	2	SMA -056	A	III	SMA-0122-59-000-02
- 3009	M39012/59-3009	2	SMA -056	A	IV	SMA-0142-59-000-02
- 3010	M39012/59-3010	2	SMA -056	A	V	SMA-0142-59-000-02
- 3025	M39012/59-3025	1	SMA -055	C	I	SMA-1196-59-000-02
- 3026	M39012/59-3026	1	SMA -055	C	II	SMA-1188-59-000-02
- 3027	M39012/59-3027	2	SMA -056	C	III	SMA-1122-59-000-02
- 3028	M39012/59-3028	2	SMA -056	C	IX	SMA-1055-59-000-02
- 3029	M39012/59-3029	2	SMA -056	C	X	SMA-1058-59-000-02
- 3030	M39012/59-3030	1	SMA -055	A	XV	SMA-0316-59-000-02
- 3502	M39012/59-3502	2	SMA -056	D	XI	SMA-3055-59-000-02

Notes:
1. Solder sleeve to be gold plated, all other stainless steel parts are passivated (MIL-C-39012/59D Amendment 1, Note 8).
2. Housing to be gold plated (MIL-C-39012/59D Amendment 1, Note 8).
3. Category A: solder sleeve; Categories B, C and D: crimp sleeve.
4. Qualification to MIL-C-39012/59 is in process at time of printing, please contact Midwest Microwave for current status.
5. See Appendix for description of connector interfaces, categories and cable types.

MIL-C-39012/60

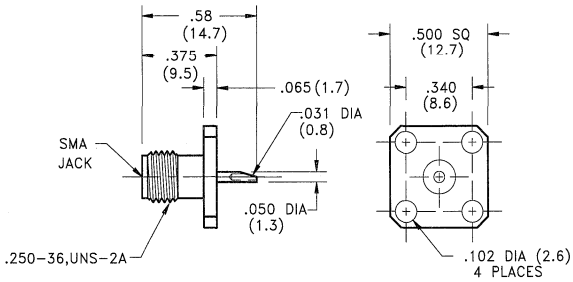


FIGURE 1

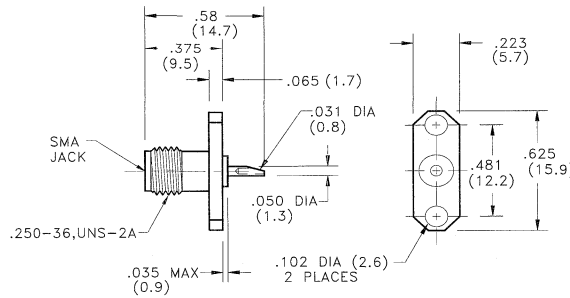


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	COMMERCIAL ALTERNATE
- 3001	M39012/60-3001	1	SMA-5540-15-000-02
- 3002	M39012/60-3002	2	SMA-5240-15-000-02

MIL-C-39012/61*

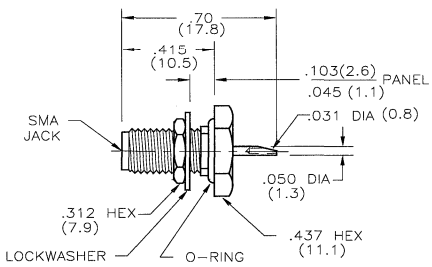


FIGURE 3

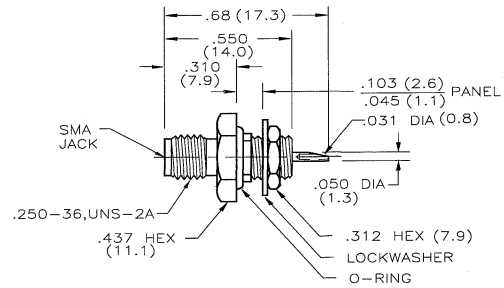


FIGURE 4

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	COMMERCIAL ALTERNATE
- 3001	M39012/61-3001	3	SMA-5040-11-000-02
- 3002	M39012/61-3002	4	SMA-5040-12-000-02

Notes :

1. * Qualification of MIL-C-39012/60 is complete, but /61 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interface .

MIL-C-39012/79

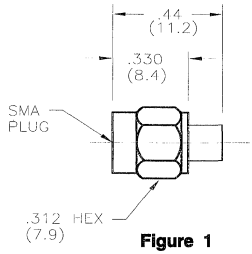


Figure 1

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- B3001	M39012/79B-3001	1	SMA -057	B	XII	SMA-0085-79-000-02
- B3002	M39012/79B-3002	1	SMA -058	B	XIII	SMA-0141-79-000-02
- 3007	M39012/79-3007	1	SMA -059	E	XII	SMA-4085-79-000-02
- 3008	M39012/79-3008	1	SMA -024	E	XIII	SMA-4141-79-000-02
- B3101	M39012/79-3101	1	SMA -057	B	XII	SMA-0085-79-000-02
- B3102	M39012/79-3102	1	SMA -058	B	XIII	SMA-0141-79-000-02
- 3107	M39012/79-3107	1	SMA -059	E	XII	SMA-4085-79-000-02
- 3108	M39012/55-3029	1	SMA -024	E	XIII	SMA-4141-79-000-02

MIL-C-39012/80*

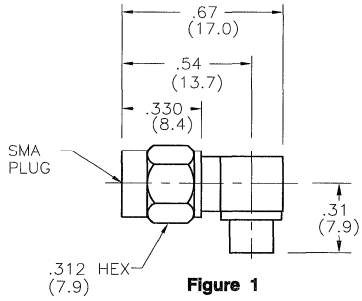


Figure 1

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3005	M39012/80-3001	1	SMA -025	E	XII	SMA-0085-80-000-02
- 3006	M39012/80-3002	1	SMA -025	E	XIII	SMA-0141-80-000-02
- 3007	M39012/80-3008	1	SMA -025	E	XII	SMA-0085-80-000-02
- 3008	M39012/80-3009	1	SMA -025	E	XIII	SMA-0141-80-000-02
- 3105	M39012/80-3101	1	SMA -025	B	XII	SMA-0085-80-000-02
- 3106	M39012/80-3102	1	SMA -025	B	XIII	SMA-0141-80-000-02
- 3107	M39012/80-3107	1	SMA -025	E	XII	SMA-0085-80-000-02
- 3108	M39012/80-3029	1	SMA -025	E	XIII	SMA-0141-80-000-02

Notes:
1. Coupling nut is passivated and lockwire safety holes are not used on - 3100 series part numbers.
2. Connector housings are gold plated for soldering of cable outer conductor (Mil-C-39012/55D Amendment 1, Note 9).
3. See Appendix for description of connector interfaces, categories and cable types.
4. * Qualification for MIL-C-39012/79 is complete, but /80 was in process at time of printing, please contact Midwest Microwave for status.

MIL-C-39012/81

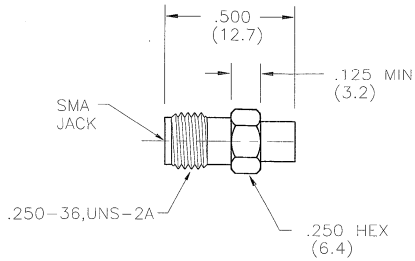


FIGURE 1

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3005	M39012/81-3005	1	SMA -060	B	XII	SMA-0085-81-000-00
- 3006	M39012/81-3006	1	SMA -023	B	XIII	SMA-0141-81-000-00
- 3007	M39012/81-3007	1	SMA -061	E	XII	SMA-4085-81-000-00
- 3008	M39012/81-3008	1	SMA -062	E	XIII	SMA-4141-81-000-00

MIL-C-39012/82

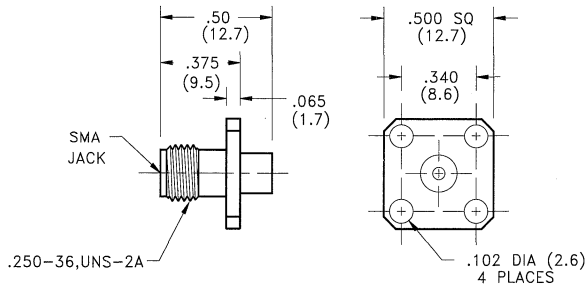
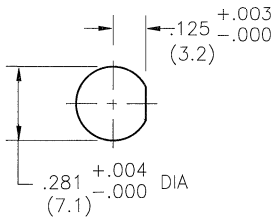


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3005	M39012/82-3005	2	SMA -063	E	XII	SMA-0085-82-000-00
- 3006	M39012/82-3006	2	SMA -064	E	XIII	SMA-0141-82-000-00
- 3007	M39012/82-3007	2	SMA -065	E	XII	SMA-4085-82-000-00
- 3008	M39012/82-3008	2	SMA -066	E	XIII	SMA-4141-82-000-00

Notes:
1. Housing to be gold plated (MIL-C-39012/59D Amendment 1, Note 8).
2. Category A: solder sleeve; Categories B, C and D: crimp sleeve.
3. Qualification to MIL-C-39012/81 and /82 is complete.
4. See Appendix for description of connector interfaces, categories and cable types.

MIL-C-39012/83*



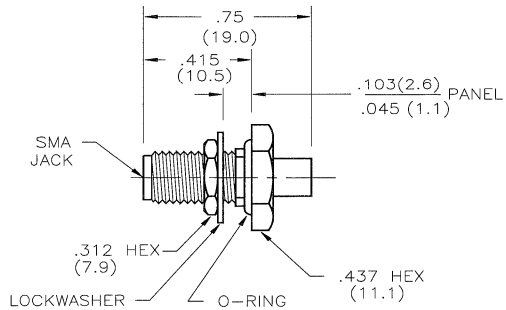


FIGURE 1

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- 3005	M39012/83-3005	1	SMA -067	E	XII	SMA-0085-83-000-00
- 3006	M39012/83-3006	1	SMA -068	E	XIII	SMA-0141-83-000-00
- 3007	M39012/83-3007	1	SMA -069	E	XII	SMA-4085-83-000-00
- 3008	M39012/83-3008	1	SMA -070	E	XIII	SMA-4141-83-000-00

MIL-C-39012/92

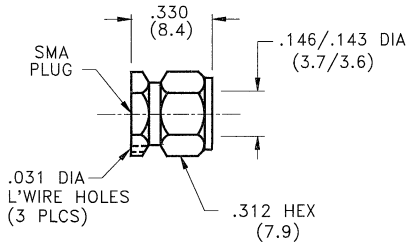


FIGURE 1

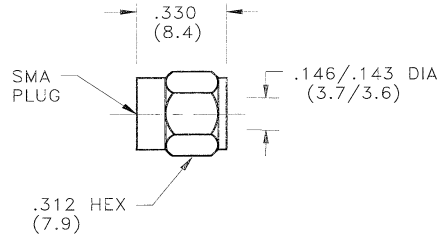
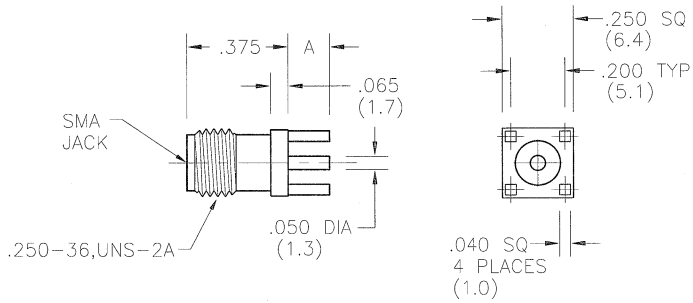


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CATEGORY	CABLE TYPE	COMMERCIAL ALTERNATE
- B3001	M39012/92B-3001	1	SMA-022	E	XIII	SMA-0141-92-000-02
-B3003	M39012/92B-3003	1	SMA-022	E	XIII	SMA-0141-92-000-02
- B3101	M39012/92B-3101	2	SMA-022	E	XIII	SMA-0141-92-000-02
- B3103	M39012/92B-3103	2	SMA-022	E	XIII	SMA-0141-92-000-02

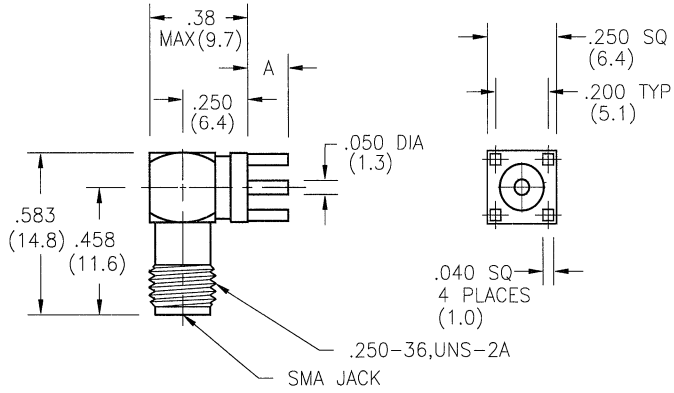
Notes:
1. Coupling nut is passivated and lockwire safety holes are not used on - 3100 series part numbers.
2. Connector housings are gold plated for soldering of cable outer conductor (Mil-C-39012/55D Amendment 1, Note 9).
3. * Qualification to MIL-C-39012/92 is complete, but /83 is in-process at time of printing. Please contact Midwest Microwave for current status.
4. See Appendix for description of connector interfaces, categories and cable types.

MIL-C-39012/93



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A (max)	COMMERCIAL ALTERNATE
- 3001	M39012/93-3001	.155 (3.9)	SMA-5010-93-000-00
- 3002	M39012/93-3002	.125 (3.2)	SMA-5010-93-002-00
- 3003	M39012/93-3003	.093 (2.4)	SMA-5010-93-003-00

MIL-C-39012/94



MILITARY PART NO.	MIDWEST PART NO.	DIMENSION A (max)	COMMERCIAL ALTERNATE
- 3001	M39012/94-3001	.155 (3.9)	SMA-5010-94-000-00
- 3002	M39012/94-3002	.125 (3.2)	SMA-5010-94-005-00
- 3003	M39012/94-3003	.093 (2.4)	SMA-5010-94-006-00

Notes:
1. See Appendix for description of connector interface.
2. Qualification to MIL-C-39012/93 and /94 is complete.

SMA TYPE TERMINATIONS
MIL-D-39030/3

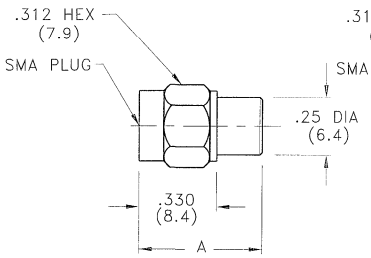


FIGURE 1

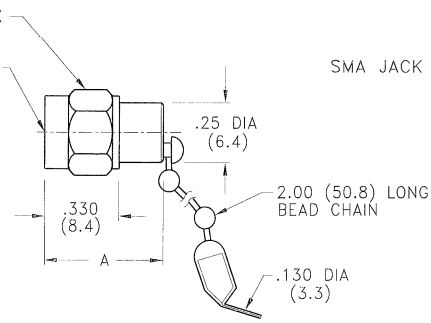


FIGURE 2

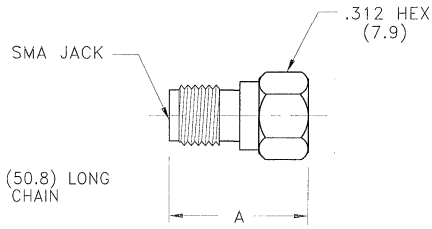


FIGURE 3

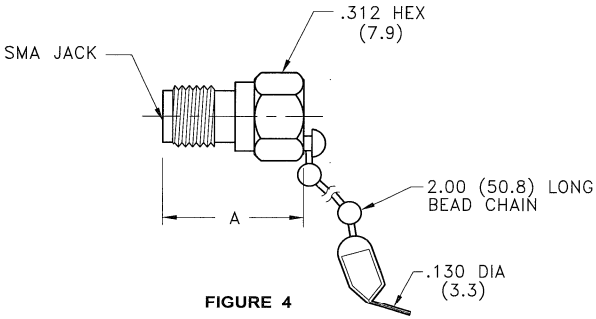


FIGURE 4

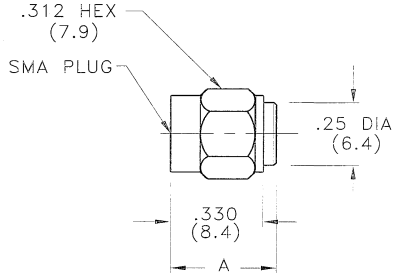


FIGURE 5

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	DIMENSION A Inches	(mm)	COMMERCIAL ALTERNATE
- 01	M39030/3-01N	1	.52	(13.2)	TRM-2090-MO-SMA-00
- 02	M39030/3-02N	1	.52	(13.2)	TRM-2090-MO-SMA-02
- 03	M39030/3-03N	2	.52	(13.2)	TRM-2090-MC-SMA-00
- 04	M39030/3-04N	2	.52	(13.2)	TRM-2090-MC-SMA-02
- 05	M39030/3-05N	3	.53	(13.5)	TRM-2090-FO-SMA-00
- 06	M39030/3-06N	3	.53	(13.5)	TRM-2090-FO-SMA-02
- 07	M39030/3-07N	4	.53	(13.5)	TRM-2090-FC-SMA-00
- 08	M39030/3-08N	4	.53	(13.5)	TRM-2090-FC-SMA-02
- 09	M39030/3-09N	1	.52	(13.2)	TRM-2090-MO-SMA-00
- 11	M39030/3-11N	5	.39	(9.9)	TRM-2444-MO-SMA-00
- 12	M39030/3-12N	1	.52	(13.2)	TRM-2090-MO-SMA-00
- 13	M39030/3-13N	2	.52	(13.2)	TRM-2090-MC-SMA-00
- 14	M39030/3-14N	1	.52	(13.2)	TRM-2090-MO-SMA-02
- 15	M39030/3-15N	1	.52	(13.2)	TRM-2090-MO-SMA-00

Notes:
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. Qualification to MIL-D-39030/3 has been completed.

TNC TYPE TERMINATIONS
MIL-D-39030/5*

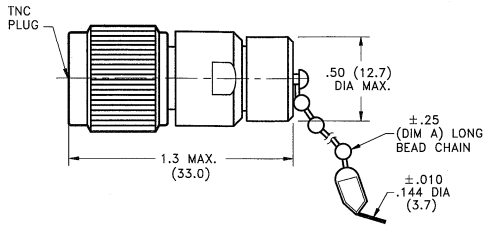


FIGURE 1

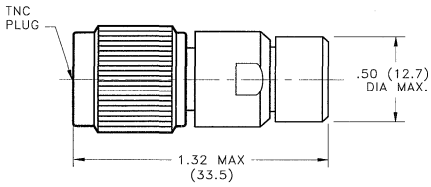


FIGURE 2

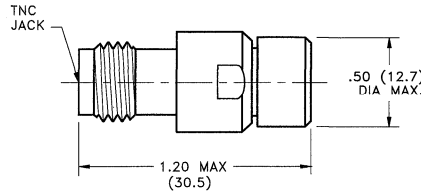


FIGURE 3

TNC TYPE 10 WATT TERMINATION
MIL-D-39030/8*

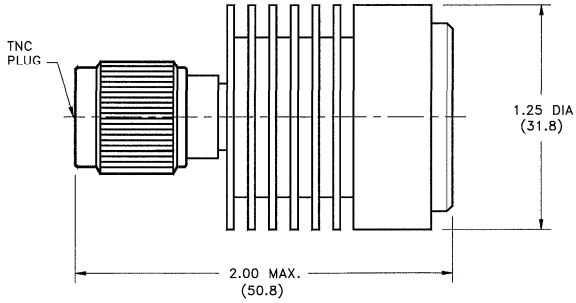


FIGURE 4

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	COMMERCIAL ALTERNATE
- 03	M39030/5-03N	1	TRM-2164-MC-TNC-00
- 05	M39030/5-05N	1	TRM-2164-MC-TNC-02
- 06	M39030/5-06N	2	TRM-2164-MO-TNC-10
- 07	M39030/5-07N	3	TRM-2164-FO-TNC-10
- 01	M39030/8-01N	4	TRM-2171-MO-TNC-07

Note: 1. * Qualification of MIL-D-39030/5 and /8 is in-process at time of printing. Please contact Midwest Microwave for current status.

N TYPE TERMINATIONS
MIL-D-39030/6

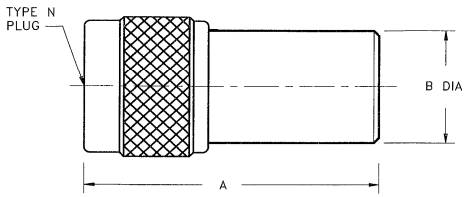


FIGURE 1

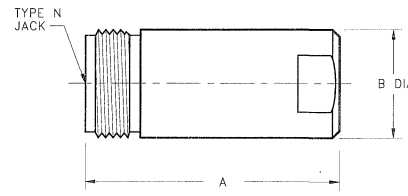
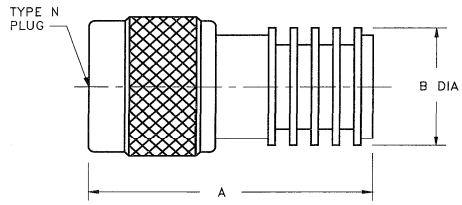


FIGURE 2



10 WATT

FIGURE 3

BNC TYPE TERMINATIONS
MIL-D-39030/7*

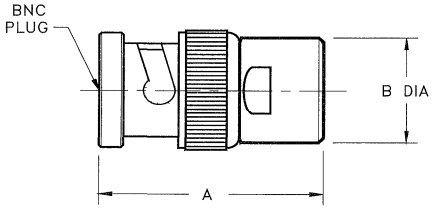


FIGURE 4

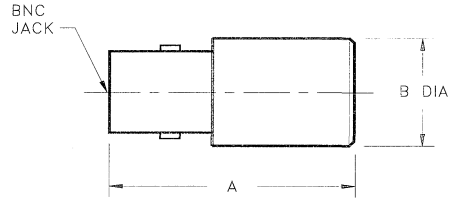


FIGURE 5

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	Dimension A Inches (mm)	Dimension B Inches (mm)	COMMERCIAL ALTERNATE
-01	M39030/6-01N	1	1.60 (40.6)	.625 (15.9)	TRM-2053-MO-NNN-02
-02	M39030/6-02N	1	1.60 (40.6)	.625 (15.9)	TRM-2053-MO-NNN-02
-03	M39030/6-03N	1	1.51 (38.4)	.38 (9.70)	TRM-2053-MO-NNN-02
-04	M39030/6-04N	2	1.48 (37.6)	.38 (9.70)	TRM-2053-FO-NNN-02
-05	M39030/6-05N	3	1.60 (40.6)	.70 (17.8)	TRM-2080-MO-NNN-07
-06	M39030/6-06N	1	1.60 (40.6)	.625 (15.9)	TRM-2169-MO-NNN-02
-07	M39030/6-07N	2	1.60 (40.6)	.625 (15.9)	TRM-2169-FO-NNN-02
-05	M39033/7-05N	4	0.93 (23.6)	.50 (12.7)	TRM-2048-MO-BNC-10
-06	M39033/7-06N	5	0.99 (25.1)	.50 (12.7)	TRM-2048-FO-BNC-10

Notes :
1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. *Qualification of MIL-D-39030/6 is complete but /7 is in-process at time of printing. Please contact Midwest Microwave for current status.

MIL-A-55339*

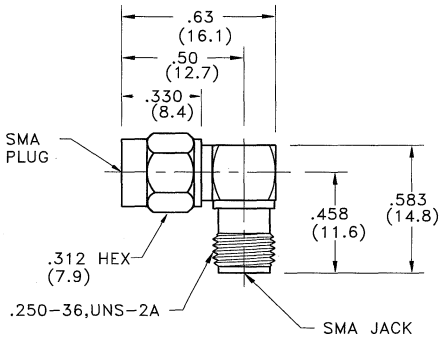


FIGURE 1

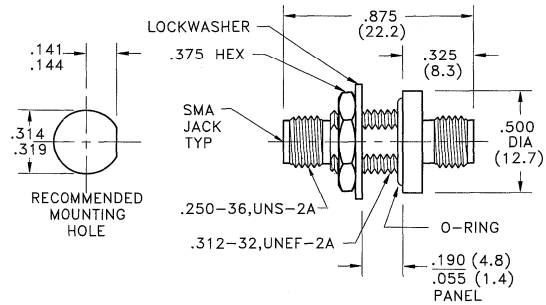


FIGURE 2

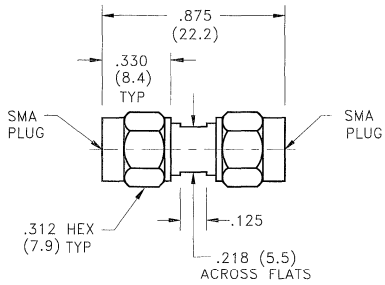


FIGURE 3

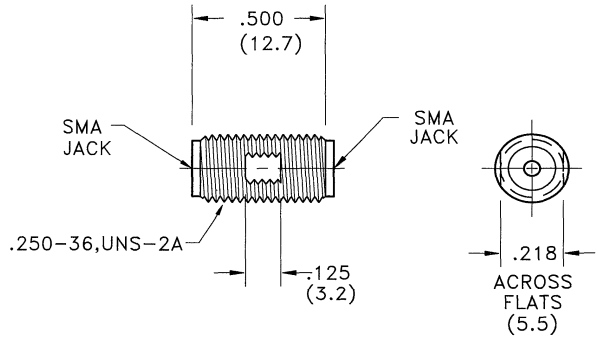


FIGURE 4

MILITARY PART NO.	GOLD PLATED MIDWEST PART NO	PASSIVATED MIDWEST PART NO.	FIGURE	COMMERCIAL ALTERNATE
/02- 30001	M55339/02-30001	M55339/02-30001	1	SMA-8000-28-000-02
/28-30001	M55339/28-30001	M55339/28-30001	2	SMA-8000-24-000-00
/29-30001	M55339/29-30001	M55339/29-30001	3	SMA-8000-21-000-02
/29-30101**	M55339/29-30101	M55339/29-30101	3	SMA-8000-21-000-02
/31-30001	M55339/31-30001	M55339/31-30001	4	SMA-8000-20-000-02

Notes:
1. * Qualification to MIL-A-55339 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. ** This unit does not have safety wire holes.
3. See Appendix for description of connector interfaces .

SMA Receptacles - Panel Mount

MIL-C-83517/1 *

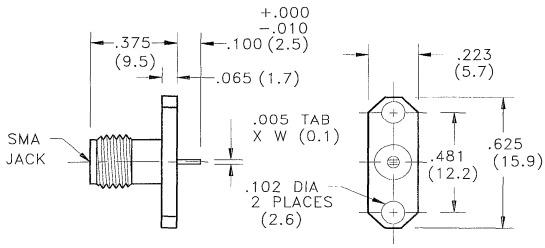


FIGURE 1

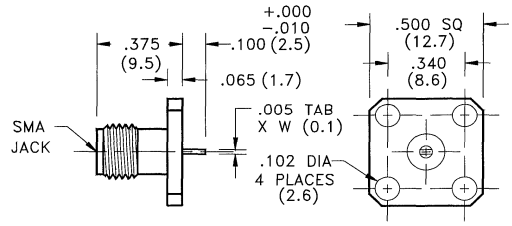


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	DIMENSION W Inches (mm)	COMMERCIAL ALTERNATE
- 31001	M83517/1- 31001	1	.020 (0.5)	SMA-5231-15-000-02
- 31002	M83517/1- 31002	1	.050 (1.3)	SMA-5230-15-000-02
- 31003	M83517/1- 31003	2	.020 (0.5)	SMA-5531-15-000-02
- 31004	M83517/1- 31004	2	.050 (1.3)	SMA-5530-15-000-02
- 32001	M83517/1- 32001	1	.020 (0.5)	SMA-5231-15-000-00
- 32002	M83517/1- 32002	1	.050 (1.3)	SMA-5230-15-000-00
- 32003	M83517/1- 32003	2	.020 (0.5)	SMA-5531-15-000-00
- 32004	M83517/1- 32004	2	.050 (1.3)	SMA-5530-15-000-00

MIL-C-83517/2 *

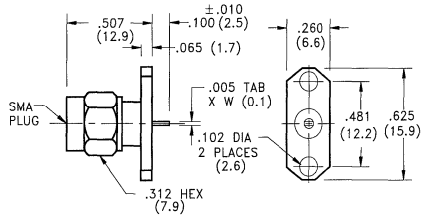


FIGURE 3

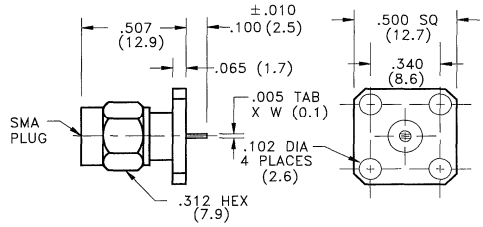


FIGURE 4

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	DIMENSION W Inches (mm)	COMMERCIAL ALTERNATE
- 31001	M83517/2- 31001	3	.020 (0.5)	SMA-5231-14-000-02
- 31002	M83517/2- 31002	3	.050 (1.3)	SMA-5230-14-000-02
- 31003	M83517/2- 31003	4	.020 (0.5)	SMA-5531-14-000-02
- 31004	M83517/2- 31004	4	.050 (1.3)	SMA-5530-14-000-02
- 32001	M83517/2- 32001	3	.020 (0.5)	SMA-5231-14-000-00
- 32002	M83517/2- 32002	3	.050 (1.3)	SMA-5230-14-000-00
- 32003	M83517/2- 32003	4	.020 (0.5)	SMA-5531-14-000-00
- 32004	M83517/2- 32004	4	.050 (1.3)	SMA-5530-14-000-00

Notes:

1. * Qualification to MIL-A-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interfaces .

MIL-C-83517/3

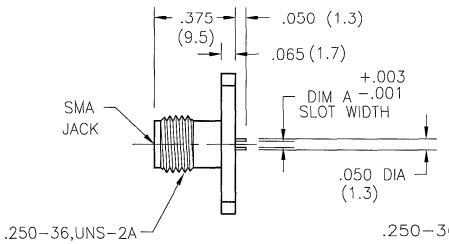


FIGURE 1

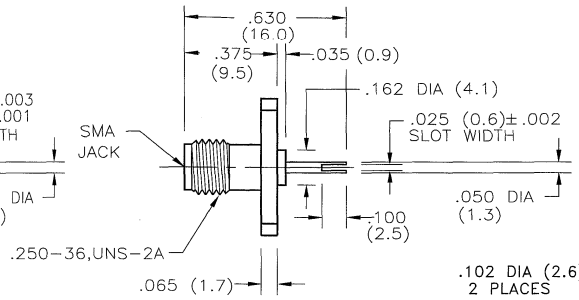
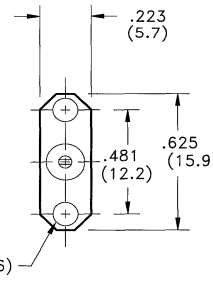


FIGURE 2



TYPICAL

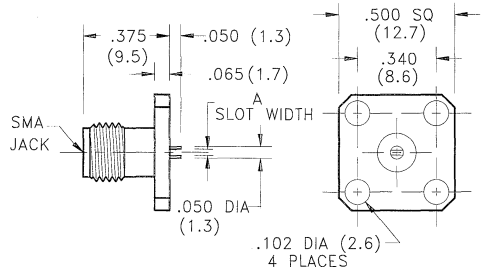


FIGURE 3

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	DIMENSION A Inches	(mm)	COMMERCIAL ALTERNATE
- 31001	M83517/3- 31001	1	.012	(0.5)	SMA-5220-15-000-02
- 31002	M83517/3- 31002	1	.018	(0.5)	SMA-5221-15-000-02
- 31003	M83517/3- 31003	1	.028	(0.7)	SMA-5222-15-000-02
- 31004	M83517/3- 31004	3	.012	(0.3)	SMA-5520-15-000-02
- 31005	M83517/3 -31005	3	.018	(0.5)	SMA-5521-15-000-02
- 31006	M83517/3 -31006	3	.028	(0.7)	SMA-5522-15-000-02
- 31007	M83517/3- 31007	2	.025	(0.6)	SMA-5524-15-000-02
- 32001	M83517/3- 32001	1	.012	(0.3)	SMA-5220-15-000-00
- 32002	M83517/3- 32002	1	.018	(0.5)	SMA-5221-15-000-00
- 32003	M83517/3- 32003	1	.028	(0.7)	SMA-5222-15-000-00
- 32004	M83517/3- 32004	3	.012	(0.3)	SMA-5520-15-000-00
- 32005	M83517/3 -32005	3	.018	(0.5)	SMA-5521-15-000-00
- 32006	M83517/3 -32006	3	.028	(0.7)	SMA-5522-15-000-00
- 32007	M83517/3 - 32007	2	.025	(0.6)	SMA-5524-15-000-00

Notes:
1. See Appendix for description of connector interfaces.
2. * Qualification to MIL-A-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.

MIL-C-83517/4 *

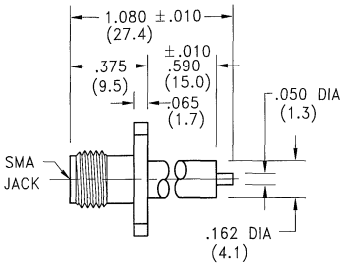
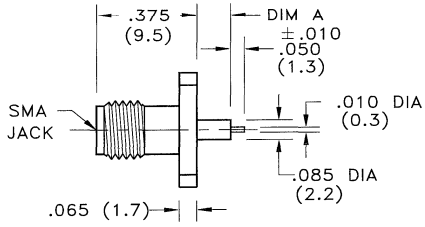


FIGURE 1



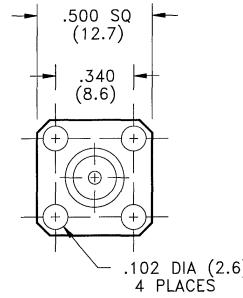


FIGURE 2

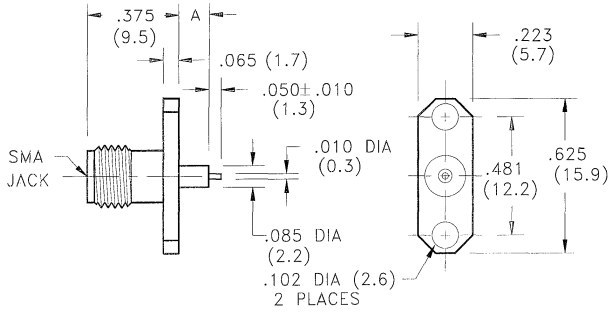


FIGURE 3

MILITARY PART NO.	MIDWEST PART NO.	FIGURE	DIMENSION A Inches +/- .003 (mm)	COMMERCIAL ALTERNATE
- 31001	M83517/4-31001	3	.057 (1.4)	SMA-5214-15-000-02
- 31002	M83517/4-31002	3	.125 (3.2)	SMA-5215-15-000-02
- 31003	M83517/4-31003	2	.057 (1.4)	SMA-5514-15-000-02
- 31004	M83517/4-31004	2	.125 (3.2)	SMA-5515-15-000-02
- 31005	M83517/4-31005	1	N/A	SMA-5510-15-000-02
- 32001	M83517/4-32001	3	.057 (1.4)	SMA-5214-15-000-00
- 32002	M83517/4-32002	3	.125 (3.2)	SMA-5215-15-000-00
- 32003	M83517/4-32003	2	.057 (1.4)	SMA-5214-15-000-00
- 32004	M83517/4-32004	2	.125 (3.2)	SMA-5515-15-000-00
- 32005	M83517/4-32005	1	N/A	SMA-5510-15-000-00

Notes:
1. * Qualification to MIL-C-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interfaces .

MIL-C-83517/5*

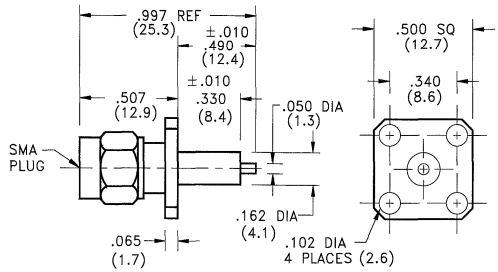


FIGURE 1

MILITARY PART NO.	MIDWEST PART NO	FIGURE	COMMERCIAL ALTERNATE
- 31001	M83517/5-31001	1	SMA-5510-14-000-02
- 32001	M83517/5-32001	1	SMA-5510-14-000-00

MIL-C-83517/6*

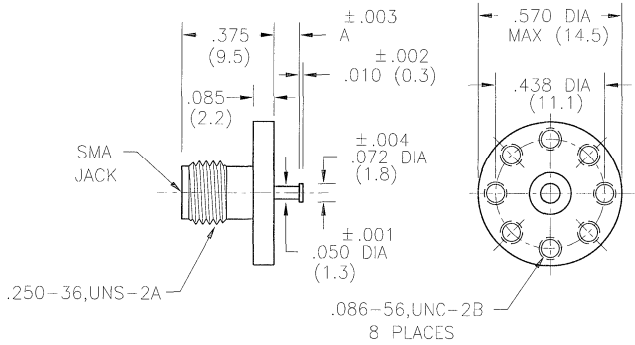


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO	FIGURE	DIMENSION A (max)	COMMERCIAL ALTERNATE
- 31001	M83517/6-31001	2	.060 (1.5)	SMA-5063-43-000-02
- 31002	M83517/6-31002	2	.120 (3.0)	SMA-5125-43-000-02
- 32001	M83517/6-32001	2	.060 (1.5)	SMA-5063-43-000-00
- 32002	M83517/6-32002	2	.120 (3.0)	SMA-5125-43-000-00

Notes:
1. * Qualification to MIL-C-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interfaces .

MIL-C-83517/7*

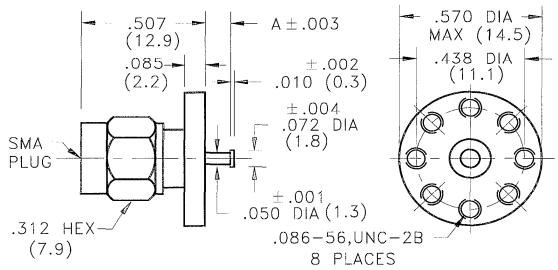
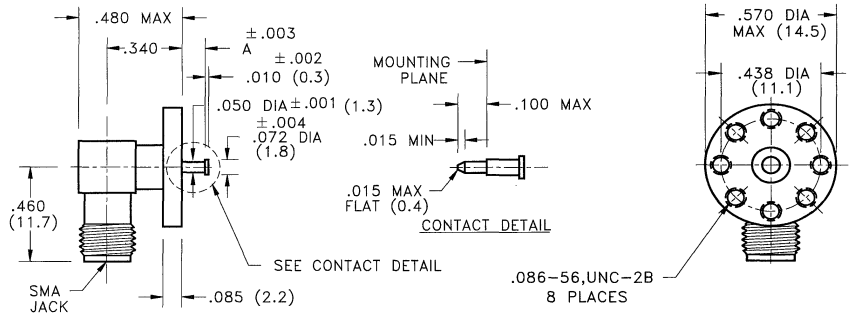


FIGURE 1

MILITARY PART NO.	MIDWEST PART NO	FIGURE	DIMENSION A (max)	COMMERCIAL ALTERNATE
- 31001	M83517/7-31001	1	.060 (1.5)	SMA-5063-44-000-02
- 31002	M83517/7-31002	1	.120 (3.0)	SMA-5125-44-000-02
- 32001	M83517/7-32001	1	.060 (1.5)	SMA-5063-44-000-00
- 32002	M83517/7-32002	1	.120 (3.0)	SMA-5125-44-000-00

MIL-C-83517/8*



MILITARY PART NO.	MIDWEST PART NO	FIGURE	DIMENSION A (max)	COMMERCIAL ALTERNATE
- 31001	M83517/8-31001	2	.060 (1.5)	SMA-5063-45-000-02
- 31002	M83517/8-31002	2	.120 (3.0)	SMA-5125-45-000-02
- 32001	M83517/8-32001	2	.060 (1.5)	SMA-5063-45-000-00
- 32002	M83517/8-32002	2	.120 (3.0)	SMA-5125-45-000-00

Notes:
1. * Qualification to MIL-C-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interfaces .

MIL-C-83517/9*

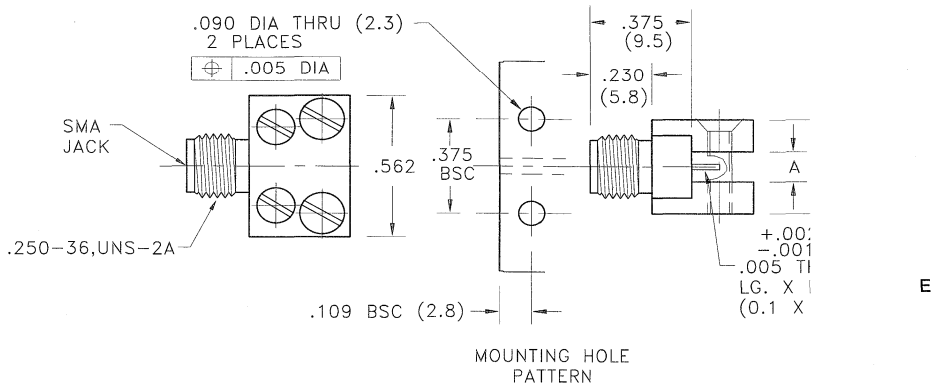


FIGURE 1

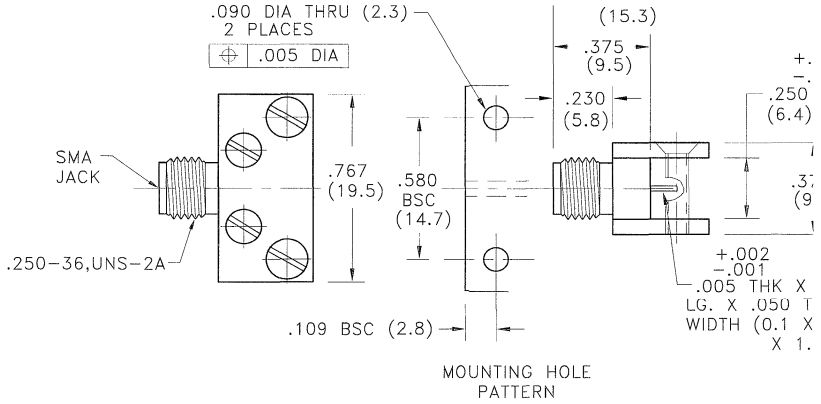


FIGURE 2

MILITARY PART NO.	MIDWEST PART NO	FIGURE	DIMENSION A Inches (mm)	DIMENSION B Inches (mm)	COMMERCIAL ALTERNATE
- 31001	M83517/9-31001	1	.057/.064 (1.4/1.6)	.025 (0.6)	SMA-0063-48-000-02
- 31002	M83517/9-31002	1	.120/.127 (3.0/3.2)	.050 (1.3)	SMA-0125-48-000-02
- 31003	M83517/9-31003	1	.245/.250 (6.2/6.4)	.050 (1.3)	SMA-0250-48-000-02
- 31004	M83517/9-31004	2	N/A	N/A	SMA-0250-48-001-02
- 32001	M83517/9-32001	1	.057/.064 (1.4/1.6)	.025 (0.6)	SMA-0063-48-000-00
- 32002	M83517/9-32002	1	.120/.127 (3.0/3.2)	.050 (1.3)	SMA-0125-48-000-00
- 32003	M83517/9-32003	1	.245/.250 (6.2/6.4)	.050 (1.3)	SMA-0250-48-000-00
- 32004	M83517/9-32004	2	N/A	N/A	SMA-0250-48-001-00

Notes:
1. * Qualification to MIL-C-83517 is in-process at time of printing. Please contact Midwest Microwave for current status.
2. See Appendix for description of connector interfaces .

CAPTURED CENTER CONTACT

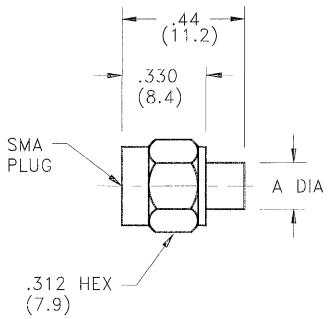


FIGURE 1

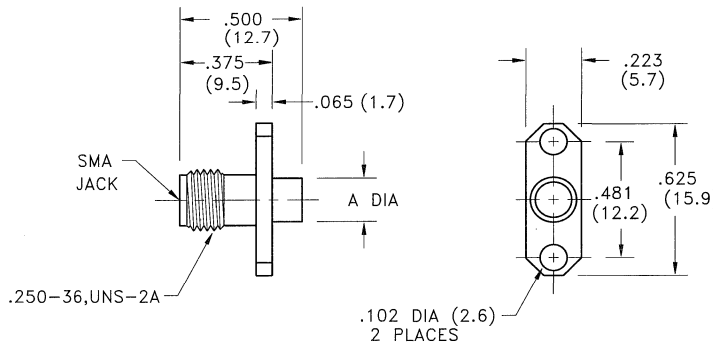


FIGURE 2

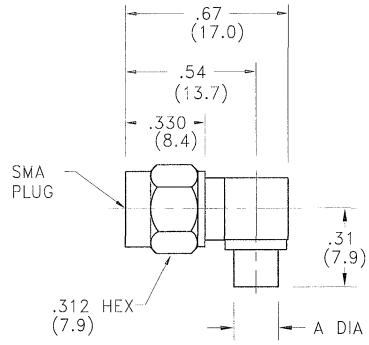


FIGURE 3

DESC PART NO.	MIDWEST PART NO	FIGURE	DIMENSION A Inches (mm)	ASSEMBLY PROCEDURE	CABLE TYPE	COMMERCIAL ALTERNATE
84149SSG	SMA-4141-79-002-02	1	.180 (4.6)	SMA-071	XIII	SMA-4141-89-000-02
84149SSG-1	SMA-0141-79-010-02	1	.180 (4.6)	SMA-071	XIII	SMA-4141-89-000-02
84149SSGA	SMA-4085-79-005-02	1	.120 (3.0)	SMA-071	XII	SMA-4085-89-000-02
84149SSGA-1	SMA-4085-79-002-02	1	.120 (3.0)	SMA-071	XII	SMA-4085-89-000-02
85022SSG	SMA-4141-82-003-00	2	.180 (4.6)	SMA-076	XIII	SMA-4141-82-000-00
85022SSGA	SMA-4085-82-004-00	2	.120 (3.0)	SMA-076	XII	SMA-4085-82-000-00
85037SSG	SMA-0141-80-005-02	3	.180 (4.6)	SMA-075	XIII	SMA-0141-80-000-02
85037SSGA	SMA-0085-80-004-02	3	.120 (3.0)	SMA-075	XII	SMA-0085-80-000-02

Notes:
1. * Defense Electronic Supply Center, Dayton, Ohio
2. See Appendix for description of connector interfaces .

NON-CAPTURED CENTER CONTACT

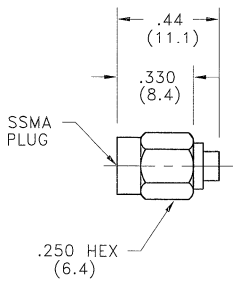


FIGURE 1

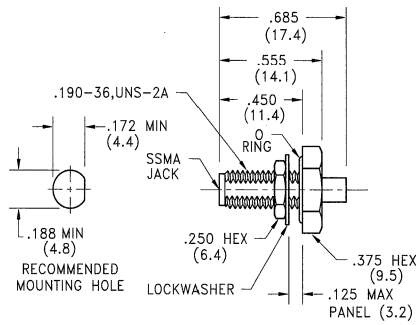


FIGURE 2

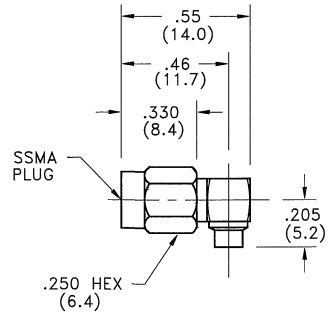


FIGURE 3

DESC PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CABLE TYPE	COMMERCIAL ALTERNATE
86116ZSG	SSM-0085-79-001-02	1	SSM-003	XII	SSM-0085-79-000-02
86117ZSG	SSM-0085-83-001-00	2	SSM-005	XII	SSM-0085-83-000-00
86118ZSG	SSM-0085-80-001-02	3	SSM-004	XII	SSM-0085-80-000-02

CAPTURED CENTER CONTACT

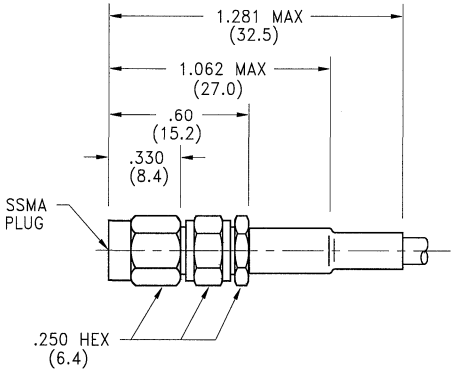


FIGURE 4

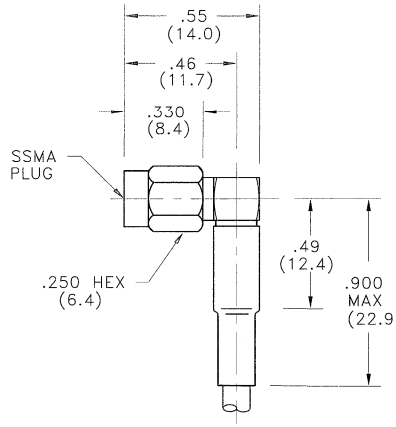


FIGURE 5

DESC PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CABLE TYPE	COMMERCIAL ALTERNATE
86119ZSG	SSM-3188-55-001-02	4	SSM-006	II, XIV	SSM-3188-55-000-02
86120ZSG	SSM-3188-56-001-02	5	SSM-007	II, XIV	SSM-3188-56-000-02

Notes:
1. * Defense Electronic Supply Center, Dayton, Ohio
2. See Appendix for description of connector interfaces .

SEMI-RIGID CABLE TYPES

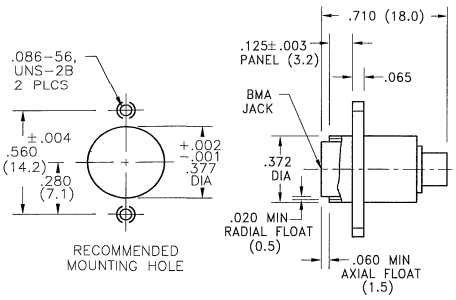


FIGURE 1

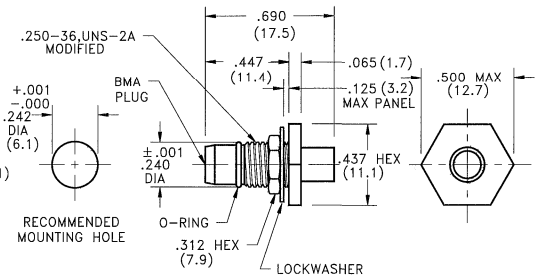


FIGURE 2

FLEXIBLE CABLE TYPES

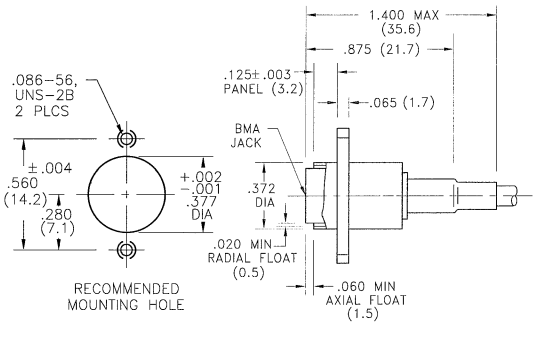


FIGURE 3

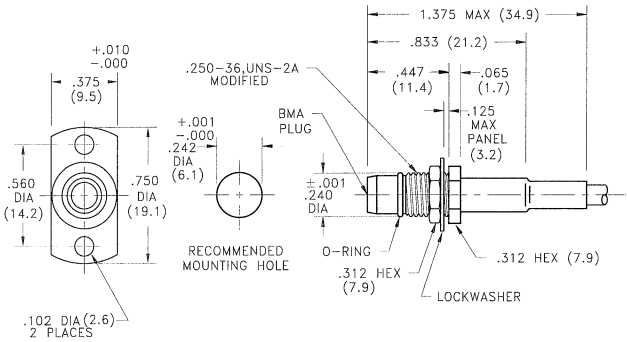


FIGURE 4

DESC PART NO.	MIDWEST PART NO.	FIGURE	ASSEMBLY PROCEDURE	CABLE TYPE	COMMERCIAL ALTERNATE
85071ZSGA	BMA-4141-82-001-02	1	BMA-003	XIII	BMA-4141-82-000-02
85071ZSGA-1	BMA-4141-82-002-00	1	BMA-003	XIII	BMA-4141-82-002-00
85071ZSGB	BMA-4085-82-001-02	1	BMA-003	XII	BMA-4085-82-000-02
85071ZSGB-1	BMA-4085-82-002-00	1	BMA-003	XII	BMA-4085-82-002-00
85072ZSGA	BMA-4141-86-001-02	2	BMA-004	XIII	BMA-4141-86-000-02
85072ZSGB	BMA-4085-86-001-02	2	BMA-004	XII	BMA-4085-86-000-02
85073ZSGA	BMA-3188-58-001-02	3	BMA-005	XIV, XVI	BMA-3188-58-000-02
85073ZSGA-1	BMA-3188-58-002-02	3	BMA-005	XIV, XVI	BMA-3188-58-000-02
85073ZSGB	BMA-3055-58-001-02	3	BMA-005	XVII	BMA-3055-58-000-02
85073ZSGB-1	BMA-3055-58-002-02	3	BMA-005	XVII	BMA-3055-58-000-02
85074ZSGA	BMA-3188-51-001-02	4	BMA-002	XIV, XV	BMA-3188-51-000-02
85074ZSGB	BMA-3055-51-001-02	4	BMA-002	XVII	BMA-3055-51-000-02

Notes:

1. Finish: Housing that is to be soldered to cable outer conductor is gold plated. Outer housing is passivated stainless steel. If gold plating is desired on entire connector, change part number suffix from -02 to -00. Center conductors are gold plated.
2. * Defense Electronic Supply Center, Dayton, Ohio
3. See Appendix for description of connector interfaces .

TNC to SMA ADAPTERS

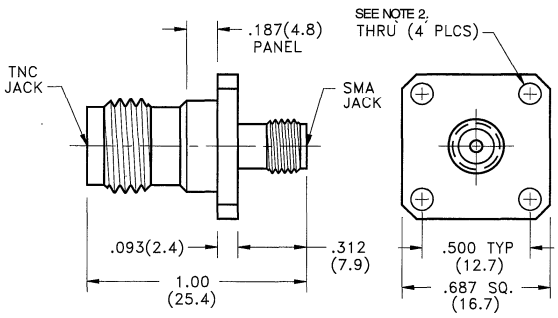


FIGURE 1

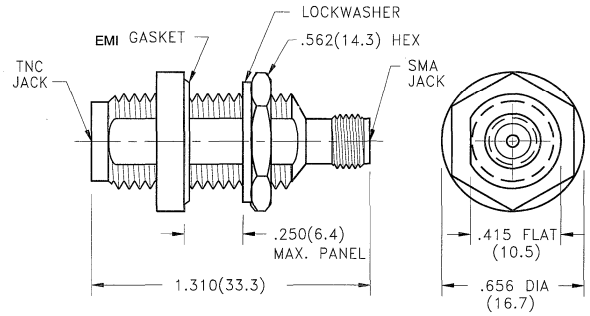


FIGURE 2

Type N to SMA ADAPTERS

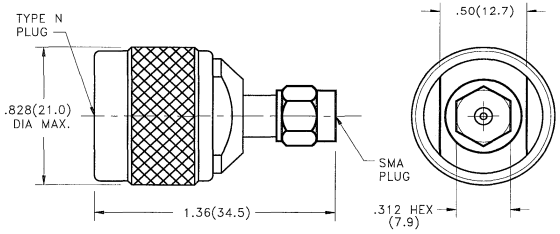


FIGURE 3

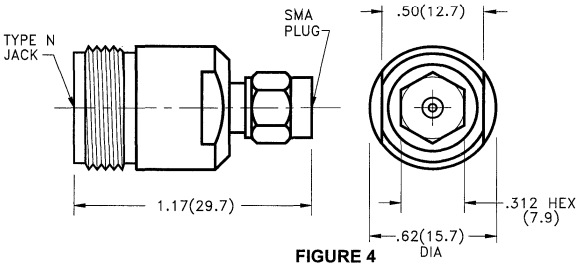


FIGURE 4

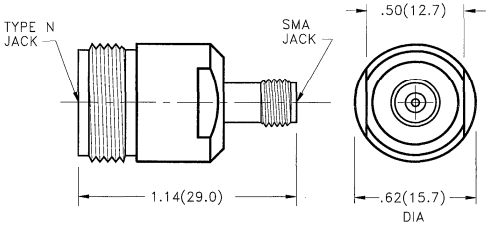


FIGURE 5

DESC PART NO.	MIDWEST PART NO	FIGURE	DESCRIPTION	COMMERCIAL ALTERNATE
8501814FP-1**	ADT-2699-FF-012-02	1	TNC Panel Female to SMA Female	ADT-2699-TF-SMF-02
8501814FP-2***	ADT-2699-FF-013-02	1	TNC Panel Female to SMA Female	ADT-2699-FF-013-02
8501814FP-3	ADT-2779-FF-001-02	2	TNC Blkhd Female to SMA Female	ADT-2779-TF-SMF-02
8604412SP-1	ADT-2580-MM-002-02	3	N Male to SMA Male	ADT-2580-NM-SMM-02
8604412SP-2	ADT-2682-FM-001-02	4	N Female to SMA Male	ADT-2682-NF-SMM-02
8604412SP-3	ADT-2683-FF-002-02	5	N Female to SMA Female	ADT-2683-NF-SMF-02

Notes:

1. Finish: Housing outer conductor is passivated stainless steel and center conductors are gold plated.
   If gold plating is desired on entire adapter, change part number suffix from -02 to -00.
2. ** .125 (3.2) Dia Thru Holes (4 Places) - *** #3-56 UNF Tapped Holes.
3. * Defense Electronic Supply Center, Dayton, Ohio
4. See Appendix for description of connector interfaces .

Type N to SMA ADAPTERS

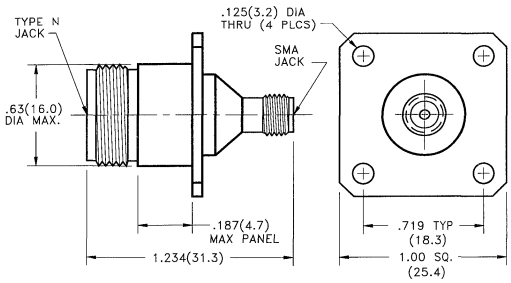


FIGURE 1

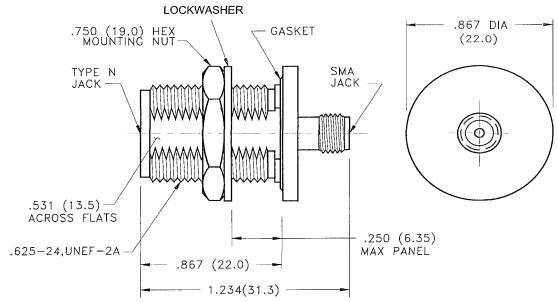


FIGURE 2

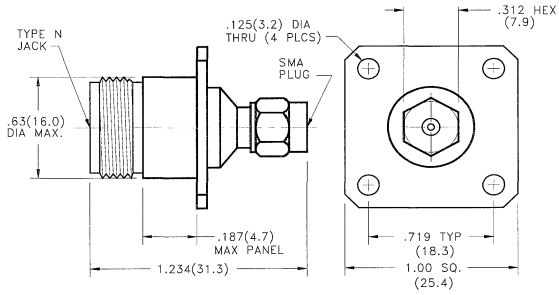


FIGURE 3

DESC PART NO.	MIDWEST PART NO	FIGURE	DESCRIPTION	COMMERCIAL ALTERNATE
8503812FP-3	ADT-2599-FF-005-02	2	N Blkhd Female to SMA Female	ADT-2840-NF-SMF-02
8503812FP-4**	ADT-2578-MF-007-02	3	N Panel Female to SMA Male	ADT-2578-NF-SMM-02
8503812FP-5***	ADT-2578-MF-008-02	3	N Panel Female to SMA Male	ADT-2578-MF-009-02
8503812SP-6**	ADT-2579-FF-010-02	1	N Panel Female to SMA Female	ADT-2579-NF-SMF-02
8503812SP-7***	ADT-2579-FF-011-02	1	N Panel Female to SMA Female	ADT-2682-NF-SMM-02

Notes:
1. Finish: Housing outer conductor is passivated stainless steel and center conductors are gold plated.
   If gold plating is desired on entire adapter, change part number suffix from -02 to -00.
2. ** .125 (3.2) Dia Thru Holes (4 Places) - *** #3-56 UNF Tapped Holes.
3. * Defense Electronic Supply Center, Dayton, Ohio
4. See Appendix for description of connector interfaces .

Definition of Categories

Category A **Flexible Cable**

Field serviceable, no special tools required to assemble. Standard wrenches, soldering equipment, pliers, etc. are not defined as special tools. Captured center contacts.

Category B **Flexible and Semi-Rigid Cable**

Non-field replaceable, special tools may be used for original installations. Field replacement is intended to be made by category A or C connectors. They will not be inventoried or procured by the U.S. Government. Captured and non-captured center contacts.

Category C **Flexible Cable**

Field replaceable. Requires crimp tool and specified cable stripping dimensions. Captured center contacts. Recommended crimp tool kit:
Midwest Microwave Part No. TLS-0030-98-000-54.

Category D **Flexible Cable**

Field replaceable. Requires crimp tool for center contact and outer ferrule; specified cable stripping dimensions, (same as category C), and defined piece parts. Captured center contact. Recommended crimp tool kit:
Midwest Microwave Part No. TLS-0030-98-000-54.

Category E **Semi-Rigid Cable**

Field replaceable. Requires specified cable stripping dimensions. Captured and non-captured center contacts. Uses standard assembly tool kit:
Midwest Microwave Part No. TLS-0001-98-000-54.

Category F **Semi-Rigid Cable**

Field replaceable. Requires crimp tool and specified cable stripping dimensions. Captured center contact.

Applicable Coaxial Cable

I.	RG 178/U	X.	RG 58/U, 303
II.	RG 174/U, 316	XI.	RG 142/U, 400
III.	RG 122/U	XII.	RG 405/U (.085 semi-rigid)
IV.	RG 58/U, 142, 223	XIII.	RG 402/U (.141 semi-rigid)
V.	RG 303/U	XIV.	RG 179/U
VI.	RG 58/U	XV.	RG 174/U, 187, 188, 316
VII.	RG 142/U	XVI.	RG 55/U, 187, 188, 316
VIII.	RG 223/U	XVII.	RG 55/U, 142, 223, 400
IX.	RG 142/U, 223		

Connector Assembly • Torque Wrenches
Interface Inspection Gauges

The Connector to Cable attachment integrity is crucial to the attainment of high performance and reliability of a microwave system. System performance can be enhanced and often assured through careful consideration of the assembly of the connectors to the cable. The interface dimensional integrity on the cable assemblies, as well as any of the other components in the system, and the mating torque applied when the components and the cable assemblies are connected together to complete the final assembly of the system are important factors effecting performance. It is most important that this process yield not only high quality, but repeatability.

Midwest offers convenient tool kits to facilitate the attatchment of connectors to coaxial cable by either a soldering, clamping, or crimping method. Tooling is supplied to assist in maintaining interface integrity as well as to hold the cable fast during assembly operations. Interface inspection guage kits are provided to allow quick and simple inspection of the coaxial interfaces (see Appendix for interface dimensions) of most of the popular connector types used in today's complex microwave systems both commercial or military. A tool kit for assembling or disassembling 7mm precision connectors is also available and an assortment of torque wrenches for the variety of connector coupling nut types and sizes. Also offered is a tool used to remove the low profile BMA panel mount connectors by compressing the retaining ring in the special counter-bored mounting hole that is used.

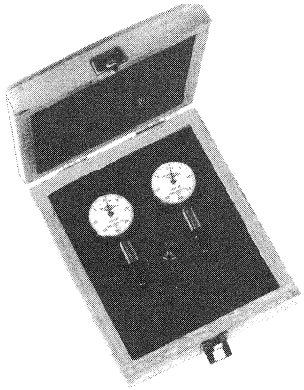


Table of Contents

Tool Kits for Connector Assembly

- **MIL-C-39012 Categories C and D**
- **MIL-C-22520/5-01 Hex Crimp Kit**

Midwest Microwave's Hex Crimp Tool Kit fulfills the needs of military specified applications where fast and efficient crimp attachment of a wide variety of flexible cable to the appropriate connector is required. The Kit contains the five most popular hex die sizes in two die sets to crimp the outer cable conductor (braid) of a flexible cable to the connector housing outer conductor. A simple instruction sheet is included with the kit to assist in proper die selection for the cable being used.

Kit Model No. : TLS-0030-98-000-54

Midwest P/N	TLS-0033-98-000-54 (No Military Part No.)			TLS-0034-98-000-54 (M22520/5-19)	
Hex Opening Designation	A	B	C	D (A)	E (B)
Hex Size	0.178	0.128	0.105	0.255	0.213
For Use with RG/U Cable	180B 195A 122	174 174A 179 187A 188A 316	178B 196A	54A 59 62A 71B 210 302 301	55B 58C 141A 142B 223 303 400

The Tool Kit contains all of the tools listed below, however any of the tools may be purchased separately for replacement purposes.

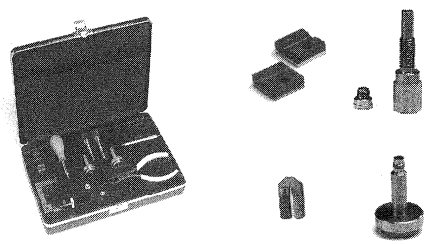
Description	Midwest Part No.
Assembly Procedure Manual	ASP-0100-98-000-54
Crimp Tool	TLS-0031-98-000-54
Die Change Tool	TLS-0032-98-000-54
Hex Die - A, B, C	TLS-0033-98-000-54
Hex Die - D, E	TLS-0034-98-000-54

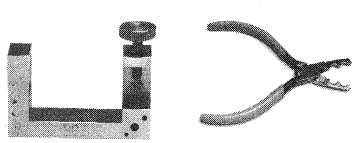
Category E
Assembly Kit for SMA Connectors
Kit Model No.: TLS-0001-98-000-54

NSN 5180-00-460-5262

The Assembly tool Kit provides all of the necessary tools to install SMA Connectors on to .085 inch and .141 inch diameter semi-rigid cable.
All of the tools that the kit contains are listed below.

Description	Midwest Part No.	National Stock No.
Assy Procedure Manual	ASP-0101-98-000-54	-------
Center Contact Holder	TLS-0016-98-000-54	5210-00-169-5779
Dielectric Insert Tool	TLS-0012-98-000-54	5120-00-132-6811
Dielectric Insert Tool	TLS-0013-98-000-54	5120-00-132-6810
Dielectric Recess Tool	TLS-0015-98-000-54	5120-00-132-6809
Fixture Sub-Assembly	TLS-0002-98-000-54	-------
Inserts - .085 (2)	TLS-0004-98-000-54	5120-00-132-6808
Inserts - .141 (2)	TLS-0003-98-000-54	5120-00-132-6807
Locator Tool	TLS-0005-98-000-54	5120-00-116-2913
Locator Tool	TLS-0006-98-000-54	5120-00-116-2914
Locator Tool	TLS-0007-98-000-54	--------
Locator Tool	TLS-0008-98-000-54	5120-00-169-5780
Retainer Ring Pliers	TLS-0014-98-000-54	5120-00-159-8850
Solder Gage - .010	TLS-0009-98-000-54	5120-00-126-3117
Solder Gage - .015	TLS-0010-98-000-54	5120-00-084-1227
Solder Gage - .018	TLS-0011-98-000-54	5120-00-084-1237





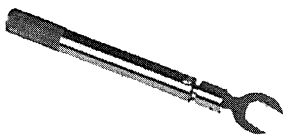
Torque Wrenches

Tool Kit for 7mm Connectors

Torque Wrenches for Production use

- **Interchangeable Wrench Heads**
- **Accurate Repeatability**
- **Pre-set Torque indicated by an audible "click"**
- **Dual Direction Wrench Movement**
- **Rugged Construction**

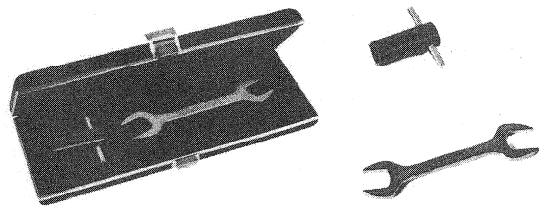
Midwest Microwave's Torque Wrenches are manufactured for production or laboratory use. They are extremely useful for accurate torque tightening of connector to connector interfaces on microwave components or for cable assembly installations in system integrations. The wrench heads are factory pre-set and are replaceable in all of the sizes offered.



Midwest Model No.	Hex Size Inches (mm)	Used For Connector Type	Preset Torque
TLS-0049-98-NNN-54	13/16 (20.6)	SC/Type N (Hex Type)	14 in. lbs.
TLS-0027-98-7MM-54	3/4 (19.1)	7mm	14 in. lbs.
TLS-0029-98-TNC-54	5/8 (15.9)	TNC (Hex Nut Type)	14 in. lbs.
TLS-0018-98-SMA-54	5/16 (7.9)	SMA	8 in. lbs.
TLS-0019-98-SSM-54	1/4 (6.4)	SSMA	8 in. lbs.

7mm Tool Kit

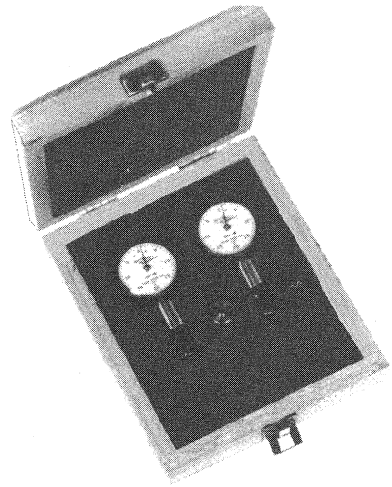
Midwest Microwave offers this simple Tool Kit for the convenient assembly and dis-assembly of 7mm Precision Connectors. It consists of a spanner wrench that fits the front sleeve of all standard 7mm Precision Connectors and an open ended wrench that fits the mounting end of the connector.



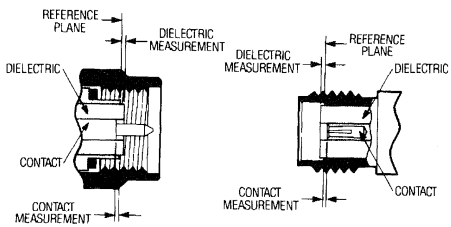
Midwest Model No.	Tool Description
TLS-0050-98-7MM-54	1/2 - 9/16 inch open end Wrench and Spanner Wrench

Interface Inspection Gauges
Removal Tool for BMA Connectors

Midwest Microwave offers these precision Interface Inspection Gauges for fast and efficient inspection of the popular coaxial connector interfaces. They are ruggedly constructed to withstand the production line environment and utilize fully jewled dial indicators. They are manufactured from corrosion resistant stainless steel and all critical measurement surfaces are precision ground and lapped to provide the maximum in accuracy and durability.



SMA Interface Example

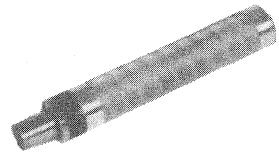


Male Plug Female Jack

Connector Type	Interface Type	Guage Kit Model No.	Gauges Included in Kit: Center Contact Gauge Model No.	Gauges Included in Kit: Dielectric Gauge Model No.
SMA Miniature	Female Jack	**TLS-0037-98-SMA-54**	TLS-0042-98-SMA-54	TLS-0043-98-SMA-54
	Male Plug	**TLS-0036-98-SMA-54**	TLS-0038-98-SMA-54	TLS-0040-98-SMA-54
SSMA Subminiature	Female Jack	**TLS-0052-98-SSM-54**	TLS-0052-98-SSM-54	TLS-0053-98-SSM-54
	Male Plug	**TLS-0055-98-SSM-54**	TLS-0055-98-SSM-54	TLS-0056-98-SSM-54
SMM Microminiature	Female Jack	**TLS-0058-98-SMM-54**	TLS-0058-98-SMM-54	TLS-0059-98-SMM-54
	Male Plug	**TLS-0061-98-SMM-54**	TLS-0061-98-SMM-54	TLS-0062-98-SMM-54
TNC/BNC	Female Jack	**TLS-0064-98-TNC-54**	TLS-0064-98-TNC-54	TLS-0065-98-TNC-54
	Male Plug	**TLS-0067-98-TNC-54**	TLS-0067-98-TNC-54	TLS-0068-98-TNC-54
Type N	Female Jack	**TLS-0070-98-NNN-54**	TLS-0070-98-NNN-54	TLS-0071-98-NNN-54
	Male Plug	**TLS-0073-98-NNN-54**	TLS-0073-98-NNN-54	TLS-0074-98-NNN-54

BMA Low Profile Panel Mount Removal Tool

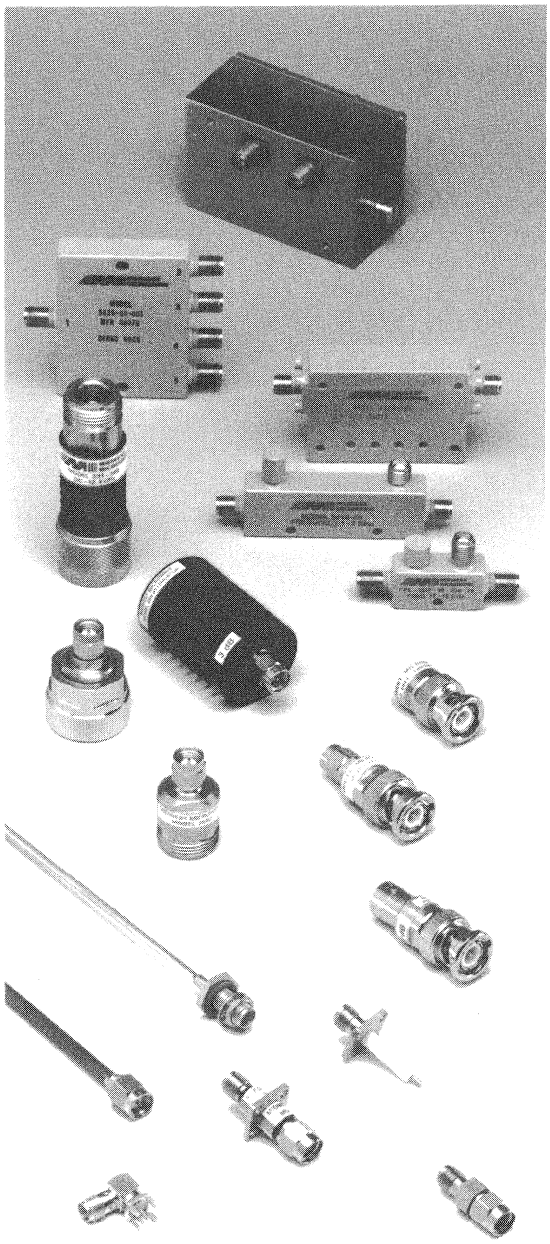
This sturdy convenient tool is used to remove BMA Low Profile Floating Rear Mount Panel Feedthru Connectors shown in the BMA Connector section of this catalog. The tool provides a simple convenient method of compressing the retaining ring that holds the connector secure in the recomended special counterbored hole in the panel.



Model Number
TLS-0075-98-BMA-54

Appendix

Coaxial Interface Dimensions
Model No. - Page No. Index

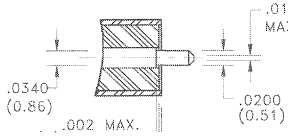


This Appendix is meant to provide the user with some of the necessary supplementary information they may require to allow them to make reasonable and timely decisions on choices of types of components, connectors, coaxial cable and cable assemblies in order to complete an up to date microwave system or subsystem. Should the user be unable to locate the information they require, please contact the factory and further information will be provided.

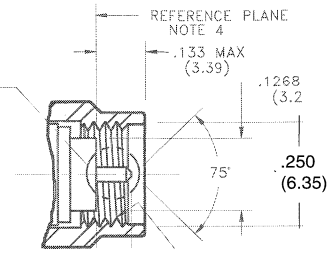
It should be noted that Midwest Microwave completely manufactures all of its products in-house at its own facilities and most of the products manufactured are 100 percent tested using state of the art microwave test equipment to assure the users that they can expect very high quality and reliable performance over an extensive time period. Electrical specifications are usually conservatively stated and even better performance is often obtained. Mechanical dimensional specifications are stated in inches with metric equivalents (to the nearest 0.01 mm) given for reference information only, and are based on 1" = 25.4 millimeters.

Table of Contents

SMA Interface Mating Dimensions



MALE PLUG DETAIL



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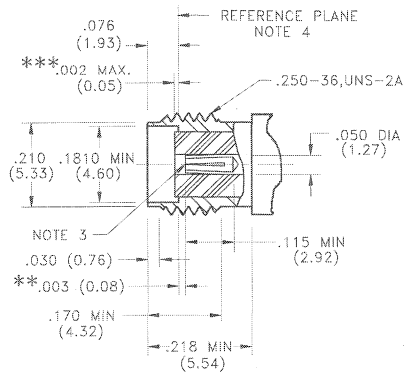
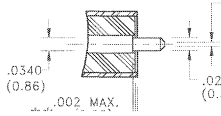
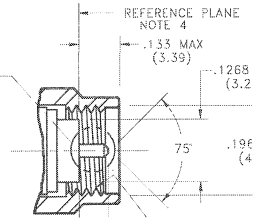


FEMALE JACK

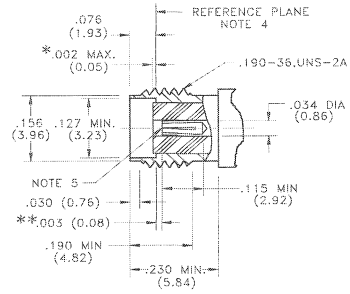
SSMA Interface Mating Dimensions



MALE PLUG DETAIL

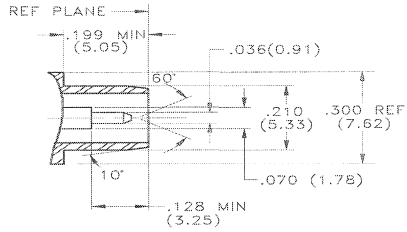


MALE PLUG

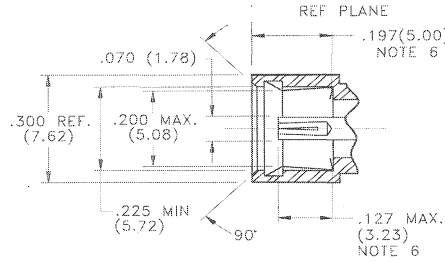


FEMALE JACK

BMA Interface Mating Dimensions



MALE PLUG



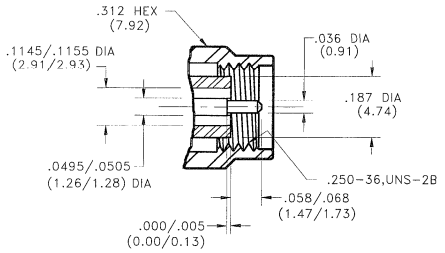
FEMALE JACK

* Dielectric Insulator Gap - measured from connector body reference plane .002 inches max. above to .010 inches max. below.
** Center Contact Gap - measured from connector body reference plane .000 inches min. (flush) to .010 max. below.
*** Dielectric Insulator Gap - measured from connector body reference plane .002 inches max. above to .005 inches max. below.

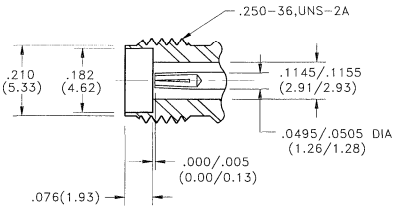
Notes:

1. Except where specified, all dimensions shown are nominal.
2. Metric equivalents (to the nearest 0.01 mm) are given for general information only and are based on 1 inch = 25.4 milimeters.
3. ID to meet VSWR, and contact resistance when mated with .0360 +.0010/-.0005 (0.914 +.0254/-.0127 mm) diameter pin.
4. When fully engaged, the two reference planes must coincide with metal to metal contact.
5. ID to meet VSWR, and contact resistance when mated with .0200 +.0008/-.0005 (0.508 +.0203/-.0127 mm) diameter pin.
6. Measured with outer contact spring bottomed as occurs in complete mating.

2.9 mm Precision Interface Mating Dimensions

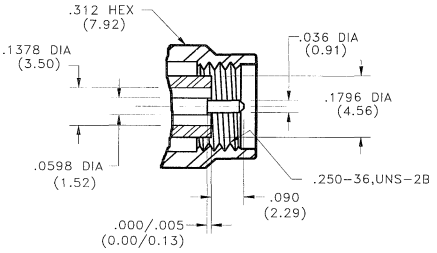


Male Plug

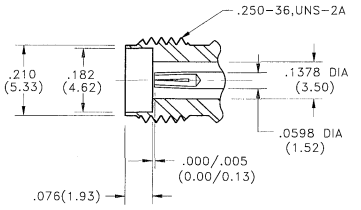


Female Jack

3.5 mm Precision Interface Mating Dimensions

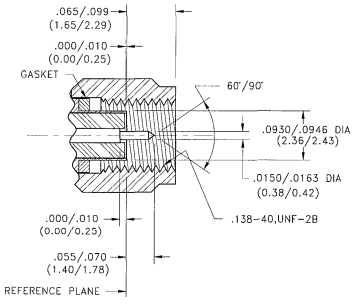


Male Plug

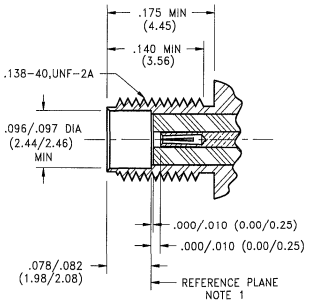


Female Jack

Type SMM Interface Mating Dimensions

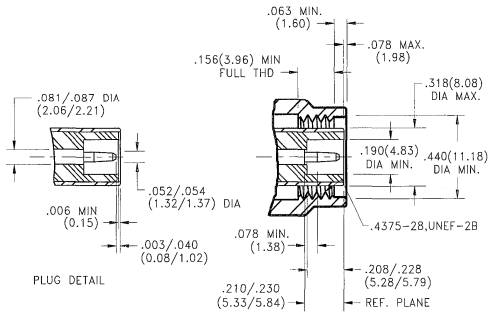


Male Plug

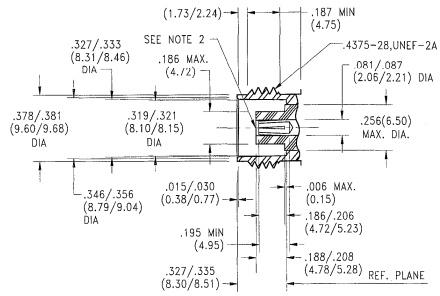


Female Jack

Type TNC Interface Mating Dimensions

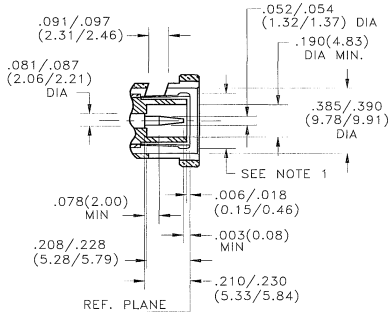


Male Plug

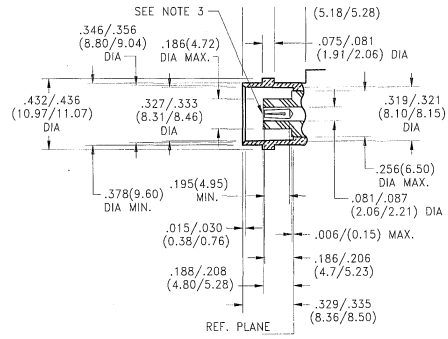


Female Jack

Type BNC Interface Mating Dimensions

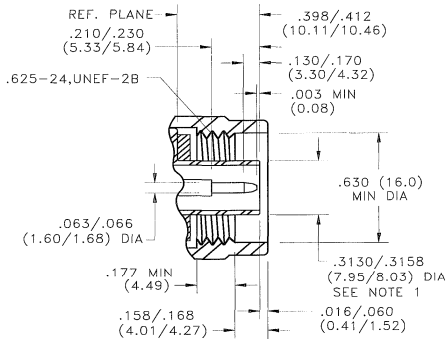


Male Plug

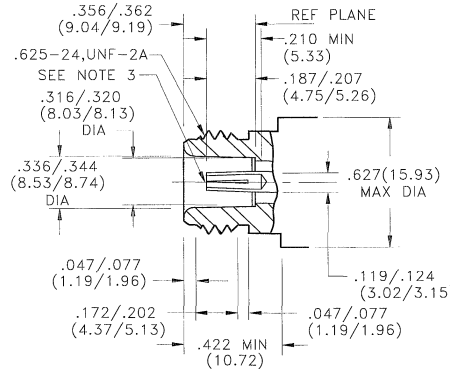


Female Jack

Type N Interface Mating Dimensions



Male Plug

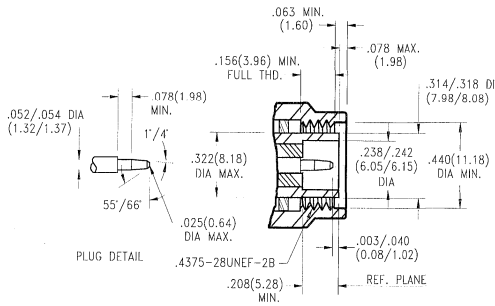


Female Jack

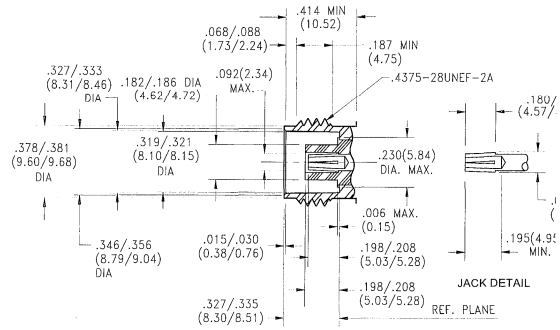
Notes:

1. DESC approved TNC and BNC Adapter Interface has Plug outer conductor slotted and flared to meet electrical and mechanical requirements.
2. I.D. to meet VSWR and contact resistance when mated with .052/.054 (1.32/1.37 mm) Diameter male pin.
3. I.D. to meet VSWR and contact resistance when mated with .063/.066 (1.60/1.68 mm) Diameter male pin.
4. Metric equivalents (to nearest 0.01 mm) are for general information only.

Type TNC-A Interface Mating Dimensions

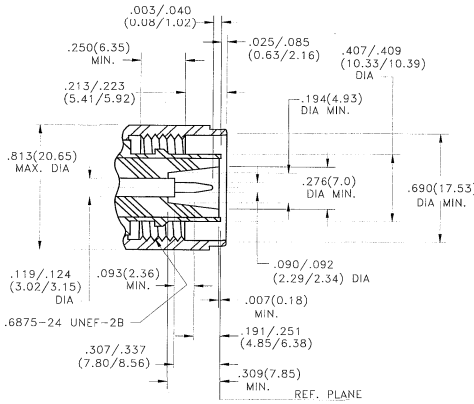


Male Plug

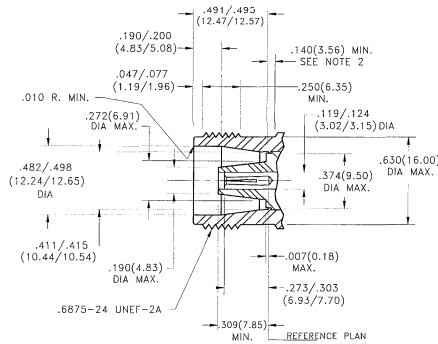


Female Jack

Type SC Interface Mating Dimensions

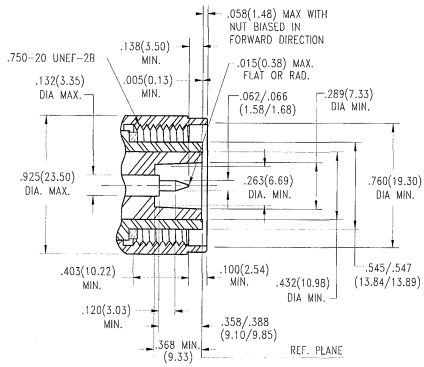


Male Plug

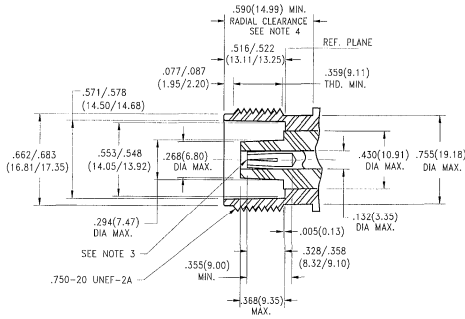


Female Jack

Type HN Interface Mating Dimensions



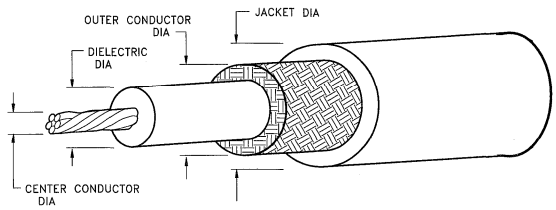
Male Plug



Female Jack

Appendix

Flexible Coaxial Cable Information



Cable Type	RG55/U	RG58/U	RG141/U	RG142/U	RG174/U	RG178/U	RG179/U	RG180/U	RG187/U	RG188/U	RG195/U	RG196/U	RG214/U	RG223/U	RG303/U	RG316/U
Impedance (Ohms)	53.5	50	50	50	50	50	75	95	75	50	95	50	50	50	50	50
Jacket Diameter	.216 max	.195 ± .004	.190 ± .005	.195 ± .005	.100 ± .005	.075 max	.100 ± .005	.145 max	.110 max	.110 max	.155 max	.080 max	.425 ± .007	.216 max	.170 ± .005	.102 max
Outer Conductor Dia.	.176 max	.150 max	.146 max	.171 max	.088 max	.054 max	.084 max	.124 max	.084 max	.081 max	.124 max	.054 max	.360 max	.176 max	.146 max	.081 max
Dielectric Diameter	.116 ± .005	.116 ± .004	.116 ± .005	.116 ± .005	.080 ± .003	.034 ± .002	.063 ± .003	.102 ± .003	.060 ± .003	.060 ± .003	.102 ± .003	.034 ± .002	.285 ± .003	.116 ± .004	.116 ± .005	.060 ± .003
Center Conductor Dia.	.032 nom	.0375 nom	.039 ± .001	.039 ± .001	.020 nom	.012 nom	.012 nom	.012 nom	.012 nom	.020 nom	.012 nom	.012 nom	.089 ± .001	.035 ± .001	.039 ± .001	.020 nom

RG/U Cable	Attenuation - dB per 100 ft at Frequency (GHz)							Power - Watts maximum at Frequency (GHz)						
Frequency	.1	.2	.4	1	3	5	10	.1	.2	.4	1	3	5	10
55	4.8	7.0	10.0	16.5	30.5	46.0	>100.0	480	320	215	120	60	40	-
58	4.6	6.9	10.5	17.5	37.5	60.0	>100.0	300	200	135	80	40	20	-
141	3.9	5.6	8.0	13.5	27.0	39.0	70.0	1,700	1,200	830	450	220	140	65
142	3.9	5.6	8.0	13.5	27.0	39.0	70.0	1,800	1,300	800	530	265	175	100
174	8.9	12.0	17.5	30.0	64.0	99.0	>100.0	110	80	60	35	15	10	-
178	14.0	19.0	28.0	46.0	85.0	>100.0	>100.0	240	180	120	75	40	-	-
179	10.0	12.5	16.0	24.0	44.0	65.0	>100.0	480	420	320	190	100	73	-
180	5.7	7.6	10.8	17.0	35.0	50.0	88.0	800	570	400	240	130	90	50
187	10.0	12.5	16.0	24.0	44.0	69.0	>100.0	480	420	320	190	100	73	-
188	11.4	14.2	16.7	31.0	60.0	82.0	>100.0	400	325	275	150	80	55	-
195	5.7	7.6	10.8	17.0	35.0	50.0	88.0	800	570	400	240	130	90	50
196	14.0	19.0	28.0	46.0	85.0	>100.0	>100.0	240	180	120	75	40	-	-
214	2.3	3.3	5.0	8.8	18.0	27.0	45.0	780	550	360	200	100	65	40
223	4.8	7.0	10.0	16.5	30.5	46.0	>100.0	480	320	215	120	60	40	-
303	3.9	5.6	8.0	13.5	27.0	39.0	70.0	1,800	1,300	900	530	265	175	100
316	11.4	14.2	16.7	31.0	60.0	82.0	>100.0	400	325	275	150	80	55	-

Note: See Cable Assembly Section for Midwest Microwave Low Loss flexible coaxial cable and other semi-rigid cables.

Appendix

VSWR vs Return Loss Table

VSWR	R. L. dB	VSWR	R.L. dB	VSWR	R.L. dB	VSWR	R.L. dB	VSWR	R.L. dB
1.001	66.025	1.060	30.714	1.138	23.803	1.480	14.264	5.400	3.255
1.002	60.009	1.061	30.575	1.140	23.686	1.490	14.120	5.600	3.136
1.003	56.491	1.062	30.438	1.142	23.571	1.500	13.979	5.800	3.025
1.004	53.997	1.063	30.303	1.144	23.457	1.520	13.708	6.000	2.923
1.005	52.063	1.064	30.171	1.146	23.346	1.540	13.449	6.200	2.827
1.006	50.484	1.065	30.040	1.148	23.235	1.560	13.201	6.400	2.737
1.007	49.149	1.066	29.912	1.150	23.127	1.580	12.964	6.600	2.653
1.008	47.993	1.067	29.785	1.152	23.020	1.600	12.736	6.800	2.573
1.009	46.975	1.068	29.661	1.154	22.914	1.620	12.518	7.000	2.499
1.010	46.064	1.069	29.538	1.156	22.810	1.640	12.308	7.200	2.428
1.011	45.240	1.070	29.417	1.158	22.708	1.660	12.107	7.400	2.362
1.012	44.489	1.071	29.298	1.160	22.607	1.680	11.913	7.600	2.299
1.013	43.798	1.072	29.181	1.162	22.507	1.700	11.725	7.800	2.239
1.014	43.159	1.073	29.066	1.164	22.408	1.720	11.545	8.000	2.183
1.015	42.564	1.074	28.952	1.166	22.311	1.740	11.370	8.200	2.129
1.016	42.007	1.075	28.839	1.168	22.215	1.760	11.202	8.400	2.078
1.017	41.485	1.076	28.728	1.170	22.120	1.780	11.039	8.600	2.029
1.018	40.993	1.077	28.619	1.172	22.027	1.800	10.881	8.800	1.983
1.019	40.528	1.078	28.511	1.174	21.934	1.820	10.729	9.000	1.938
1.020	40.086	1.079	28.405	1.176	21.843	1.840	10.581	9.200	1.896
1.021	39.667	1.080	28.299	1.178	21.753	1.860	10.437	9.400	1.855
1.022	39.867	1.081	28.196	1.180	21.664	1.880	10.298	9.600	1.816
1.023	38.885	1.082	28.093	1.182	21.576	1.900	10.163	9.800	1.779
1.024	38.520	1.083	27.992	1.184	21.489	1.920	10.032	10.000	1.743
1.025	38.170	1.084	27.892	1.186	21.403	1.940	9.904	11.000	1.584
1.026	37.833	1.085	27.794	1.188	21.318	1.960	9.780	12.000	1.451
1.027	37.510	1.086	27.696	1.190	21.234	1.980	9.660	13.000	1.339
1.028	37.198	1.087	27.600	1.192	21.151	2.000	9.542	14.000	1.243
1.029	36.898	1.088	27.505	1.194	21.069	2.100	8.999	15.000	1.160
1.030	36.607	1.089	27.411	1.196	20.988	2.200	8.519	16.000	1.087
1.031	36.327	1.090	27.318	1.198	20.907	2.300	8.091	17.000	1.023
1.032	36.055	1.091	27.226	1.200	20.828	2.400	7.707	18.000	0.966
1.033	35.792	1.092	27.135	1.210	20.443	2.500	7.360	19.000	0.915
1.034	35.537	1.093	27.046	1.220	20.079	2.600	7.044	20.000	0.869
1.035	35.290	1.094	26.957	1.230	19.732	2.700	6.755	22.000	0.790
1.036	35.049	1.095	26.869	1.240	19.401	2.800	6.490	24.000	0.724
1.037	34.816	1.096	26.782	1.250	19.085	2.900	6.246	26.000	0.668
1.038	34.588	1.097	26.697	1.260	18.783	3.000	6.021	28.000	0.621
1.039	34.367	1.098	26.612	1.270	18.493	3.100	5.811	30.000	0.579
1.040	34.151	1.099	26.528	1.280	18.216	3.200	5.617	32.000	0.543
1.041	33.941	1.100	26.444	1.290	17.949	3.300	5.435	34.000	0.511
1.042	33.763	1.102	26.281	1.300	17.692	3.400	5.265	36.000	0.483
1.043	33.536	1.104	26.120	1.310	17.445	3.500	5.105	38.000	0.457
1.044	33.341	1.106	25.963	1.320	17.207	3.600	4.956	40.000	0.434
1.045	33.150	1.108	25.809	1.330	16.977	3.700	4.815	42.000	0.414
1.046	32.963	1.110	25.658	1.340	16.755	3.800	4.682	44.000	0.395
1.047	32.780	1.112	25.510	1.350	16.540	3.900	4.556	46.000	0.378
1.048	32.602	1.114	25.364	1.360	16.332	4.000	4.437	48.000	0.362
1.049	32.427	1.116	25.221	1.370	16.131	4.100	4.324	50.000	0.347
1.050	32.256	1.118	25.081	1.380	15.936	4.200	4.217	55.000	0.316
1.051	32.088	1.120	24.943	1.390	15.747	4.300	4.115	60.000	0.290
1.052	31.923	1.122	24.808	1.400	15.563	4.400	4.018	65.000	0.267
1.053	31.762	1.124	24.675	1.410	15.385	4.500	3.926	70.000	0.248
1.054	31.604	1.126	24.544	1.420	15.211	4.600	3.838	75.000	0.232
1.055	31.449	1.128	24.415	1.430	15.043	4.700	3.753	80.000	0.217
1.056	31.297	1.130	24.289	1.440	14.879	4.800	3.673	85.000	0.204
1.057	31.147	1.132	24.164	1.450	14.719	4.900	3.596	90.000	0.193
1.058	31.000	1.134	24.042	1.460	14.564	5.000	3.522	95.000	0.183
1.059	30.856	1.136	23.921	1.470	14.412	5.200	3.383	100.000	0.174

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MIDWEST MICROWAVE PRODUCTS

MICROWAVE COAXIAL COMPONENTS

- Attenuators - Fixed Coaxial - MIL-A-3933 - QPL
- Attenuators - Stepped - Mechanical and Digital
- Attenuators - Continuously Variable
- Couplers and Hybrid Couplers
- D.C Blocks
- Gain Equalizers - Fixed and Tunable
- Optomizers and Iso-Optomizers
- Phase Shifters - Harmonic and Line Extension
- Power Dividers - n Way
- Terminations - Shorts - Opens - Coaxial
- Multi-Function Microwave Assemblies

MICROWAVE COAXIAL ADAPTERS

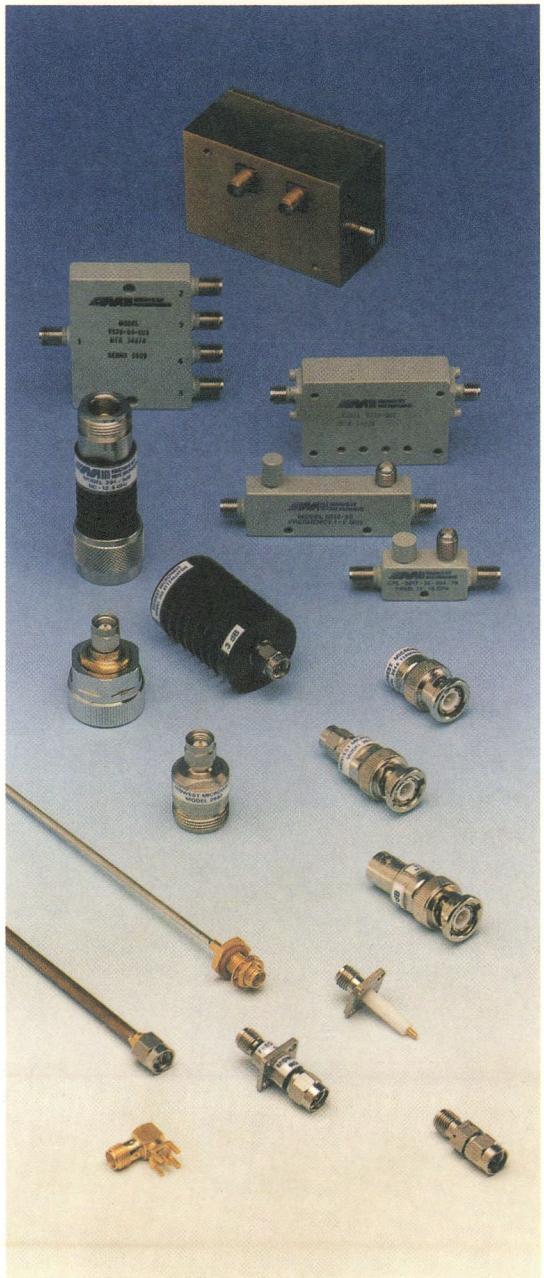
- Between Series - Coaxial
- In - Series - Coaxial
- Waveguide to Coaxial
- 7mm, 3.5mm
- MIL-A-55339 Approved

MICROWAVE COAXIAL CONNECTORS

- SMA Miniature - MIL-C-39012 QPL Approved
- SSMA Subminiature
- SMM Microminiature
- BMA - Blind Mate
- 7mm Precision
- 3.5 mm Precision
- Type N
- TNC
- BNC
- SC
- Tool Kits for Connector to Cable Assembly

MICROWAVE CABLE ASSEMBLIES

- Low Loss Flexible Cable Assemblies
- Semi-Rigid Cable Assemblies
- Phase Stable and Phase Matched
- Ruggedized or Armoured for abraison protection



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