

VECTOR NETWORK ANALYZER
37200A
 22.5 MHz to 40 GHz



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The 37200A Series Microwave Vector Network Analyzers are high performance tools designed to make fast and accurate S-parameter measurements across the 22.5 MHz to 40 GHz range. New instrument models 37211A, 37217A, 37225A, 37247A and 37269A offer new levels of measurement capabilities to speed manufacturing test and increase throughput. Choose from the variety of new instrument models the one that best suits your application and budget.

The 37211A and 37217A are economical choices for quasi-microwave component testing up to 3 and 8.6 GHz. Broader frequency solutions to 13.5, 20 and 40 GHz are available in microwave models 37225A, 37247A, and 37269A, respectively. These three microwave units have been developed to address the needs of satellite, terrestrial microwave and radar manufacturers.

Features

• **High throughput measurements**

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

• **Compact size**

The 37200A series analyzers integrate a fast sweeping synthesized source, auto-reversing S-parameter test set and four channel receiver into a single compact package. Components within the analyzer have been integrated to reduce cost, weight and improve the instrument's long-term reliability. Despite its small size, the 37200A series analyzers rival the performance normally found in 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 1.44 MByte MS-DOS floppy drive can be used for uploading proprietary setups.

• **Fast synthesized sweeps**

Measurement update rates of less than 3 ms per point are possible with these new 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 kHz satisfies most wide and narrowband requirements. Devices requiring more frequency definition can be evaluated with 1 Hz frequency resolution (Option 3).

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 sweeps in one direction for better hand-to-eye tuning while maintaining a 12-term corrected S-parameter display. Anritsu Wiltron's Tune Mode maximizes sweep speed and accuracy, simultaneously by allowing you to choose when reverse parameters are updated.

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

• **Amplifiers**

Easily characterize amplifiers using the more than 82 dB (0.1 dB steps) of port 1 power control. A 1 watt, 40 dB step attenuator (Option 6) in the port 2 path assists in testing high gain devices by eliminating the need for external pads. Internal bias tees simplify DC biasing of your active designs. For more control in compression measurements, power meter assisted calibrations provide flat output power at the analyzer's test ports.

• Microstrip Devices

The 37200A offers complete substrate measurement solutions for both microstrip and coplanar waveguide (CPW) designs. The 37200A 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 37200A'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.

• Upgradeability

The 37200A series analyzers are designed to accommodate higher frequency ranges and more powerful features as your requirements grow. Any 37200A model can be upgraded to any other model in the instrument family to fit your changing requirements. Simply select the upgrade kit you need and a Anritsu Wiltron 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.

• Time domain analysis

Analyze impedance discontinuities as a function of time or distance with the 37200A's High Speed Time Domain (Option 2). 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. Let Wiltron's exclusive phasor impulse mode show you the true impedance characteristics of mismatches in waveguide, microstrip and other bandlimited media.

• Dual source control

Conveniently test mixers and multipliers through the 37200A's Dual 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 37200A 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 real-time updates on your PC's display. Customize programs to automatically display, test, and document measurement results. Re-use VIs in other test routines to minimize program development time. LabVIEW gives you full access to the more than 900 mnemonics in the 37200A analyzer's command set for complete automated data collection and analysis.

Specifications

Measurement capabilities	Number of channels	Four measurement channels
	Parameters	S11, S21, S12, S22; or user defined, complex input and output impedance; complex input or output admittance; complex forward and reverse transmission
	Domains	Frequency domain, CW draw, and optional High Speed Time Domain
	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 $2 \leq N \leq 501$. 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
	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
Display capabilities	Measurement dynamic range	Table 1 gives dynamic range in two manners. Receiver dynamic range is defined as the ratio of maximum signal level at port 2 for 0.1 dB compression to the noise floor at port 2. System dynamic range is defined as the ratio of the power incident on port 2 in a through line connection to the noise floor at port 2
	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
	CRT	Color, 7.5" 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

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Display capabilities	Scale resolution	Log mag: 0.001 dB, linear mag: 1 pU Phase: 0.01 dB, group delay: 0.001 ps Time: 0.001 ms, distance: 0.001 mm SWR: 1 pU
	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
Measurement enhancement	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.
	Test ports	GPC-7, SMA, GPC-3.5, N-Type, K connectors supported
	Data averaging	Averaging of 1 to 4096 averages per data point can be selected
	Video bandwidth	Front panel switch selects three levels of video IF bandwidth. 10 kHz, 1 kHz, 100 Hz and 10 Hz.
source control	Source power level	Source power may be set from a 37200A front panel menu. The signal level at port 1 or port 2 (optional) can be controlled using the internal step attenuators.
	Flat power correction	The 37200A corrects for test port power variations using an external Hewlett Packard 437B 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.
	Dual source control	Allows a user to separately control the frequency of two sources and receiver without need for an external controller. Source #1: 37200A internal source Source #2: Any 68000B or 6700B synthesizer Receiver: 37200A internal receiver
Frequency accuracy	Internal 10 MHz time base stability	Standard: With aging: $< 1 \times 10^{-6}$ /day With temperature: $< 1 \times 10^{-6}$ over 15° to 50°C Optional: With aging: $< 1 \times 10^{-9}$ /day With temperature: $< 1 \times 10^{-9}$ over 0° to 55°C
Hard copy	Printers	Select full screen, graphical, tabular data, and printer type. Compatible with HP QuietJet, HP Deskjet, HP LaserJet and Epson compatible printers with a parallel (Centronix) interface
	GPIB plotters	Compatible with HP models 7440A, 7470A, 7475A and 7550A Plotters
Data storage	Internal memory	Four front panel states (setup and calibration) can be stored and recalled from non-volatile memory locations
	Internal hard disk drive	250 MByte capacity. Used to store and recall setup and calibration files, trace data and tabular data files. All files are MS-DOS compatible
	Internal floppy disk drive	Stores and recalls setup and calibration files from 3.5 inch 1.44 MByte or 720 KByte 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 0 to 30
	Transfer formats	ASCII, 32-bit floating point and 64-bit floating point
	Speed	62 KBytes/sec
	Interface function codes	SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP1, DT1, DC0, C0
General	Power requirements	85 to 240 volts, 48 to 63 Hz, 540 VA maximum
	Dimensions	267H x 432W x 585D mm (10.5 x 17 x 23 in)
	Mass	34 kg (75 lb)
	Temperature	Operating: 0° to 50°C Storage: -40° to 75°C

Ordering information

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

Model/Order No.	Name	Remarks
37211A	Main frame Vector Network Analyzer	22.5 MHz to 3 GHz
37217A	Vector Network Analyzer	22.5 MHz to 8.6 GHz
37225A	Vector Network Analyzer	40 MHz to 13.5 GHz
37247A	Vector Network Analyzer	40 MHz to 20 GHz
37269A	Vector Network Analyzer	40 MHz to 40 GHz
Option 1A	Options Rack Mount	
Option 2	High Speed Time (Distance) Domain	
Option 3	1 Hz Resolution (Standard on 37217A & 37211A)	
Option 6	Port 2 Step Attenuator	
Option 10	High Stability Time Base	
Option 11	Reference Loop Extension Cables	
ND39533	Upgrades 37211A to 37217A Upgrade	
ND39534	37211A to 37225A Upgrade	
ND39535	37211A to 37247A Upgrade	
ND39536	37211A to 37269A Upgrade	
ND39537	37217A to 37225A Upgrade	
ND39538	37217A to 37247A Upgrade	
ND39539	37217A to 37269A Upgrade	
ND39540	37225A to 37247A Upgrade	
ND39541	37225A to 37269A Upgrade	
ND39542	37247A to 37269A Upgrade	
Option ES32	Extended service support options 3 Year Return to Service Center Cal	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES34	3 Year Return to Service Center Mil-Cal	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES52	5 Year Return to Service Center Cal	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES54	5 Year Return to Service Center Mil-Cal	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES31	On-site support options 3 Year On-site Repair	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES37	3 Year On-site Verification	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES38	3 Year On-site Mil-Std Verification	Models 37211A, 37217A, 37225A, 37247A and 37269A
Option ES51	5 Year On-site Repair	Models 37211A, 37217A, 37225A, 37247A and 37269A