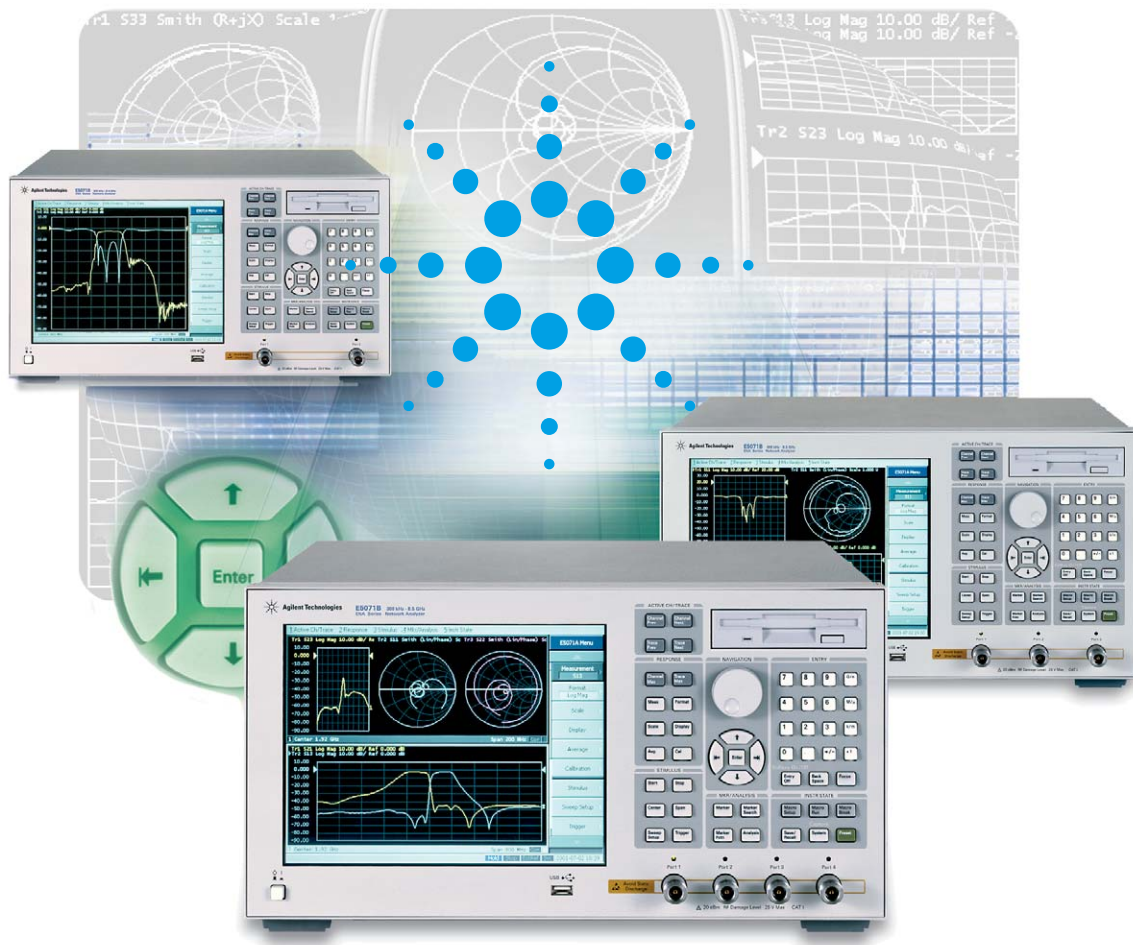




## **Agilent** **ENA RF Network Analyzers**

E5070B 300 kHz to 3 GHz

E5071B 300 kHz to 8.5 GHz



### **Enabling highly accurate and efficient RF component evaluations**

- Integrated 2-, 3-, and 4-port test set
- Powerful analysis functions
- Built-in balanced measurements
- Advanced frequency-offset measurements
- Expand error correction capabilities

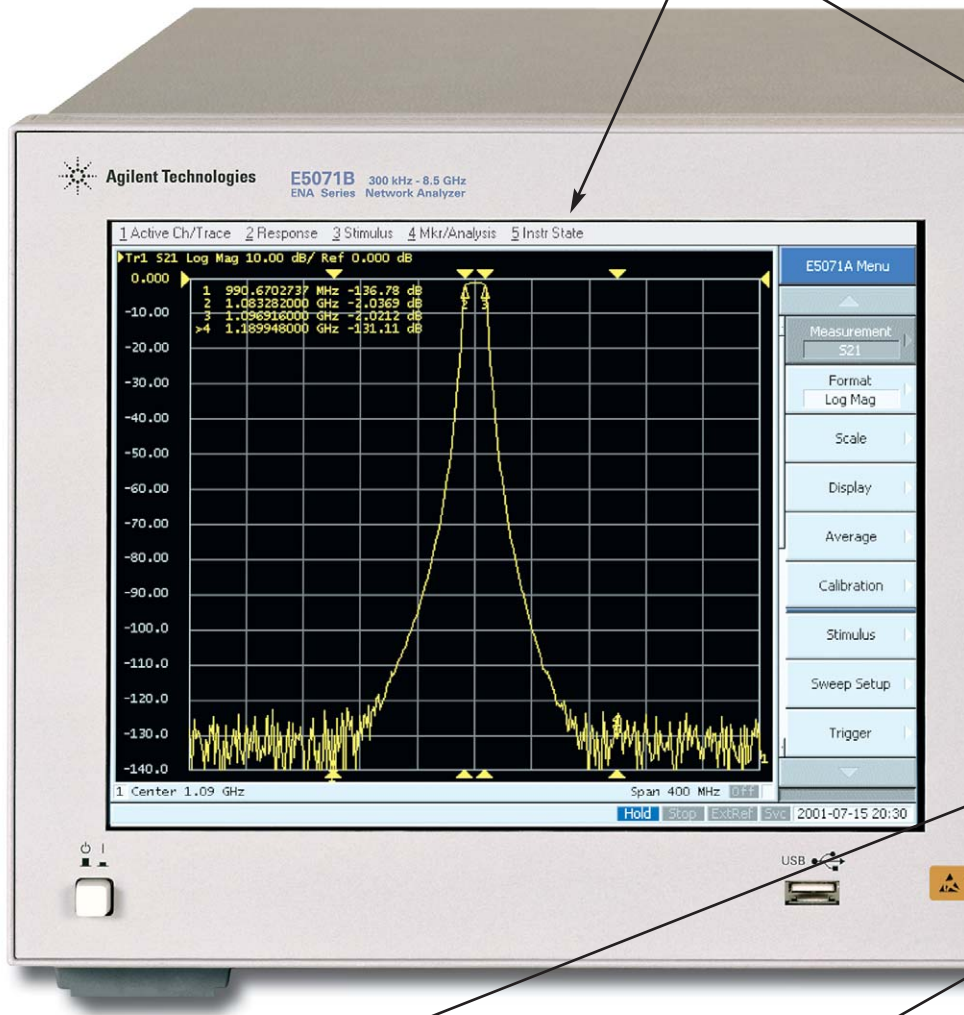
# Increasing throughput, enhancing measurement quality and easing usability

## Excellent measurement accuracy

The Agilent ENA dramatically improves measurement accuracy and responds to current and future test needs. Because it performs up to 125 dB<sup>2</sup> wide dynamic range at 10 Hz IFBW, the sweep speed can be faster at the required dynamic range. The trace noise is lowered to 0.001 dB rms at 3 kHz IFBW. It delivers accurate pass band ripple measurement of a filter. The ENA's excellent measurement performance improves test quality and repeatability as well as test throughput, which affect production yield and the overall cost of test.

## Ease of use

- Maximum sixteen<sup>1</sup> windows and sixteen traces per window
- 10.4-inches color LCD
- Optional touch screen
- Windows® styled pull down menu for mouse operation
- Channel/trace previous and next keys to select measurement result of interest
- Navigation keys



## Powerful analysis functions

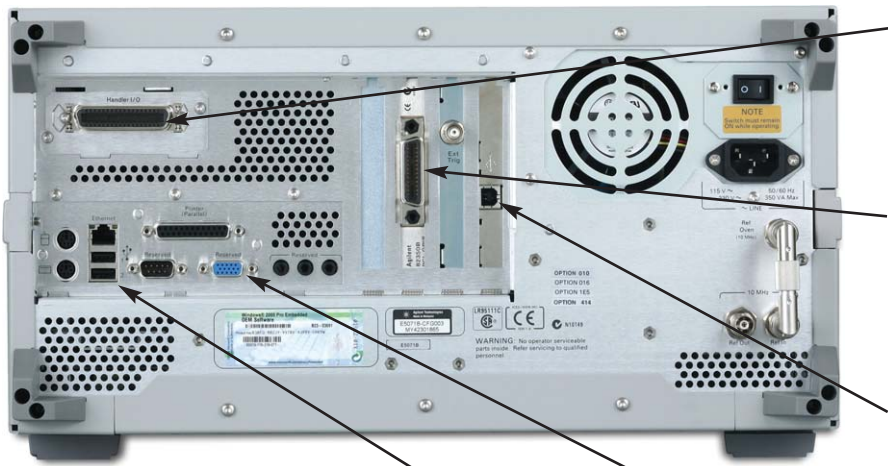
- Marker analysis and marker function
- Balanced conversion
- Matching circuit simulation
- Port characteristic conversion as complex impedance
- Time domain analysis
- Frequency-offset sweep
- Impedance conversion

## Advanced measurement

- Built-in two to four test ports
- Up to simultaneous four ports measurement
- Full four-port calibration
- 125 dB at 10 Hz IFBW wide dynamic range<sup>2</sup>
- 0.001 dB rms at 3 kHz IFBW low trace noise

1. 6 different channel and trace setups are available.

2. Typical



**Handler I/O**

- High speed handshake with parts handler
- Pass/Fail, test sequencing and user defined I/O signals

**GPIB interface**

- Connection to an external PC controller
- Control external test equipment using USB/GPIB converter

**USB (USBTMC) interface**

- Connection to an external PC controller
- Control the ENA through fast and easy connection

**VGA output**

- External display to enlarge measurement data and/or VBA editor

**Peripheral ports**

- USB-Host (front x 1, rear x 2) for ECal, printer, and multiport test set
- PS2 for mouse and keyboard
- Parallel interface for printer
- 10/100 Base-T LAN



**Built-in automation control**

- Macro Setup/Run/Break keys to control VBA program

**Key specifications**

Test frequency	300 kHz to 3 GHz (E5070B)
	300 kHz to 8.5 GHz (E5071B)
Max port output power	-50 to 10 dBm
Test set	S-parameter test set
Number of test ports	2      3      4
Measurement parameters	$S_{11} - S_{22}$ $S_{11} - S_{33}$ $S_{11} - S_{44}$
	with balanced conversion    Mixed mode S-parameter, amplitude/phase imbalance
IFBW	10 Hz to 100 kHz (1, 1.5, 2, 3, 4, 5, 7 step)
Number of points	2 to 20,001 <sup>1</sup>
System dynamic range <sup>2</sup>	120 dB at 10 Hz BW (3 MHz to 1.5 GHz)
	122 dB at 10 Hz BW (1.5 GHz to 3 GHz)
	121 dB at 10 Hz BW (3 GHz to 4 GHz)
	117 dB at 10 Hz BW (4 GHz to 6 GHz)
	112 dB at 10 Hz BW (6 GHz to 7.5 GHz)
	105 dB at 10 Hz BW (7.5 GHz to 8.5 GHz)
	(Response & isolation calibration)
Trace noise (magnitude)	0.001 dBrms at 3 kHz BW (3 MHz to 3 GHz)
	0.0012 dBrms at 3 kHz BW (3 GHz to 4.25 GHz)
	0.0036 dBrms at 3 kHz BW (4.25 GHz to 7.5 GHz)
	0.006 dBrms at 3 kHz BW (7.5 GHz to 8.5 GHz)
	(0 dBm source power, through measurement)

1. 20,001 points measurement can be used with only 1 channel/4 traces mode.

2. Typical

## Accurate and efficient component measurements



The Agilent ENA network analyzers perform fast and accurate RF component measurements for both R&D evaluations and production testing. Both the E5070B (300 kHz to 3 GHz) and the E5071B (300 kHz to 8.5 GHz) models offer integrated 2, 3, or 4 test ports, and enable various component measurements from 2-port filters to multiport devices like duplexers and couplers. The ENA offers built-in balanced measurements, matching circuit simulation, and port characteristic impedance conversion. In addition, the ENA provides frequency-offset and harmonics measurement capabilities. These functions increase engineering efficiency by delivering fast and accurate measurement results for the most advanced RF components, such as balanced SAW filters, differential amplifiers, mixers, converters, and front-end modules.



### Comprehensive measurements from an innovative platform:

- Fast multipoint measurements: 9.6  $\mu$ s/point
- High accuracy 125 dB dynamic range<sup>1</sup> and 0.001 dB rms trace noise
- Integrated 2, 3, or 4 test ports
- Full-port SOLT and TRL/LRM calibration
- Built-in balanced measurement and fixture simulator
- Time domain analysis with gating
- Mixer evaluation with advanced mixer calibration techniques
- Up to 16 ports using the multipoint test set
- 4-port electronic calibration (ECal) support
- Bundled Microsoft® Visual Basic® for Applications (VBA)

1. Typical

# Flexible test port architecture for a variety of applications



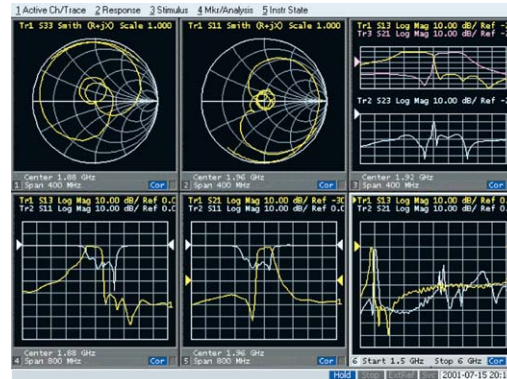
## Advanced multiport test set architecture

Built-in two to four test ports provide simultaneous measurement of all signal paths for components with up to four ports. This advanced architecture minimizes the number of sweeps to complete a multiport S-parameter measurement and dramatically improves test throughput.



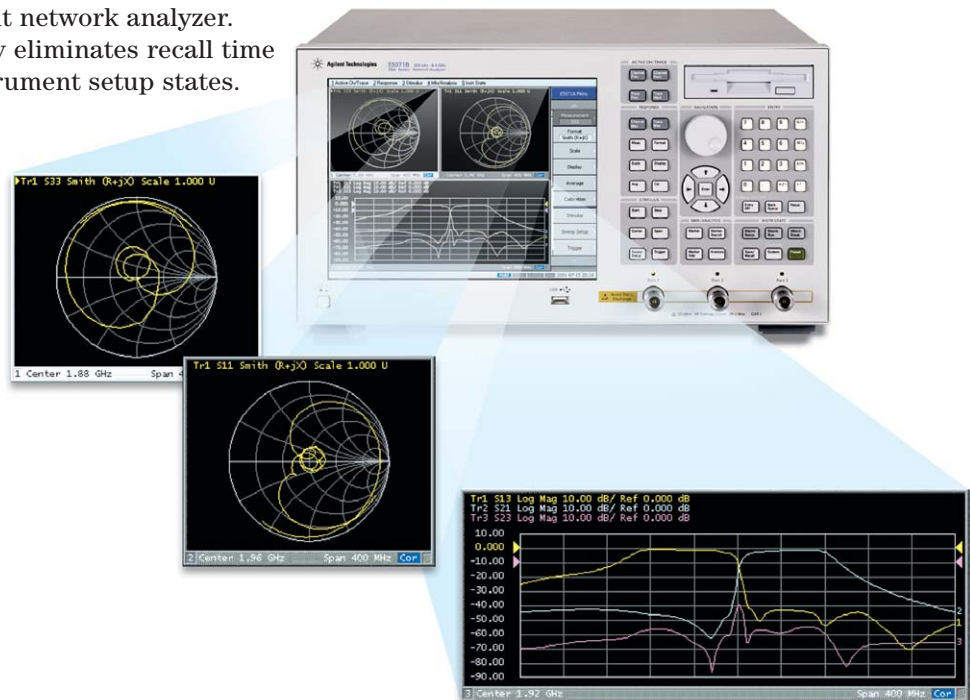
## The ENA features built-in two to four test ports

The ENA holds up to sixteen<sup>1</sup> measurement channels in a single instrument state. Independent frequency list, calibration data, measurement parameters, trace layout, triggering and limit test are applied in each measurement channel, which acts as if it is an independent network analyzer. This multi-channel capability eliminates recall time for sequencing multiple instrument setup states.



## Six-channel layout example

Up to sixteen<sup>1</sup> display windows representing each measurement channel may be observed simultaneously. Within each window, it is possible to display up to sixteen<sup>1</sup> traces. The layout of display windows and traces are easily selected from the various preset states.



## Multi-channel measurement example

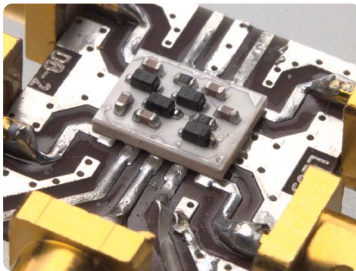
1. 6 different channel and trace setups are available.

# Dedicated measurements for RF components used in wireless handsets



## Complete solutions for antenna switch modules

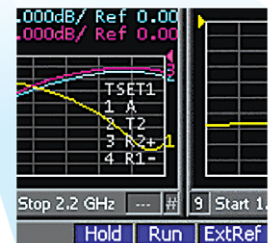
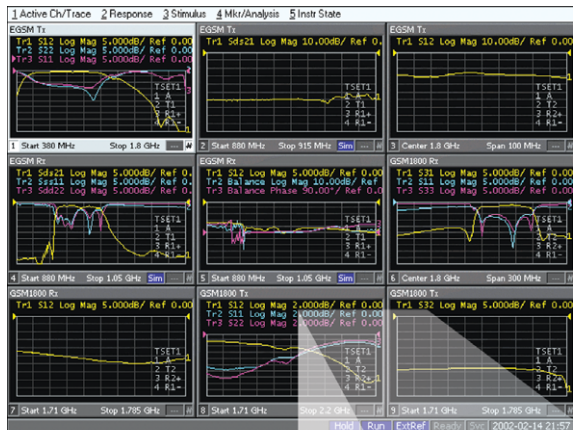
The requirement for smaller size and higher performance of mobile communication equipment is driving the integration of more RF components into multi-functional modules, such as antenna switch modules. The ENA provides an ideal solution for testing antenna switch modules with the E5091A multiport test set. The system is tailored for testing the antenna switch modules for mobile handsets, particularly those modules with balanced ports, although it can be used in a wide range of multi-port measurement applications. The test set is available in 9- and 16-port configurations and is controlled as if it were a part of the analyzer; rather than a separate test set.



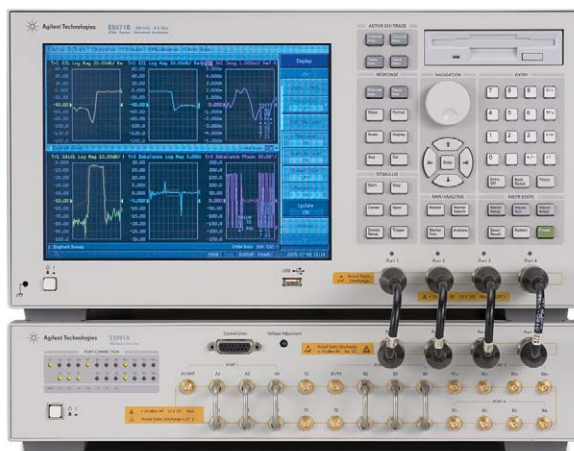
Antenna switch module employing LTCC technology

## Single-connection single-setup measurement drastically lowers the cost of test

With sixteen<sup>1</sup> measurement channels, each of which can measure up to four<sup>1</sup> measurement parameters, the ENA multiport test solution can measure all the measurement paths required for antenna switch module testing. The signal paths of each measurement channel can also be displayed to help identify complicated connection to the device. These capabilities ensure a single connection, single-set-up measurement that reduces test time and the overall cost of test.



Antenna switch module measurement example



ENA network analyzer with the E5091A 13/16-port configurable multiport test set

1. 6 different channel and trace setups are available.

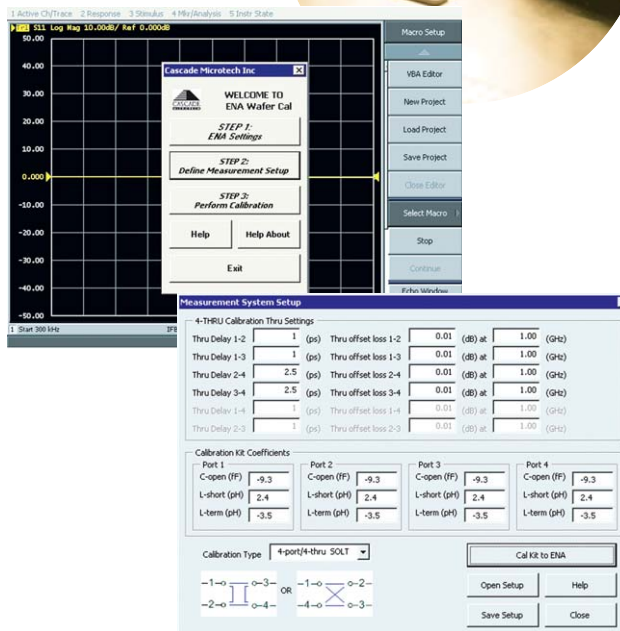
# On-wafer characterization of differential circuits and components



**Agilent ENA RF network analyzer and Cascade Summit 12000 Probing System**

The use of differential circuit topologies is becoming increasingly common in a wide range of RF applications for better noise immunity with circuits. For these advanced devices, quick evaluation of prototypes is very important to reduce the modeling and design cycle time, and enable shorter time to market of next for next generation chips.

Agilent and Cascade Microtech provide a complete solution for performing on-wafer multipoint/differential measurements. This solution consists of the ENA, dual high-performance characterization probes, differential calibration standards, probe station, and ENA Wafer Cal (Cascade calibration software). This approach facilitates the performance of the devices and circuits to be measured under their operating environment, thereby reducing modeling and design cycle time.



## ENA Wafer Cal calibration software

The ENA Wafer Cal is a software program created by Cascade Microtech that runs on the ENA network analyzers. The software wizard guides the user through the entire calibration kit setup process and procedure. This results in improved calibration accuracy, repeatability, and increased engineering productivity.

The most commonly used stimulus settings can be setup within the software. The ENA Wafer Cal comes with probe coefficients that can be selected for each probe configuration. The user enters the coefficient values based on the probe and ISS type used. For details, refer to *On-wafer Multipoint Calibration using the ENA Series RF Network Analyzer with the Cascade Microtech Probing System*, Product Note E5070/71-3, literature number 5988-5886EN.

# Extensive measurements and analysis for design characterization



With the combination of speed, accuracy, and advanced functionality, including multiport and balanced measurements, the ENA has been well received as a powerful tool for manufacturing wireless handset components. The ENA has evolved and now offers extensive measurement, analysis and post data processing capabilities, enabling the network analyzer to be effective for design characterization.

## Flexible measurements

Thoroughly analyzing and characterizing your design is essential to develop and improve your final product. The ENA delivers wide selections of sweep types, such as power sweep, linear, and log sweep, simultaneous measurements of multiple parameters in various frequency bands, and flexible display capability that can verify devices from many different angles and reduce cycle time.

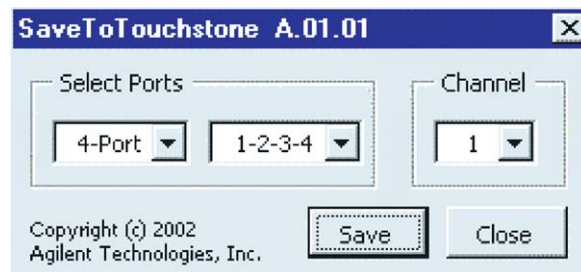


## Real time analysis capabilities

In addition to the balanced measurement, the ENA's time domain analysis and gating capability delivers a more complete signal profile. You can remove unwanted responses from the measured data and extract the true responses of a device at real time, which significantly improves your test productivity.

## Powerful post data processing

Bundled VBA macros and analysis functions enable fast and easy post data processing. Measured data can be easily shared with EDA tools, such as Agilent's Advanced Design System (ADS), using two-, three- and four-port touchstone file formats. This enables you to quickly link measurement results back to your simulations to improve your designs, thus accelerating design verification. In addition, a complex math library has been added to the built-in VBA, to perform complex number calculations.



**Measurement data saved as touchstone file links simulation and verification**



# Enhanced performance and usability for manufacturing test



## Automated test

### Fast and accurate

Superior measurement performance of the ENA improves measurement quality and repeatability. It also allows fast measurement for high speed manufacturing test.

### Evolution of test automation

The evolution of built-in automation empowers the test development environment. Visual Basic® for Application (VBA) comes with the ENA and provides flexibility of test programs while significantly reducing test development time.

### Expanded choice of connectivity

The ENA expands the choice of connectivity to other test equipment, parts handler, external PCs and peripherals. GPIB, LAN, USB-Host, USB (USBTMC<sup>1</sup>) and handler I/O are available at no additional cost.

### Increase productivity with Measurement Wizard Assistant

The Measurement Wizard Assistant (MWA), is measurement setup software, that enables you to easily set up multipoint measurement systems and simplify your operation. MWA software assists not only with complex measurement parameter setups such as the segment sweep, limit testing, and calibration but also handler system control via the handler I/O port. After entering the necessary measurement parameters, the MWA automatically generates a measurement setup file. Then, all you have to do is simply load the setup file into the ENA and you can start complex measurements immediately.

## Manual operation

### Designed for productivity

The ENA increases test engineer and operator productivity. A variety of limit-line functions provide flexible pass/fail testing in production. A large LCD display provides clear views of multiple traces in multiple windows. In addition, an optional touch screen eases interactive operation and minimizes operational errors at tuning process of filter and duplexer manufacturing.

### Simplified operation

Dedicated keys are available to select and maximize the display window or trace. This allows an operator to quickly enlarge a measurement result.



**Touch screen eases interactive operation**

1. USB Test and Measurement Class (TMC) interface that communicates over USB using USBTMC messages based on the IEEE 488.1 and IEEE 488.2 standards.

# Powerful built-in analysis functions solve the toughest test problems



The fixture simulator adds a powerful analysis engine to the ENA for RF component measurements and enables accurate characterization with flexible user defined fixture simulation capability.

## Characterizing balanced components

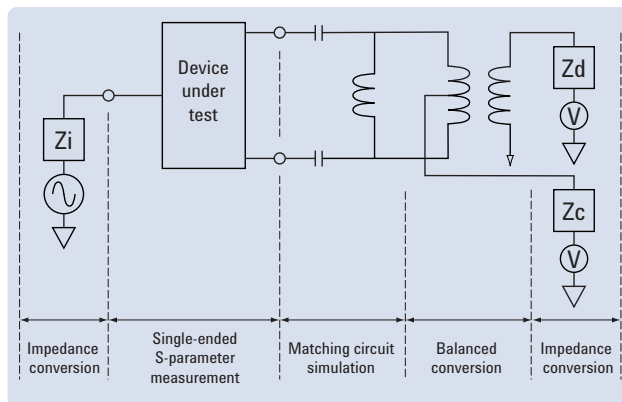
The fixture simulator provides high speed and accurate balanced conversion inside the ENA. The conversion algorithm is compatible with the Agilent N4444A balanced measurement system, which is a proven solution in many industries. Mixed mode S-parameters can be measured and enable strict characterization of the components. In component manufacturing this high-speed balanced measurement solution improves test quality and throughput dramatically. This system also contributes to higher production yield and lowers the cost of test.

## Characterizing components with matching circuits

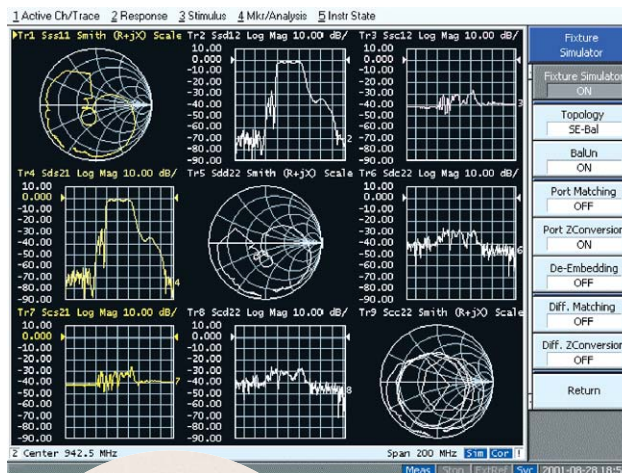
At times a component needs to be specified as it will be used in the real circuit of a wireless handset. The ENA uses a user-defined matching circuit with characteristics that are simulated by selecting circuit topology with arbitrary values of inductance and capacitance. The S-parameter of the matching circuit, in touchstone format, can also be applied for even more complicated simulation.

## Characterizing non-50 Ω components

The port impedance of components is not always 50 Ω, however a network analyzer is usually built with 50 Ω test port impedance. The fixture simulator mathematically converts the measurement result from 50 Ω to a user-defined complex port impedance. The ENA also provides 75 Ω component measurements with actual 75 Ω test port impedance with 50 to 75 Ω minimum-loss pads.



Fixture simulator capability block diagram



Mixed mode S-parameter measurement



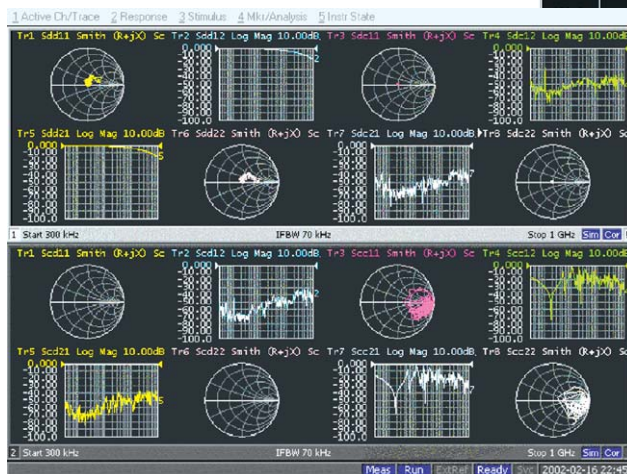


## Time domain analysis enables thorough design characterization

Time domain analysis allows you to locate and resolve discontinuities and mismatches in your device, test fixture, and cable. Employing the gating function in the time domain and transforming back to the frequency domain, you can remove unwanted responses of connector mismatch in your fixture and triple travel echo (TTE) of SAW devices.



Removing TTE of a SAW filter using time domain and gating



Balanced cable measurement example

## Log sweep and mixed-mode S-parameters allow better cable measurements

It is difficult to analyze the differential transmission characteristics of balanced cables over a wide frequency range. New features of the ENA allow the measurement of both differential and common mode characteristics such as longitudinal conversion loss (LCL), without using band-limited balun transformers, which can degrade measurement results.

## Power sweep

In addition to frequency response measurements of devices, the ENA delivers gain compression characteristics by simply using the power sweep function. Its wide power range with optional attenuator provides the ability to characterize active devices such as amplifiers.

## Up to 20,001 measurement points per trace

The ENA offers up to 20,001 measurement points per trace; capability that provides high frequency resolution for swept frequency measurement or highly accurate time domain analysis.



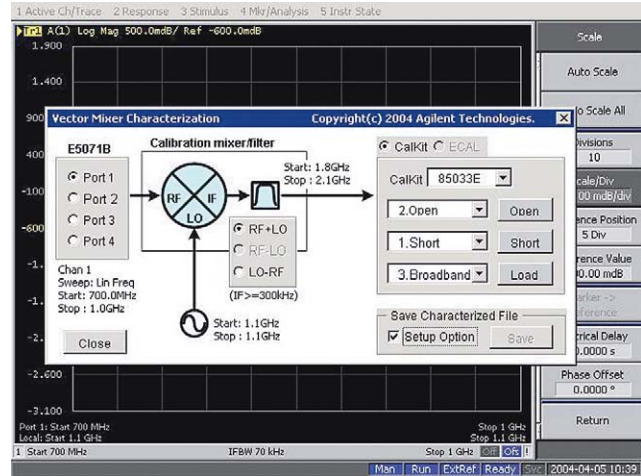
Gain compression measurement example

# Gain competitive advantage with industry-leading measurement technologies



## Advanced mixer measurement capabilities

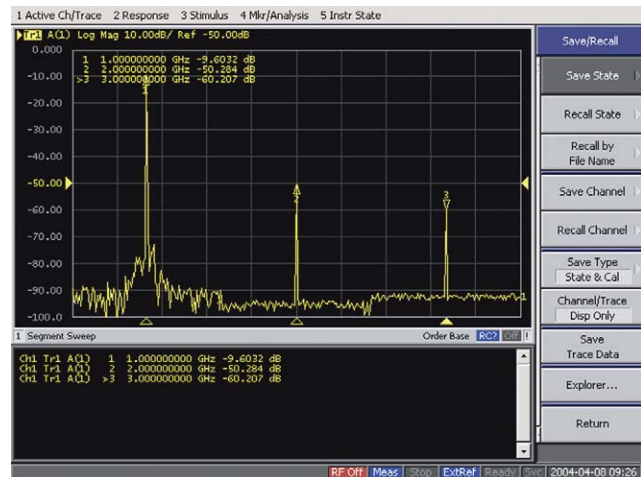
The ENA offers the frequency-offset mode (FOM) that provides frequency-offset sweep, external signal source control, and fixed IF/RF measurement capabilities. In addition, the ENA FOM supports two mixer calibration techniques. The first one is the vector-mixer calibration (VMC) that corrects for directivity, source match, load match, and reflection frequency response at each test port by using a characterized calibration mixer with de-embedding function. This calibration provides the most accurate measurements of phase and absolute group delay. The second one is the scalar-mixer calibration (SMC) that offers the highest accuracy conversion loss/gain measurement results with correcting the mismatches of both input and output test ports.



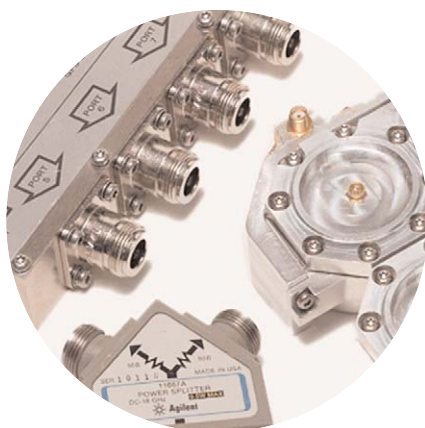
Vector-mixer calibration using VBA

## Harmonics measurements for non-linear devices

The ENA FOM also provides harmonics measurement capabilities for non-linear device evaluations. In combining the frequency-offset sweep and receiver calibration with power-meter, the ENA performs fast and accurate absolute magnitude measurements as same as a spectrum analyzer.



Harmonics measurement example

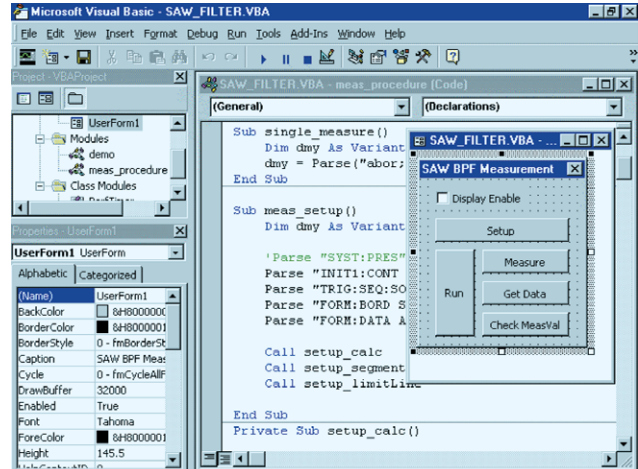


# Evolution of test automation, built-in VBA



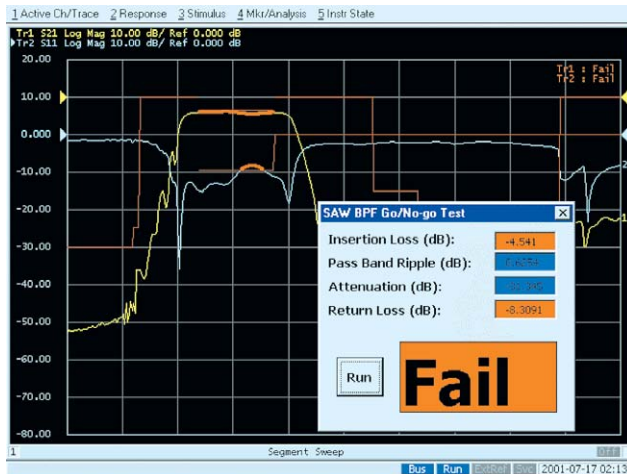
The ENA accelerates test development, expands customization capability and increase flexibility of test system integration. VBA is a powerful programming language that brings a new era of test automation and post data processing. A test program can be developed with the ENA's built-in VBA editor or using an external PC with Visual Basic (VB). The ENA can be programmed using SCPI or COM in the VBA routine. This powerful programming tool helps you to accelerate test system development.

In addition, a custom user interface can be easily developed with the graphical programming features of VBA. This allows the limit test results and/or test instruction to be displayed and helps to avoid operational errors. The VBA launcher function can allocate VBA programs to the ENA's softkeys enabling program execution with quick one-key operation.

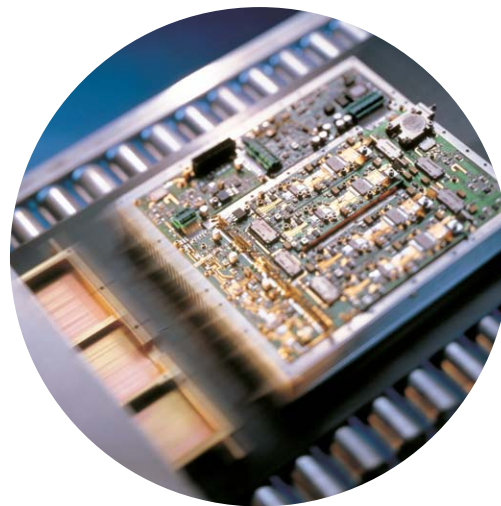


**Built in VBA editor**

At times measurement parameters need to be calculated mathematically or processed statistically after the data is acquired. The VBA is also useful for such post processing. Unique analysis functions are easily implemented using various VBA functions. This expands analysis capability of the test equipment and fully meets test needs.



**Customized user interface using VBA**

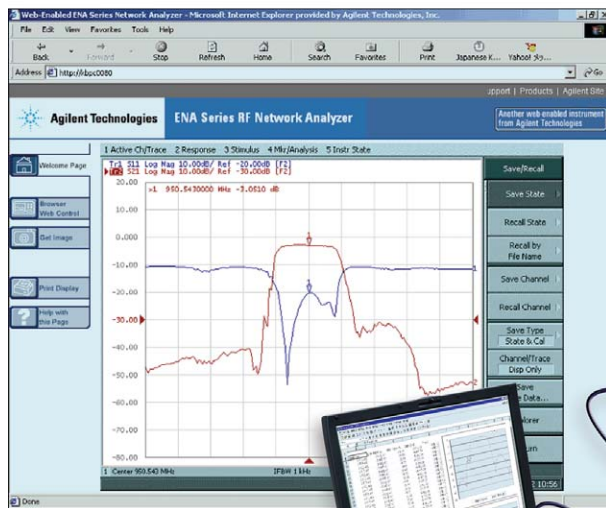


# Flexible programming and connectivity for productive test environments



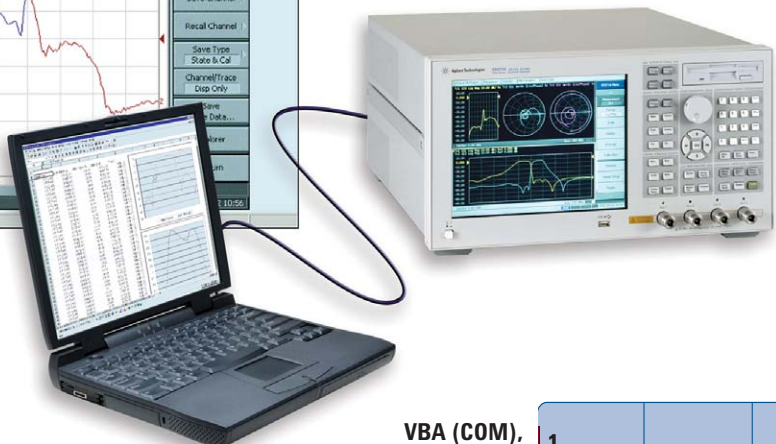
## Web-enabled control

For distributed teams, simply setup the ENA on your LAN, and users can access it from any Java™-enabled Web browser. You can easily capture screen shots for a report, or control the ENA from a remote location without using special software.



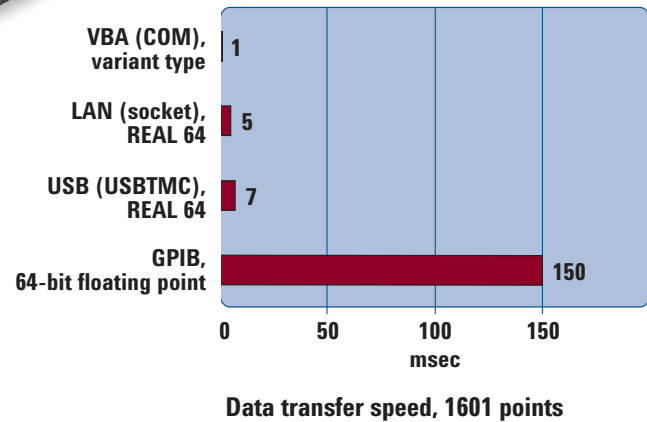
## Controlling the ENA

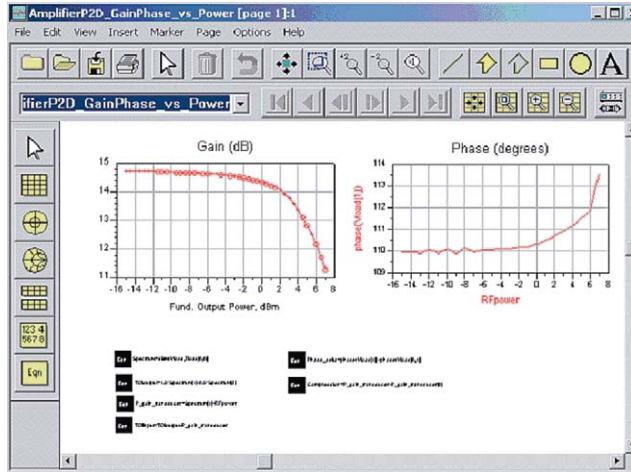
The ENA is equipped with various interfaces to help you maximize productivity, such as different views for measurement results, external test equipment controls, and peripheral utilization. In addition to built-in automation using SCPI or COM on the VBA, the ENA can be controlled from an external PC using your preferred programming language and method such as Socket or SICL over LAN, or SICL over GPIB. Furthermore, a newly equipped USB (USBTCM) interface offers the easiest connection between the ENA and the PC controller with a USB cable. The ENA can be easily controlled via the USB interface with Agilent VEE 7.0 or Agilent I/O library suite.



## Transferring measurement results for post processing – simple and fast

Design characterization often requires analyzing measured data on an external PC. The ENA uses IntuiLink software to easily control and transfer data to a PC. It is also possible to transfer data from the ENA directly to your network using LAN. The ENA can transfer 1601 points of data to a PC via LAN in about 5 ms. This accelerated data transfer time means you can post process your data in real time.

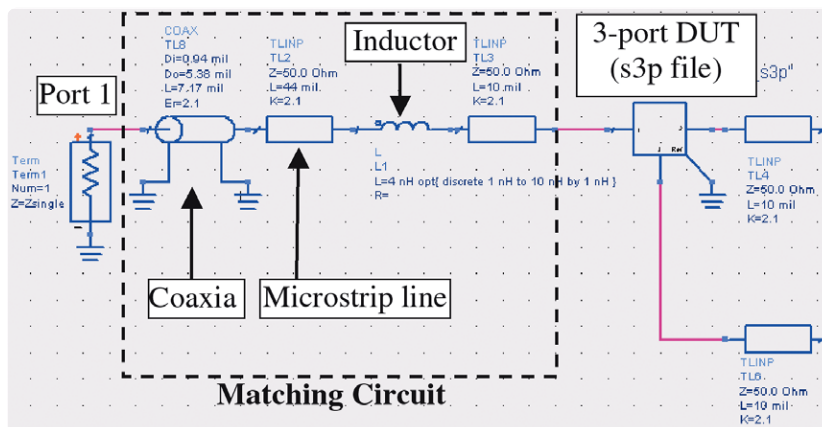




Example for gain-phase simulation of an amplifier

### Expanding the simulation capability with the ADS

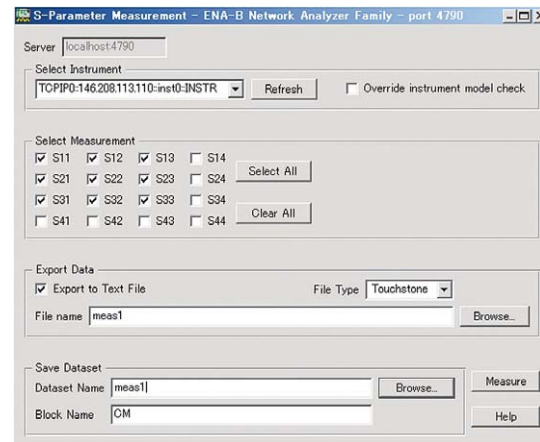
A combination of the ENA and the Advanced Design System (ADS) allows you to evaluate electronic components and RF circuits from various angles. For example, when you are trying to perform a complex matching circuit simulation, the ADS provides various types of circuit models such as coaxial connectors and microstrip lines. Also, the ADS has many practical tools like the auto tuning function, which enables you to automatically determine multiple circuit values on the matching circuit at the same time. Thus, the ENA and ADS solution makes your circuit design process faster and significantly reduces your total development time.



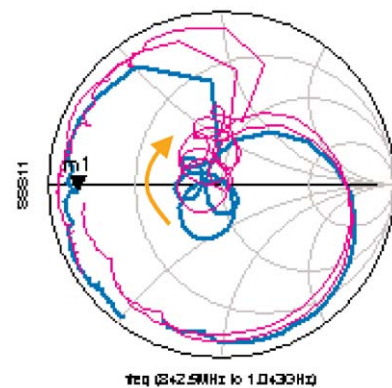
The ADS supports varieties of matching circuit models

### Excellent Connectivity with the ADS

The ENA provides an excellent connection capability with the ADS, which dramatically improves your measurements and simulation processes. The ADS has a GUI interface called the Connection Manager, which makes it easier to obtain measurement data directly from the ENA. Users can easily connect to the ENA from your PC then save the measurement results with a various file format such as Touchstone and CITT file. The ADS also gives you a new functionality: Automatic discovery of the instruments and a built-in swept power S-parameter application for creating behavioral models of an amplifier.



The Connection Manager Client on the ADS



The auto tuning function seeks a matching point as the circuit values changes

# Improving measurement accuracy and productivity of error correction



## Error correction for multiport device measurements

Error correction is critical for multiport devices, especially low loss and non-isolated devices such as couplers and balanced filters. When the full two-port error correction is applied to such three- or four-port devices, the port match characteristics of non-corrected ports affect measurement results. The ENA provides full two-, three- and four-port calibration and improves measurement accuracy of multiport devices.

## Expanding calibration capability for non-coaxial measurements

TRL/LRM is a useful calibration method for non-coaxial device measurements. The ENA extends TRL/LRM calibration to three- and four-port error correction, which enables accurate non-coaxial multiport measurements. In addition, the ENA supports waveguide calibration. For waveguide calibration, Agilent recommends Maury Microwave products. Maury Microwave is an Agilent channel partner that provides the best suited waveguide calibration kits<sup>1</sup> for the ENA.



**Maury Microwave Waveguide calibration kit**

1. For more information about the waveguide calibration kit, visit the Maury Microwave web site: [www.maurymw.com](http://www.maurymw.com)

## Automatic port extension

The automatic port extension (APE) provides an excellent solution for a complex test environment. APE not only enhances port extension by compensating for both electrical delay and insertion loss, but it also simplifies the approach such that the user no longer needs to provide accurate standards for in-fixture calibration. Instead, a “blank” test fixture can be used as the open standard to characterize the fixture.

## Reducing calibration time using ECal

The ENA supports Agilent two-port and four-port electronic calibration modules (ECal). ECal automatically performs the calibration procedure and minimizes operational errors. The ECal module can be controlled by the ENA via USB interface without an external PC. The front USB port is available for the ECal module and it is easy to connect to a rack-mounted analyzer. After an ECal calibration, the calibration performance can be verified using the ECal Confidence Check function.

## ECal calibration for mixed connector types

Components sometimes have mixed connector types like type N and 3.5 mm. The User-Characterization ECal function enables ECal calibration with adapters, increasing your calibration efficiency dramatically.



**Agilent ECal modules improve your accuracy and simplify the process to speed your calibrations.**

## Accessible calibration coefficients

Calibration coefficients can be easily read and written with programming commands. This function allows you to apply your own system error correction to the ENA.



# Flexible display layout maximizes test productivity



## Multi-window layout displays all measurement channels

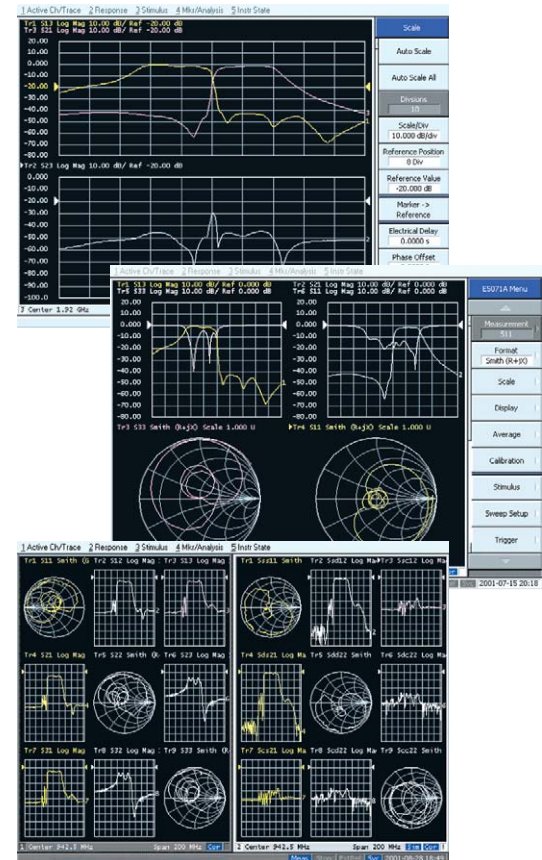
Measurement results require quick and clear observation, especially for multiport component test. The ENA can display up to sixteen<sup>1</sup> measurement channels simultaneously. For example, it is possible to use nine channels for a multiport device measurement as shown in the following measurement example. In most cases, each of these measurement channels requires individual sweep list, number of points (NOP), sweep type and test limits. The measurement result of all these channels needs to be displayed. The ENA provides flexible windows layout and displays up to up to sixteen<sup>1</sup> windows in the large LCD display. Operators can easily select from pre-defined layouts using either soft keys, pull down menus or SCPI/COM commands. It is easy to monitor all measurement results in a variety of layouts that help to achieve increased test productivity.



**Multiport device measurement example shows 28 traces in 9 channels**

## Up to sixteen<sup>1</sup> traces can be displayed in an independent format

In addition to the display window layout, an operator can allocate multiple measurement parameters with a choice of trace format. The ENA displays up to sixteen<sup>1</sup> traces per display window. Trace format and allocation of each parameter are fully independent between display windows. Pre-defined layouts are available and traces can be overlaid if necessary.



**Flexible window and trace layout**

1. 6 different channel and trace setups are available.

# Enhancing data security capabilities

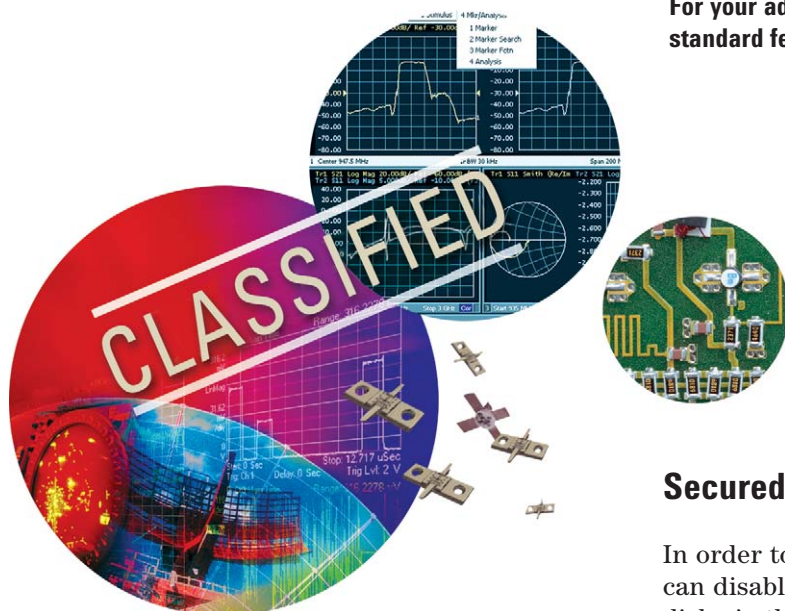


## Protect confidential data

Since it is virtually impossible to completely or selectively erase all user data on a hard disk without destroying the operating system, the best method for maintaining security when the ENA is not in a secure area is to remove the hard disk drive. The ENA provides the removable hard disk drive as a standard feature; enabling you to easily remove the drive and keep it safe in a secure area.



**For your added protection, the removable hard drive is a standard feature on the ENA**



## Secured operation

In order to protect confidential data, the ENA can disable access to the information on its hard disk via the LAN and USB mass storage devices. In addition, the frequency blanking function allows you to completely hide the displayed frequency parameters. Using the ENA security functions, it's easy to protect classified data and measurement parameters which are not to be viewed by unauthorized personnel.



## Ordering information

E5070B	300 kHz to 3 GHz network analyzer
E5071B	300 kHz to 8.5 GHz network analyzer
Option E5070B/71B-008	Frequency-offset mode
Option E5070B/71B-010	Time domain analysis capability
Option E5070B/71B-790	Measurement wizard assistant software
Option E5070B/71B-214	Two-port S-parameter test set
Option E5070B/71B-314	Three-port S-parameter test set
Option E5070B/71B-414	Four-port S-parameter test set
Option E5070B/71B-016	Touch screen color LCD
Option E5070B/71B-1E5	High stability frequency reference
E5091A	Multiport test set
Option E5091A-009	9-port test set
Option E5091A-016	13/16-port configurable test set

For details, refer to the *ENA Series Configuration Guide*, (literature number 5988-4926EN) available on the ENA Web site: [www.agilent.com/find/ena](http://www.agilent.com/find/ena)

## To our 8753 Series customers... The ENA RF network analyzer provides even greater value!

### The standard just got better

Agilent 8753 Series RF network analyzer has been widely recognized as the standard tool for a wide range of applications, providing various kinds of measurement capabilities at a reasonable price. ENA provides you with even greater value for your money offering advanced measurement technologies such as fixture simulator, multiport calibration, built-in VBA, and an 8753-style interface.

### Protecting your software investment

Agilent protects your 8753 software investment by providing migration tools<sup>1</sup> to reduce your code conversion effort.



**Agilent ENA  
E5070/71B**



**Agilent  
8753ES**

<b>Frequency</b>	300 kHz to 8.5 GHz	30 kHz to 6 GHz
<b>Test set</b>	S-parameter	S-parameter
<b>Built-in test port</b>	2, 3, or 4	2 or 3 <sup>2</sup>
<b>Dynamic range</b>	122 dB	110 dB
<b>Trace noise</b>	0.001 dB rms	0.006 dB rms
<b>Mixer calibration</b>	Yes <sup>3</sup>	No
<b>LAN interface</b>	Yes	No
<b>USB interface</b>	Yes (USB x 3, USBTMC x 1)	No

1. For more information about migration tools and trade up offers, visit: [www.agilent.com/find/nadisco](http://www.agilent.com/find/nadisco).

2. Option H39 is required.

3. Option 008 is required.

## Web Resources

Visit our Web sites for additional product information and literature.

ENA Series network analyzers:  
[www.agilent.com/find/ena](http://www.agilent.com/find/ena)

Multiport & S-Parameter test sets:  
[www.agilent.com/find/multiport](http://www.agilent.com/find/multiport)

Electronic Calibration (ECal) modules:  
[www.agilent.com/find/ecal](http://www.agilent.com/find/ecal)

Test and measurement accessories:  
[www.agilent.com/find/accessories](http://www.agilent.com/find/accessories)

For additional information regarding Cascade Microtech probing equipment and accessories visit:  
[www.cascademicrotech.com](http://www.cascademicrotech.com)

For addition information regarding Maury Microwave waveguide calibration kits visit:  
[www.maurymw.com](http://www.maurymw.com)



### Agilent Email Updates

[www.agilent.com/find/emailupdates](http://www.agilent.com/find/emailupdates)  
Get the latest information on the products and applications you select.

## Literature

*ENA Series Data Sheet*, literature number 5988-3780EN  
*ENA Series Configuration Guide*, literature number 5988-4926EN

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**Agilent Technologies' Test and Measurement Support, Services, and Assistance**  
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

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Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you receive your new Agilent equipment, we can help verify that it works properly and help with initial product operation.

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Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.



### Agilent Open

[www.agilent.com/find/open](http://www.agilent.com/find/open)

Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.

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(fax) 800 820 2816

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(fax) 0800 286 331

#### Other Asia Pacific

#### Countries:

(tel) (65) 6375 8100  
(fax) (65) 6755 0042

Email: [tm\\_ap@agilent.com](mailto:tm_ap@agilent.com)

Contacts revised: 05/27/05

**For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:**

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