



High Performance, Broadband Network Analysis Solutions

ME7838A4 4-Port Broadband Vector Network Analyzers

4-Port Broadband VNA System 70 kHz to 110 (125) GHz

The VectorStar ME7838A4 system incorporates the Anritsu millimeter-wave module utilizing Non Linear Transmission Line (NLTL) technology with single sweep 4-port coverage from 70 kHz to 110 GHz and provides:

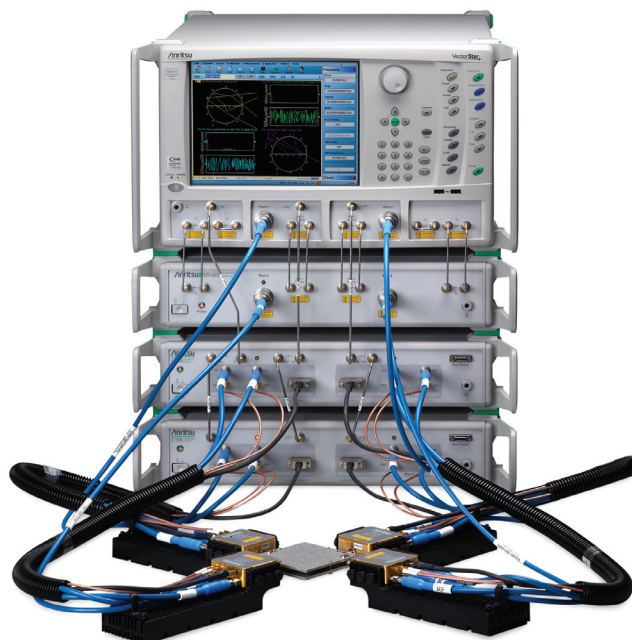
- Industry-best broadband frequency coverage – starts at 70 kHz instead of 10 MHz and is operational from 40 kHz to 125 GHz.
- Industry-best calibration and measurement stability – 0.1 dB vs 0.6 dB over 24 hrs.
- Industry-best compact, lightweight mmWave modules for easy, precise, and economical positioning on the wafer probe station – 0.6 vs 7.6 lb and 1/50 the volume.
- Thin film multipliers, receivers, and couplers at the test port, offering best raw directivity and providing excellent calibration and measurement stability.
- The industry's only available mmWave real time electronic power leveling – eliminates time-lagging software correction tables.
- Compatibility with all major probe stations.
- Kelvin bias tees for sense and force capabilities closely positioned to the DUT.
- Can be upgraded to a 4-port 145 GHz version with an exchange of modules.

4-Port Millimeter Waveguide VNA System 50 GHz to 1.1 THz

The ME7838A4 4-port millimeter-wave configuration provides waveguide output from 50 GHz to 1.1 THz in waveguide bands. The system can extend the broadband system or be configured to operate only as a waveguide system.

Broadband/Millimeter-Wave System Options

- MS4640B-002, Time Domain
- MS464xB-031, Dual Source Architecture
- MS4640B-041, Noise Figure
- MS4640B-043, DifferentialView™
- MS464xB-061, Active Measurement Suite, with 2 Attenuators
- MS464xB-062, Active Measurement Suite, with 4 Attenuators
- SC8215 and SC7287 Kelvin Bias Tees



VectorStar ME7838A4 4-Port Broadband System

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1. Definitions

All specifications and characteristics apply under the following conditions, unless otherwise stated:	
Warm-Up Time	After 90 minutes of warm-up time, where the instrument is left in the ON state.
Temperature Range	Over the 25 °C ± 5 °C temperature range.
Error-Corrected Specifications	For error-corrected specifications, over 23 °C ± 3 °C, with < 1 °C variation from calibration temperature. For error-corrected specifications are warranted and include guard bands, unless otherwise stated.
Typical Performance	"Typical" specifications describe expected, but not warranted, performance based on sample testing. Typical performance indicates the measured performance of an average unit and do not guarantee the performance of any individual product. "Typical" specifications do not account for measurement uncertainty and are shown in parenthesis, such as (-102 dB), or noted as Typical.
User Cables	Specifications do not include effects of any user cables attached to the instrument.
Discrete Spurious Responses	Specifications may exclude discrete spurious responses.
Internal Reference Signal	All specifications apply with internal 10 MHz Crystal Oscillator Reference Signal.
Characteristic Performance	Characteristic performance indicates a performance designed-in and verified during the design phase. It does include guard-bands and is not covered by the product warranty.
Below 300 kHz	All uncertainties below 300 kHz are typical.
Recommended Calibration Cycle	12 months
Interpolation Mode	All specifications are with Interpolation Mode Off.
Specifications Subject to Change	All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site at www.anritsu.com .

2. 4-Port Broadband Characteristics

2.1 ME7838A4 4-Port Broadband System Configuration

ME7838A4 4-Port Broadband Hardware Configuration

The ME7838A4 4-port broadband VNA system provides single sweep coverage from 70 kHz to 110 GHz and is operational from 40 kHz to 125 GHz. It consists of the following items:

Broadband VNA	ME7838A4 Broadband VNA System with Option MS464xB-051
4-Port Test Set	MN4697C 2U 4-Port Test Set
mm-Wave Modules	3743A Millimeter-Wave Modules, 4 each (two incremental to the modules in the ME7838A)
Broadband Test Set	3739C Broadband Test Set with Cables
Test Set	3736B Broadband Test Set with Cables

ME7838A4 4-Port Broadband System Major Options

The major ME7838A4 4-port broadband VNA system options are:

Option 002	MS4640B-002, Time Domain
Option 031	MS464xB-031, Dual Source Architecture
Option 041	MS4640B-041, Noise Figure
Option 043	MS4640B-043, DifferentialView
Option 051	MS464xB-051, External VNA Direct Access Loops
Option 061	MS464xB-061, Active Measurement Suite, with 2 Attenuators
Option 062	MS464xB-062, Active Measurement Suite, with 4 Attenuators
Bias Tees	SC8215 and SC7287 Kelvin Bias Tees

2.2 System and Receiver Dynamic Range, Noise Floor (Excludes localized spurious responses and crosstalk)

System Dynamic Range	System dynamic range is measured as the difference between maximum port power and the RMS noise floor in a 10 Hz bandwidth and no averaging (ports terminated).
Noise Floor	Noise floor is calculated as the difference between maximum rated port power and system dynamic range.
Receiver Dynamic Range	Receiver Dynamic Range is calculated as the difference between the receiver compression level and the noise floor at the appropriate port.
Normalizing Measurement	Normalizing measurement made with a through line connection, with its effects compensated for. The cables between the VNA and the 3743A modules are assumed to be the 806-206 1.85 mm cable (61 cm, 24 in long) or the 806-209 1.85 mm cable (91 cm, 36 in long). All figures are typical.

Frequency Range	System Dynamic Range (dB) ^{a,c}		Receiver Dynamic Range (dB) ^a		Noise Floor (dBm) ^a	
	ME7838A4 Option 051	ME7838A4 Option 031/051	ME7838A4 Option 051	ME7838A4 Option 062	ME7838A4 Option 051	ME7838A4 Option 062
70 kHz to 300 kHz	76	78	78	79	-72	-73
> 0.3 to 2 MHz	86	88	94	94	-82	-81
> 2 to 10 MHz	100	102	106	105	-94	-92
> 0.01 to 2.5 GHz	111	115	115	115	-103	-101
> 2.5 to 24 GHz	96	97	114	114	-102	-100
> 24 to 54 GHz	90	91	114	113	-104	-103
> 54 to 60 GHz	108	108	122	122	-112	-112
> 60 to 67 GHz	108	108	117	117	-107	-107
> 67 to 80 GHz	108	108	120	120	-110	-110
> 80 to 85 GHz	107	107	123	123	-113	-113
> 85 to 90 GHz	105	105	121	121	-111	-111
> 90 to 95 GHz	109	109	121	121	-111	-111
> 95 to 105 GHz	105	105	117	117	-107	-107
> 105 to 110 GHz	109	109	122	122	-112	-112
> 110 to 120 GHz ^b	107	107	115	115	-110	-110
> 120 to 125 GHz ^b	104	104	112	112	-107	-107

a. Excludes localized spurious responses and crosstalk.

b. 110 to 125 GHz frequency range is available as operational.

c. Table represents dynamic range with Ports 1 and/or 3 driving. With Port 2 driving, dynamic range may be up to 4 dB lower in the 24-54 GHz band. With Port 4 driving, dynamic range may be up to 3 dB higher in the 24-54 GHz band.

2.3 Test Port Power

Port power control is provided by the base VNA for frequencies below 54 GHz, and by the 3743A mm-Wave module for frequencies greater than 54 GHz. Port Power and Power Range tables represent powers available at Ports 1 and 3. Max Power may be up to 4 dB lower on Port 2 in the 24-54 GHz band (only for option 031 systems). Max Power may be up to 3 dB higher on Port 4 in the 24-54 GHz band. Receiver compression point is defined as the port power level beyond which the response may be compressed more than 0.2 dB relative to normalization level. 10 Hz IF bandwidth used to remove trace noise effects. All typical.

Frequency Range	Port Power		Port Power W/MS4647B Opt 31 Dual Source Architecture	
	Max Power ME7838A4 Option 051	Max Power ME7838A4 Option 062	Max Power ME7838A4 Option 031/051	Max Power ME7838A4 Option 031/062
70 kHz to 300 kHz	4	6	6	8
> 0.3 to 2 MHz	4	6	6	8
> 2 to 10 MHz	6	6	8	8
> 0.01 to 2.5 GHz	8	6	12	10
> 2.5 to 24 GHz	-6	-8	-5	-7
> 24 to 54 GHz	-14	-16	-13	-15
> 54 to 60 GHz	-4	-4	-4	-4
> 60 to 67 GHz	1	1	1	1
> 67 to 80 GHz	-2	-2	-2	-2
> 80 to 85 GHz	-6	-6	-6	-6
> 85 to 90 GHz	-6	-6	-6	-6
> 90 to 95 GHz	-2	-2	-2	-2
> 95 to 105 GHz	-2	-2	-2	-2
> 105 to 110 GHz	-3	-3	-3	-3
> 110 to 120 GHz ^a	-3	-3	-3	-3
> 120 to 125 GHz ^a	-3	-3	-3	-3

a. 110 GHz to 125 GHz frequency range is available as operational.

Power Range, Accuracy, Linearity, and Resolution

Accuracy is defined at -10 dBm or max rated power, whichever is lower. Linearity is defined as the incremental error between the accuracy test power level and 5 dB below. Typical.

Frequency	Range (dB)		Accuracy (dB)	Linearity (dB)	Resolution (dB)
	ME7838A4 Option 051	ME7838A4 Option 062			
70 kHz to 300 kHz	4 to -25	6 to -85	±1.5	±1.5	0.01
> 0.3 to 2 MHz	4 to -25	6 to -85	±1.5	±1.5	0.01
> 2 to 10 MHz	6 to -25	6 to -85	±1.5	±1.5	0.01
> 0.01 to 2.5 GHz	8 to -25	6 to -85	±1.0	±1.0	0.01
> 2.5 to 24 GHz	-6 to -25	-8 to -85	±1.0	±1.0	0.01
> 24 to 54 GHz	-14 to -30	-16 to -90	±1.5	±1.0	0.01
> 54 to 60 GHz	-4 to -55	-4 to -55	±2.0	±1.5	0.01
> 60 to 67 GHz	1 to -55	1 to -55	±2.0	±1.5	0.01
> 67 to 80 GHz	-2 to -55	-2 to -55	±2.0	±1.5	0.01
> 80 to 85 GHz	-6 to -55	-6 to -55	±2.0	±1.5	0.01
> 85 to 90 GHz	-6 to -55	-6 to -55	±2.0	±1.5	0.01
> 90 to 95 GHz	-2 to -55	-2 to -55	±2.0	±1.5	0.01
> 95 to 105 GHz	-2 to -55	-2 to -55	±3.0	±2.0	0.01
> 105 to 110 GHz	-3 to -55	-3 to -55	±3.0	±2.0	0.01
> 110 to 120 GHz ^a	-3 to -40	-3 to -40	±4.0	±3.0	0.01
> 120 to 125 GHz ^a	-3 to -40	-3 to -40	±4.0	±3.0	0.01

a. 110 to 125 GHz frequency range is available as operational.

2.4 Receiver Compression^a

Receiver compression point is defined as the port power level beyond which the response may be compressed more than 0.2 dB relative to normalization level. 10 Hz IF bandwidth used to remove trace noise effects. All typical.

Frequency Range	Compression ME7838A4 Option 051	Compression ME7838A4 Option 062
70 kHz to 300 kHz	6	6
> 0.3 to 10 MHz	12	13
> 0.01 to 24 GHz	12	14
> 24 to 110 GHz ^a	10	10
> 110 to 125 GHz ^b	5	5

a. Using the 806–206 1.85 mm (61 cm, 24 in long) test port cables or the 806–209 1.85 mm (91 cm, 36 in long) test port cables between the VNA and the 3743A mm-Wave modules.

b. 110 GHz to 125 GHz frequency range is available as operational.

2.5 High Level Noise

Noise measured at 1 kHz IF bandwidth, at maximum power or compression limit (whichever is less), with through transmission. RMS. Typical.

Frequency (GHz)	Magnitude (dB)	Phase (deg)
70 kHz to 500 kHz	< 0.04	< 0.4
> 0.5 to 2 MHz	< 0.006	< 0.06
> 2 to 10 MHz	< 0.006	< 0.06
> 0.01 to 24	< 0.006	< 0.06
> 24 to 54	< 0.005	< 0.06
> 54 to 80	< 0.005	< 0.06
> 80 to 110	< 0.008	< 0.09
> 110 to 120 ^a	< 0.010	< 0.20
> 120 to 125 ^a	< 0.025	< 0.30

a. 110 to 125 GHz frequency range is available as operational.

2.6 Stability

Ratioed measurement at maximum leveled power with nominally a full reflect or a stable thru over the normal specified temperature range. Typical.

Frequency (GHz)	Magnitude (dB/°C)	Phase (deg/°C)
70 kHz to 300 kHz	< 0.04	< 0.4
> 0.3 to 2 MHz	< 0.04	< 0.4
> 2 to 10 MHz	< 0.04	< 0.4
> 0.01 to 24	< 0.04	< 0.4
> 24 to 54	< 0.03	< 0.4
> 54 to 80	< 0.03	< 0.4
> 80 to 110	< 0.03	< 0.5
> 110 to 120 ^a	< 0.06	< 1.0
> 120 to 125 ^a	< 0.1	< 1.0

a. 110 to 125 GHz frequency range is available as operational.

2.7 Frequency Resolution, Accuracy, and Stability

Resolution	Accuracy	Stability
1 Hz	$\pm 5 \times 10^{-7}$ Hz/Hz (at time of calibration)	$< 5 \times 10^{-9}$ /°C over 0 °C to 50 °C temperature < 1×10^{-9} /day aging, instrument on

2.8 Uncorrected (Raw) Port Characteristics

Typical performance

Frequency (GHz)	Directivity (dB)	Port Match (dB)
70 kHz to 0.01 MHz	10 ^a	8
> 0.01 to 2.5	9 ^a	10
> 2.5 to 30	5 ^a	12
> 30 to 40	5 ^a	5
> 40 to 54	10	5
> 54 to 80	10	10
> 80 to 110	5	7
> 110 to 120 ^b	5	7
> 120 to 125 ^b	5	7

a. Raw directivity is degraded below 300 kHz, 2.2 to 2.5 GHz and in narrow bands within 10 to 34 GHz.

b. 110 to 125 GHz frequency range is available as operational.

2.9 Corrected System Performance and Uncertainties – SOLT/SSST

With 12-term concatenated SOLT and Triple Offset Short Calibration (SSST), using the 3656B W1 Calibration Kit. Typical.

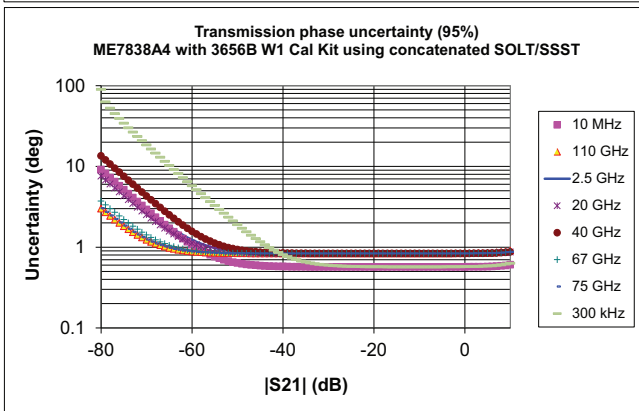
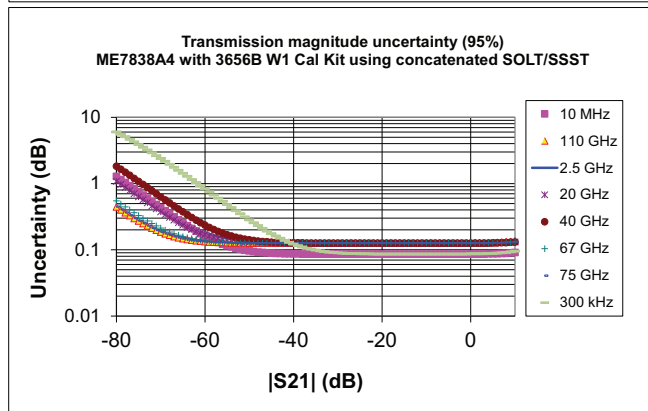
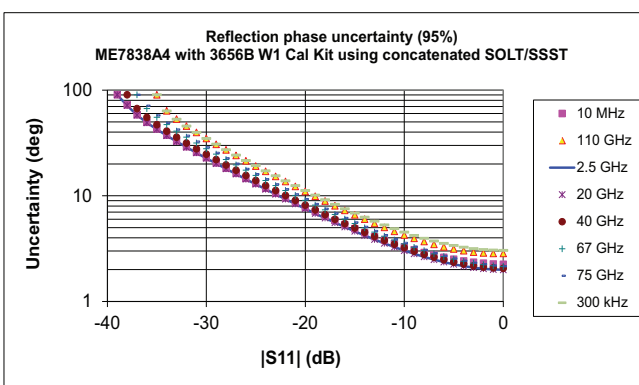
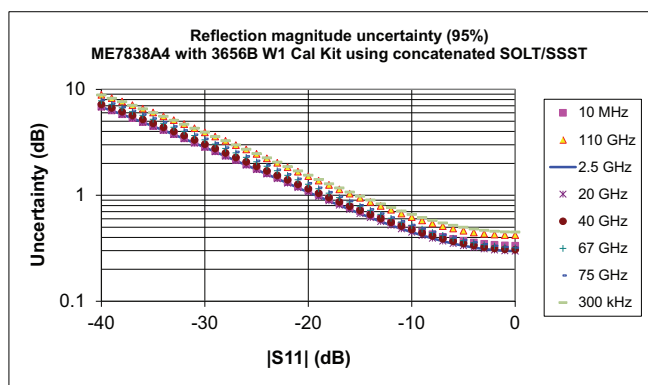
Frequency (GHz)	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
70 kHz to 10 MHz	36	36	36	± 0.1	± 0.1
> 0.01 to 2.5	40	41	40	± 0.05	± 0.03
> 2.5 to 20	40	41	40	± 0.05	± 0.05
> 20 to 67	38	41	38	± 0.05	± 0.07
> 67 to 95	37	42	37	± 0.05	± 0.07
> 95 to 110	35	35	35	± 0.05	± 0.07

Measurement Uncertainties – SOLT/SSST

The graphs give measurement uncertainties after the above calibration. The errors are worst case contribution of residual directivity, load and source match, frequency response and isolation, network analyzer dynamic accuracy, and connector repeatability while noise effects are added on an RSS basis. 10 Hz IF Bandwidth is used. For transmission uncertainties, it is assumed that $S_{11} = S_{22} = 0$. For reflection uncertainties, it is assumed that $S_{21} = S_{12} = 0$. For other conditions, please use our free Exact Uncertainty calculator software, downloadable from the Anritsu web site at, www.anritsu.com.

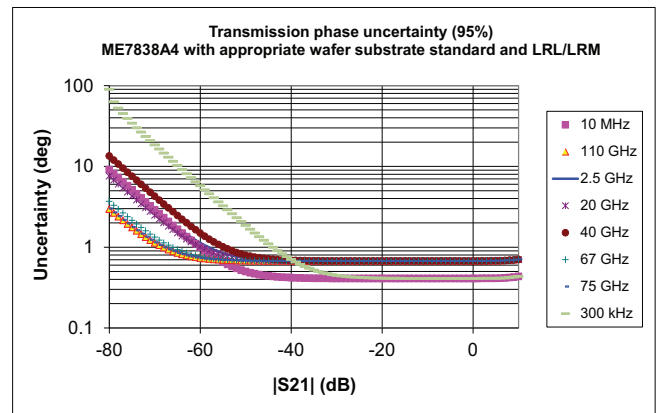
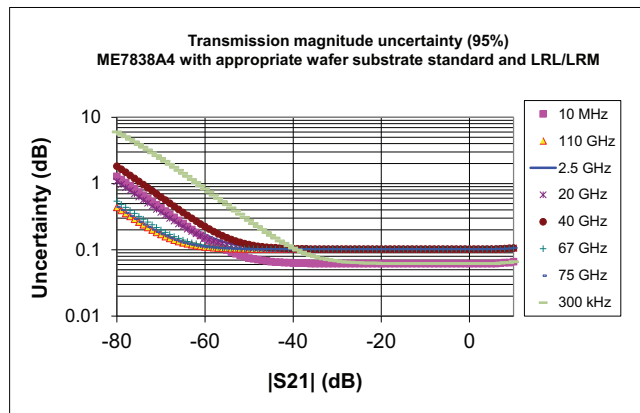
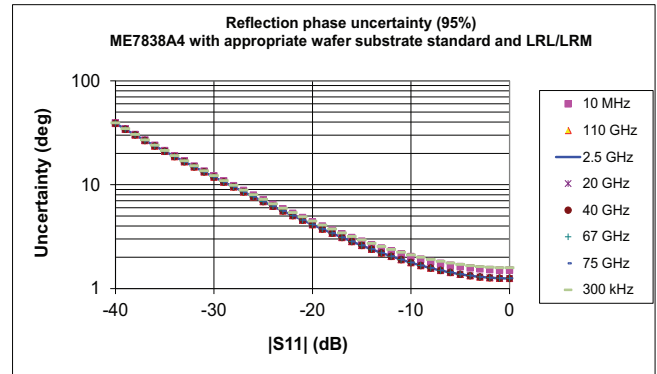
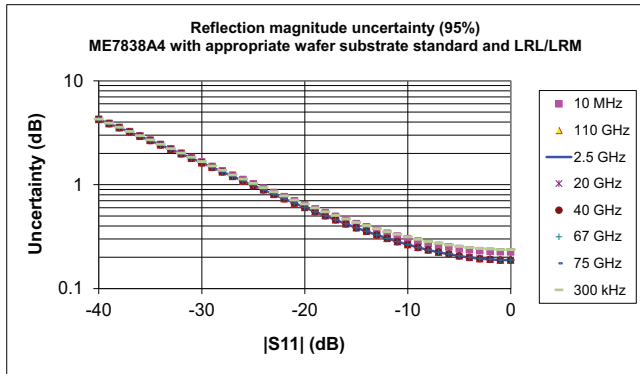
Note

Although the graph axes show specific S-parameters, they apply to all transmission or reflection parameters, as appropriate.

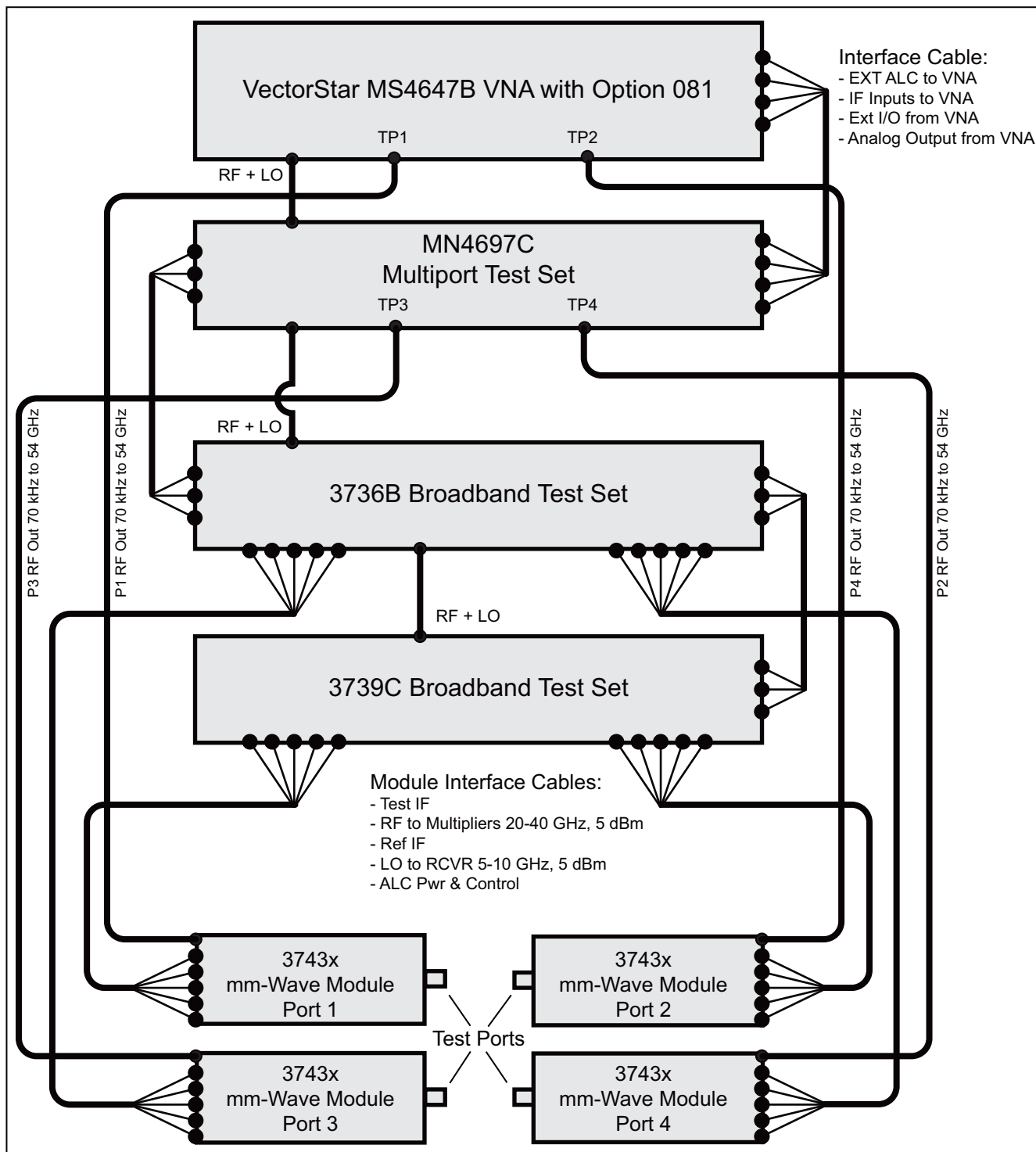


2.10 Corrected System Performance and Uncertainties – LRL/LRM

With 12 term LRL/LRM calibration using single-ended probes and on-wafer substrate standards. Typical. Based on a typical vendor supplied impedance standard substrate.



2.11 Block Diagram – ME7838A4 4-Port Broadband VNA System



ME7838A4 4-Port Broadband (70 kHz to 110 GHz) Configuration Block Diagram

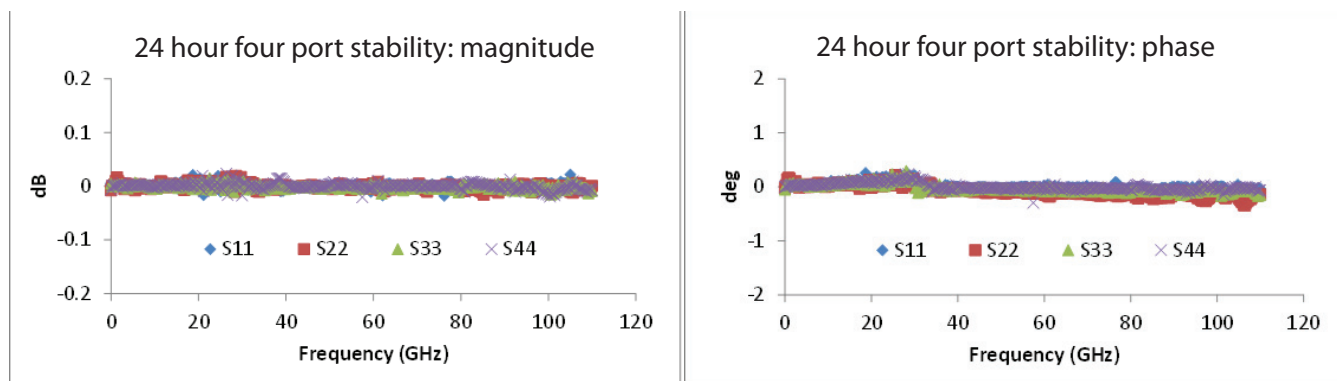
2.12 SC8215 and SC7287 Kelvin Bias Tees

Provides Sense and Force SMC connections close to the mm-Wave module to minimize the IR drops associated with the impedances between the bias tee and the DUT. The bias tees are V-type connectors and are to be connected to the inputs of the 374x modules.

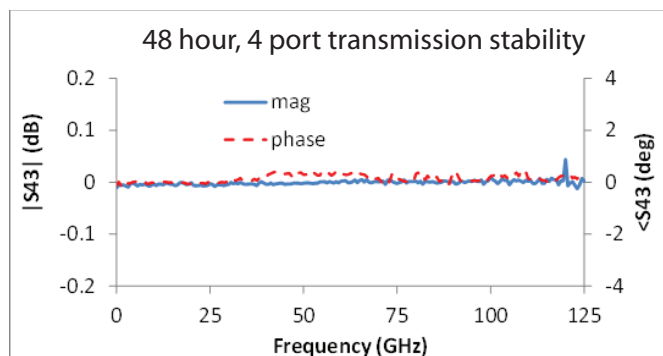
Part Number	Description	Voltage	Current
SC8215	The SC8215 is a bias tee that can be used with system frequencies in the range 70 kHz to 125 GHz	Max Voltage: 16 VDC	Max Current: 100 mA
SC7287	The SC7287 is a bias tee that can be used with system frequencies in the range 100 MHz to 125 GHz	Max Voltage: 50 VDC	Max Current: 500 mA
Tri-Axial Output SMUs	For applications requiring Source Measure Units (SMU) with tri-axial outputs, a tri-axial (male) to SMC (male) cable is available. Check the accessories list for ordering information on page 27 .		

2.13 Measurement Examples

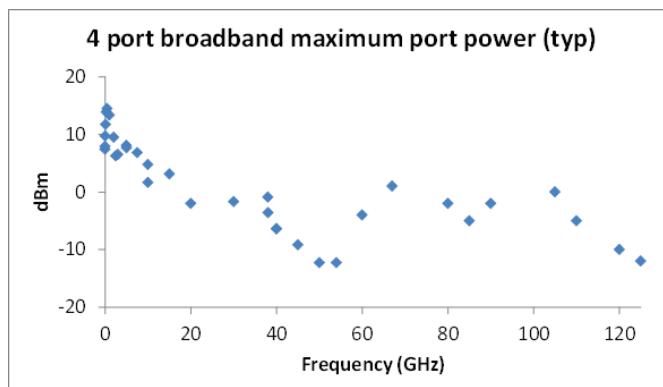
The following figures are measurement examples of the ME7838A4 Broadband system performance.



ME7838A4 4-Port Broadband Magnitude and Phase Stability over 24 hours with Temperature held constant.



ME7838A4 4-Port Transmission Stability over 48 hours and 6 °C Temperature swing.



ME7838A4 4-Port Broadband Typical Maximum Port Power. Units with option 031 will typically have higher maximum power below 54 GHz.

3. Specifications for Waveguide Band Configuration

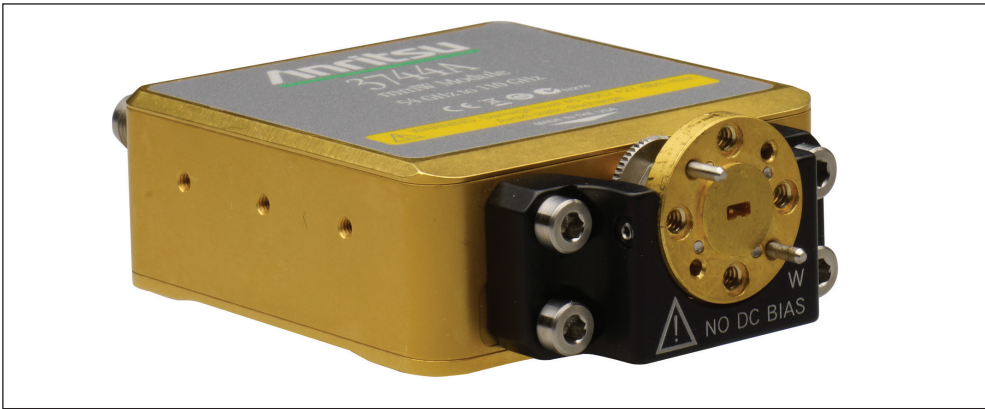
3.1 ME7838A4 4-Port Millimeter-Wave VNA, Waveguide Bands

- Three configurations are available for 4-port waveguide band operation for E and W bands when using the ME7838A4 4-port system.
- First, the Anritsu 3743A Broadband Millimeter-Wave (mm-Wave) module can be configured for waveguide measurements using waveguide adapters.
 - Second, the Anritsu 3744A-EE or 3744A-EW millimeter-Wave module can be used. These version modules operate in the extended E and W waveguide bands and are operational using the MS4644B, MS4645B, or MS4647B VectorStar (with options 08x and 007), and the 3739C broadband/millimeter-wave test set and 3736B Broadband test set.
 - The third configuration option is to use external millimeter-wave modules with any model VectorStar (with options 08x and 007), and the 3739C test set and 3736B broadband/millimeter-wave test set. For millimeter bands above 110 GHz, either the OML or VDI modules may be used.

3.2 E and W Band Operation Using the 3743A, 3744A-EE, or 3744A-EW mm-Wave Module



3743A Millimeter-Wave Modules



3744A-EE/3744A-EW Millimeter-Wave Module with Waveguide Adapter

The 3743A Broadband mm-Wave module can be adapted to a waveguide band output by adding an available waveguide band adapter and mounting flange. VectorStar menus automatically configure the system frequencies incorporating the 3743A module for banded operation. Using the 3743A modules provides the opportunity to sweep frequencies for broadband applications and quickly convert to waveguide configurations for banded measurements. The advantages of small compact modules with excellent RF performance and power range control can therefore be realized in both broadband and waveguide configurations when using the 3743A mm-Wave module. For systems where only waveguide band operation is required, the 3744A-EE or 3744A-EW mm-Wave module can be used.

The 3744A-EE or 3744A-EW mm-Wave module operates from 54 GHz to 110 GHz. The band supported is determined by the waveguide adapter connected to the 1 mm test port output of the 3744A-EE/EW module:

- 3744A-EE configures the module for Extended E Band
- 3744A-EW configures for Extended W Band

The RF input port of the 3744A-EE or 3744A-EW module is restricted below 54 GHz, however, the RF input port retains a DC connection to the 1 mm test port. Thus, the waveguide adapter can be removed for on-wafer applications from 54 GHz to 110 GHz operation and the on-wafer DUT can be biased through the RF input port.

Band	Frequency Range	Waveguide Flange	Transmission/Reflection Module
Ext-E	56 to 94 GHz ^a	WR-12	3744A-EE
Ext-W	65 to 110 GHz	WR-10	3744A-EW

a. Operational to 95 GHz.

3.3 Port Power, Noise Floor, Dynamic Range – 3744A-EE/3744A-EW mm-Wave Modules

System dynamic range is defined as the ratio of the source power to the noise floor.

Maximum Receiver Power is defined as the 0.2 dB compression point of the receiver at the waveguide port.

Receiver dynamic range is defined as the ratio of maximum receive power to the noise floor.

Noise Floor measurements are RMS, are made with no average in a 10 Hz IF bandwidth, and include an isolation calibration.

All figures are typical.

3744A-EE Extended-E Band (WR-12) Waveguide

Frequency Range (GHz)	Source Power (dBm)	Max. Receive Power (0.2 dB comp. pt.) (dBm)	Noise Floor (dBm)	System Dynamic Range (dB)	Receiver Dynamic Range (dB)
56 to 60	-5	11	-111	106	122
> 60 to 67	0	11	-106	106	117
> 67 to 80	-3	11	-109	106	120
> 80 to 85	-7	11	-112	115	123
> 85 to 90	-7	11	-110	105	120
> 90 to 94 ^a	-2	12	-105	103	117

a. Operational to 95 GHz.

3744A-EW Extended-W Band (WR-10) Waveguide

Frequency Range (GHz)	Source Power (dBm)	Max. Receive Power (0.2 dB comp. pt.) (dBm)	Noise Floor (dBm)	System Dynamic Range (dB)	Receiver Dynamic Range (dB)
65 to 67	0	11	-106	106	117
> 67 to 80	-3	11	-109	106	120
> 80 to 85	-7	11	-112	115	123
> 85 to 90	-7	11	-110	105	120
> 90 to 105	-3	12	-105	103	117
> 105 to 110	-7	12	-110	103	122

Power Range, Accuracy, Linearity, and Resolution

Accuracy is defined at -10 dBm or max rated power, whichever is lower. Linearity is defined as the incremental error between the accuracy test power level and 5 dB below. Typical.

Frequency (GHz)	Range (dBm)		Accuracy (dB)	Linearity (dB)	Resolution (dB)
	ME7838A4	ME7838A4 Option 062			
54 to 60	-55 to -4	-55 to -4	± 2.0	± 1.5	0.01
> 60 to 67	-55 to 1	-55 to 1	± 2.0	± 1.5	0.01
> 67 to 80	-55 to -2	-55 to -2	± 2.0	± 1.5	0.01
> 80 to 85	-55 to -6	-55 to -6	± 2.0	± 1.5	0.01
> 85 to 90	-55 to -4	-55 to -4	± 2.0	± 1.5	0.01
> 90 to 105	-55 to 0	-55 to 0	± 3.0	± 2.0	0.01
> 105 to 110	-55 to -5	-55 to -5	± 3.0	± 2.0	0.01
> 110 to 120 ^a	-40 to -3	-40 to -3	± 4.0	± 3.0	0.01
> 120 to 125 ^a	-40 to -3	-40 to -3	± 4.0	± 3.0	0.01

a. 110 to 125 GHz frequency range is available as operational.

Alternatively, the V, E, and W bands can be supported using external millimeter-wave modules such as the 3740/41A series modules available from Anritsu. For further description and specifications please refer to the VectorStar ME7838A Technical Data Sheet – 11410-00593 available at www.anritsu.com.

3.4 Corrected System Performance/Uncertainties – 3744A-EE/3744A-EW mm-Wave Modules

With 12-term Offset Short Sliding Load or LRL calibrations, using high precision waveguide sections and standards from the appropriate calibration kit.

3744A-EE Extended-E Band (WR-12) Waveguide – 56 GHz to 94 GHz

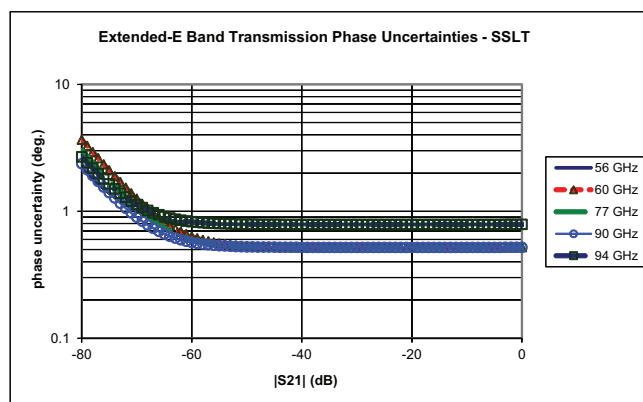
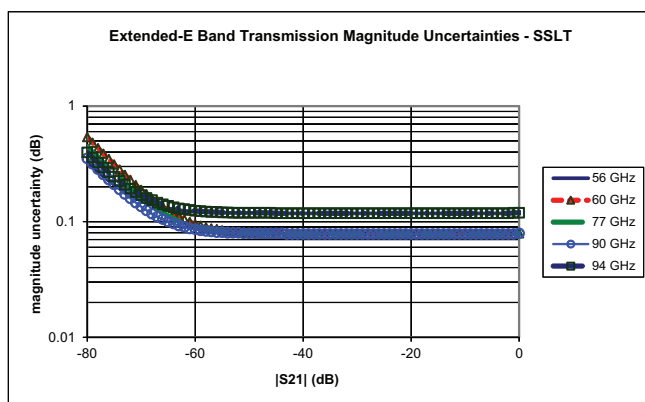
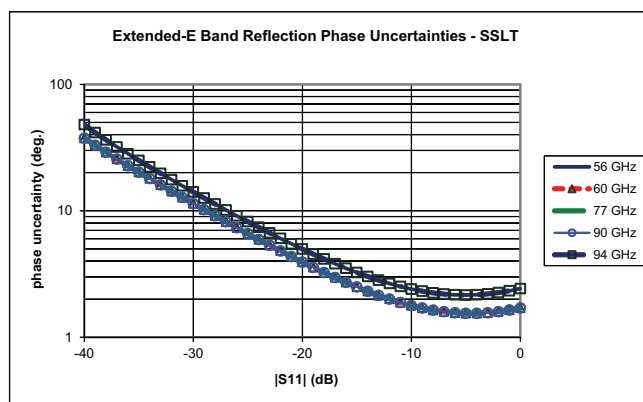
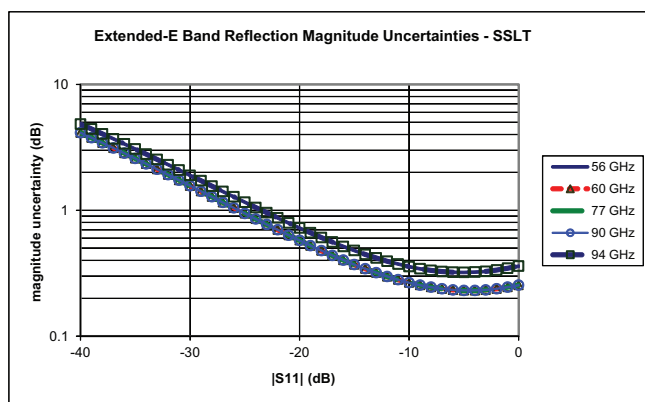
Calibration Type	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
Offset Short	> 44	> 33	> 44	± 0.080	± 0.100
LRL	> 44	> 43	> 44	± 0.006	± 0.006

3744A-EW Extended-W Band (WR-10) Waveguide – 65 GHz to 110 GHz

Calibration Type	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
Offset Short	> 40	> 30	> 46	± 0.080	± 0.100
LRL	> 40	> 40	> 46	± 0.006	± 0.006

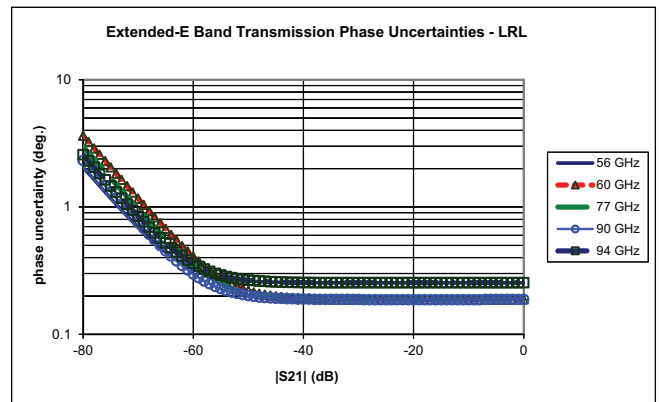
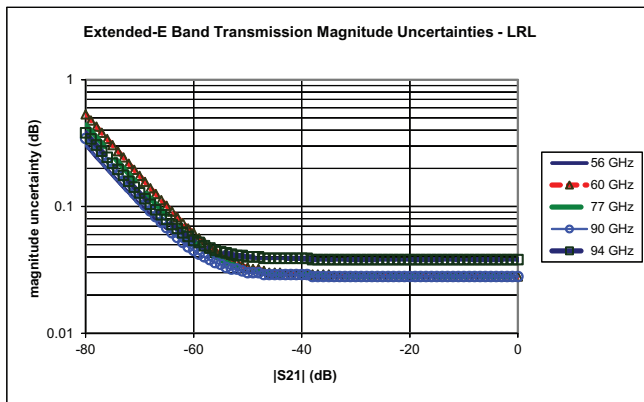
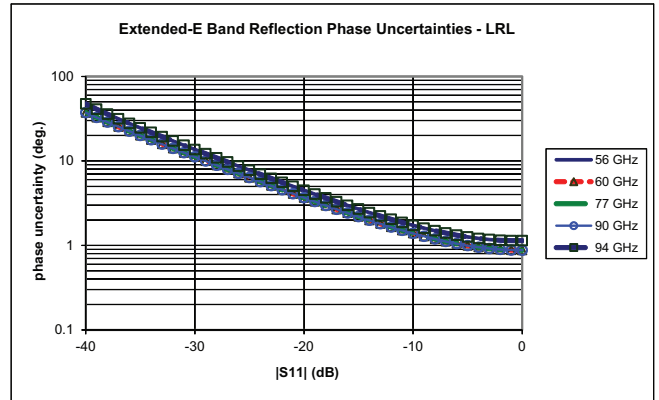
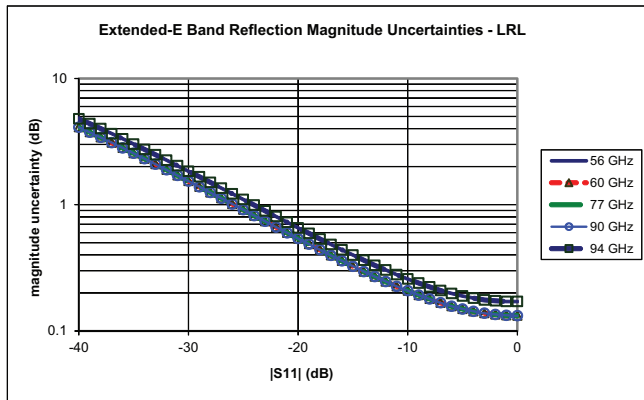
Measurement Uncertainties – Extended-E Band – SSLT

The graphs give measurement uncertainties after the above calibration. The errors are worst case contribution of residual directivity, load and source match, frequency response and isolation, network analyzer dynamic accuracy, and connector repeatability. 10 Hz IF Bandwidth is used. For transmission uncertainties, it is assumed that $S_{11} = S_{22} = 0$. For reflection uncertainties, it is assumed that $S_{21} = S_{12} = 0$. All calibrations and measurements were performed at default port power. For other conditions, please use our free Exact Uncertainty Calculator software, available for download from the Anritsu web site at www.anritsu.com. Typical.



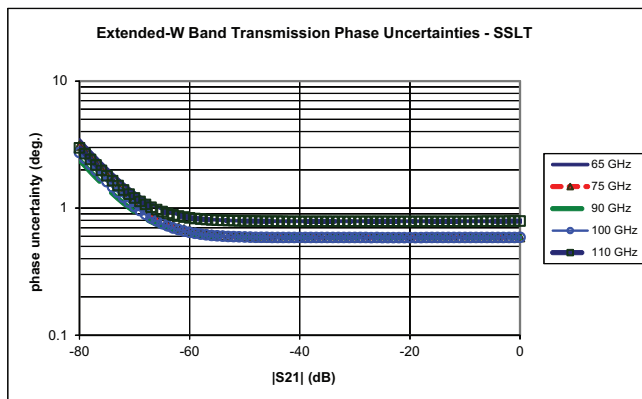
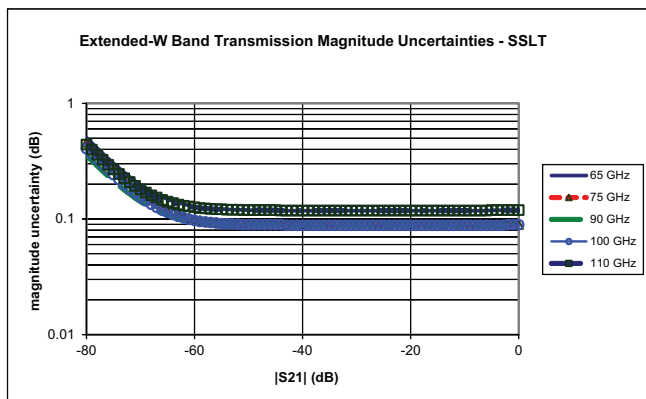
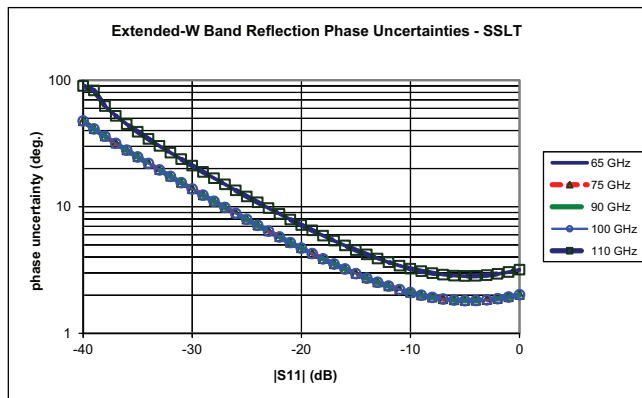
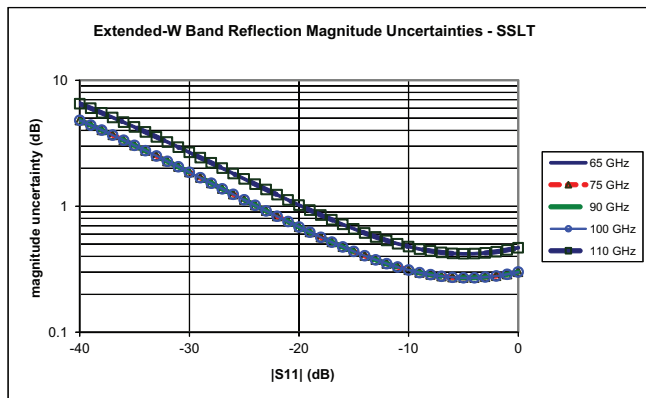
Measurement Uncertainties – Extended-E Band – LRL

The graphs give measurement uncertainties after the above calibration. The errors are worst case contribution of residual directivity, load and source match, frequency response and isolation, network analyzer dynamic accuracy, and connector repeatability. 10 Hz IF Bandwidth is used. For transmission uncertainties, it is assumed that $S_{11} = S_{22} = 0$. For reflection uncertainties, it is assumed that $S_{21} = S_{12} = 0$. All calibrations and measurements were performed at default port power. For other conditions, please use our free Exact Uncertainty Calculator software, available for download from the Anritsu web site at www.anritsu.com. Typical.



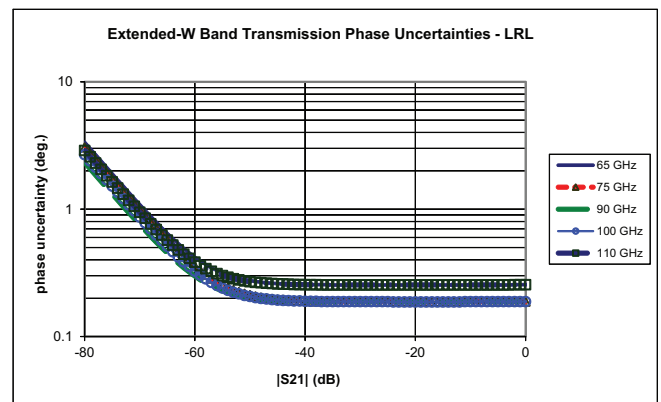
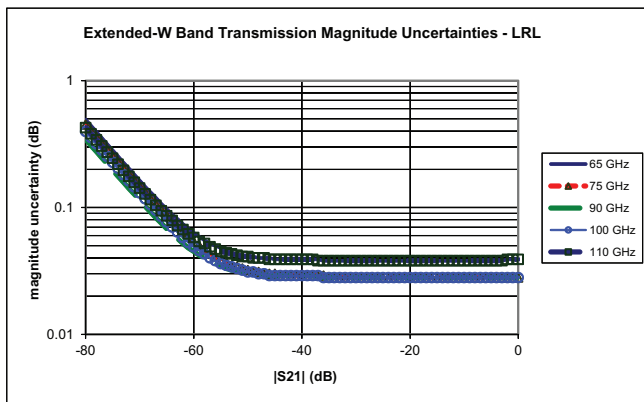
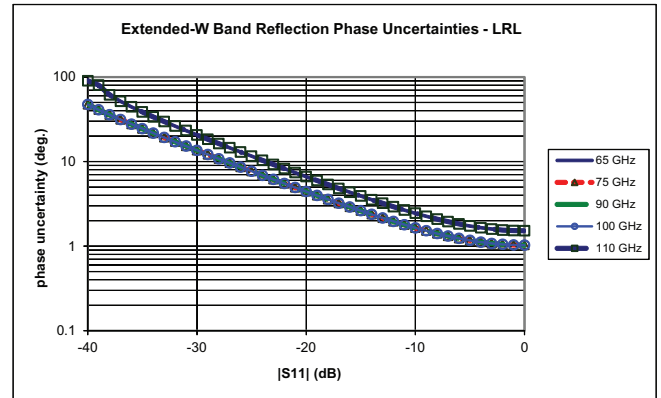
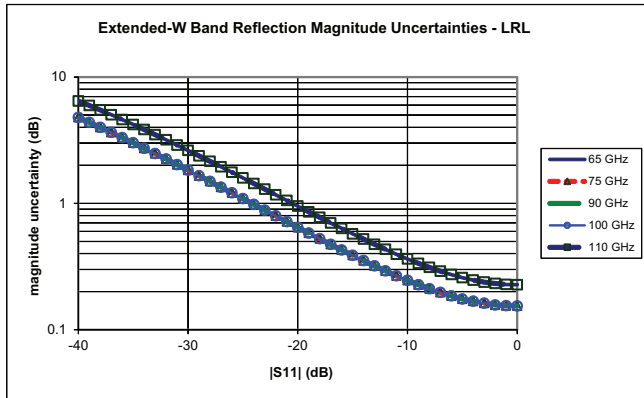
Measurement Uncertainties – Extended-W Band – SSLT

The graphs give measurement uncertainties after the above calibration. The errors are worse case contribution of residual directivity, load and source match, frequency response and isolation, network analyzer dynamic accuracy, and connector repeatability. 10 Hz IF Bandwidth is used. For transmission uncertainties, it is assumed that $S_{11} = S_{22} = 0$. For reflection uncertainties, it is assumed that $S_{21} = S_{12} = 0$. All calibrations and measurements were performed at default port power. For other conditions, please use our free Exact Uncertainty Calculator software, available for download from the Anritsu website at www.anritsu.com. Typical.

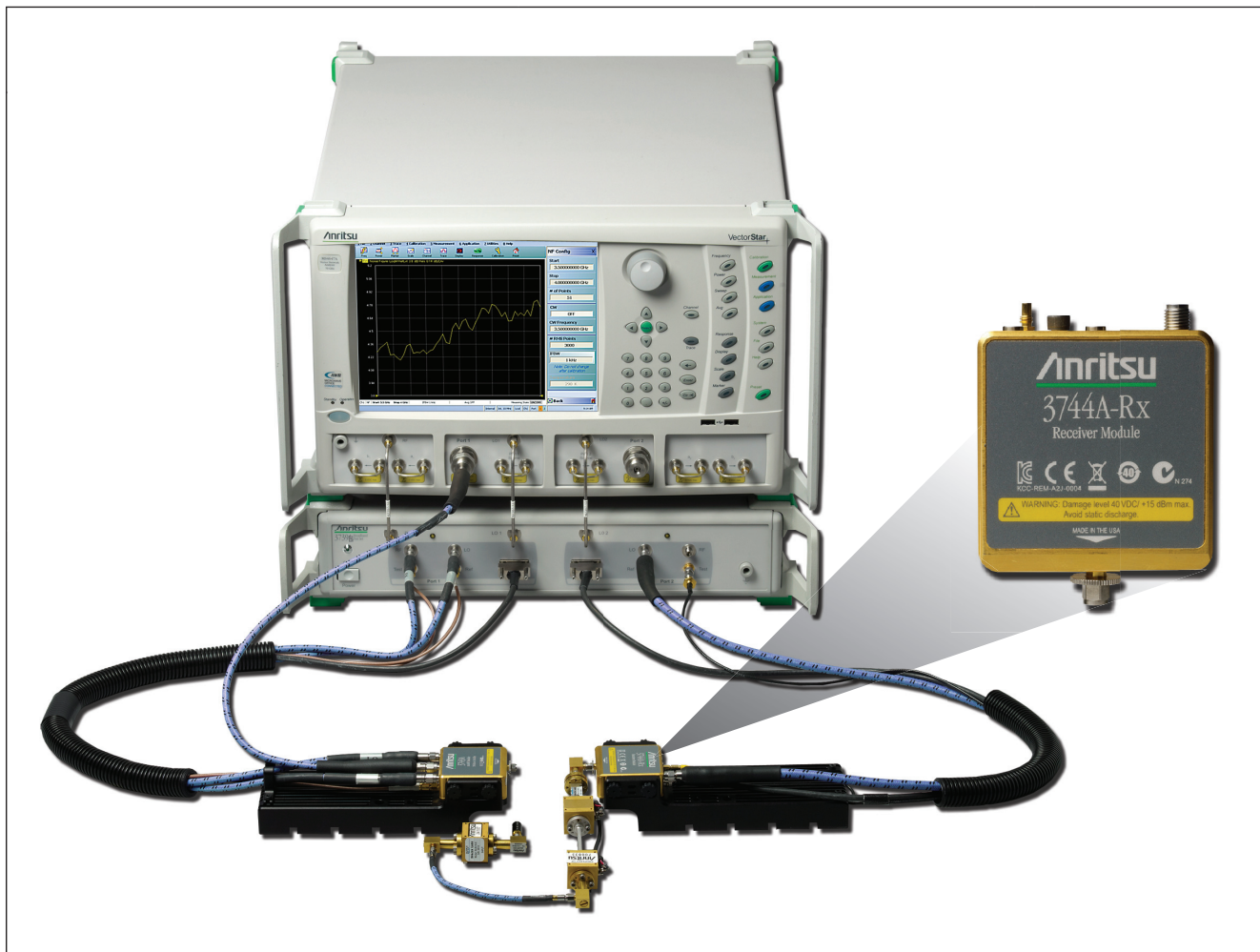


Measurement Uncertainties – Extended-W Band – LRL

The graphs give measurement uncertainties after the above calibration. The errors are worst case contribution of residual directivity, load and source match, frequency response and isolation, network analyzer dynamic accuracy, and connector repeatability. 10 Hz IF Bandwidth is used. For transmission uncertainties, it is assumed that $S_{11} = S_{22} = 0$. For reflection uncertainties, it is assumed that $S_{21} = S_{12} = 0$. All calibrations and measurements were performed at default port power. For other conditions, please use our free Exact Uncertainty Calculator software, available for download from the Anritsu website at www.anritsu.com. Typical.



3.5 ME7838A4 with Option 041 and 3744A-Rx mm-Wave Noise Figure Measurements

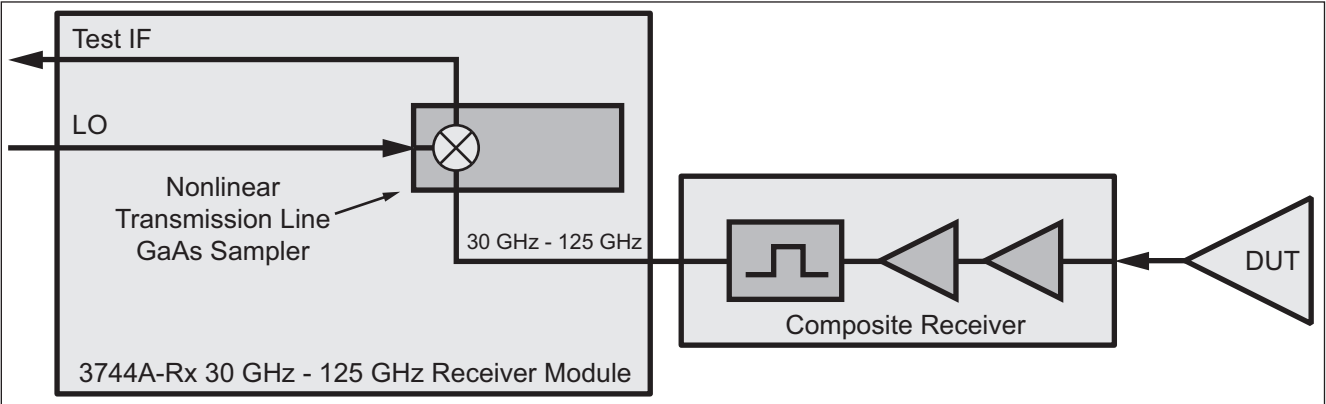


3744A-Rx Receiver Module

The 3744A-Rx receiver module can be used with Option 041, Noise Figure, and the ME7838A4 mm-Wave or broadband system to perform mm-Wave noise figure measurements from 30 GHz to 125 GHz. The receiver bypasses the internal couplers (see block diagram), maximizing the noise figure of the receiver for optimum noise figure measurement accuracy. The receiver is derived from the 3743A mm-Wave module and utilizes the same nonlinear transmission line technology for optimum mm-Wave performance. Using the advantages of the 3743A mm-Wave module system architecture provides a unique solution to mm-Wave noise figure measurements previously unavailable.

3.6 Block Diagram – 3744A Receiver Module

As with all cold source method noise figure measurements, the output of the DUT is first sent to an external composite receiver for pre-amplification. This ensures that the system noise figure is minimized for optimum measurement accuracy. The Anritsu Noise Figure Uncertainty Calculator (available on the website at www.anritsu.com) can be used to determine optimum preamplifier gain needed for the desired measurement uncertainty.



3744A-Rx Block Diagram

3.7 3744A-Rx Receiver Compression, Noise Floor

Receiver Compression Point is defined as the port power level beyond which the response may be compressed more than 0.2 dB relative to the normalization level. 10 Hz IF bandwidth is used to remove trace noise effects. All typical.
Noise Floor is relative to the receiver power calibration performed at -10 dBm. Typical.

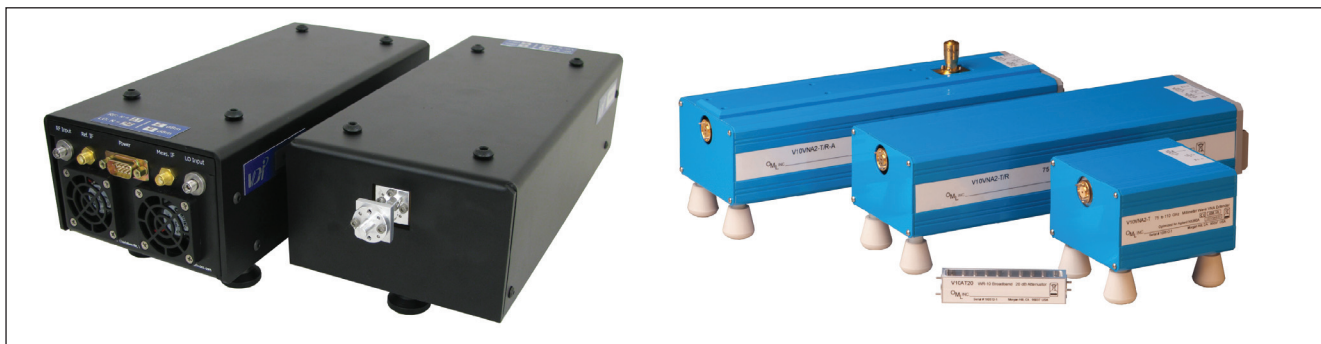
Frequency (GHz)	Receiver Compression (dBm) ^a	Noise Floor (dBm) ^b
30 GHz to 54 GHz	0	-124
> 54 to 60 GHz	0	-122
> 60 to 67 GHz	0	-117
> 67 to 80 GHz	0	-120
> 80 to 85 GHz	0	-123
> 85 to 90 GHz	0	-121
> 90 to 95 GHz	0	-121
> 95 to 105 GHz	0	-117
> 105 to 110 GHz	0	-122
> 110 to 120 GHz	-5	-120
> 120 to 125 GHz	-5	-117

a. At the 3744A-Rx test port.

b. Excludes localized spurious responses and crosstalk.

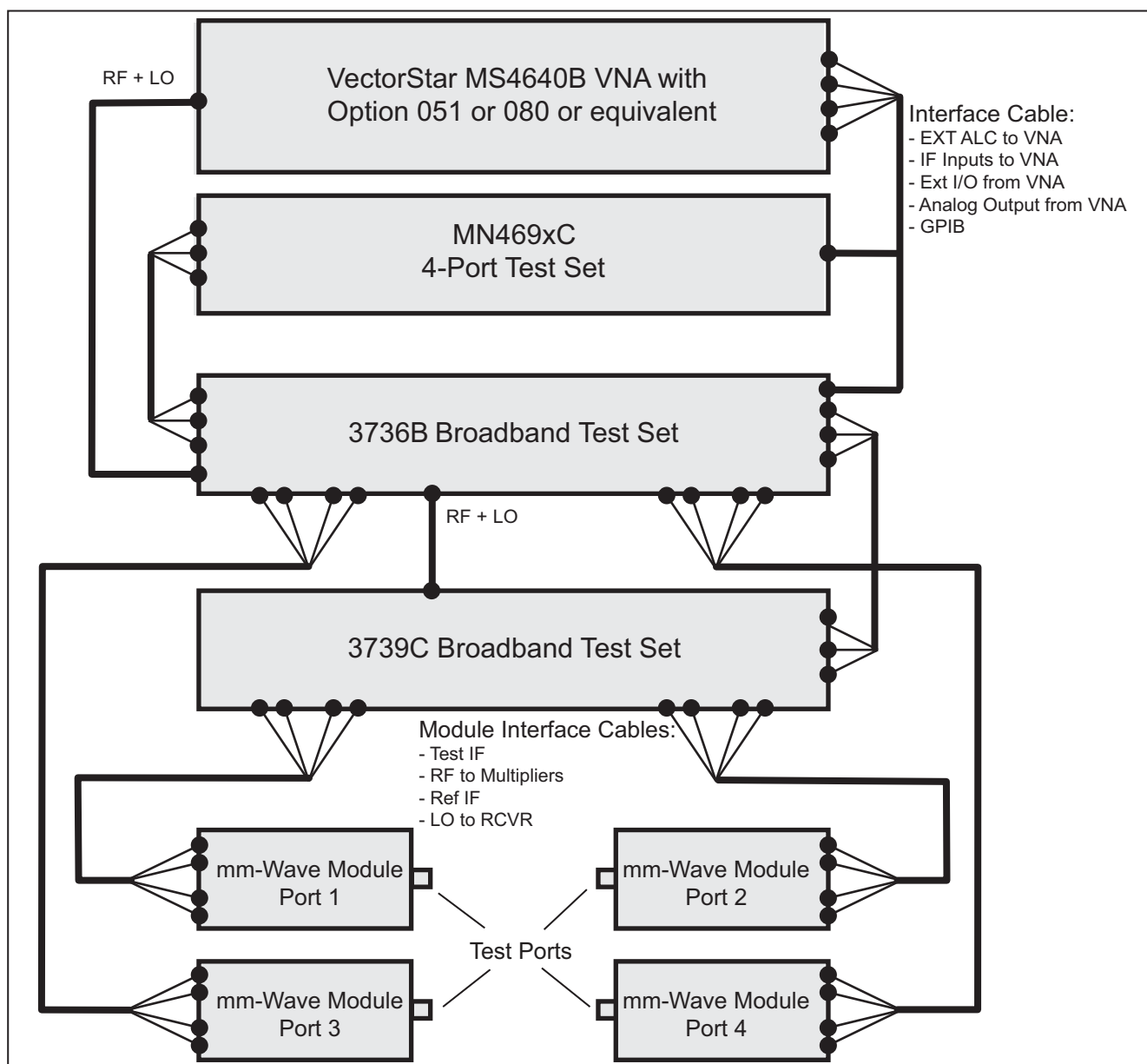
4. VectorStar ME7838A4 Waveguide Bands

From 50 GHz to 750 GHz (1.1 THz). The VectorStar 4-Port Millimeter-Wave system supports OML or VDI modules starting at 50 GHz. System performance is based on the specific mm-Wave module installed and appropriate cal kit. Contact the vendor web site for additional information.



VDI and OML Millimeter-Wave Modules

4.1 Block Diagram – Millimeter-Wave VNA System



ME7838A4 4-Port Broadband Millimeter-Wave Configuration Block Diagram

4.2 VectorStar ME7838A4 4-Port Millimeter-Wave System with VDI Modules

This section provides the specifications for the VectorStar MS4640B series microwave Vector Network Analyzers (VNAs) when configured with the Virginia Diodes, Inc. millimeter-wave (mm-Wave) frequency extension modules. The following frequency bands are supported:

Waveguide Band	WR15	WR10	WR8.0	WR6.5	WR5.1	WR4.3	WR3.4	WR2.8	WR2.2	WR1.5	WR1.0
Frequency (GHz)	50 to 75	75 to 110	90 to 140	110 to 170	140 to 220	170 to 260	220 to 330	260 to 400	325 to 500	500 to 750	750 to 1100

4.3 4-Port System Configuration with VDI Modules

The VectorStar Millimeter-Wave system provides control of VDI modules for frequency extension coverage up to 1.1 THz. MS4640B series VectorStar VNA may be configured for mm-Wave operation by adding the appropriate control option and test set. 4-Port system requirements include:

- MS4642B, MS4644B, MS4645B, or MS4647B Model VectorStar VNA
- MS4640B Option 007, Receiver Offset
- MS464xB Option 080, 081, 082, or 083
- SM6537 Interface Cable (2)
- 3736B Test Set
- 3739C Test Set
- MN469xC 2U 4-port Test Set

Each VDI module is equipped with a dedicated external power supply and DC cable. Connection between VectorStar and the VDI mm-Wave module is provided with the supplied interface cable.

4.4 VDI Module Specifications

- Specifications: Dynamic range specifications are valid for any MS4640B VectorStar VNA with appropriate options. Directivity specifications are valid when using appropriate VDI calibration kits. These specification results assume a through measurement with two TxRx Heads. All extender heads include a precision Test Port. The specifications here are typical and subject to change.
- Stability: 1 hour after a 1 hour warm-up, in a stable environment with ideal cables.
- Dynamic Range: The dynamic range (RBW 10 Hz) is measured by first connecting two TxRx heads together and normalizing the un-calibrated S_{21} and S_{12} . The heads are then disconnected and terminated with a waveguide short. The rms of the measured S_{21} & S_{12} give the system dynamic range. Dynamic range is measured on front-panel, using a controller can reduce DR by ~5–10 dB.
- Test Port Power: Test Port Power is typical, reduced power at band edges.

Waveguide Band (GHz)	VDI Extenders-Summary of Specifications											
	WR15 50-75	WR12 60-90	WR10 75-110	WR8.0 90-140	WR6.5 110-170	WR5.1 140-220	WR4.3 170-260	WR3.4 220-330	WR2.8 260-400	WR2.2 325-500	WR1.5 500-750	WR1.0 750-1100
Dynamic Range BW = 10 Hz, dB, typical	120	120	120	120	120	120	115	115	100	100	100	60
Dynamic Range BW = 10 Hz, dB, minimum.	100	100	100	100	100	100	100	100	80	80	80	40
Magnitude Stability (± dB)	0.15	0.15	0.15	0.15	0.25	0.25	0.3	0.3	0.5	0.5	0.8	1
Phase Stability (± deg.)	2	2	2	2	4	4	6	6	8	8	10	15
Test Port Power (dBm Typical, Standard, High power)	6/13	6/10	6/10	0	0	-6	-6	-9	-16	-17	-25	-35
Test Port Input Limit ^a (dBm, Saturation/ Damage)	16/20	16/20	16/20	16/20	9/20	9/20	-3/13	-4/13	-10/13	-10/13	-19/13	-20/13
Directivity (dB)	30	30	30	30	30	30	30	30	30	30	30	30
Typical Dimension (LxWxH in)	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	11x5x3	8x5x3

a. Test Port Input Limits shown for standard test port power models only.

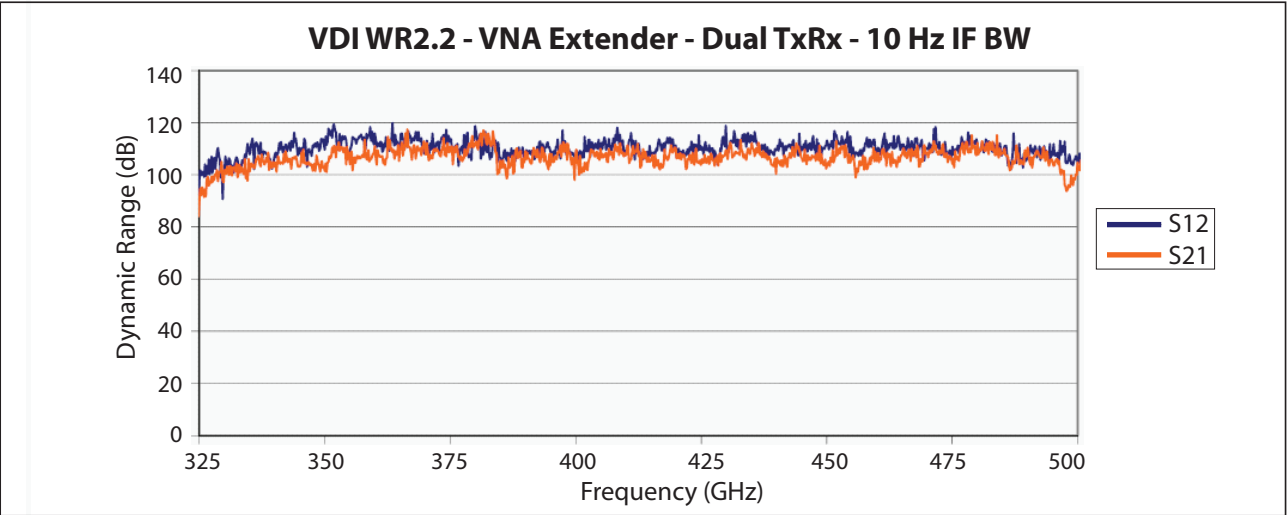
4.5 VDI Module Head Configurations

- TxRx Transmitter with two receivers (reference and measurement), and two couplers. Two TxRx heads are required for full two-port measurements.
- TxRef Transmitter with reference receiver and one coupler.
- Rx Measurement receiver.
- Tx Transmitter.

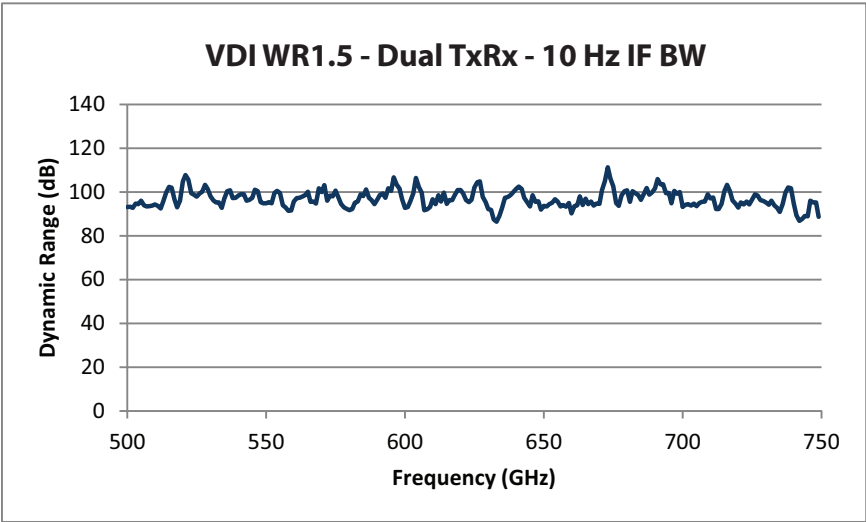
4.6 VDI Module Options

Reduce Input Frequency	Options available for millimeter-wave extenders are listed below: Reduce the input frequency to below 24 or 20 GHz.
Micrometer-Drive Variable Attenuator	A 0 dB to 30 dB micrometer-drive variable attenuator option is available on TxRx and Tx modules up through WR1.5. If ordered, "-Attn" is added as an option suffix to the module model number. The attenuators reduce TPP and DR by as much as 5dB in the WR3.4 and higher frequency bands and also adds ~2 in to enclosure.
Increased Test Port Power	Options exist for increasing test port power in some full bands or in partial bands. Consult factory for more information.
Non-Standard Frequency Bands	Non-standard frequency bands or other specific needs are possible. Consult factory for more information.
Custom Configuration	Anritsu/VDI will work with customers to reconfigure any extender to meet specific needs.

4.7 ME7838A4 Measurement Examples Using VDI Millimeter-Wave Modules

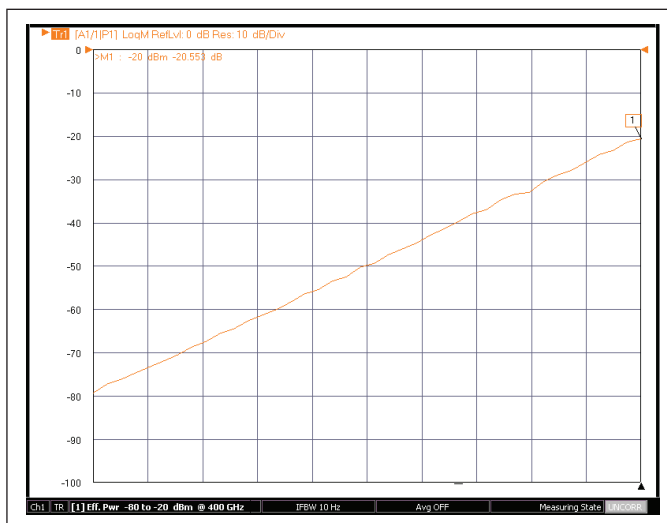


Dynamic Range Plot of VDI WR2.2 Module – 10 Hz IFBW



Dynamic Range Plot of VDI WR1.5 Dual TxRx – 10 Hz IFBW

ME7838A4 400 GHz Power Sweep with VDI WR2.2 TxRx Module



Real time power sweep of VDI WR2.2 module using system power level control and no mechanical attenuators.

4.8 VectorStar ME7838A4 4-Port Millimeter-Wave System with OML Modules

This section provides specifications for the VectorStar MS4640B series microwave Vector Network Analyzers (VNAs) when configured with the OML millimeter-wave frequency extension modules.

Description	Each OML module must be equipped with a dedicated external power supply and DC cable. Connection between the VectorStar and the OML mm-Wave module is provided with the supplied interface cable.
System Configuration	The VectorStar Millimeter-Wave system provides control of OML modules for frequency extension coverage up to 500 GHz. The MS4640B series VectorStar VNA may be configured for mm-Wave operation by adding the appropriate control option and test set.
System requirements	MS4642B, MS4644B, MS4645B, or MS4647B Model VectorStar VNA MS4640B Option 007, Receiver Offset MS4640B Option 080, 081, 082, 083, 084, 085 SM6537 Interface Cable (2) 3736B Test Set 3739C Test Set MN469xC 2U 4-port Test Set
Specifications	Dynamic range specifications are valid for any MS4640B VectorStar VNA with appropriate options. Directivity specifications are valid when using appropriate OML calibration kits.

4.9 OML Millimeter-Wave Extenders Summary Specifications

Specifications are typical and subject to change without notice.

OML "T/R" Models		V15VNA2-T/R	V12VNA2-T/R	V10VNA2-T/R	V08VNA2-T/R	V06VNA2-T/R	V05VNA2-T/R	V03VNA2-T/R
System Operating Frequency ^a	(GHz)	WR-15 50 – 75	WR-12 60 – 90	WR-10 75 – 110	WR-08 90 – 140	WR-06 110 – 170	WR-05 140 – 220	WR-03 220 – 325
Test Port Output Power ^b	Minimum Typical (dBm)	+5 +8	+2 +5	+3 +5	-8 -4	-15 -10	-18 -13	-23 -
Test Port Input Power @ 0.1 dB Compression ^c	Typical (dBm)	+8	+8	+6	+4	-5	-5	-5
Test Port Match ^c	Typical (dB)	> 17	> 17	> 17	> 17	> 15	> 15	> 9
Residual Source & Load Match	Typical (dB)	> 35	> 35	> 35	> 35	> 35	> 35	> 33
Test Dynamic Range ^d	Minimum Typical (dB)	92 > 105	92 > 105	95 > 110	90 > 105	80 > 95	80 > 95	60 > 75
Reflection & Transmission Tracking ^e	Magnitude (dB) Phase (deg.)	± 0.2 ± 2	± 0.2 ± 2	± 0.2 ± 2	± 0.3 ± 3	± 0.4 ± 5	± 0.4 ± 6	± 0.4 ± 8
Coupler Directivity ^c	Typical (dB)	> 35	> 35	> 35	> 33	> 30	> 30	> 30
Size ^f	(L x W x H)	13.0" x 4.3" x 2.7"						

a. Test Port Flange Configuration is compatible with MIL-DTL-3922/67D (UG 387/U-M)

b. As there are no internationally recognized power standards above 110 GHz, any power data supplied above 110 GHz is traceable only to OML's calorimeter.

c. Not Tested

d. Measured at 10 Hz IF bandwidth.

e. At +25 °C. Measured for 1 hr after 1 hr warm-up. Based on "perfect" RF and LO test cables not moved after warm-up and calibration. Not tested.

f. Height excludes the adjustable rubber feet; length and depth dimensions exclude the output waveguide length.

5. Standard Capabilities for All Configurations^f

For standard capabilities of the VectorStar VNAs, please see the VectorStar MS4640B Series VNA Technical Data Sheet and Configuration Guide – 11410-00432, available at www.anritsu.com.

6. Mechanical and Environmental

MS4640B Vector Network Analyzer Dimensions without rack mount option

Height	267 mm body (6u) 286 mm between feet outer edges
Width	426 mm body 457 mm between feet outer edges 487 mm between front panel handles outer edges
Depth	502 mm body 591 mm between handle and foot outer edges
Weight	<30 kg (< 66 lbs), Typical weight for a fully-loaded MS4647B VNA

3739C Broadband/Millimeter-Wave Test Set Dimensions without rack mount option

Height	89 mm body (2u) 108 mm between feet outer edges
Width	426 mm body 457 mm between feet outer edges 487 mm between front panel handles outer edges
Depth	502 mm body 591 mm between handle and foot outer edges
Weight	5.75 kg

3736B Broadband/Millimeter-Wave Test Set Dimensions without rack mount option

Height	89 mm body (2u) 108 mm between feet outer edges
Width	426 mm body 457 mm between feet outer edges 487 mm between front panel handles outer edges
Depth	502 mm body 591 mm between handle and foot outer edges
Weight	5.75 kg

MN469xC Test Set

Height	89 mm (3u) 108 mm between feet outer edges
Width	426 mm body 444 mm between feet outer edges 487 mm between front panel handles outer edges
Depth	502 mm body 591 mm between handle and foot outer edges
Weight	< 10 kg (fully loaded)

3743A Millimeter-Wave Module

Height	21.5 mm
Width	54 mm
Depth	55.3 mm
Weight	0.27 kg

Environmental – Operating

Conforms to MIL-PRF-28800F (Class 3).	
Temperature Range	0 °C to +50 °C without error codes, except for 'unleveled' error messages that may occur at the extreme edges of the temperature range and above
Relative Humidity	5 % to 95 % at +40 °C, Non-condensing
Altitude	4,600 m (15,000 ft)

Environmental – Non-Operating

Temperature Range	–40 °C to +75 °C
Relative Humidity	0 % to 90 % at +65 °C, Non-condensing
Altitude	15,200 m (49,000 ft)

EMI

Meets the emissions and immunity requirements of:
 EN55011/2007 Class A, Group 1
 EN61000-4-2: 1998 (± 4 kV CD, 8k AD)
 EN61000-4-3: 2008 (80 MHz to 2700 MHz @ 3 V/m)
 EN61000-4-4: 2004 (500V SL, 1000V PL)
 EN61000-4-5: 2006 (2 kV L-E, 1 kV L-L)
 EN61000-4-6:2007 (0.15 MHz to 80 MHz, 3 V)
 EN61000-4-11:2004 (1 cycle, 100 %)

7. Calibration and Correction Capabilities

Calibration Methods	Short-Open-Load-Through (SOLT) with Fixed or Sliding Load Offset-Short Triple-Offset-Short Short-Open-Load-Reciprocal (SOLR) or Unknown Through Method Line-Reflect-Line (LRL) / Line-Reflect-Match (LRM) Advanced-LRM (A-LRM™) for improved on-wafer calibrations AutoCal
Correction Models	Full 2-port (up to 2 at once), 3-port and 4-port calibrations 1 path / 2 port Frequency response (transmission or reflection, any path combination) Reflection only (1, 2, 3 or 4 ports)
Merged Calibration	Merge multiple calibration methods over bands of frequency points.
Coefficients for Calibration Standards	
Load from USB Device	Load coefficients from USB Memory Device from your Anritsu calibration kit.
User-Defined	Enter manual coefficients into User-Defined locations.
Reference Impedance	Modify the reference impedance from 50 Ω to any impedance, excluding 0 Ω .
Interpolation	Allows interpolation between calibration frequency points, if selected.
Adapter Removal Calibration	Characterizes and "removes" an adapter used during calibration that will not be used for subsequent device measurements, for accurate measurement of non-insertable devices.
Dispersion Compensation	Selectable as Coaxial, other non-dispersive (for example a coplanar waveguide), Waveguide, or Microstrip.
Power Calibrations	
Types	Flat Power Calibrations and Linear Power Calibrations (Power Meter Correction).
Enhanced Power Accuracy	Different power meter calibrations are available to enhance power accuracy at the desired reference plane (to usually ≈ 0.1 dB for short periods of time).
Flat Power Calibrations	Flat power calibrations (using the appropriate W1 adapter depending on the sensor) are available. Different power meters/sensors are required depending on the frequency range (above or below 70 GHz). Power level is user-selectable when within the power adjustment range of the internal source. Other power levels are then arrived at by offset transfers.
Linear Power Calibration	A linear power calibration is performed over a range of power levels for use in power sweep mode and is performed at a specified frequency or frequency range.
External Power Meter	Both calibrations are performed using an external power meter over the dedicated GPIB port.
Embedding/De-embedding	The MS4640B is equipped with an Embedding/De-embedding system.
De-embedding	De-embedding is generally used for removal of test fixture contributions, modeled networks and other networks described by S-parameters (sNp files) from measurements. An extraction utility is part of this package that allows the easier computation of de-embedding files based on some additional calibration steps and measurements.
Embedding	Similarly, the Embedding function can be used to simulate matching circuits for optimizing amplifier designs or simply adding effects of a known structure to a measurement.
Multiple Networks	Multiple networks can be embedded/de-embedded and changing the port and network orientations is handled easily.
Impedance Conversion	Allows entry of different impedances (complex values) for different ports.

8. Mechanical Calibration/Verification Kits

W1 (1 mm) Calibration/Verification Kit, 3656B

Provides 12-term SOLT or Triple Offset Short calibrations, for W1 (1 mm) devices, and two verification standards.



3656B W1 1 mm Calibration/Verification Kit providing 12-Term SOLT or SSST calibrations and two verification standards.

3656B Cal Kit Contains:	Additional Information (Typical)	Quantity	Part Number
Offset Short W1 (male)	Offset: 2.020 mm	1	23W50-1
Offset Short W1 (male)	Offset: 2.650 mm	1	23W50-2
Offset Short W1 (male)	Offset: 3.180 mm	1	23W50-5
Offset Short W1 (female)	Offset: 2.020 mm	1	23WF50-1
Offset Short W1 (female)	Offset: 2.650 mm	1	23WF50-2
Offset Short W1 (female)	Offset: 3.180 mm	1	23WF50-5
Open W1 (male)	Offset: 1.510 mm	1	24W50
Open W1 (female)	Offset: 1.930 mm	1	24WF50
Fixed Termination W1 (male)		1	28W50
Fixed Termination W1 (female)		1	28WF50
Adapter, W1 (male) to Fixed SC ^a Connector		1	33WSC50
Adapter, W1 (female) to Fixed SC ^a Connector		1	33WFSC50
Interchangeable Slider for SC ^a Connector (male)		1	-
Interchangeable Slider for SC ^a Connector (female)		1	-
Locking Keys for SC ^a Connectors		2	-
Pin Exchange Tool for SC ^a Connectors	Contains 1 male pin	1	01-402
Adapter, W1 (male) to W1 (female)		1	33WWF50
Adapter, W1 (male) to W1 (male)		1	33WW50
Adapter, W1 (female) to W1 (female)		1	33WFWF50
Stepped Impedance ThruLine, W1 (male - female)	Verification Device	1	18WWF50-1B
50 Ohm matched ThruLine, W1 (male - female)	Verification Device	1	18WWF50-1
Torque Wrench	6 mm, 5.4 N·cm (4 lbf·in)	1	01-504
Open-ended Wrench	6 mm / 7 mm	1	01-505
Coefficients for standards	On USB Memory Device and 3.5 in Floppy Disk	1	-

a. SC Connectors are a solution for accurate calibrations for non-insertable 1 mm devices. Users can change the gender of the SC connector using the provided tool, pin, sliders, and locking keys to ensure the best pin-depth, thus calibrations are valid after changing the gender of the adapter.

9. Test Port Cables

Test Port Cables, Flexible, High Performance

Description	Frequency Range	Impedance	Length (cm)	Insertion Loss (dB)	Return Loss (dB)	Part Number
W1 (1 mm) (male) to W1 (1 mm) (female)	DC to 110 GHz	50 Ω	10	1.74	≥ 14	3671W1-50-1
			13	2.23	≥ 14	3671W1-50-2
			16	2.74	≥ 14	3671W1-50-3



3671W1-50-X Flexible Test Port Cables

10. Precision Adapters, Attenuators, and Other Components

Anritsu offers a complete line of precision adapters and attenuators. For more information, please visit our web site at www.anritsu.com.



11. Warranty and Ordering Information

The ME7838A4 4-Port BB/mm-Wave VNA and related accessories offer a 3 year warranty from the date of shipment (excluding OML and VDI modules). Please contact your local service center for additional warranty coverage.

The ME7838A4 4-Port Broadband/Millimeter-Wave VNA System provides single sweep coverage from 70 kHz to 110 GHz and consists of the following standard components and optional accessories, which are described in the sections below:

11.1 ME7838A4 4-Port Broadband System, 70 kHz to 110 GHz

Action	Part Number and Description	Additional Information
Order the base VectorStar model with the listed options:	- MS4647B, 70 kHz to 70 GHz VNA - MS4640B-007, receiver offset - MS4640B-070, 70 kHz frequency coverage 3739C, Broadband/Millimeter-Wave Test Set with 36 inch interface cables 3743A, Millimeter-Wave Module, 2 each - ME7838A4-SS020, on-site system assembly and verification 806-209, 1.85 mm phase stable VNA RF cable, 36 in, (m-f), 2 each	
Include one of the following:	- MS4647B-081, MS4647B with ME7838A4 system option and - Either Option 051 or 061 or 062	Option 085 if Option 031 is included
Order:	- MN4697C 2U 4-Port Test Set 3736B Broadband/Millimeter-Wave Test Set 3743A Millimeter-Wave Module, 2 each 806-209, 1.85mm phase stable VNA RF cables, 36 in, (m-f) 2 each	
Additional Options:	- MS4640B-002 Time Domain - MS464xB-031 Dual Source Architecture - MS4640B-041 Noise Figure - MS4640B-043 DifferentialView	

11.2 ME7838A4 4-Port Waveguide-Band System to 110 GHz – 3744A-EE or 3744A-EW mm-Wave Modules

Configurator for ME7838A4 Millimeter-Wave System using 3744A-EE or 3744A-EW mm-Wave Modules:

Action	Part Number and Description	Additional Information
Choose and order one of the three base VectorStar models with options listed:	- MS4644B VNA, 10 MHz to 40 GHz - MS4640B-007 - MS4644B-082 or MS4644B-083	- MS4644B-083 is ordered when options 051, 061, or 062 are included - MS4644B-085 is ordered when Option 031 included
	- MS4645B VNA, 10 MHz to 50 GHz - MS4640B-007 - MS4645B-082 or MS4645B-083	- MS4645B-083 ordered when options 051, 061, or 062 are included - MS4645B-085 is ordered when Option 031 included
	- MS4647B VNA, 10 MHz to 70 GHz - MS4647B-007 - MS4647B-080 or MS4647B-081	- MS4647B-081 is ordered when options 051, 061, or 062 are included - MS4647B-085 is ordered when Option 031 included
Include one of the following:	Either Option 051 or 061 or 062	Options 061 and 062 include the Active Measurement Suite
Add options if desired:	MS4640B-070 for 70 kHz operation in base VNA	
	MS4640B-002 for Time Domain	
	- MS464xB-031 Dual Source Architecture - MS4640B-041 for Noise Figure - MS4640B-043 DifferentialView	
Order:	- MN4697C 2U 4-Port Test Set 3736B Broadband/Millimeter-Wave Test Set 3739C Broadband/Millimeter-Wave Test Set	
Choose Extended-E or Extended-W Band Modules:	3744A-EE, 56 GHz to 94 GHz Extended E Band module, 4 each	
	3744A-EW, 65 GHz to 110 GHz Extended W Band module, 4 each	

Accessories

35WR12WF-EE	Precision Waveguide to Coax Adapter, 56 GHz to 94 GHz, WR12 to W1 (f)
35WR10WF-EW	Precision Waveguide to Coax Adapter, 65 GHz to 110 GHz, WR10 to W1 (f)

11.3 ME7838A4 4-Port Waveguide-Band System – Anritsu 3740/41A; OML; VDI mm-Wave Modules

ME7838A4 4-Port Waveguide-Band System using Anritsu 3740/41A, OML, or VDI Millimeter-Wave modules:

Action	Part Number and Description	Additional Information
Choose and order one of the four base VectorStar models with options listed:	- MS4642B VNA, 10 MHz to 20 GHz - MS4640B-007 Receiver Offset - MS4642B-082 or MS4642B-083	- MS4642B-083 is ordered when Options 051, 061, or 062 are included - MS4642B-085 is ordered when MS464xB-031 is ordered
	- MS4644B VNA, 10 MHz to 40 GHz - MS4640B-007 Receiver Offset - MS4644B-082 or MS4644B-083	MS4644B-083 is ordered when Options 051, 061, or 062 are included MS4644B-085 is ordered when MS464xB-031 is ordered
	- MS4645B VNA, 10 MHz to 50 GHz - MS4640B-007 Receiver Offset - MS4645B-082 or MS4645B-083	MS4645B-083 is ordered when Options 051, 061, or 062 are included MS4645B-085 is ordered when MS464xB-031 is ordered
	- MS4647B VNA, 10 MHz to 70 GHz - MS4640B-007 Receiver Offset - MS4647B-080 or MS4647B-081	MS4647B-081 is ordered when Options 051, 061, or 062 are included MS4647B-085 is ordered when MS464xB-031 is ordered
Include one of the following:	Either Option 051 or 061 or 062	Options 061 and 062 include the Active Measurement Suite
Add options if desired:	- MS4640B-070 for 70 kHz operation in base VNA - MS4640B-002 for Time Domain - MS464xB-031 Dual Source Architecture - MS4640B-041 for 2-port Noise Figure - MS4640B-043 DifferentialView	
Order:	3739C Broadband/Millimeter-Wave test set 3736B Broadband/Millimeter-Wave Test Set - MN469xC 2U 4-port Test Set	
	- SM6600 Interface Cables (2) for Anritsu 3740/41A mm-Wave Modules - SM6537 Interface Cables (2) for OML/VDI mm-Wave Modules	Does not include DC cable. DC supply is provided by mm-Wave module power supply.
Choose one of the two appropriate millimeter-wave module combinations:	4 each TxRx transmission and reflection millimeter-wave modules	Choose appropriate OML or VDI modules. Contact Anritsu Company for ordering information.

Accessories

SC8215	Kelvin Bias Tee 70 kHz to 110 GHz, Max Voltage: 16 VDC, Max Current: 100 mA
SC7287	Kelvin Bias Tee 100 MHz to 110 GHz, Max Voltage: 50 VDC, Max Current: 500 mA
SC8218	Triax (male) to SMC (male) Cable, (Inner-shield floating at SMC end), 1.5 m (60 in) long two (2) needed per Kelvin Bias Tee
ML2437A	Power Meter, Single Channel, for flat test port power calibration
SC7770	Thermal Sensor, with special characterization, 70 kHz to 70 GHz, V (female)
SM6494	System floor console. Includes larger size writing table
2100-1	GPIO cable, 1 m (39 in) long
2100-2	GPIO cable, 2 m (79 in) long
2100-4	GPIO cable, 4 m (157 in) long
806-206	1.85 mm cable, 61 cm (24 in) long, for connecting the VNA and the 3743A Modules
806-209	1.85 mm cable, 91 cm (36 in) long, for connecting the VNA and the 3743A Modules
01-201	Torque Wrench (for tightening male devices), 8 mm (5/16 in), 0.9 N·m (8 lbf·in) for SMA, 3.5 mm, 2.4 mm, K, and V connectors
01-202	Universal Test Port Connector Wrench
01-203	Torque Wrench (for tightening the VNA test ports to female devices) 20.6 mm (13/16 in), 0.9 N·m (8 lbf·in)
01-204	Anritsu Stainless Steel Connector Wrench, circular, open-ended for SMA, 3.5 mm, 2.4 mm, K and V connectors

Contact Anritsu regarding rack mount options www.anritsu.com.

Calibration/Verification Kits

3656B	W1 (1 mm) Calibration/Verification Kit
3655V	WR-15 Waveguide Calibration Kit, Without Sliding Loads
3655V-1	WR-15 Waveguide Calibration Kit, With Sliding Loads
3655E	WR-12 Waveguide Calibration Kit, Without Sliding Loads
3655E-1	WR-12 Waveguide Calibration Kit, With Sliding Loads
3655W	WR-10 Waveguide Calibration Kit, Without Sliding Loads
3655W-1	WR-10 Waveguide Calibration Kit, With Sliding Loads
3650A	SMA/3.5 mm Calibration Kit, Without Sliding Loads
3650A-1	SMA/3.5 mm Calibration Kit, With Sliding Loads
3652A	K Calibration Kit, Without Sliding Loads
3652A-1	K Calibration Kit, With Sliding Loads
3654D	V Calibration Kit, Without Sliding Loads
3654D-1	V Calibration Kit, With Sliding Loads
3657	V Multi-Line Calibration Kit, Without Shorts
3657-1	V Multi-Line Calibration Kit, With Shorts

Test Port Cables, Flexible, High Performance

3671W1-50-1	W1 (male) to W1 (female), 1 each, 10.0 cm (3.9 in)
3671W1-50-2	W1 (male) to W1 (female), 1 each, 13.0 cm (5.1 in)
3671W1-50-3	W1 (male) to W1 (female), 1 each, 16.0 cm (6.3 in)
3671KFS50-60	K (female) to 3.5 mm (male) cable, 60 cm (one cable)
3671KFK50-60	K (female) to K (male) cable, 60 cm (one cable)
3671KFK50-100	K (female) to K (male) cable, 1 each, 100 cm (one cable)
3671KFKF50-60	K (female) to K (female) cable, 1 each, 60 cm (one cable)
3671VVF50-60	V (female) to V (male) cable, 1 each, 60 cm (one cable)
3671VVF50-100	V (female) to V (male) cable, 1 each, 100 cm (one cable)
3671KFSF50-60	K (female) to 3.5 mm (female) cable, 1 each, 60 cm (one cable)
3671VVFVF50-60	V (female) to V (female) cable, 1 each, 60 cm (one cable)

Adapters and More

34WV50	W1 (male) to V (male) Adapter, W1 (1 mm) to V, Coaxial
34WVF50	W1 (male) to V (female) Adapter, W1 (1 mm) to V, Coaxial
34WV50	W1 (female) to V (male) Adapter, W1 (1 mm) to V, Coaxial
34WVF50	W1 (female) to V (female) Adapter, W1 (1 mm) to V, Coaxial
33WW50	W1 (male) to W1 (male) Adapter, W1 (1 mm) in-series, Coaxial
33WWF50	W1 (male) to W1 (female) Adapter, W1 (1 mm) in-series, Coaxial
33WFWF50	W1 (female) to W1 (female) Adapter, W1 (1 mm) in-series, Coaxial
35WR10W	WR10 to W1 (male) Adapter, W1 (1mm) to WR10 Waveguide
35WR10WF	WR10 to W1 (female) Adapter, W1 (1mm) to WR10 Waveguide
SC7260	WR12 to W1 (male) Adapter, W1 (1 mm) to WR12 Waveguide
SC7442	WR12 to W1 (female) Adapter, W1 (1 mm) to WR12 Waveguide
35WR15V	WR15 to V (male) Adapter, V (1.85mm) to WR15 Waveguide
35WR15VF	WR15 to V (female) Adapter, V (1.85mm) to WR15 Waveguide
For More Information	Refer to our Precision RF & Microwave Components Catalog for descriptions of adapters and other components.

12. Notes

Notes



Find Drivers, Utilities, Software Updates, and other Helpful Tools at the VectorStar Users Site. Visit:
www.anritsu.com/en-us/Products-Solutions/Solution/Welcome-to-the-VectorStar-Users-Site-.aspx

Training at Anritsu

Anritsu has designed courses to help you stay up to date with technologies important to your job. For available training courses visit:
www.anritsu.com/training



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