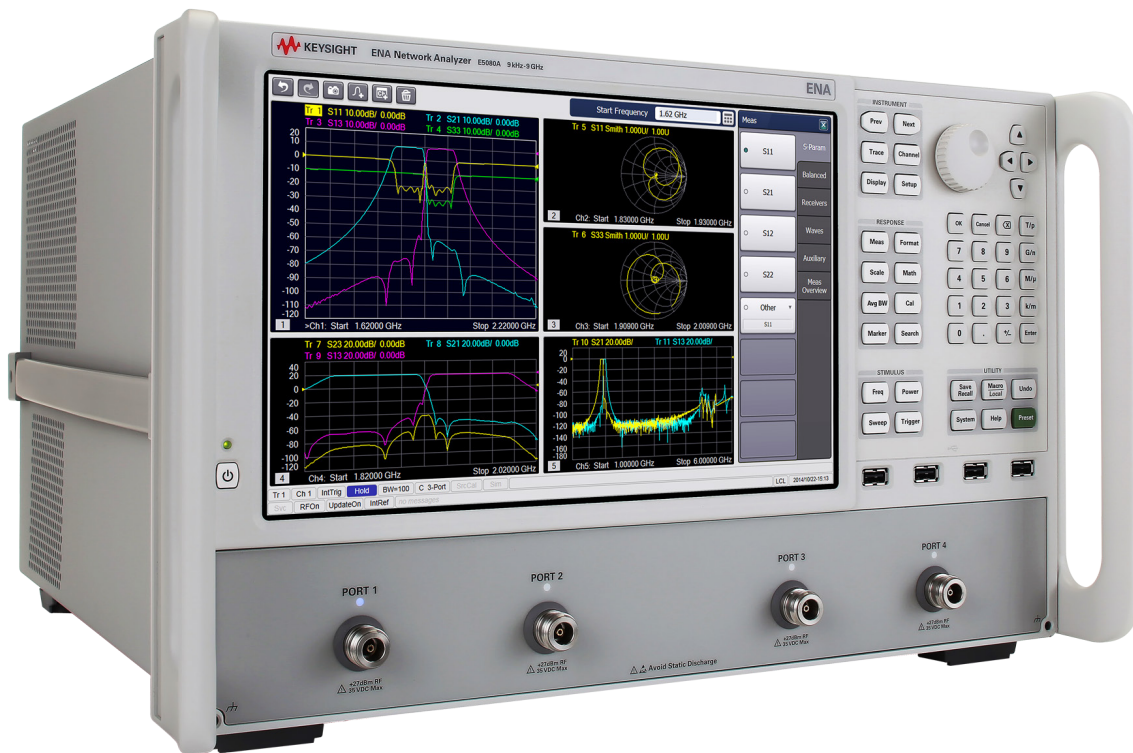


# Keysight E5080A

## ENA Vector Network Analyzer

- 9 kHz to 4.5/6.5/9 GHz



## The Next-Generation ENA

The Keysight E5080A is the next-generation RF vector network analyzer (VNA), providing best-in-class performance, flexible functionality and advanced usability for testing antennas, filters, cables, balanced/differential components, amplifiers and mixers. With its intuitive, touch-based interface, the E5080A is designed to help users streamline their measurement flow and achieve better results in less time. This new instrument implements a converged platform that leverages the best attributes of the ENA and PNA families. The E5080A sets the new standard in RF component testing for both R&D and manufacturing environments. The E5080A offers comprehensive functionalities for measuring active and passive components such as amplifiers, mixers, filters, antennas, cables, and many more. It builds on the over 45-year legacy of excellence in network analysis and 75-year electronic test and measurement experience.

### Best-in-class performance

Wide dynamic range	152 dB (typical, 3 Hz IFBW)
Fast measurement speed	3 ms (401 points, uncorrected)
Low trace noise	0.0005 dBrms (typical, 10 kHz IFBW)
High temperature stability	0.005 dB/°C (typical)
Wide source power range	-90 to +15 dBm (spec)

The E5080A provides wide dynamic range from 9 kHz. More than 10 dB better dynamic range than E5071C enables to measure high-blocking DUTs such as filters accurately and improve measurement speed using wider IF bandwidth (IFBW). The unparalleled measurement speed compared to competitor products maximizes the test throughput in production line.

Extremely low trace noise helps minimize errors and associated test margin when measuring low-loss devices such as filter pass-bands.

The E5080A is designed to have the minimum temperature drift against variation of environment temperature. The superior measurement stability helps high-volume manufacturers minimize calibration time and associated downtime.

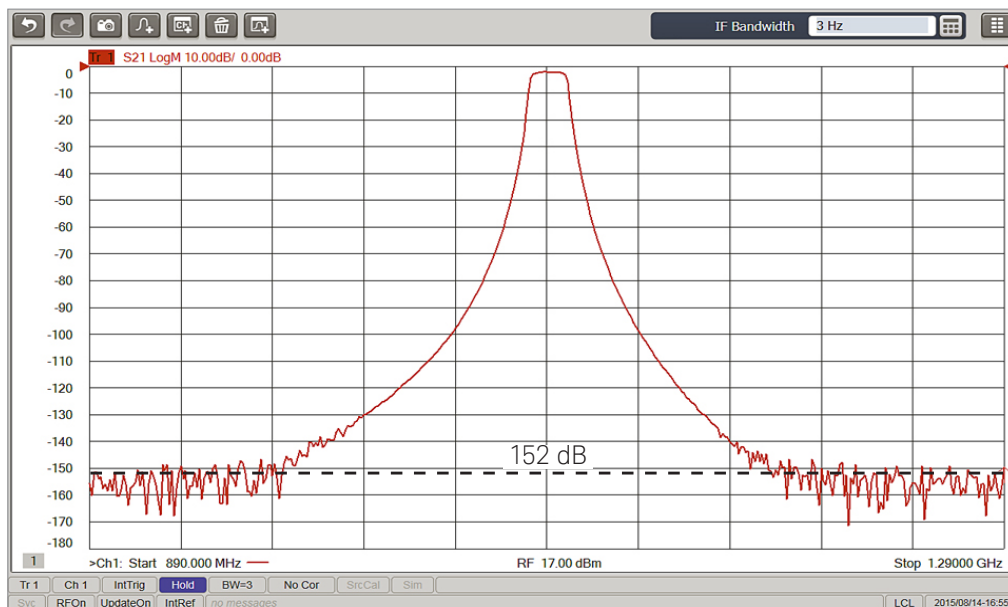


Figure 1. Wide dynamic range (IFBW = 3 Hz).

## Intuitive and Flexible Operations with Modern User Interface

The E5080A integrates a high resolution display with a touch screen, which provides a crisp view and easy access to all data and traces. This enhanced user interface allows intuitive operation and helps you set up complex measurements quickly.

The E5080A is designed to help users streamline their measurement flow. Measurement flow proceeds from right to left: front panel keys, touch-activated softkeys with tabs, and touch-driven trace displays and windows.

### Easy access to frequently used functions

The tabbed soft panel enables you to access the analyzer's major functions within a few steps. Your frequently used softkeys can be registered to the Favorite menu. A long touch on the screen activates the Context Popup menus, and these present the most relevant choices without needing to access the softkeys.

### Direct access to essential features through the toolbar

Measurement traces, channels, and windows can be quickly added by pressing the icons on the toolbar. The list of icons is customizable depending on your preference.

### Flexible traces and windows layout

The layout of traces and windows can be flexibly allocated with intuitive drag-and-drop operations. Or the layout can also be changed by using the softkeys that split or combine traces and windows in a single action.

### Magnifying the display

With multi-touch or single-touch gestures, you can magnify the displayed area on the screen.

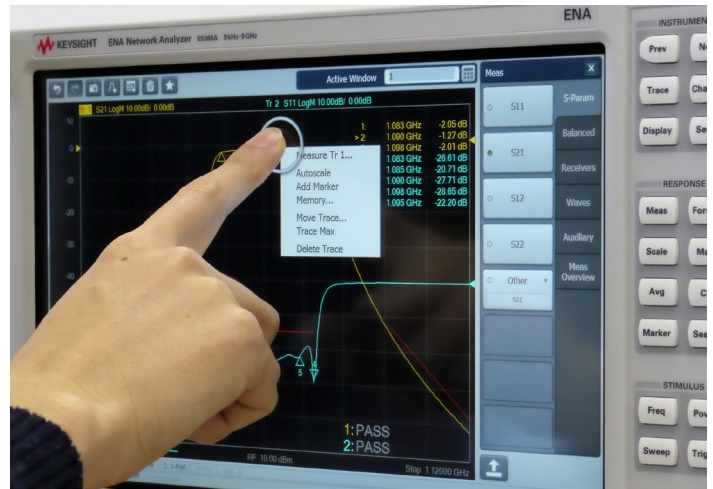


Figure 2. Tabbed soft panel and popup menu.

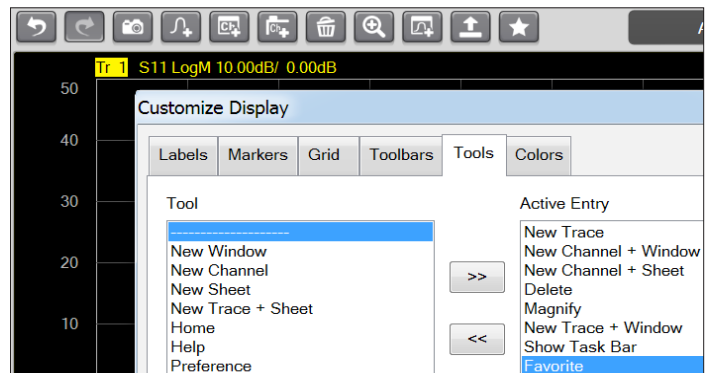


Figure 3. Customizable toolbar menus.

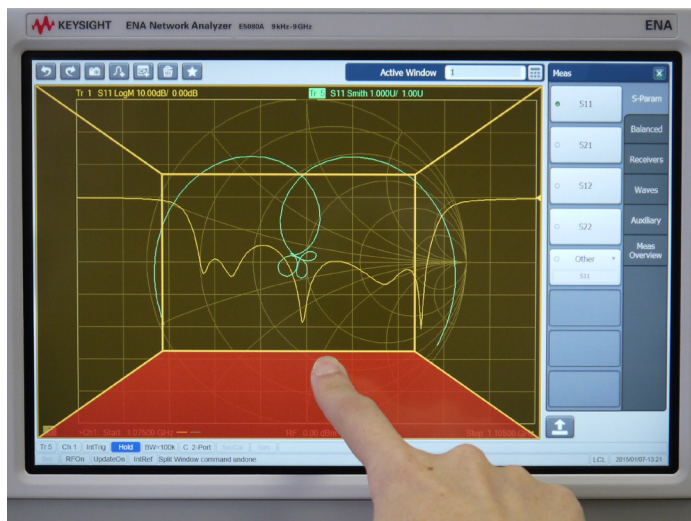


Figure 4. Drag-and-drop for traces/windows.

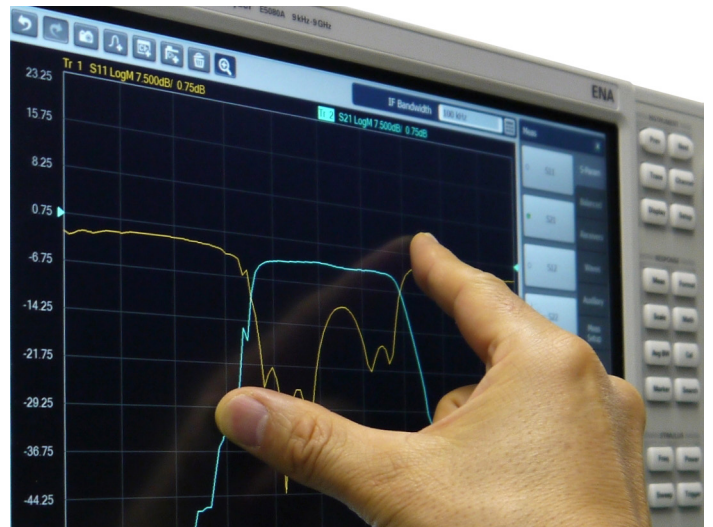


Figure 5. Multi-touch magnification.

## Streamline Your Measurements with Advanced Usability

The E5080A's advanced usability simplifies the measurement setup tasks, and its flexible display capabilities give excellent visibility of the measurement data.

### Quick setups using dialog menus and Copy Channel

A variety of dialog menus assist you in making complex measurement setups easily. The quick start dialog gives the templates of display layouts for typical measurement applications, and the subsequent sweep setup dialog completes necessary stimulus settings in a single page. Moreover, once you have completed making the setup for one channel, you can copy it to other channels by using the copy channel function. This significantly reduces the time required for making multi-channel measurement setups.

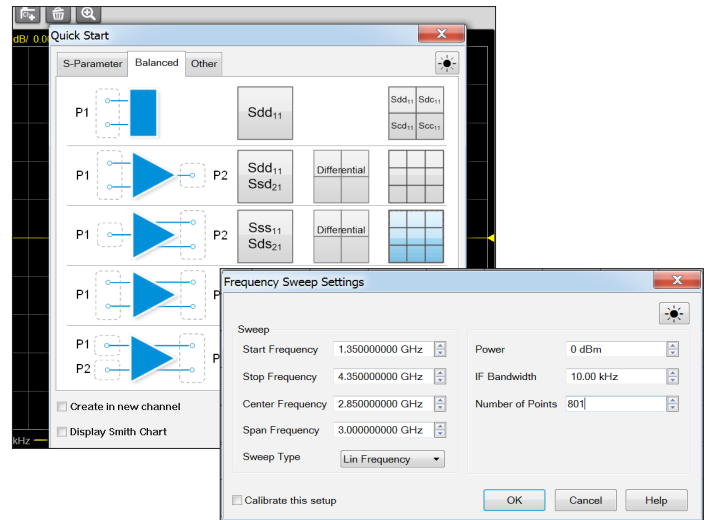


Figure 6. Quick Start dialogs.

### Tabbed sheet

The tabbed sheet function allows you to split the measurement display into multiple pages within a single instrument state. Complicated multi-channel measurement data can be easily observed by splitting the channels into the sheets. The active sheet can be switched not only with the touch or mouse operations but with the Prev/Next hardkeys on the front panel. This is useful for manufacturing applications such as the BTS filter tuning where the hardkey operation is preferred.

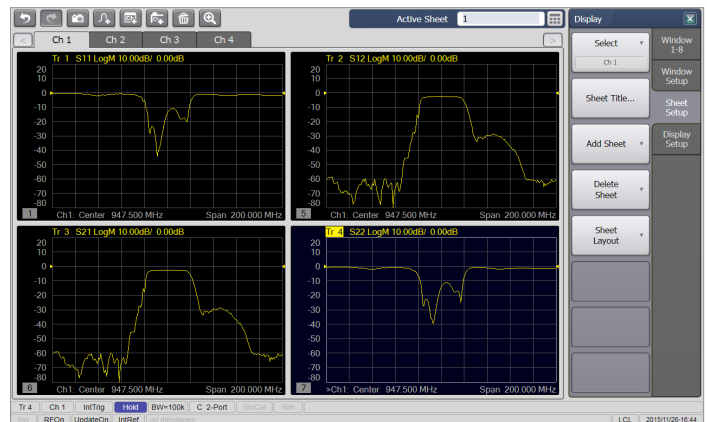


Figure 7. Displaying four channel data using Tabbed Sheet.

### Flexible marker capabilities

You can place up to 15 markers per trace. For better visibility, the locations of the marker lists are flexibly movable, and the number of decimal places can be changed as you like. In addition, a variety of marker search functions are available, including the single or multiple max/min/peak/target search, the bandwidth/notch search, and the gain compression search.

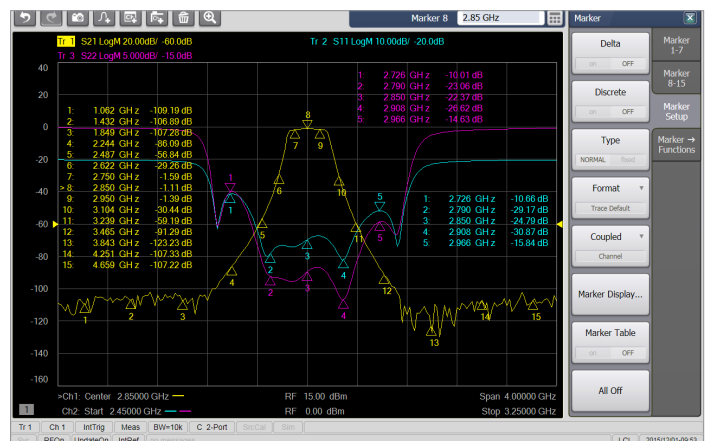


Figure 8. Up to 15 markers per trace.

## E5080A Innovative Applications

The E5080A combines the highest RF performance with powerful analysis capabilities that enables you to address a variety of applications and increase test efficiency.

### Powerful, fast and accurate automatic fixture removal (S96007A)

Accurately removing the effects of the fixture is required to get a good measurement of the DUT. Automatic fixture removal adds a powerful application wizard to guide you through characterizing a fixture and removing it from the measurement. Complicated modeling in EM simulation software or multiple calibration standards fabricated on board is no longer needed to characterize and remove a fixture.

- Easiest way to remove fixture effects from non-coaxial device measurements
- Extract fixture S-parameters from 2x thru or one-port measurements
- Step-by-step wizard to characterize your fixture and remove it from your measurements

### Accurate characterization of mixers and converters (S96082A)

Frequency offset mode is available to set the E5080A's source frequency independently from where the receivers are tuned for mixer measurements. Scaler mixer calibration (SMC) provides the most accurate conversion loss/gain measurements by combining two-port and power calibration. Vector mixer calibration (VMC) provides measurements of match, conversion loss/gain and group delay. Input and output mismatch correction reduces ripple and eliminates the need for attenuators.

- Intuitive user interface
- Frequency-offset sweep
- Match-corrected conversion loss measurements
- Controls external signal generators and power meters

### Fast, accurate gain compression versus frequency measurements of amplifiers (S96086A)

S96086A makes it easy to characterize compression over the DUT's operating frequency range with extreme speed and accuracy, and with a simple setup. Instead of a linear power sweep with many points, the S96086A uses an adaptive algorithm to find the desired compression point at each frequency with just a few power measurements, thus significantly reducing test times.

- Fast and convenient measurements with SMART Sweep
- Complete amplifier with 2-dimensional (2D) sweeps, choice of sweep frequency per power, or sweep power per frequency

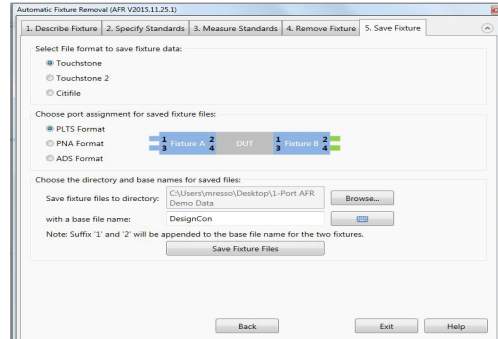


Figure 9. Automatically characterizing test fixture.

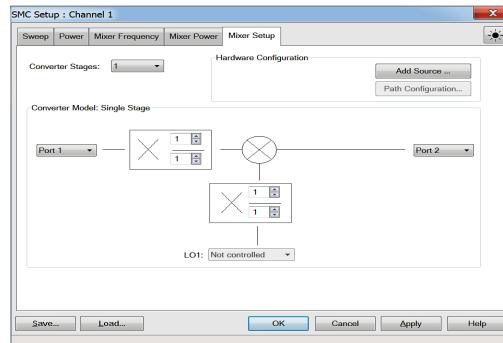


Figure 10. Intuitive wizard for configuring mixer/frequency converter measurements.

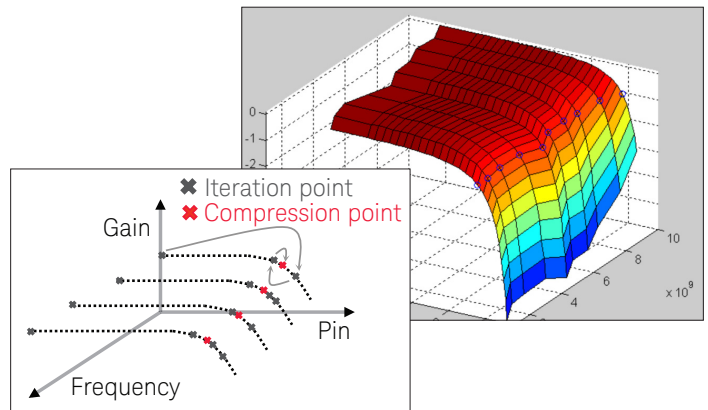


Figure 11. Gain compression analysis of amplifier.

## Advanced Calibration Tools

Calibrating network analyzers is critical for high accuracy measurements. The E5080A supports all common calibration methods for coaxial DUTs, waveguide DUTs and DUTs in test fixtures, on printed circuit boards (PCB) and on wafers. The built-in capabilities include advanced calibration methods and a new “basic calibration” feature that can simplify the calibration processes.

**TRL/LRL/TRM/LRM** calibration (Through, Reflect, Line, Match) for on PCB and on-wafer measurements.

**Unknown Thru (SOLR)** calibration for non-insertable devices.

**Source Power Cal** for amplifier measurements, and offers advanced techniques such as power cal using the analyzer’s receiver.

**Quick SOLT (QSOLT)** reduces the number of correction standards and calibration steps for multiple ports calibration.

**Electronic calibration (ECal)** modules offer accurate calibration with simple one-connection operation.

### Basic Cal

The E5080A offers a variety of calibration menus and you can choose an appropriate menu depending on the complexity of your calibration methods. The Basic Cal dialog is a very simple calibration UI providing all the calibration buttons in the same dialog page. This calibration menu is suitable for performing relatively simple calibrations such as the basic SOLT cal.

### Advanced calibration methods

#### Cal Wizard

The E5080A also offers wizard-type calibration menus for complicated calibrations. The Smart Cal guides all the operation steps of the calibrations with the wizard menu. This calibration menu is suitable for performing complicated calibrations such as mixed-connector cal, and the combination of the SOLT cal and the source/receiver power cal. The Cal All is the advanced wizard function of the Smart Cal. This calibration menu guides the calibrations of multi-channel measurement setups at minimal steps.

#### Cal Plane Manager

The Cal Plane Manager allows you to characterize the adapters, test fixtures, or probes to the S2P data, and mathematically de-embed them for improving the measurement accuracy at the DUT planes. This function also provides the capabilities for modifying the existing S2P files, such as reversing the port order of the S2P file and cascading two S2P files.

### Fixture simulator

The fixture simulator offers functions for simulating fixtures and adapters such as embedding/deembedding, port matching, impedance transformation and port extensions.

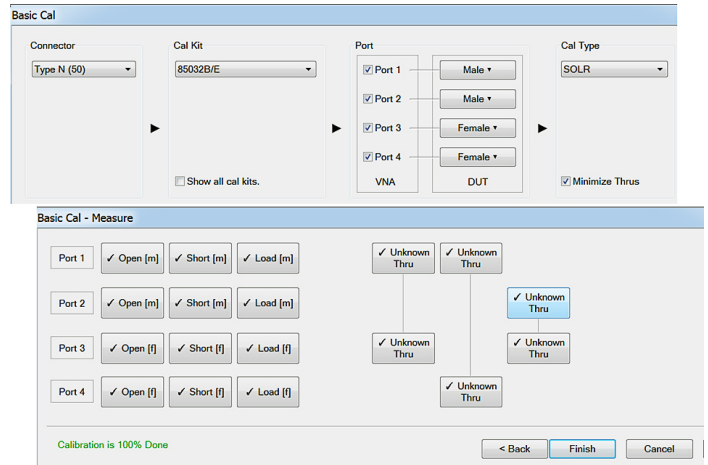


Figure 12. Basic Cal.

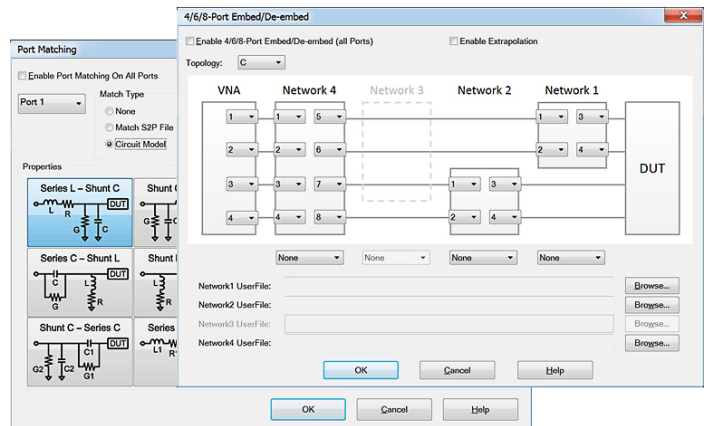


Figure 13. Fixture simulator.

## Extend the Power of the E5080A ENA Measurements with up to 40 ports

The combination of the 4-port E5080A and E5092A configurable multiport test set offers a comprehensive multiport solution. Depending on your test requirements, you can flexibly build the test port configurations by changing the front jumper connections of up to two E5092A test sets. The Automated Measurement Expert (AMX) is the ready-to-use automated test software supporting the E5080A and E5092A. The AMX frontend Test Plan Builder (S94701A) generates test plan files that contain optimal VNA setups and test sequences from your DUT test plans. The AMX backend software (KS8400A/S94702A) performs automated multiport S-parameter tests according to the generated test sequences.

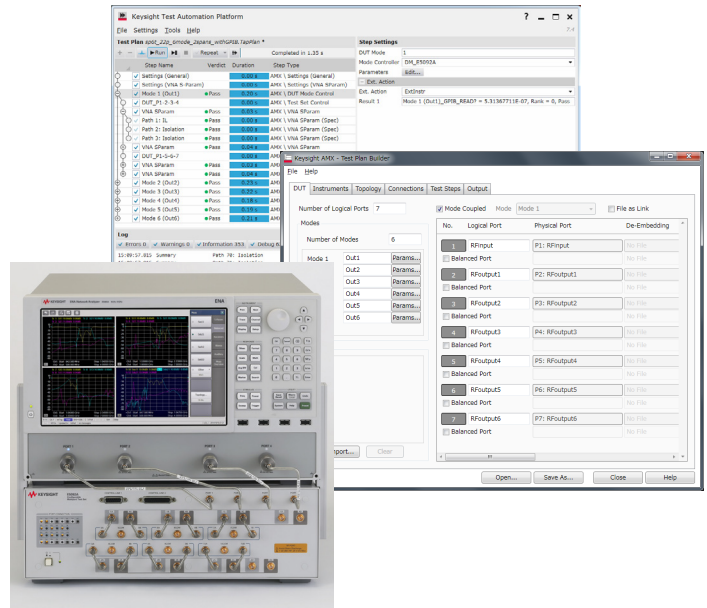


Figure 14. Multiport solution with AMX.

## CalPod calibration-refresh modules

Keysight provides a unique way to quickly and easily refresh a calibration at the push of a button, without removing the DUT, and without the physical connection of standards. CalPods are particularly useful in thermal or thermal-vacuum chambers for removing environmental effects from your measurement results due to temperature changes of cables, connectors, and adaptors, or for removing variations due to cable movements or variations in switch matrices.



Figure 15. CalPods refresh a calibration without removing your DUT.

## BenchVue Software

Keysight BenchVue software for the PC eliminates many of the issues around bench testing. By making it simple to connect, control instruments, and automate test sequences so you can quickly move past the test development phase and access results faster than ever before with just a few clicks. A dedicated Network Analyzer App, available with BV9001B, allows you to quickly configure the most commonly used measurements and setups. Rapidly build custom test sequences with the integrated Test Flow App to automate and visualize test results without the need for instrument programming. BenchVue supports hundreds of Keysight instrument types and models all from one easy to use software platform. Control, Automate, Simplify with BenchVue.

- Easily control, get screen captures and trace data
- Capture measurements from your network analyzer in a single click
- Automate common network analyzer controls and measurements as quickly as using your front panel

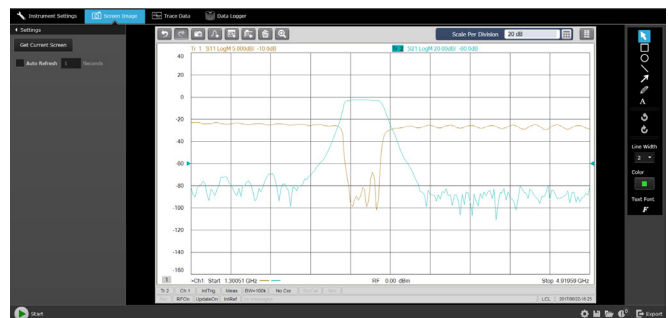


Figure 16. BenchVue: PC control, capture screen images or trace data, and build automated tests in minutes.

## Extend the Power of the E5080A ENA (Continued)

### Compatibility

The E5080A shares a common software platform with all members of the latest PNA family that makes it easy to choose just the right level of performance to match your budget and measurement needs. This commonality guarantees measurement consistency and repeatability and a common remote-programming interface across multiple instruments in R&D and manufacturing.

The E5080A offers the E5071C code emulation mode which interprets the SCPI commands of the E5071C. This allows for instrument emulation and backward code capability enabling a seamless drop-in replacement in your automated test environment and minimizing transition risks. State files created using the E5071C can be converted and recalled with the E5080A. The E5080A also supports the code emulation mode for the legacy 8753 series network analyzers.

This compatibility means that you can easily make the transition to the E5080A while leveraging your investment and expertise in test software. The test software from R&D can be effortlessly transferred to manufacturing which helps you maintain past efforts, enhance current designs, and accelerate future innovations.

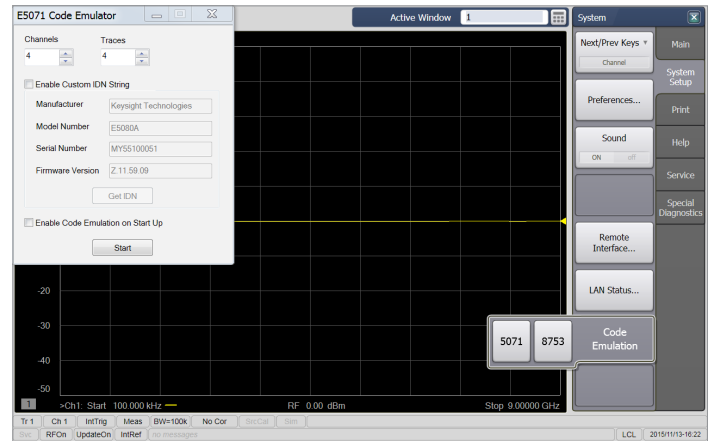


Figure 17. Code emulation mode for legacy vector network analyzers.

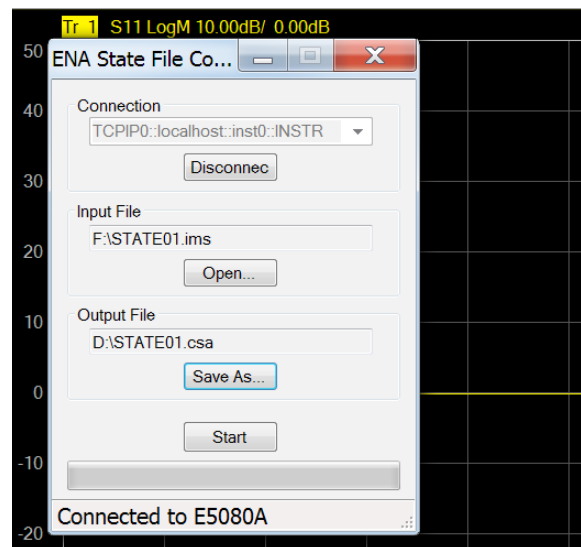


Figure 18. The E5080A's state file converter helps you easily transfer your tests with the E5071C.



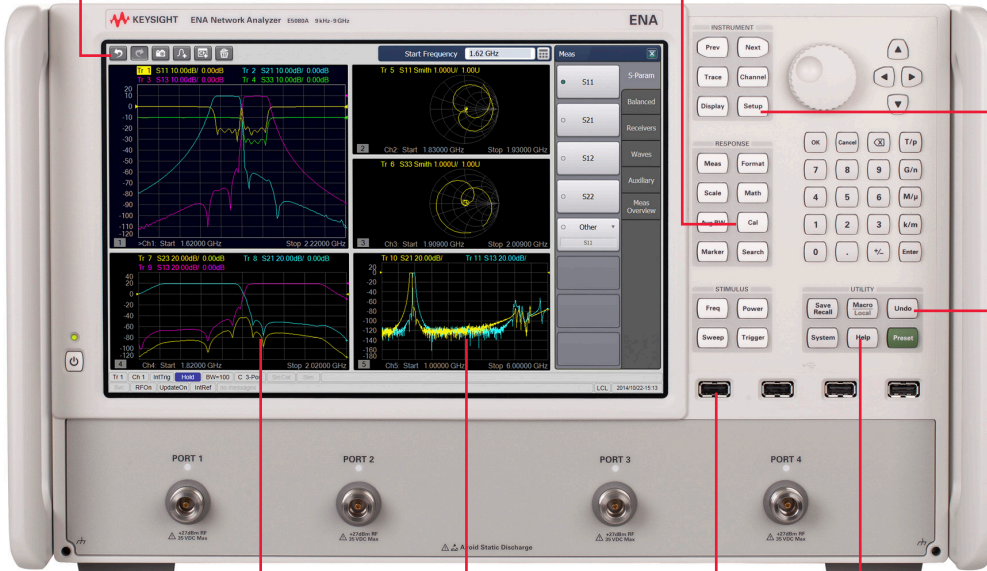
## E5080A Front and Rear Panels

Flexible, modern user interface: front panel keys tabbed soft panel, pulldown menus, customizable toolbar, right-click shortcuts, drag-and-drop operation and 12.1" touch screen

State-of-the-art calibration capabilities

Sweep Setup and Quick Start enables easy setup

Undo/Redo cancels or restores the previous entries



200 measurement channels and unlimited traces

Up to 15 markers per trace

Quick access for Ecal and other USB devices

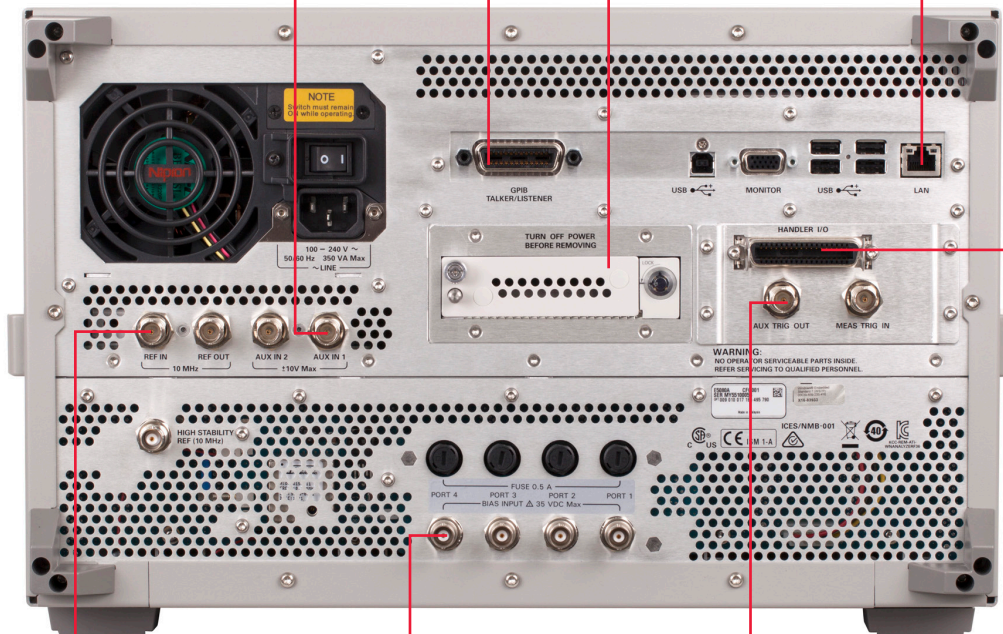
Context sensitive built-in help

Aux inputs for DC measurements

GPIB for remote operation

Removable solid-state drive for secure environments (optional)

LAN and device-side USB provide alternatives to GPIB for remote programming



Handler I/O for external device control

### Maintain data security

The removable solid-state drive makes it easy to move the instrument from one location to another.

10 MHz reference In/Out

DC Bias inputs

Trigger In/Out

## E5080A Key Specifications and Features (Comparison with E5071C)

Item	E5080A	E5071C (4.5/6.5/8.5 GHz options)
Frequency	9 kHz to 4.5/6.5/9 GHz, with bias-tees	9 kHz to 4.5/6.5/8.5 GHz, without bias-tees 100 kHz to 4.5/6.5/8.5 GHz, with bias-tees
Test port	2 or 4-port, 50 $\Omega$	2 or 4-port, 50 $\Omega$
Dynamic range (at max source power)	135 dB (spec, 10 Hz IFBW) 152 dB (typical, 3 Hz IFBW)	123 dB (spec)
Trace noise	0.0015 dBrms (spec, 10 kHz IFBW) 0.0005 dBrms (typical, 10 kHz IFBW)	0.003 dBrms (spec, 70 kHz IFBW)
Stability	0.005 dB/ $^{\circ}$ C (typical)	0.005 dB/ $^{\circ}$ C (typical)
Measurement speed (401 pts, 200 MHz span, uncorrected)	3 ms	7 ms
Source power	-90 to +15 dBm (spec) -110 to +17 dBm (typical)	-55 to +10 dBm (spec)
NOP	Max 100,001	Max 20,001
Channels	200	160
Markers	15/trace	9/trace
Measurement parameters	S-parameters (single-ended, mixed-mode), Absolute power	S-parameters (single-ended, mixed-mode), Absolute power, TDR and TDT parameters <sup>1</sup>
Software capabilities	Automatic fixture removal, time-domain analysis, frequency offset mode, scalar and vector mixer/converter measurement, gain compression measurements, measurement wizard assistant	Time-domain analysis, frequency offset mode, scalar and vector mixer/converter measurement, measurement wizard assistant, enhanced time-domain analysis
Other major software capabilities	Fixture simulator, Equation editor, PMAR (power meter as receiver)	Fixture simulator, Equation editor, External test set mode <sup>2</sup>
Automation	Remote control with SCPI commands, 8753/E5071C code emulation, BenchVue	Remote control with SCPI commands, Built-in VBA 8753 code emulation, BenchVue
Multiport test set	E5092A	E5092A, E5091A <sup>3</sup>
Display	12.1 inch	10.4 inch
Box height	6U	5U
Other major hardware capabilities	High stability oven (option), Bias tees, DC input ports	High stability oven (option), Bias tees, DC input ports, Probe power

1. Optional capabilities.

2. Assigns 4 test ports as direct source/receiver ports, S, R, A, and B.

3. Discontinued test set, Dec. 2014 EOS.

For more detailed information, refer to E5080A Data Sheet.

### Related literature

Publication title	Publication number
<i>E5080A ENA Vector Network Analyzer, E5092A Configurable Multiport Test Set - Data Sheet</i>	5992-0291EN
<i>E5080A ENA Vector Network Analyzer &amp; E5092A Configurable Multiport Test Set - Configuration Guide</i>	5992-0292EN
<i>Vector Network Analyzer - Selection Guide</i>	5989-7603EN

### Web resources

- [www.keysight.com/find/ecal](http://www.keysight.com/find/ecal)
- [www.keysight.com/find/mta](http://www.keysight.com/find/mta)
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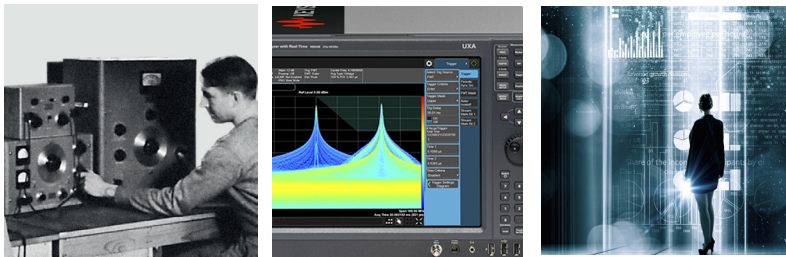


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