Anritsu

ME7808A

Broadband Vector Network Analyzer

40 MHz to 110 GHz

Measurement Solutions from 40 MHz to 110 GHz

The Anritsu Broadband Vector

The ME7808A Broadband Vector Network Analyzer (VNA) is a high performance measurement solution that covers 40 MHz to 110 GHz in a single fast sweep. Built on the advanced technology of the Anritsu Lightning 65 GHz VNA, the ME7808A is ideal for making accurate S-parameter measurements of components and devices to 110 GHz. The flexible system architecture of the ME7808A makes it easy to adapt to multiple measurement applications.

Key Features and Benefits

- Continuous Broadband Frequency Coverage, 40 MHz to 110 GHz
- Ultra Fast Sweep Speed
- Fine Resolution in Time Domain
- Supports On-Wafer Device Characterization and Broadband Coaxial Measurements
- Offers Total Flexibility and Upgradeability

Configuration

The ME7808A consists of:

- Lightning 65 GHz VNA
- Millimeter-Wave Modules
  (Extended W Band, 65 GHz to 110 GHz)
- Broadband Test Set
- Frequency Sources
- Multiplexing Couplers
- Equipment Console with Table

Vector Network Analyzer

The Lightning high performance 65 GHz VNA (37397C with Option 12) is the foundation of the ME7808A Broadband VNA. Option 12 adds the rear panel IF inputs that interface with the millimeter-wave (mmW) modules. The Lightning VNA also controls the two synthesizers that are used for the LO and RF drive to the mmW modules. In addition to S-parameter measurements, the VNA supports time domain and swept power gain compression measurements as well. The internal test port attenuators, bias tees, and wide ALC range provide flexibility for active device measurements. Multiple storage formats and ample hard disk space make it convenient to save test results and measurement set-ups.

Broadband Test Set and Millimeter-Wave Modules

The broadband test set drives the two external mmW modules that enable frequency coverage up to 110 GHz. The test set performs band switching between the 40 MHz to 65 GHz VNA and the 65 GHz to 110 GHz mmW module in order to create the broadband sweep. In addition, the test set routes the IF outputs from the mmW modules back to the VNA. The mmW modules use the latest in component technology for optimum output power and dynamic range. A 20 dB variable attenuator is built into each millimeter-wave module to provide output power control.

Test port flexibility provided with Anritsu's innovative multiplexing coupler

Frequency Sources

The Anritsu Broadband VNA uses two 20 GHz synthesized sources. They provide the LO and RF to the mmW modules. These synthesizers are members of the latest family of Anritsu synthesizers and offer a full range of capabilities. The two synthesizers may be upgraded at any time to add features such as expanded modulation or improved phase noise, for other general-purpose applications.

Network Analyzer System

Single Pair of Coaxial Test Ports

The ME7808A Broadband VNA combines the 40 MHz to 65 GHz output from the VNA and the 65 GHz to 110 GHz output from the mmW modules using a unique multiplexing coupler design.

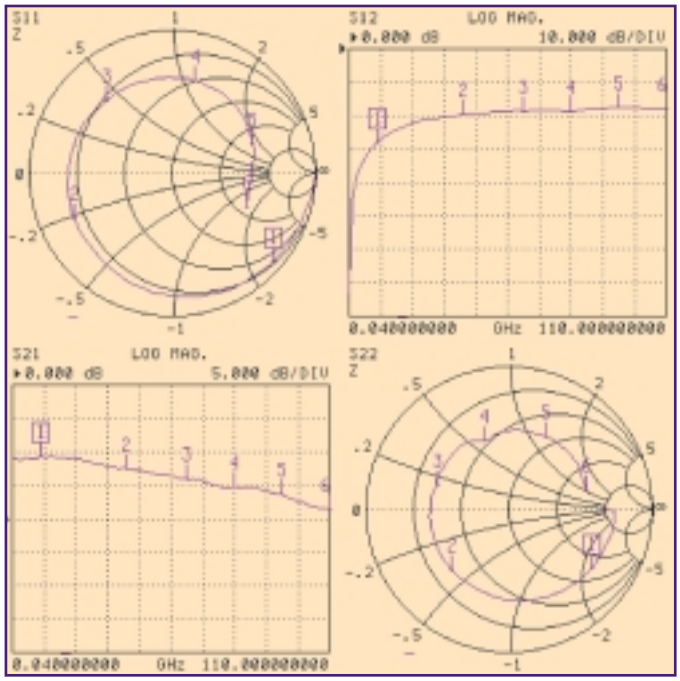
The effective system test ports for broadband are therefore two W1 (1.0 mm) coax connectors. The Anritsu W1 connector is compatible with the IEEE standard 1.0 mm connector. This design provides a DC path that permits bias injection from the VNA front panel bias inputs directly to the W1 coax test ports.

Three Systems in One

Using the approach of coupling the 65 GHz VNA output with that of the mmW modules, the system can be used in any of the following configurations:

1) as a *broadband VNA* (40 MHz to 110 GHz) with W1 (1.0 mm) connector coaxial interface
2) as a *stand-alone 65 GHz VNA* with V-connector coaxial interface
3) as a *millimeter-wave VNA* (65 GHz to 110 GHz) with a WR-10 waveguide connector interface. Additional discrete mmW bands are easily supported by substituting other available mmW modules into the system.

When operating either the 65 GHz or mmW systems independently, higher output power and increased dynamic range are achievable. Wafer probe tips can be connected to any of the three interfaces to make on-wafer measurements.



On-wafer broadband measurement of a FET using the ME7808A

Compact Module Design

The Anritsu mmW modules are small and lightweight which facilitates mounting on the micropositioners associated with semi-automatic or manual probe stations.

On-Wafer Calibration Methods

Device characterization and parameter extraction are most commonly performed on a wafer probe system, requiring specific on-wafer calibration methods. The Anritsu VNAs provide an easy interface for entering the parameters for OSLT, LRL, and LRM calibrations. Other external calibration techniques, optimized for wafer probing applications, are also supported for users of Karl Suss and Cascade Microtech probe systems.

Complete on-wafer measurement solution: ME7808A integrated with Karl Suss PA200 probe system

SYSTEM SPECIFICATIONS

Dynamic Range (typical)

W1 Coaxial Port	Frequency (GHz)	0.04	2	20	40	50	<65	>65	75	85	100	110
	Max Signal into Port 2 (dBm)	30	30	30	30	30	30	16	14	13	12	12
	Port 1 Power, Typical (dBm)	-1	3	-7	-14	-10	-12	-14	-10	-11	-9	-11
	Noise Floor (dBm)	-76	-103	-92	-88	-79	-67	-65	-78	-81	-78	-73
	System Dynamic Range (dB)	75	106	85	74	69	55	51	68	70	69	62
	Receiver Dynamic Range (dB)	106	133	122	118	109	97	81	92	94	90	85

On Wafer	Frequency (GHz)	0.04	2	20	40	50	<65	>65	75	85	100	110
	Max Signal into Port 2 (dBm)	30	30	30	30	30	30	18	17	16	16	16
	Port 1 Power, Typical (dBm)	-1	3	-8	-16	-12	-14	-16	-13	-14	-13	-15
	Noise Floor (dBm)	-76	-103	-91	-86	-77	-65	-63	-75	-78	-74	-69
	System Dynamic Range (dB)	75	106	83	70	65	51	47	62	64	61	54
	Receiver Dynamic Range (dB)	106	133	121	116	107	95	81	92	94	90	85

V Coaxial Port	Frequency (GHz)	0.04	2	20	40	50	65
	Max Signal into Port 2 (dBm)	30	30	30	30	30	30
	Port 1 Power, Typical (dBm)	0	5	-2	-7	-2	-2
	Noise Floor (dBm)	-77	-105	-97	-95	-87	-77
	System Dynamic Range (dB)	77	110	95	88	85	75
	Receiver Dynamic Range (dB)	107	135	127	125	117	107

WR-10 Waveguide	Frequency (GHz)	65	75	85	100	110
	Max Signal into Port 2 (dBm)	8	8	8	8	8
	Port 1 Power, Typical (dBm)	-6	-4	-6	-5	-7
	Noise Floor (dBm)	-73	-84	-86	-82	-77
	System Dynamic Range (dB)	67	80	80	77	70
	Receiver Dynamic Range (dB)	81	92	94	90	85

System dynamic range is defined as the ratio of the typical power at Port 1 and the system noise floor.
The noise floor measurement is made using 512 averages in a 100 Hz IF bandwidth, including isolation calibration.

Measurement Time for 101 Data Points (typical)

Frequency Span	40 MHz to 110 GHz
Time (s)	1.5

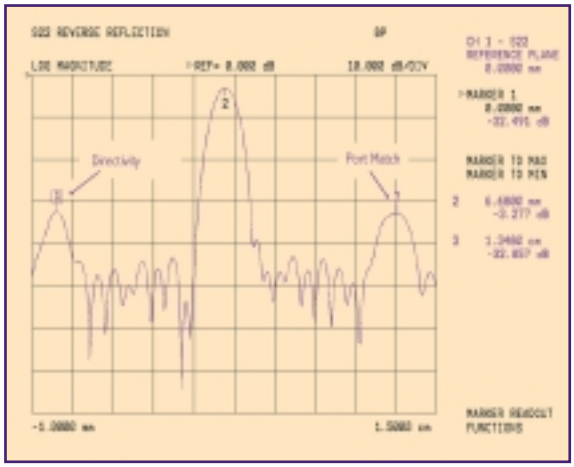
Measurement time is based on a single 40 MHz to 110 GHz sweep with 10 kHz IF bandwidth (no averages) after full 12-term calibration. Sweep time includes retrace and band switch times.

Compatibility with Probe Stations

Anritsu's VNAs are fully compatible with Karl Suss wafer probe stations and GGB Industries Picoprobe® tips. Contact your local sales representative to schedule a factory demonstration of on-wafer measurements with the ME7808A, the Karl Suss PA200 semi-automatic probe system, SussCal calibration software, GGB Industries 110 GHz probes and calibration substrates.

Cascade Microtech's probe stations and WinCal™ calibration software also support Anritsu VNAs.

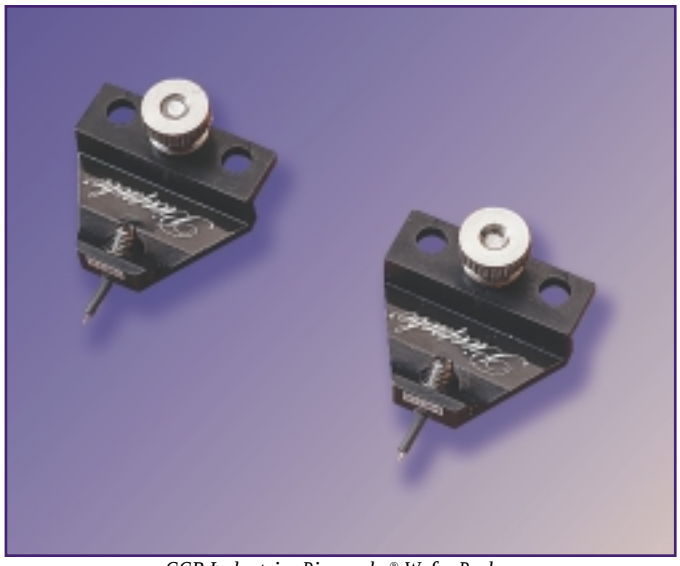
For parameter extraction and device modeling, an EEsof IC-CAP driver is available for the ME7808A.



Time domain measurement of a 6600 micrometer open-ended transmission line showing composite directivity and port match after an on-wafer calibration

BROADBAND VNA OPTIONS AND ACCESSORIES

Anritsu offers a complete line of accessories for on-wafer and coaxial measurements including test port cables, calibration kits, adapters, and high frequency probes.



GGB Industries Picoprobe® Wafer Probes

Options

- ❑ Option 14, Split-Band (Microwave/mmW) VNA, replaces 65 GHz (37397C) with 50 GHz (37377C) VNA, deletes multiplexing coupler and 65 to 110 GHz mmW modules. Select desired mmW modules separately.

Millimeter-Wave Modules

- ❑ Transmission/Reflection Module, 50 to 75 GHz
- ❑ Transmission/Reflection Module, 60 to 90 GHz
- ❑ Transmission/Reflection Module, 56 to 94 GHz
- ❑ Transmission/Reflection Module, 65 to 110 GHz
- ❑ Transmission/Reflection Module, 75 to 110 GHz
- ❑ Transmission/Reflection Module, 90 to 140 GHz

Test Port Cables

- ❑ Flexible, V female to V male
- ❑ Semi-rigid, V female to V male
- ❑ Semi-rigid, W1 male to W1 male

Calibration Kits

- ❑ V-connector calibration kit with sliding terminations
- ❑ WR-10 waveguide calibration kit
- ❑ WR-10 waveguide calibration kit with sliding terminations

Adapters

Coaxial

- ❑ W1 male to V male
- ❑ W1 male to V female
- ❑ W1 female to V male
- ❑ W1 female to V female
- ❑ W1 male to W1 male
- ❑ W1 male to W1 female
- ❑ W1 female to W1 female

Waveguide to coaxial

- ❑ WR-10 to W1 male
- ❑ WR-10 to W1 female

On-Wafer Test Probes and Substrates (GGB Picoprobe®)

- ❑ 110 GHz wafer probe, W1 female
- ❑ 67 GHz wafer probe, V female
- ❑ Extended W band wafer probe, WR10
- ❑ Extended W band wafer probe, WR10, with bias tee
- ❑ Calibration substrate

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