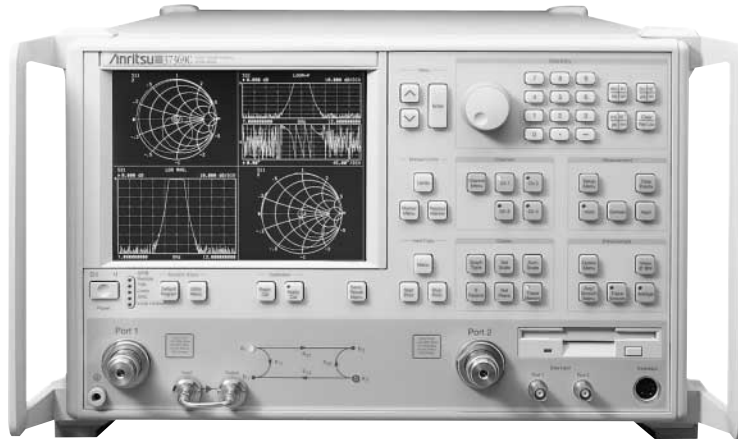


VECTOR NETWORK ANALYZERS 37100C, 37200C, 37300C Series

22.5 MHz to 65 GHz



For Fast and Accurate S-Parameter Measurements



The 37200C and 37300C series microwave vector network analyzers (VNAs) are high performance tools designed to make fast and accurate S-parameter measurements across the 22.5 MHz to 65 GHz range. These network analyzers integrate a synthesized source, S-parameter test set, and tuned receiver into a single compact package that is ideal for benchtop testing.

Code named Lightning, the 37200C and 37300C offer new levels of measurement capabilities to speed manufacturing test and increase throughput. Choose the instrument model and options that best suit your application and budget.

The 37200C series is designed for passive device measurements, while the 37300C series adds active device measurement capabilities. Five microwave models are available from 40 MHz to 13.5, 20, 40, 50, or 65 GHz.

The 37100C series microwave vector network analyzers are configured as direct-access receivers for antenna, frequency conversion, and multiple output device measurements. The 37100C offers ultimate flexibility to meet most receiver measurement needs while maintaining the ability to measure all four S parameters with the addition of a reflectometer setup at the front end of the receiver.

The 37100C series offers two wide-band microwave models covering the 22.5 MHz to 20 GHz or 40 GHz ranges.

Features

• Next generation VNA technology

The 37100C/37200C/37300C series incorporates a higher speed processor and faster power sweep capability.

• High speed data transfer and control

For maximum efficiency, dual GPIB ports are standard on every 37100C/37200C/37300C series VNA. High-speed transfers across the analyzer's IEEE 488.2 GPIB bus minimize data collection times. The second GPIB port is dedicated to control of peripheral devices such as printers, plotters, power meters, and frequency synthesizers. The 37100C/37200C/37300C series maximizes throughput by combining fast, error-corrected sweeps with high-speed data transfers. Measurement throughput for the 37100C/37200C/37300C series ranks as the fastest of any microwave analyzer in the industry.

• Compact size

The 37200C/37300C series analyzers integrate a fast sweeping synthesized source, auto-reversing S-parameter test set, and four-

channel receiver into a single compact package. The 37100C series analyzers integrate a fast sweeping synthesized source and four-channel receiver into a single compact package and provides direct access to all four receiver samplers via the front panel. Components within the analyzer have been integrated to reduce cost and weight and improve the instrument's long-term reliability. Despite its small size, the 37100C/37200C/37300C series analyzers rival the performance normally found in larger, more expensive vector systems.

• Built-in mass storage

Testing devices with multiple setups is now easier. A built-in hard disk drive rapidly stores and recalls frequently used front panel setups and calibrations. Store your complete test setup including limit lines and frequency markers. Create descriptive file names to assist multiple users or device types. The high storage capability of the internal hard disk means there is space for literally hundreds of calibrations, front panel setups, and data traces. In secure environments, the internal hard disk can be removed and either an external drive on the SCSI port or the internal 1.44 MB floppy drive can be used for uploading proprietary setups.

• Fast synthesized sweeps

Measurement update rates of less than 2 ms per point are possible with the 37100C/37200C/37300C series analyzers. Each data point is fully phase-locked and vector-error-corrected for optimum accuracy. Realize near real-time updates with the instrument's tune mode. The internal source frequency resolution of 1 Hz facilitates narrow-band device measurements.

• Time domain analysis

Analyze impedance discontinuities as a function of time or distance with the 37100C/37200C/37300C's high-speed time domain (Option 2A). Isolate individual reflections in time and evaluate their effects in the frequency domain. Remove the effects of device packages and fixturing with time domain gating to see the actual performance of your designs. Use the independent display channels to view the response of your designs before, during, and after time domain processing. The software provides four different windowing functions to optimize dynamic range and resolution. The exclusive phasor impulse mode will show you the true impedance characteristics of mismatches in waveguide, microstrip, and other band-limited media.

● Multiple source control

Conveniently test mixers and multipliers through the 37100C/37200C/37300C's multiple source control. Separately control the frequency of two sources and a receiver without the need for an external controller. Independently specify the sweep ranges and output powers of the sources and the sweep range of the receiver to accommodate testing of frequency translation devices.

● LabVIEW® compatibility

Standard with every 37100C/37200C/37300C series analyzer is National Instruments LabVIEW® instrument driver. Create custom test programs (virtual instruments) in less time with LabVIEW®'s graphical programming environment. Take advantage of the network analyzer's high data throughput for tuning operations. Fast data transfers over GPIB permit near realtime updates on your PC's display. Customize programs to automatically display, test, and document measurement results. Reuse virtual instruments in other test routines to minimize program development time. LabVIEW® gives you full access to more than 900 mnemonics in the 37100C/37200C/37300C analyzer's command set for complete automated data collection and analysis.

● Internally controlled AutoCal®

One source of potential errors and inaccuracies in any network analyzer system is the calibration of that system. The Anritsu AutoCal automatic calibrator is designed to speed and simplify the calibration of your 37200C/37300C VNA. Using the built-in software support and an AutoCal module connected to the serial port on the rear panel of the instrument, you are ready to make fast, accurate, and repeatable calibrations.

● Three-year factory warranty

All 37100C/37200C/37300C series VNAs are backed with a no-questions-asked three-year warranty.

● Upgradeability

The 37100C/37200C/37300C series analyzers are designed to accommodate higher frequency ranges and more powerful features as your requirements grow. Any 37100C/37200C/37300C series VNA can be upgraded to any other model in the instrument family, or any other series, to fit your changing requirements. Contact Anritsu Customer Service to request an upgrade and an Anritsu service engineer will install the added capability and verify your system's total performance. Upgradeability is a cost-effective approach to satisfying today's production needs while providing the flexibility to meet tomorrow's demands. System software upgrades are as easy as inserting new discs into the instrument's floppy drive.

Applications

● Filters

Let the analyzer's wide dynamic range show you filter rejection and input match on the same display. Overlay traces and tune for optimum transmission and group delay responses without reduction in sweep speed.

Further speed improvements are possible using the instrument's tune mode. This unique feature helps users optimize sweep times in one direction for better hand-to-eye tuning while maintaining a 12-term corrected S-parameter display. Anritsu's tune mode maximizes sweep speed and accuracy, simultaneously, by allowing you to choose when reverse parameters are updated.

Automatically locate filter center frequency, 3 dB bandwidth, max/min insertion loss, Q, and shape factor. Instantly measure passband phase distortions with Anritsu's automatic reference plane extension capability. A single key press quickly identifies filter non-linear phase responses.

● Amplifiers (available on 37300C series only)

Easily measure amplifier gain compression vs. input power or frequency. Power meter assisted linearity and flat output power calibration combined with a receiver port calibration provides capability to measure output power in dBm. A 1 watt, 70 dB (60 dB on >40 GHz models) step attenuator in the port 1 path, and a 40 dB step attenu-

ator in the port 2 path, coupled with 20 dB ALC range, give complete control to characterize virtually any amplifier. This range is reduced to 12 dB at frequencies >50 GHz. Internal bias tees simplify DC biasing of your active designs. A front panel loop allows external amplifier insertion, increasing port 1 power up to 1 watt maximum for high input power amplifiers.

● Mixers

Mixers as multiport devices take advantage of the multiple source control and set-on receiver mode features.

The 37100C/37200C/37300C can be configured to measure the relative harmonic level of test devices with set-on receiver mode capability. The 37100C/37200C/37300C's unique phase locking scheme allows it to operate as a tuned receiver by locking all of its local oscillators to its internal crystal reference oscillator. Set-on receiver mode capability significantly increases the versatility of the 37100C/37200C/37300C VNA in applications that check for harmonics, intermodulation products, and signals of known frequency.

Multiple source control capability allows a user to independently control the frequencies of two sources and the receiver without the need for an external controller. The frequency ranges and output powers of the two sources may be specified. A frequency sweep may be comprised of up to five separate bands, each with independent source and receiver settings, for convenient testing of frequency translation devices such as mixers. Up to five sub-bands may be tested in one sweep. This feature enables users to easily test mixers, up/down converters, multipliers, and other frequency conversion devices.

● Microstrip devices

The 37200C/37300C series offers complete substrate measurement solutions for both microstrip and coplanar waveguide (CPW) designs. The 37200C/37300C series analyzers accommodate the model 3680 series Universal Test Fixtures (UTF), calibration kits, and verification kits. Guaranteed system specifications provide assurance that your test results are accurate and verifiable.

Completely characterize connectorless devices with the 37200C/37300C's Line-Reflect-Line (LRL) and Line-Reflect-Match (LRM) calibration capability. The four channel design provides true LRL/LRM error-correction giving you the highest performance available for in-fixture measurements. Highly reflective devices, along with well matched ones are measured with the same degree of ease. Automatic dispersion compensation improves measurement accuracy to help you determine phase distortions in all your microstrip designs. The result is quality measurements you can count on for your connectorless devices.

● E/O and O/E devices

The 37200C/37300C series incorporates a de-embedding function that simplifies VNA calibration when measuring E/O and O/E devices. Characterize the transfer function, group delay, and return loss of optical modulators (E/O) and photodiode receivers (O/E).

A characterized photodiode (O/E) reference and a laser source are required to complete the test set-up. The internal VNA application de-embeds the response of the O/E reference to allow direct measurement of the modulator. For O/E measurements, use a photodiode reference to characterize a modulator first, then use the modulator as the characterized reference to measure another photoreceiver.

● Antennas

Far field measurements are enhanced with the speed of taking data over GPIB, using the 37100C/37200C/37300C in fast CW mode. Rates of 0.8 ms/point can be achieved using internal triggering, 1.2 ms/point with external triggering, and 1.5 ms/point with GPIB triggering.

For near field measurements, internal buffer data collection is provided to allow saving active channel measurement data from multiple sweeps without having to synchronize and collect data at the end of each sweep. The 37100C/37200C/37300C can store up to 50,000 data point measurements, each consisting of two real and imaginary IEEE 754 4-byte floating point numbers.

Specifications

Measurement capabilities	Number of channels	Four measurement channels
	Parameters	S ₁₁ , S ₂₁ , S ₁₂ , S ₂₂ , or user defined; analog voltage input; complex input and output impedance; complex input and output admittance; complex forward and reverse transmission
	Domains	Frequency domain, CW draw, and optional high speed time domain (Option 2A)
	Formats	Log magnitude, phase, log magnitude and phase, Smith chart (impedance), Smith chart (admittance), linear polar, log polar, group delay, linear magnitude, linear magnitude and phase, real, imaginary, real and imaginary, and SWR
	Data points	1601 maximum. System also accepts an arbitrary set of N discrete data points where 2 ≤ N ≤ 1601. CW mode permits selection of a single point.
	Reference delay	Can be entered in time or in distance. Automatic reference delay adds the correct electrical length compensation at the push of a button. Software compensation for the electrical length difference between the reference and test is accurate and stable since measurement frequencies are always synthesized.
	Reference offset	Magnitude and phase
	Markers	Six independent markers can be used to read out measurement data. In delta-reference mode, any one marker can be selected as the reference for the other five. Markers can automatically find critical filter parameters i.e. 3 dB bandwidth, loss, center frequency, shape factor and Q.
	Marker sweep	Sweeps upward in frequency between any two markers. Recalibration is not required during the marker sweep.
	Limits	Two limit lines per data trace to indicate test limits. Limits can be either single or segmented limits for testing devices pass-fail.
	Measurement dynamic range	Table 1 gives receiver dynamic range as the ratio of maximum signal level at Port 2 (or individual sampler input) to the noise floor.
	Data averaging	Averaging of 1 to 4096 averages per data point can be selected.
	IF bandwidth	Front panel switch selects four levels of IF bandwidth: 10 kHz, 1 kHz, 100 Hz and 10 Hz
Display capabilities	Display channels	1, 2, 3 or 4 channels can be displayed. Each channel can display any S-parameter or user defined parameter in any format with up to two traces per channel for a maximum of eight traces simultaneously.
	Display type	Color LCD, 8.5" diagonally, VGA display. Color of graticule, trace data and text are user definable.
	Trace overlay	Overlays two traces with the same graticule type on the same display
	Trace memory	A separate memory for each channel can be used to store measurement data for later display or subtraction, addition, multiplication or division.
	Scale resolution	Log mag: 0.001 dB, linear mag: 1 pU Phase: 0.01°, group delay: 0.001 ps Time: 0.001 ms, distance: 0.1 mm SWR: 1 pU Power: 0.05 dB
	Autoscale	Automatically sets resolution and offset to display measurement data on the full display
	Reference position	Settable to any graticule line
	Annotation	Type of measurement, vertical and horizontal scale resolution, start and stop frequencies and reference position
Vector error correction	Error correction models	Full 12-term, one-path two-port, reflection only, transmission response
	LRL/LRM	Line-Reflect-Line and Line-Reflect-Match calibration models are available for coaxial, microstrip and waveguide transmission lines.
Signal source capabilities	Source power level	Source power may be set from the 37100C/37200C/37300C front panel menu. Check table 2 for levels.
	Flat power correction	The 37100C/37200C/37300C corrects for test port power variations using an external power meter. Once the port power has been flattened, the power meter is removed and the signal source power level may be changed within the remaining power adjustment range.
	Multiple source control	Allows a user to separately control the frequency of two sources and receiver without need for an external controller. Source #1: 37200C/37300C internal source, or any 68000C, 69000B, or MG3690A synthesizer Source #2: Any 68000C, 69000B, or MG3690A synthesizer Receiver: 37200C/37300C internal receiver
	Internal 10 MHz time base stability	Standard (1 Hz resolution) With aging: <1 x 10 ⁻⁹ /day With temperature: <5 x 10 ⁻⁹ over 0° to 55°C
Hard copy	Printers	Select full screen, graphical, tabular data, and printer type. Compatible with most HP and Epson printers with a parallel (Centronics) interface
	GPIB plotters	Compatible with most HP and Tektronix plotters
	Disk file	Bitmap, S2P, text, tabular data, and HPGL
Storage	Internal memory	Ten front panel states (setup) can be stored and recalled from non-volatile memory locations.
	Internal hard disk drive	Store and recall instrument setups, calibration files and trace data files. All files are MS-DOS compatible.
	Internal floppy disk drive	Store and recall instrument setups, calibration files and trace data files from 3.5 inch 1.44 MB floppy disks. All files are MS-DOS compatible.
Remote programming	Interface	GPIB (IEEE 488.2)
	Addressing	Address can be set from the front panel and can range from 1 to 30.
	Transfer formats	ASCII, 32-bit floating point and 64-bit floating point
	Speed	150 kB/sec
	Interface function codes	SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP1, DT1, DC0, C0
General	Test ports	GPC-7, 3.5 mm, N-type, K, and V connectors supported
	Power requirements	85 to 240 V, 48 to 63 Hz, 540 VA maximum
	Dimensions	432 (W) x 267 (H) x 585 (D) mm (10.5 x 17 x 23 in)
	Mass	27 kg (60 lbs)
	Temperature	0° to 50°C (operate), -40° to 75°C (storage)

Table 1a Dynamic range (37100C)

Model	Frequency (GHz)	Max. signal into a _x , b _x (dBm)	Noise floor (dBm)	Receiver dynamic range (dB)	Source power (dBm, typical)
37147C	0.0225	-18	-122	104	10
	2	-12	-106	94	8
	20	-12	-103	91	5
37169C	0.0225	-18	-122	104	10
	2	-12	-106	94	8
	20	-12	-103	91	3
	40	-15	-100	85	-3

Table 1b Dynamic range (37200C/37300C)

Model	Frequency (GHz)	Max. signal into port 2 (dBm)	Noise floor (dBm)	Receiver dynamic range (dB)	Port 1 power (dBm, typical)	System dynamic range (dB)
37225C	0.04	+20	-70	90	0	70
	2	+3	-98	101	0	98
	13.5	+3	-98	101	0	98
37247C	0.04	+20	-70	90	0	70
	2	+3	-98	101	0	98
	20	+3	-96	99	0	96
37269C	0.04	+20	-70	90	0	70
	2	+3	-98	101	0	98
	20	+3	-95	98	-5	90
	40	+3	-93	96	-15	78
37277C	0.04	+20	-77	97	0	77
	2	+3	-105	108	+5	110
	20	+3	-97	100	-2	95
	40	+3	-95	98	-7	88
	50	+3	-87	90	-2	85
37297C	0.04	+20	-77	97	0	77
	2	+3	-105	108	+5	110
	20	+3	-97	100	-2	95
	40	+3	-95	98	-7	88
	50	+3	-87	90	-2	85
	65	+3	-77	80	-2	75
37325C	0.04	+30	-65	95	+5	70
	2	+30	-93	123	+5	98
	13.5	+30	-93	123	+5	98
37347C	0.04	+30	-65	95	+5	70
	2	+30	-93	123	+5	98
	20	+30	-91	121	+5	96
37369C	0.04	+30	-65	95	0	70
	2	+30	-93	123	+5	98
	20	+30	-90	120	0	90
	40	+30	-83	113	-7	76
37377C	0.04	+30	-77	107	0	77
	2	+30	-105	135	+5	110
	20	+30	-97	127	-2	95
	40	+30	-95	125	-7	88
	50	+30	-87	117	-2	85
37397C	0.04	+30	-77	107	0	77
	2	+30	-105	135	+5	110
	20	+30	-97	127	-2	95
	40	+30	-95	125	-7	88
	50	+30	-87	117	-2	85
	65	+30	-77	107	-2	75

Table 2 Power range

Model	Rated power (dBm)	Minimum power (dBm)	Resolution (dB)
37147C	+5	−15	0.05
37169C	−3	−23	
37225C	0	−20	
37247C			
37269C	−15	−27	
37277C	−7	−27	
37297C	−7	−19	
37325C	+5	−90	
37347C			
37369C	−7	−97	
37377C	−7	−87	
37397C	−7	−79	

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Main frame
37147C	Direct Access Receiver (22.5 MHz to 20 GHz)
37169C	Direct Access Receiver (22.5 MHz to 40 GHz)
37225C	Vector Network Analyzer (40 MHz to 13.5 GHz)
37247C	Vector Network Analyzer (40 MHz to 20 GHz)
37269C	Vector Network Analyzer (40 MHz to 40 GHz)
37277C	Vector Network Analyzer (40 MHz to 50 GHz)
37297C	Vector Network Analyzer (40 MHz to 65 GHz)
37325C	Vector Network Analyzer (40 MHz to 13.5 GHz)
37347C	Vector Network Analyzer (40 MHz to 20 GHz)
37369C	Vector Network Analyzer (40 MHz to 40 GHz)
37377C	Vector Network Analyzer (40 MHz to 50 GHz)
37397C	Vector Network Analyzer (40 MHz to 65 GHz)
	Options
Option 1	Rack mount kit with slides
Option 1A	Rack mount kit with handles
Option 2A	High-speed time (distance) domain capability
Option 4	External SCSI-2 hard disk drive compatibility (internal HDD removed)
Option 7A	Replaces universal K connector (standard) with universal GPC-7 (37200C/37300C only)
Option 7N	Replaces universal K connector (standard) with universal N-male (37200C/37300C only)
Option 7NF	Replaces universal K connector (standard) with universal N-female (37200C/37300C only)
Option 7S	Replaces universal K connector (standard) with universal 3.5 mm-male (37200C/37300C only)
Option 7K	Replaces universal V connector (standard) with universal K (m) (37277C/37297C/37377C/37397C models only)
Option 11	Reference loop extension cables (standard on 37300C series)
Option 12	Rear Panel IF Inputs (for 37x97C and 37x77C only). Required for upgrade to ME7808A Broadband VNA.
	Calibration kits
3650	SMA/3.5 mm Calibration Kit
Option 1	Adds sliding terminations
3651	GPC-7 Calibration Kit
Option 1	Adds sliding terminations
3652	K Connector Calibration Kit
Option 1	Adds sliding terminations
3653	Type N Calibration Kit
3654B	V Connector Calibration Kit with sliding terminations
36581NNF	AutoCal, N (m) to N (f), 40 MHz to 18 GHz
36581KKF	AutoCal, K (m) to K (f), 40 MHz to 20 GHz
36582KKF	AutoCal, K (m) to K (f), 40 MHz to 40 GHz

Model/Order No.	Name
	Verification kits
3663	Type N Verification Kit
3666	SMA/3.5 mm Verification Kit
3667	GPC-7 Verification Kit
3668	K Connector Verification Kit
3669B	V Connector Verification Kit
	Test port cables
3670A50-1	GPC-7 semi-rigid cable, 1 foot
3670A50-2	GPC-7 semi-rigid cable, 2 foot
3670K50-1	K connector semi-rigid cable, 1 foot
3670K50-2	K connector semi-rigid cable, 2 foot
3670V50-1	V connector semi-rigid cable, 1 foot
3670V50-2	V connector semi-rigid cable, 2 foot
3671A50-1	GPC-7 flexible cables, 25 in. (1 pair)
3671A50-2	GPC-7 flexible cables, 38 in.
3671S50-1	3.5 mm flexible cables, 25 in. (1 pair)
3671S50-2	3.5 mm flexible cables, 38 in.
3671K50-1	K connector flexible cables, 25 in. (1 pair)
3671K50-2	K connector flexible cables, 38 in.
3671V50-3	V connector flexible cable, 25 in. (1 pair)
3671V50-4	V connector flexible cable, 38 in.

* Call your Anritsu representative for 50 and 65 GHz upgrades.

MILLIMETER WAVE VECTOR NETWORK ANALYZER

37000 Family

33 to 140 GHz



High Performance Millimeter Wave Vector Network Analysis



The 37000 family millimeter wave vector network analyzer (VNA) extends the exceptional performance of the Lightning VNA family to 140 GHz. This improvement to our original millimeter wave system, based on the 360B VNA, continues our commitment to providing the highest quality microwave and millimeter wave test equipment available while still maintaining an intuitive user interface. The minimum configuration for the millimeter wave VNA has a 37147C VNA, a 3735B Test Set, two synthesized sources, and a pair of millimeter heads.

Features

• Measurement speed and accuracy

The millimeter wave VNA, based on our popular Lightning 37000 platform, offers the fastest measurement speed available in a millimeter wave VNA. Measurement speed of approximately 20 ms per point for an 801 data point sweep means faster tuning and throughput for your millimeter wave devices. The millimeter wave system also offers full auto-reversing, 12-term, error-corrected S-parameter measurements that enable advanced calibration techniques such as Line-Reflect-Line (LRL), Line-Reflect-Match (LRM), and Thru-Reflect-Match (TRM) to be used for maximum accuracy in your on-wafer measurements. For waveguide measurements, the millimeter wave system supports all of the above methods as well as the off-set short calibration technique. The 8.5 inch, color liquid crystal display (LCD) allows users to easily view the data traces for all four S-parameters while simultaneously displaying limit lines and trace memory functions. The built-in 3.5 inch MS-DOS® compatible floppy disk drive and internal hard disk drive simplify the procedure to both store and recall calibrations, front panel setups, and measurement data. The versatility of the Lightning platform allows data to be gathered using the *.s2p, *.txt, *.dat, *.bmp, and the *.hgl file format so data can be easily loaded into both circuit simulation and graphics programs.

• The most dynamic range in a millimeter VNA

Increased dynamic range relates directly to increased measurement accuracy and confidence when measuring millimeter wave components and subsystems. To achieve optimum measurement speed and dynamic range for your measurements, the Lightning millimeter wave VNA allows the number of measurement averages and video IF bandwidth to be varied. The Lightning millimeter wave VNA system dynamic range is typically 15 dB better than comparable VNAs,

and noise floor specifications are measured with 512 averages not 1024 averages — an important point to consider when making comparisons. Simply stated, the Lightning millimeter wave system provides the best dynamic range with sweep speeds twice as fast as comparable instruments.

• Flexible configuration in waveguide and coax

Our flexible module configurations let you specify the capability of your millimeter wave VNA. We offer two versions of millimeter wave heads that allow you to tailor the Lightning based millimeter system to your exact measurement needs. The 3740A series transmission/reflection modules have simultaneous transmission and reflection capability, while the 3741A series transmission only module is used when reflection measurements are not required. A pair of 3740A modules allows measurement of all four S-parameters. A 3740A transmission/reflection module combined with a 3741A Transmission Only module allows measurement of one-path/two port S-parameters (S_{11} and S_{21}).

A single 3740A transmission/reflection module can be used for S_{11} reflection measurements. The 3740A series also provides the smallest footprint and lightest weight of any millimeter wave test head on the market today. This greatly simplifies your test setup; regardless of whether you are manually adjusting the head position for waveguide measurements or have attached them to a wafer probe station. In order to maximize the flexibility of your VNA, the system architecture provides for a smooth transition between your waveguide and coaxial device measurements. Simply add a coaxial test set to your system and now you have the capabilities to fully characterize your active and passive coaxial devices up to 40 GHz.

• Complete measurement solutions

In addition to the millimeter wave VNA measurement system, Anritsu offers a full line of power meters and synthesized signal generators up to 110 GHz. To complete your millimeter wave measurement setup, Anritsu also offers solutions for waveguide, on-wafer, and even coaxial applications. With our custom design and manufacturing capabilities, we have developed 110 GHz coaxial connectors, couplers, adapters, and even test fixtures for use in your millimeter wave test set-ups.

Specifications

• System performance

Waveguide designation	Q-Band (WR-22)	V-Band (WR-15)	E-Band (WR-12)	Extended E-Band	W-Band (WR-10)	Extended W-Band	F-Band (WR-8)
Frequency range (GHz)	33 to 50	50 to 75	60 to 90	56 to 60 60 to 85 85 to 94	75 to 100 100 to 110	65 to 75 75 to 100 100 to 110	90 to 115 115 to 140
Maximum signal into port 2 (dBm)	+10	+8	+8	+8	+6	+6	+4
Noise floor (dBm)	−93	−90	−90	−85 −90 −76	−90 −90	−90 −89 −87	−88 −87
Receiver dynamic range (dB)* ¹	103	98	98	93 98 84	96 96	96 95 93	92 91
High level noise (dB, typical)	.02	.05	.06	.08	.06	.08	.08
Power @ DUT (dBm, typical)	+7	+7	+6	+5 +6 +4	+5 +2	−5 +5 +2	−3 −7
System dynamic range (dB)* ²	100	97	96	90 96 80	95 92	85 94 89	85 80

*1: "Receiver dynamic range" is defined as the ratio of the maximum signal level at Port 2 for 0.1 dB compression to the system noise floor.

*2: "System dynamic range" is defined as the ratio of the power at Port 1 and the system noise floor (forward measurements only).

• Test port characteristics

Waveguide designation	Offset short calibration* ¹						
	Q-Band (WR-22)	V-Band (WR-15)	E-Band (WR-12)	Extended E-Band	W-Band (WR-10)	Extended W-Band	F-Band (WR-8)
Frequency (GHz)	33 to 50	50 to 75	60 to 90	56 to 94	75 to 110	65 to 110	90 to 140
Directivity (dB)	>50	>50	>46	>44	>46	>40	>45
Source match (dB)	>45	>37	>36	>33	>36	>30	>34
Load match (dB)	>50	>50	>46	>44	>46	>40	>45
Reflection frequency tracking (dB)	±0.010	±0.030	±0.040	±0.080	±0.040	±0.080	±0.060
Transmission frequency tracking (dB)	±0.010	±0.060	±0.060	±0.1	±0.070	±0.1	±0.1
Isolation (dB)	>100	>90	>90	>80	>90	>80	>80

Waveguide designation	LRL calibration* ¹						
	Q-Band (WR-22)	V-Band (WR-15)	E-Band (WR-12)	Extended E-Band	W-Band (WR-10)	Extended W-Band	F-Band (WR-8)
Frequency (GHz)	33 to 50	50 to 75	60 to 90	56 to 94	75 to 110	65 to 110	90 to 140
Directivity (dB)	>50	>50	>46	>44	>46	>40	>45
Source match (dB)	>50	>50	>46	>43	>46	>40	>45
Load match (dB)	>50	>50	>46	>44	>46	>40	>45
Reflection frequency tracking (dB)	±0.002	±0.002	±0.002	±0.006	±0.002	±0.006	±0.004
Transmission frequency tracking (dB)	±0.002	±0.002	±0.002	±0.006	±0.002	±0.006	±0.004
Isolation (dB)	>100	>90	>90	>80	>90	>80	>80

*1: At 23 ±3°C using the offset short calibration method with a sliding load or LRL calibration method (as noted) to achieve 12-term error correction.

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
37147C	Main frame
37169C	Vector Network Analyzer (22.5 MHz to 20 GHz)
	Vector Network Analyzer (22.5 MHz to 40 GHz)
	Options (for VNA)
Option 1	Rack mount with track slides
Option 1A	Rack mount kit with handles
Option 2A	High-speed time (distance) domain capability
Option 4	External SCSI-2 hard disk drive compatibility
Option 13	Delete internal source
	Millimeter wave test set
3735B	Millimeter wave test set
3700C3	System console
	Options (for test set)
Option 1	Rack mount kit with track slides
Option 1A	Rack mount kit with handles
	Millimeter wave modules*1
3740A-Q	Transmission/reflection module (33 to 50 GHz, WR-22)
3740A-V	Transmission/reflection module (50 to 75 GHz, WR-15)
3740A-E	Transmission/reflection module (60 to 90 GHz, WR-12)
3740A-EE	Transmission/reflection module (56 to 94 GHz, WR-12)
3740A-W	Transmission/reflection module (75 to 110 GHz, WR-10)
3740A-EW	Transmission/reflection module (65 to 110 GHz, WR-10)
3740A-F	Transmission/reflection module (90 to 140 GHz, WR-8)
3741A-Q	Transmission only modules (33 to 50 GHz, WR-22)
3741A-V	Transmission only modules (50 to 75 GHz, WR-15)
3741A-E	Transmission only modules (60 to 90 GHz, WR-12)
3741A-EE	Transmission only modules (56 to 94 GHz, WR-12)
3741A-W	Transmission only modules (75 to 110 GHz, WR-10)
3741A-EW	Transmission only modules (65 to 110 GHz, WR-10)
3741A-F	Transmission only modules (90 to 140 GHz, WR-8)
	Synthesizers*2
MG3692A	Synthesized CW generator, 2 to 20 GHz
MG3693A	Synthesized CW generator, 2 to 30 GHz
MG3694A	Synthesized CW generator, 2 to 40 GHz
	Options (for signal source)
Option 1	Rack mount kit with track slides
Option 1A	Rack mount kit with handles
Option 11	0.1 Hz frequency resolution
Option 14	VNA console mounting
Option 15A*2	High power output
Option 17B	Delete front panel
	Calibration kits*3
3655Q	WR-22 Waveguide (33 to 50 GHz)
Option 1	Adds sliding termination
3655V	WR-15 Waveguide (50 to 75 GHz)
Option 1	Adds sliding termination
3655E	WR-12 Waveguide (60 to 90 GHz)
Option 1	Adds sliding termination
3655W	WR-10 Waveguide (75 to 110 GHz)
Option 1	Adds sliding termination
3655F	WR-8 Waveguide (90 to 140 GHz)
Option 1	Adds sliding termination

*1: The millimeter wave VNA requires that at least one of the two modules is a transmission/reflection type.

*2: One of the synthesizers must have Option 15A for millimeter wave operation.

*3: Consisting of: Short, fixed (2 each)
Shim, 1/4 wavelength and 3/8 wavelength
Termination, fixed (2 each)
Test port section (2 each)