Anritsu

Lightning 37000 Family

Vector Network Analyzers

22.5 MHz to 110 GHz

Defining a New Standard in Microwave Vector Network Analysis

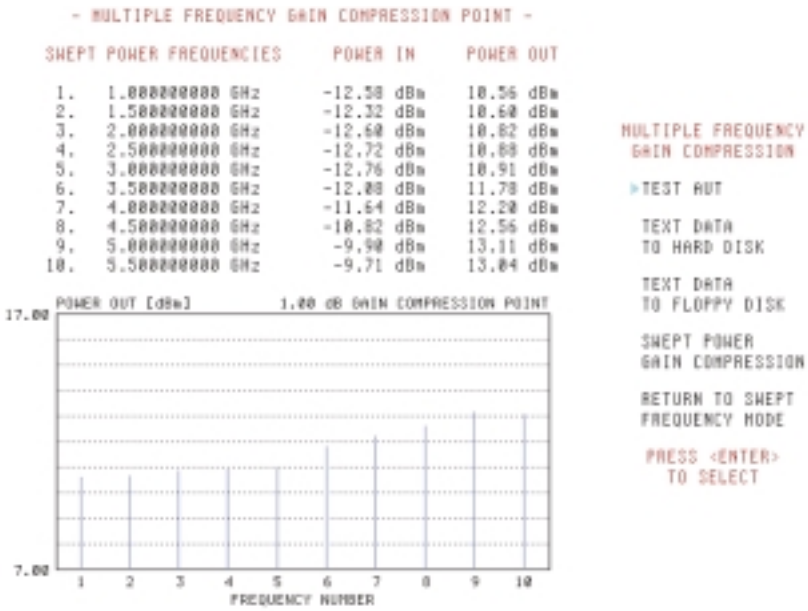
A MICROWAVE VECTOR NETWORK ANALYZER DESIGNED FOR R & D AND PRODUCTION

The Lightning family of microwave and millimeter-wave vector network analyzers and systems encompasses a wide range of high performance test tools designed to address the growing needs of defense, satellite, radar, broadband communication, and opto-electronic component markets. The Lightning family features the latest in technology and performance. Specific models and added options offer higher levels of measurement capability, including Gain Compression, Time Domain, Frequency Translation, and E/O and O/E measurements, in addition to fast and accurate S-parameter measurements.

Complete measurement solutions to 13.5, 20, 40, 50 and 65 GHz are available in microwave models 37x25, 37x47, 37x69, 37x77, and 37x97 respectively.

For applications above 65 GHz, the ME7808A Broadband VNA is the perfect solution. The award winning ME7808A VNA covers fast single sweeps from 40 MHz to 110 GHz. The broad frequency coverage makes the ME7808A well suited for on-wafer test and device modeling applications.

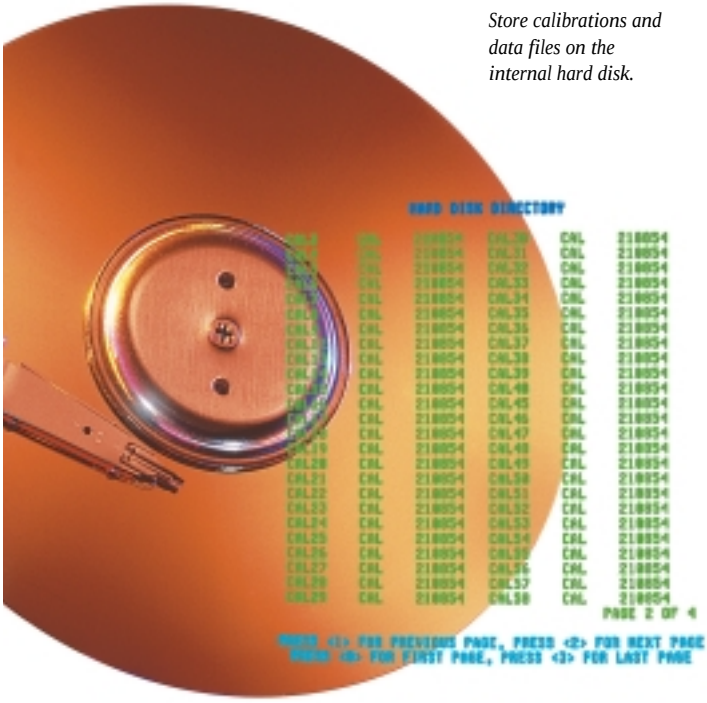
In addition, the Lightning millimeter wave system is available for applications requiring single discrete waveguide band coverage. Millimeter wave systems are an economical alternative to the Broadband VNA and can be configured to cover the Q, V, E, W or F bands. Extended E and extended W bands are also offered to meet the needs of new Wireless LAN and Automotive Collision Avoidance applications.



Simplify Pass/Fail testing using multiple frequency gain compression software.

Compact Size

The Lightning 37000 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 their small size, the 37000 family of VNAs rival the performance of more expensive vector network analyzer systems.

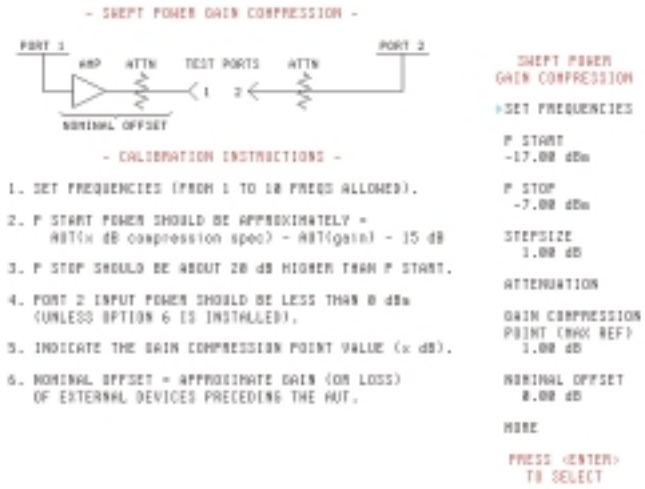


Store calibrations and data files on the internal hard disk.

Fast and Accurate Measurements

Measurement update rates of less than 2 ms per point for a full band sweep are possible with the Lightning VNAs. Each data point is fully phase-locked and vector-error-corrected for optimum accuracy. Near real-time updates are achieved with the instrument's Tune Mode.

Every 37000 VNA is equipped with a highly stable, 1 Hz resolution time base. This allows for maximum accuracy when making on-wafer and frequency conversion measurements. The high resolution time base combined with fast sweep speeds makes the VNA suitable for both R & D and manufacturing applications.



High Speed Data Transfer and Control

For maximum efficiency, dual GPIB ports are standard on every 37000. High speed transfers across the analyzer's IEEE 488.2 GPIB bus minimize data collection times. The second GPIB port is dedicated to the control of peripheral devices such as plotters, power meters, and frequency synthesizers. The 37000 maximizes throughput by combining fast, error-corrected sweeps with high speed data transfers. Measurement throughput for the 37000 family is the fastest of any microwave vector network analyzer in the industry.

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 set-ups and calibrations. Store your complete test set-up including limit lines and frequency markers. Switch instantly between gain compression and S-parameter measurements.

Create descriptive file names to assist with 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. An external SCSI hard drive can be used by ordering the option that removes the internal hard drive and adds an external interface.

Ease of Use

Efficiency on the production floor includes minimizing key strokes. First-time users, as well as experienced operators, will appreciate the analyzer's friendly user interface. Logical key groupings and on-screen instructions help save time. You will be able to make meaningful, accurate measurements within minutes.

Change the number of display data points, IF bandwidths, and start-stop frequencies without losing any part of the 12-term calibration. Attach an IBM-compatible keyboard to navigate through front panel menus, document device data, hold instrument sweeps and automatically print or plot displays.

For more involved measurements, easy to follow help menus guide the user through the setup and measurement steps.

Simple menus guide the user through complex procedures such as swept power gain compression.

TEST MORE DEVICES . . .

Filters and Isolators

The 37000's wide dynamic range lets you see 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 the user optimize sweep speed in one direction for easier tuning while maintaining a 12-term error 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 using Anritsu's automatic reference plane extension capability. A single key-press can quickly identify non-linear phase responses in filters.

Simplify final testing with segmented and single limit lines. Automatically PASS or FAIL components using on-screen indicators and audible alarms.

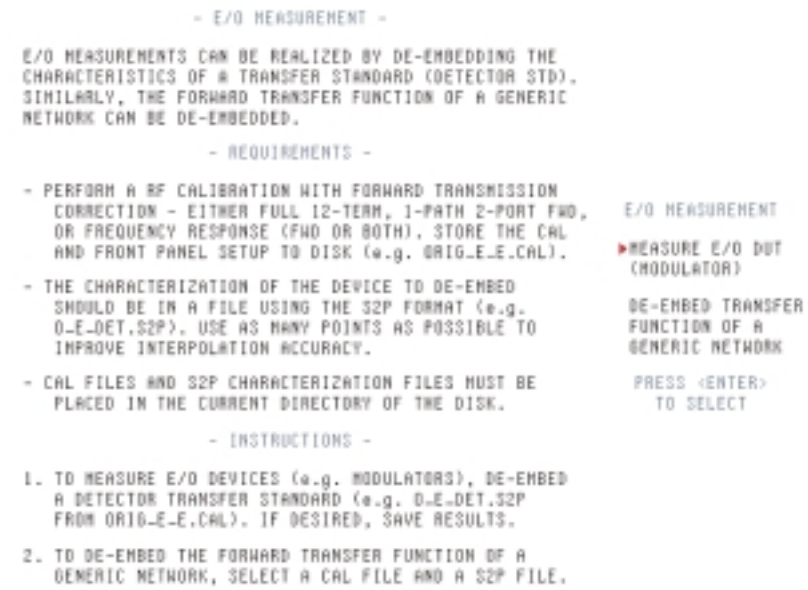
Four independent display channels provide you with the freedom to measure input match, insertion loss, and reverse rejection on a single display. The excellent high level noise performance of the 37000 family permits rapid sweeps without the need to reduce IF bandwidth, when using fine vertical resolutions.

Standard on every Lightning analyzer is a solid-state transfer switch that continually reverses the input stimulus after every sweep.

Wide dynamic range and tune mode assist filter testing.

Cables and Switches

Precision phase matching, path loss and SWR measurements are easily performed on low insertion loss devices with the Lightning VNA. Vector error-correction eliminates the distorting effects of source and load match, allowing you to view the true response of your components. Trace memory readily compares the magnitude and phase responses of multiple transmission paths through switches. The Lightning's high system stability means your production line can continue to operate for extended periods without the need for recalibration.



Built-in E/O and O/E Measurement Application simplifies calibration.

Frequency Translation Devices

With built-in Multiple Source Control Mode and direct access to the samplers, the Lightning VNA can measure conversion loss, port match, isolation, relative group delay, amplitude tracking and phase tracking for frequency translation devices such as mixers, upconverters, and downconverters. With the addition of Mixer Measurement Assistant Software, you can also make real time error corrected mixer measurements. Measure magnitude and phase conversion loss, absolute group delay and phase linearity directly with the 37200 or 37300 and the mixer software.

. . . IN LESS TIME

E/O and O/E Devices

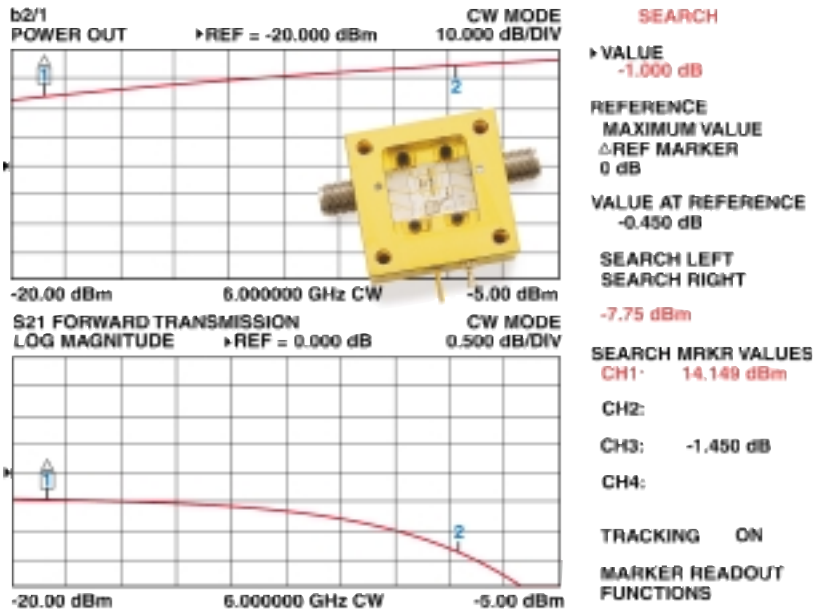
The 37200/37300 series incorporates a de-embedding function that simplifies VNA calibration when measuring E/O and O/E devices. Characterize the transfer function, group delay, and return loss of optical modulators (E/O) and photo-receivers (O/E). A characterized photo-diode (O/E) reference and a laser source are required to complete the test setup. 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 photo-diode reference to characterize a modulator first, then use the modulator as the characterized reference to measure another photo-receiver.

Microstrip Devices

Anritsu offers complete substrate measurement solutions for both microstrip and coplanar waveguide (CPW) designs. The 37000 VNA accommodates the Anritsu 3680 series Universal Test Fixture (UTF), calibration kits and verification kits. Guaranteed system specifications provide assurance that your test results are accurate and verifiable.

Completely characterize connector-less devices with Lightning's Line-Reflect-Line (LRL) and Line-Reflect-Match (LRM) calibration capability. The four sampler 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 connector-less devices.

Additional flexibility built-in to simplify amplifier testing.



View gain compression and P_{out} vs P_{in} on one display.

Amplifiers

Measure amplifier gain and match with either the 37200 or 37300 series VNA. For additional flexibility, the 37300 has an extended ALC range, Port 1 step attenuator, and Port 2 step attenuator. Use the front panel input connectors to bias your amplifier, or use a pre-amplifier in the loop to increase the Port 1 power up to 1W.

The standard gain compression software in all 37300 VNAs allows you to thoroughly characterize the gain compression of your amplifier using swept frequency and swept power routines. By manually increasing the calibrated flat test port power, it is possible to measure the minimum gain compression point within a frequency range. For more traditional gain compression measurements at selected CW frequencies, the user menu guides you through the linear port power calibration process. The built-in software will sweep the power and detect the selected compression point at up to ten CW frequencies. The results are shown in graphical and tabular format.

Swept and CW IMD measurements can also be performed to 65 GHz using the 37300 series. Application software that automates TOI measurements on the 37300 is available for download from the Anritsu website. The software guides the user through the calibration and measurement process for IMD measurements and third-order intercept calculations.

The Anritsu 37000 Family of Vector Network Analyzers ...

Speed

Improve test times with fast synthesized sweeps and high speed GPIB data transfers. Tune Mode increases trace updates for optimum speed during tuning operations.

Four Independent Display Channels

View all four S-parameters simultaneously or a single parameter in four different displays. Each channel's scaling, format, and domain settings are defined independently.

Next Generation VNA Technology

Incorporates higher speed processor and faster power sweep capability

Flexible Calibration

Popular calibration methods and connector types are easily selected during the automated calibration sequence. These analyzers guide you through the complete calibration process to minimize operator error.

Internally Controlled AutoCal®

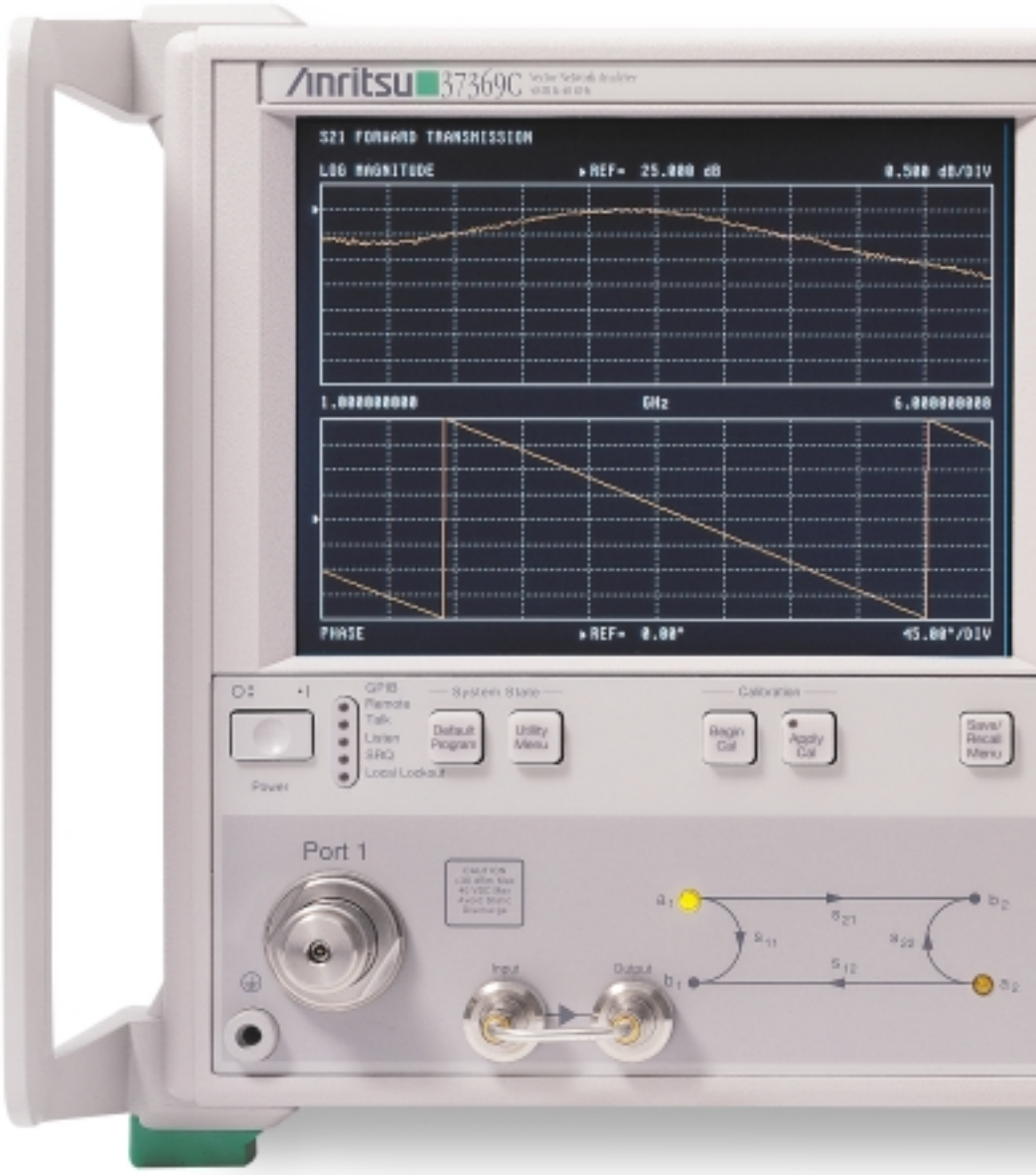
Built-in software support for the Anritsu AutoCal module. Simplify instrument setup, speed calibration, and enhance measurement accuracy.

Four Sampler Design

Achieve maximum accuracy for applications requiring LRM and LRL calibrations with the 37000's standard four sampler architecture.

Hard Disk Drive

Quickly save and recall measured data, calibrations and instrument states to/from an internal MS-DOS® hard drive. Files can also be moved to external PCs via the built-in floppy drive.



... The Lightning Family

Keyboard Control

Plug in an AT-style keyboard and use standard MS-DOS commands to quickly and easily perform file management functions on the hard drive such as MOVE, COPY, CREATE DIRECTORY, etc. Use the function key overlay to fully operate the unit from the keyboard.

Smart Front Panel

Logical menu-driven interface simplifies measurements and calibrations. Change frequency range, data points and IF bandwidths without the need for re-calibration. Instrument states are remembered at power-down so you are ready to continue with your project when you power up.

Pass/Fail Testing

Evaluate test data using single and segmented limit lines. Create upper and lower trace boundaries for go/no-go testing. Six independent markers are available to evaluate critical frequency points.

Software Compatibility

Easily integrate these analyzers into ATE environments utilizing computer aided test (CAT) and computer aided design (CAD) functions. Features such as S2P file formats for microwave simulation, and DLLs for ATE programming are provided for use with commercially available software packages.

Solid-State Transfer Switch

Automatically reverse signal flows through devices for hands-off measurement. The electronic switch design provides you with reliable and continual operation.

Upgradeability

Each analyzer in the 37000 family can now be upgraded in frequency (to 110 GHz) and capability. Your analyzer investment is protected as measurement demands increase.

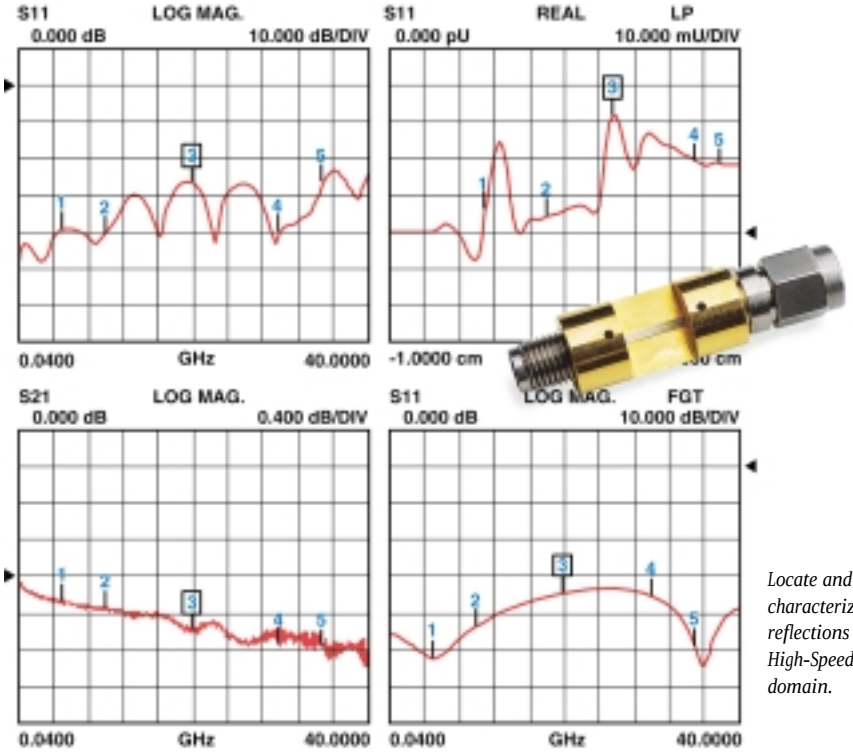
Three-Year Factory Warranty

All Lightning VNA models are backed with a no-questions-asked three-year warranty.

POWERFUL SOFTWARE FEATURES . . .

Time Domain Analysis

Analyze impedance discontinuities as a function of time or distance with Lightning's High Speed Time Domain function (available as an option). 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 Anritsu's exclusive Phasor Impulse Mode show you the true impedance characteristics of mismatches in waveguide, microstrip and other band-limited media.



Locate and characterize reflections using High-Speed time domain.

Multiple Source Control

Conveniently test mixers and multipliers through the Lightning'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.

Flat Test Port Power

Automated flat test port power correction simplifies your gain compression measurements by compensating for losses in external switches and cables. The analyzer's built-in software controls an external power meter over GPIB to correct test port power levels at every frequency point and interpolates between user-defined frequencies.

Use a power meter for a flat test port power correction.

VNA Utilities Software

VNA Utilities is the ultimate solution for automated test software development. It includes fully functional application programs, re-usable calibration, set-up and data manipulation samples, and software development tools for creating custom applications.

VNA Utilities is comprised of a simple, language independent, interface with a set of dynamic link libraries (DLLs). It can be called from any Windows® based development tool or application that supports programmability. All future Anritsu VNAs will be designed to be compatible with this interface, so upgrading the test system will require no changes for recompiling.

VNA Utilities also includes applications such as the *Capture Utility*, which allows the user to extract data off the VNA in any of the supported formats (bitmap, S2P, plotter graphics, etc.). The *Calkit File Maker* helps create a custom calibration kit disk from the coefficients entered by the user. And the *VNA File Utility* manages system software downloads and data file uploads to/from the VNA's hard disk via a PC.

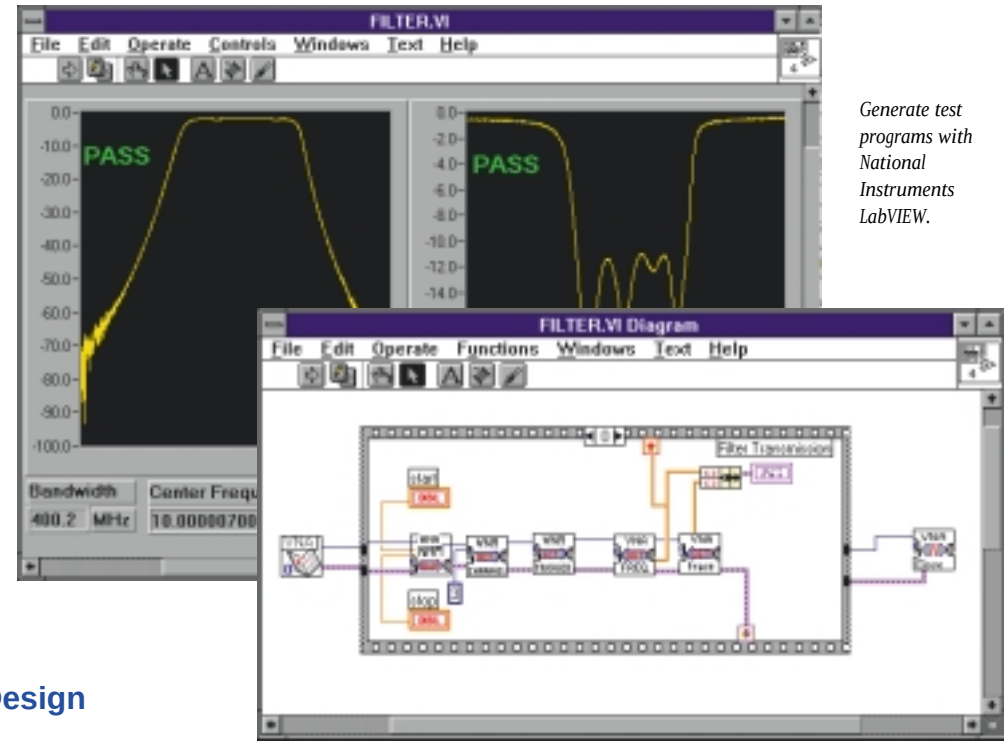
Lightning Command Encyclopedia

The Lightning Command Encyclopedia, included with the VNA Utilities software, simplifies the programming of the VNA. The Command Encyclopedia is a searchable, Windows® based, fully integrated command database for the Lightning VNAs which includes command mnemonic names, descriptions and usage information. All commands are searchable by mnemonic, description, query command, application and user comment.

. . . AND GREATER AUTOMATION

LabVIEW® Compatibility

Standard with every 37000 series analyzer is the VNA Utilities CD-ROM that includes a National Instruments LabVIEW instrument driver. Create custom test programs 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 37000 family analyzer's command set for complete automated data collection and analysis.



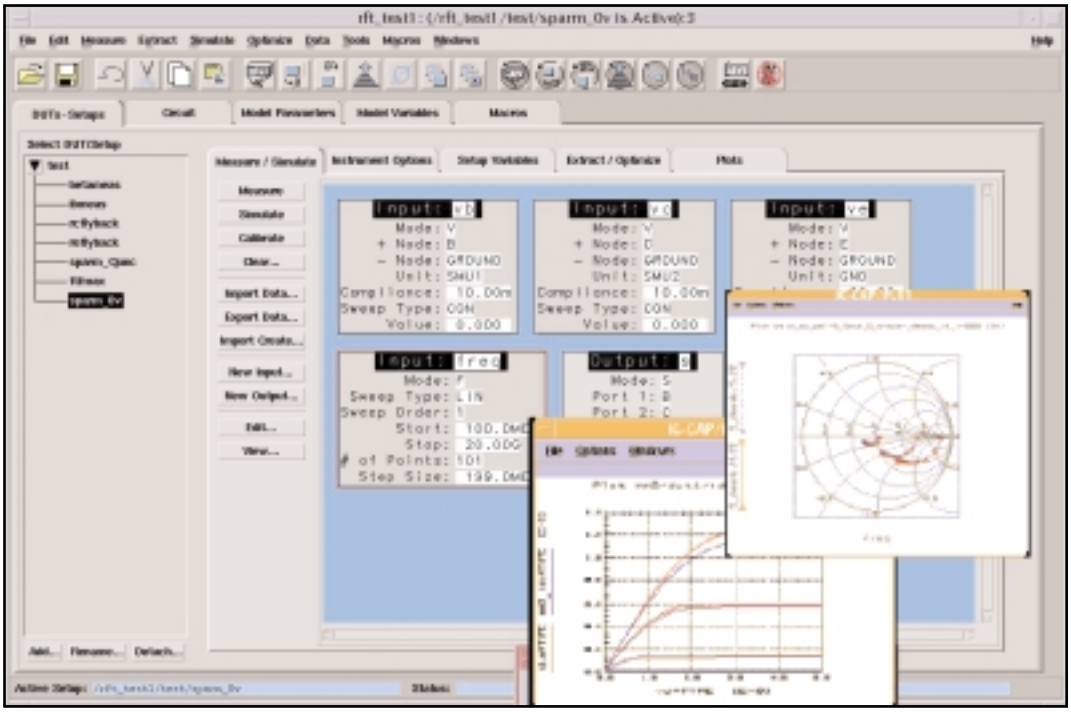
Generate test programs with National Instruments LabVIEW.

Parameter Extraction and Design Automation

The advanced measurement capabilities of the 37000 family analyzers are further enhanced through compatibility with popular computer-aided design and test packages such as EEsof IC-CAP. Transfer S-parameter data files from the network analyzer directly into your microwave circuit design software. Create device models using data in S2P format, transferred across the analyzer's high speed GPIB bus.

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 Lightning 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.



Automate data collection for use in circuit simulators.

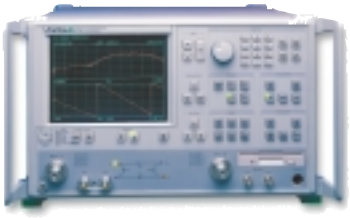
THE RIGHT CHOICE . . .

The 37100C series is a VNA configured as a receiver with direct access to all four samplers. In order to make S-parameter measurements, an external reflectometer is required.

The 37100C series offers flexibility as a multi-purpose receiver, for measuring frequency conversion devices such as mixers, multipliers, upconverters and downconverters.

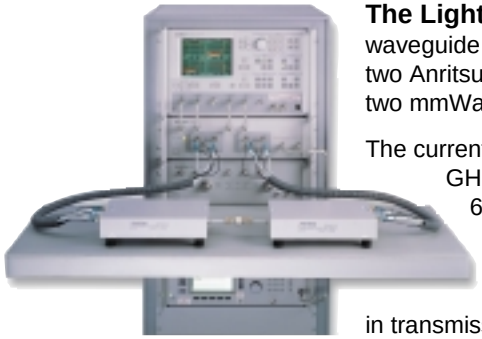
Use a 37100C receiver for antenna measurements, taking advantage of its fast-CW GPIB mode of operation. For near field antenna scanning, store the data in its internal buffer. The 37100C allows ratioed measurements to be displayed on two channels simultaneously.

The 37200C series is designed for passive device measurements. It eliminates the cost of features only needed for active device measurements. The 37200C still offers a four sampler design, with a solid-state transfer switch architecture. The result is a less expensive VNA without compromising on accuracy or speed.



The 37300C series offers the full line of Lightning family features. It is ideal for passive and active device measurements. It adds step attenuators on both ports, bias tees, higher output power, and a wider ALC range. For direct access to the samplers, two standard access loops are added to the rear panel.

The 37300C series adds set-on receiver mode, for harmonics and third order intercept measurements, and Gain Compression/Power Sweep capability.

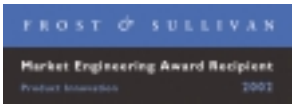


The Lightning Millimeter Wave system offers waveguide frequency coverage, using a 37100C receiver, two Anritsu synthesizers, an interface test set, and two mmWave modules.

The current available modules are Q band (WR-22) 33-50 GHz, V band (WR-15) 50-75 GHz, E band (WR-12) 60-90 GHz, extended E band (WR-12) 56-94 GHz, W band (WR-10) 75-110 GHz, extended W band (WR-10) 65-110 GHz, and F band (WR-8) 90-140 GHz. These modules are available, in transmission only or transmission and reflection configurations.

The ME7808A Broadband VNA offers single sweep broad frequency coverage from 40 MHz to 110 GHz. The Broadband VNA uses a Lightning 37397C VNA, two Anritsu synthesizers, a broadband test set, two multiplexing couplers and extended W-band (WR-10) modules to generate the fast broadband sweep.

The ME7808A is an ultra-flexible, high performance VNA ideal for broadband on-wafer device characterization, as well as banded waveguide or coaxial measurements.



. . . FOR THE BEST RETURN ON YOUR INVESTMENT

3650 and 3750 Series Calibration Kits

Accurate operation of your 37000 series analyzer is ensured by using Anritsu's precision coaxial OSLT (sliding load) or TRM calibration kits. These kits include precision components for calibrating measurements in GPC-7, type N, SMA, 3.5 mm, K Connector® and V Connector®. For waveguide measurements, standard kits offer offset-short calibration capabilities. Anritsu's microstrip calibration kits include all the components necessary for OSLT, LRL and LRM calibrations using the 3680 series UTF.

3650 and 3750 Series Coaxial Calibration Kits (Sliding Load OSLT)

3658 Series AutoCal®

The 3658 series AutoCal modules are automatic calibrators that provide fast, repeatable and high quality coaxial calibrations up to 40 GHz. These modules contain precisely characterized calibration standards that aid in the removal of normal systematic errors of Vector Network Analyzers. These calibrators are ideal for the manufacturing environment where speed, accuracy, and reliability are important.

With the aid of test port cable converter kits, a single module can calibrate insertable and non-insertable devices, as well as K, SMA, or 3.5 mm devices. AutoCal is directly driven by the VNA via a serial bus, sparing the use of an external controller.

3660 Series Verification Kits

Anritsu offers a complete line of coaxial verification kits to confirm your system's performance. All verification kits contain precision components with characteristics traceable to the US National Institute of Standards and Technology (NIST). Verification kits can be kept in your metrology laboratory where they provide the most dependable means of checking system accuracy.

3650 Series Waveguide Calibration Kits

3680 Series Universal Test Fixture (UTF)

Anritsu's UTF accommodates measurements in microstrip and coplanar waveguide. Spring-loaded jaws help to provide 0.1 dB repeatability on devices from 5 to 75 mils thick. Special fixtures are available for testing packaged transistors. An optional MMIC attachment helps you test integrated circuits.

3670 and 3671 Series Test Port Cables

Anritsu offers laboratory quality semi-rigid and flexible test port cables for GPC-7, N, 3.5 mm and K and V connectors.

34 Series Test Port Converters

Test port converters allow you to change the connectors on the VNA's test ports. Converters are available for GPC-7, type N, 3.5 mm, K and V connectors.

35 Series Waveguide to Coaxial Adapters

These precision waveguide-to-coax adapters transform standard or double-ridge waveguide to coaxial K or V connectors. Sixteen different models cover the 18 to 65 GHz frequency range.

3660 Series Verification Kits

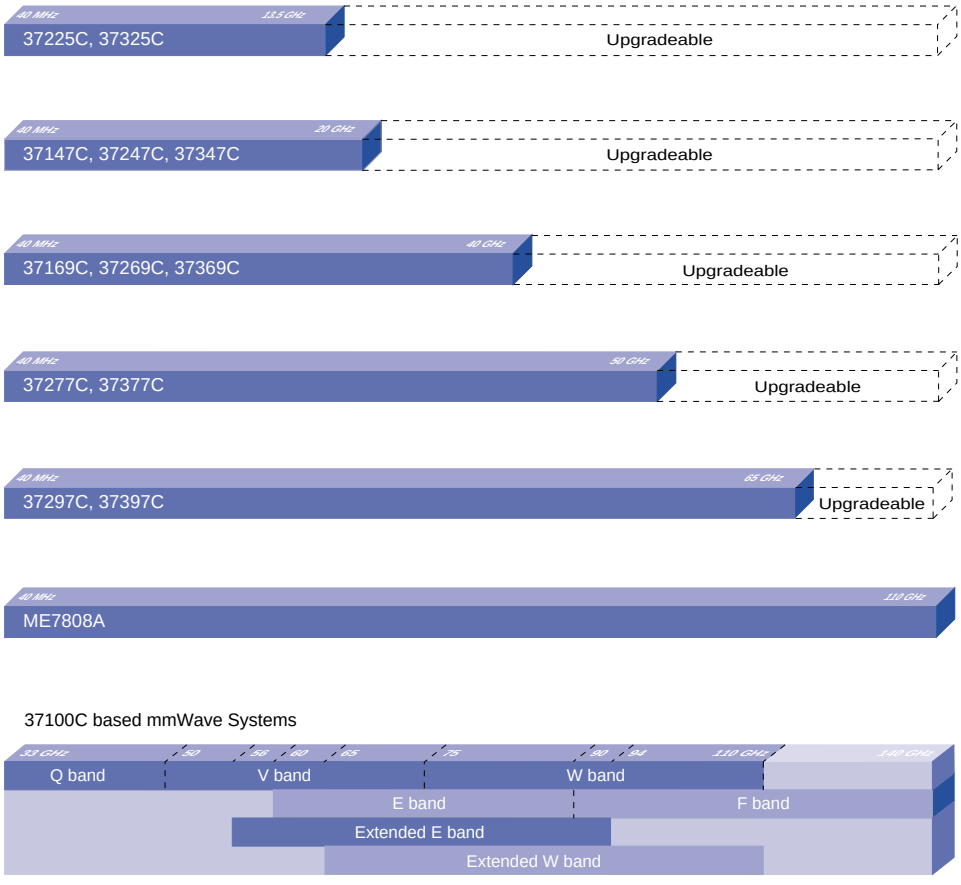
Let a 3658 Series Autocal module automatically calibrate your VNA.

3680 Series Universal Test Fixture

37000 SERIES VECTOR NETWORK ANALYZERS

Upgradeability

The 37000 series analyzers are designed to accommodate higher frequency ranges and more powerful features as your requirements grow. Any 37000 model can be upgraded to any other model in the instrument family, to fit your changing requirements. Simply order 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 needs, while providing the flexibility to meet tomorrow's demands. System software upgrades are as easy as inserting a disk into the instrument's floppy drive.



Warranty and Extended Service

The 37000 family of network analyzers are backed by a standard three-year warranty. If a failure occurs, a Service Engineer will come to your facility to troubleshoot, repair, and verify the system's performance at no additional cost to you. To ensure your analyzer's calibrated performance for up to 5 years, return-to-service center support plans are available.

Anritsu

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