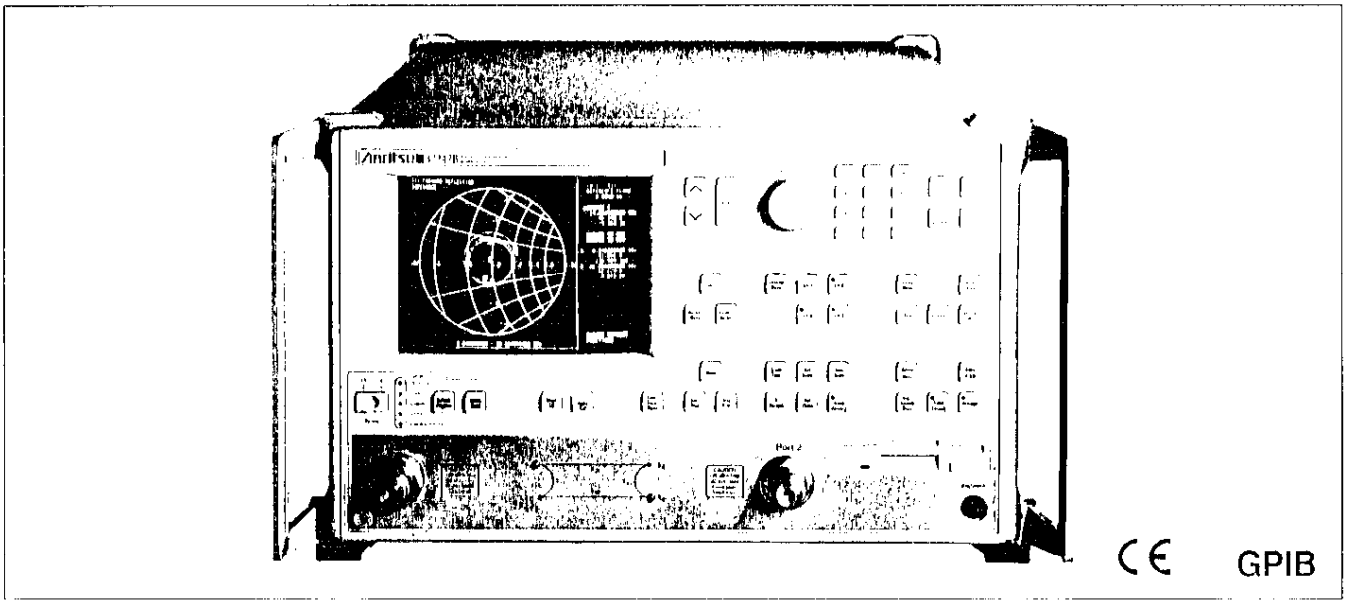
VECTOR NETWORK ANALYZERS
37200B, 37300A series
22.5 MHz to 40 GHz



The 37200B and 37300A 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. Instrument series 37200B and 37300A offer new levels of measurement capabilities to speed manufacturing test and increase throughput. Choose the instrument model that best suits your application and budget from a wide variety.

The 37200B series is designed for passive device measurements, while the 37300A series add active device measurement capabilities. The 37211B/37311A and 37217B/37317A are economical choices for low-microwave component testing up to 3 and 8.6 GHz respectively. Broader frequency solutions to 13.5, 20, and 40 GHz are available in microwave models 37225B/37325A, 37247B/37347A, and 37269B/37369A, respectively.

Features

• High throughput measurements

For maximum efficiency, dual GPIB ports are standard on every 37200B/37300A series. 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 37200B/37300A series maximizes throughput by combining fast, error-corrected sweeps with high-speed data transfers. Measurement throughput for the 37200B/37300A series ranks as the fastest of any microwave analyzer in the industry.

• Compact size

The 37200B/37300A 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 and weight and improve the instrument's long-term reliability. Despite its small size, the 37200B/37300A 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 HDD can be removed and either an external drive on the SCSI port or the internal 1.44 MB 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-connected 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 narrow-band requirements. Devices requiring more frequency definition can be evaluated with 1 Hz frequency resolution (Option 10A).

• Upgradeability

The 37200B/37300A series analyzers are designed to accommodate higher frequency ranges and more powerful features as your requirements grow. Any 37200B/37300A series can be upgraded to any other model in the instrument family, or any other series, to fit your changing requirements. Simply select the upgrade kit you need 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 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, max/min insertion loss 3 dB points, and shape factor. Instantly measure pass-band phase distortions with Anritsu's automatic reference plane extension capability. A single key press quickly identifies filter non-linear responses.

• Amplifiers (available on 37300A series only)
Easily measure amplifier gain compression vs. input power or frequency. Power meter assisted flat output power calibration provides capability to measure power in dBm. A 1 watt, 70 dB step attenuator in the port 1 path, and a 40 dB step attenuator in the port 2 path, coupled with 20 dB AI C range, give complete control to characterize virtually any amplifier. 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 for high input power amplifiers.

• Microstrip devices
The 37200B/37300A series offers complete substrate measurement solutions for both microstrip and coplanar waveguide (CPW) designs. The 37200B/37300A 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 37200B/37300A'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.

• Time domain analysis
Analyze impedance discontinuities as a function of time or distance with the 37200B/37300A'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. The exclusive phasor impulse mode will show you the true impedance characteristics of mismatches in waveguide, microstrip, and other band-limited media.

• Dual source control
Conveniently test mixers and multipliers through the 37200B/37300A'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 37200B/37300A 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 37200B/37300A analyzer's command set for complete automated data collection and analysis.

Specifications

Measurement capabilities	Number of channels	Four measurement channels
	Parameters	S_{11}, S_{21}, S_{12}, S_{22}, 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 $2 \le N \le 501$. 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
	Measurement dynamic range	Table 1 gives receiver dynamic range as the ratio of maximum signal level at a sampler input to the noise floor.
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.
	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.
	Scale resolution	Log mag: 0.001 dB, linear mag: 1 pU Phase: 0.01 dB, group delay: 0.001 ps Time: 0.001 ns, 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

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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 37200B/37300A front panel menu. Check table 2 for levels.
	Flat power correction	The 37200B/37300A corrects for test port power variations using an external Anritsu ML2437A 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: 37200B/37300A internal source, or any 68000B or 69000A synthesizer Source #2: Any 68000B or 69000A synthesizer Receiver: 37200B/37300A internal receiver
Frequency accuracy	Internal 10 MHz time base stability	Standard With aging: <1 x 10 $^{-6}$/day With temperature: <1 x 10 $^{-6}$ over 15° to 50°C Optional With aging: <1 x 10 $^{-9}$/day With temperature: <1 x 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	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 MB or 720 KB 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 KB/sec
	Interface function codes	SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP1, DT1, DC0, C0
General	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	29 kg (65 lb)
	Temperature	0° to 50°C (operate), −40° to 75°C (storage)

Table 1

Model	Frequency range (GHz)	Max. signal into port 2 (dBm)	Noise floor (dBm)	Receiver dynamic range (dB)	Port 1 power (dBm, typical)	System dynamic range (dB)
37211B	0.0225	+3	−95	98	0	95
	2	+3	−98	101	0	98
	3	+3	−98	101	0	98
37217B	0.0225	+3	−95	98	0	95
	2	+3	−98	101	0	98
	8.6	+3	−98	101	0	98
37225B	0.04	+20	−70	90	0	70
	2	+3	−98	101	0	98
	13.5	+3	−98	101	0	98
37247B	0.04	+20	−70	90	0	70
	2	+3	−98	101	0	98
	20	+3	−96	99	0	96
37269B	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
37311A	0.0225	+30	−95	125	0	95
	2	+30	−98	128	0	98
	3	+30	−98	128	0	98
37317A	0.0225	+30	−95	125	0	95
	2	+30	−98	128	0	98
	8.6	+30	−98	128	0	98
37325A	0.04	+30	−65	95	+5	70
	2	+30	−93	123	+5	98
	13.5	+30	−93	123	+5	98
37347A	0.04	+30	−65	95	+5	70
	2	+30	−93	123	+5	98
	20	+30	−91	121	+5	96
37369A	0.04	+30	−65	95	+5	70
	2	+30	−93	123	+5	98
	20	+30	−90	120	0	90
	40	+30	−83	113	−7	76

Table 2 Power range

Model	Rated power (dBm)	Minimum power (dBm)	Resolution (dB)
37211B	0	−15	0.05
37217B			
37225B			
37247B			
37269B	−15	−27	
37311A	0	−90	
37317A			
37325A	+5	−85	
37347A			
37369A	−7	−95	

Ordering information

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

Model/Order No.	Name
	Main frame
37211B	Vector Network Analyzer (22.5 MHz to 3 GHz)
37217B	Vector Network Analyzer (22.5 MHz to 8.6 GHz)
37225B	Vector Network Analyzer (40 MHz to 13.5 GHz)
37247B	Vector Network Analyzer (40 MHz to 20 GHz)
37269B	Vector Network Analyzer (40 MHz to 40 GHz)
37311A	Vector Network Analyzer (22.5 MHz to 3 GHz)
37317A	Vector Network Analyzer (22.5 MHz to 8.6 GHz)
37325A	Vector Network Analyzer (40 MHz to 13.5 GHz)
37347A	Vector Network Analyzer (40 MHz to 20 GHz)
37369A	Vector Network Analyzer (40 MHz to 40 GHz)
	Options
Option 1	Rack mount
Option 2	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
Option 7N	Replaces universal K connector (standard) with universal N male
Option 7NF	Replaces universal K connector (standard) with universal N-female
Option 7S	Replaces universal K connector (standard) with universal 3.5 mm-male
Option 10A	High stability (ovenized) time base (1 Hz frequency resolution)
Option 11	Reference loop extension cables (standard on 37300A series)
	Upgrades
ND42844	37211B to 37311A upgrade
ND42845	37217B to 37317A upgrade
ND42846	37225B to 37325A upgrade
ND42847	37247B to 37347A upgrade
ND42848	37269B to 37369A upgrade
ND42849	37211B to 37217B upgrade
ND42850	37211B to 37225B upgrade
ND42851	37211B to 37247B upgrade
ND42852	37211B to 37269B upgrade
ND42853	37217B to 37225B upgrade
ND42854	37217B to 37247B upgrade
ND42855	37217B to 37269B upgrade
ND42856	37225B to 37247B upgrade
ND42857	37225B to 37269B upgrade
ND42858	37247B to 37269B upgrade
ND42689	37311A to 37317A upgrade
ND42690	37311A to 37325A upgrade
ND42691	37311A to 37347A upgrade
ND42692	37311A to 37369A upgrade
ND42693	37317A to 37325A upgrade
ND42694	37317A to 37347A upgrade
ND42695	37317A to 37369A upgrade
ND42696	37325A to 37347A upgrade
ND42697	37325A to 37369A upgrade
ND42698	37347A to 37369A upgrade

Model/Order No.	Name
	On-site support options
Option ES31	3 year on-site repair (37200B series only)
Option ES37	3 year on-site verification (37200B series only)
Option ES38	3 year on-site Mil std verification (37200B series only)
Option ES51	5 year on-site repair (37200B series only)
	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
3750	SMA/3.5 mm Economy Calibration Kit (8.6 GHz)
3751	GPC-7 Economy Calibration Kit (8.6 GHz)
3753	Type N Economy Calibration Kit (50 Ω, 8.6 GHz)
3753-75	Type N Economy Calibration Kit (75 Ω, 8.6 GHz)
36550	3.5 mm T/LRM Calibration Kit
36552	K Connector T/LRM Calibration Kit
36553	GPC-7 T/LRM Calibration Kit
	Verification kits
3663	Type N Verification Kit
3666	3.5 mm Verification Kit
3667	GPC-7 Verification Kit
3668	K Connector Verification Kit
	Test port cables
3670A50-1	GPC-7 semi-rigid cable, 1 foot (2 required)
3670A50-2	GPC-7 semi-rigid cable, 2 foot
3670K50-1	K connector semi-rigid cable, 1 foot (2 required)
3670K50-2	K 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.