Keysight E5080B ENA Series Vector Network Analyzers

2-/4-port, Up to 20 GHz

Drive Down The Cost of Test

KEYSIGHT TECHNOLOGIES

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E5080B ENA Series Vector Network Analyzer Configurations

This configuration guide describes standard configurations, options, accessories, upgrade kits and compatible peripherals for the Keysight E5080B ENA Series vector network analyzer (VNA). All documentation of the E5080B is available on the product page at: www.keysight.com/find/e5080b

Test set options

Choose one of the frequency and test set options for the E5080B. Option 2xx indicates two test ports and option 4xx indicates four test ports. To add options to a product, order the corresponding item number (E5080B-xxx).

Option Number	Description	Test port connectors
2-port Options		
E5080B-240	2-port test set, 9 kHz to 4.5 GHz	Type-N (f)
E5080B-260	2-port test set, 9 kHz to 6.5 GHz	Type-N (f)
E5080B-290	2-port test set, 9 kHz to 9 GHz	Type-N (f)
E5080B-2D0	2-port test set, 9 kHz to 14 GHz	3.5 mm (m)
E5080B-2K0	2-port test set, 9 kHz to 20 GHz	3.5 mm (m)
4-port Options		
E5080B-440	4-port test set, 9 kHz to 4.5 GHz	Type-N (f)
E5080B-460	4-port test set, 9 kHz to 6.5 GHz	Type-N (f)
E5080B-490	4-port test set, 9 kHz to 9 GHz	Type-N (f)
E5080B-4D0	4-port test set, 9 kHz to 14 GHz	3.5 mm (m)
E5080B-4K0	4-port test set, 9 kHz to 20 GHz	3.5 mm (m)

Spectrum analysis hardware options

Choose one of spectrum analysis hardware to the E5080B (Option 09x). The frequency of Option 09x must match with the operation frequency of test set options. S96090A application software is required for spectrum analysis using the Option 09x.

Option Number	Description	Additional Information
E5080B-090	Spectrum analysis hardware, 9 kHz to 4.5 GHz	
E5080B-091	Spectrum analysis hardware, 9 kHz to 6.5 GHz	
E5080B-092	Spectrum analysis hardware, 9 kHz to 9 GHz	
E5080B-093	Spectrum analysis hardware, 9 kHz to 14 GHz	
E5080B-094	Spectrum analysis hardware, 9 kHz to 20 GHz	

Internal bias tees options

Choose one of internal bias tees options.

Option Number	Description	Additional Information
E5080B-120	Add internal bias tees for 2-port E5080B	
E5080B-140	Add internal bias tees for 4-port E5080B	

Hardware options

Option Number	Description	Additional information
E5080B-021	Add pulse modulation hardware	This option enables the internal pulse modulator on the analyzer's source. S96025A application software is required for pulsed-RF measurements
E5080B-1E5	Add high stability time base	Adds higher stability time base reference
E5080B-172	Add GPIB interface	
E5080B-175	Add analog input and output	Provides two DC sources and four input ports for DC measurements.

Application software

Model Number[1]	Description	Additional information
S96007A	Automatic fixture removal	
S96010A	Time domain analysis	
S96011A	Enhanced time domain analysis with TDR	Includes all capability of S96010A
S96025A	Basic pulsed-RF measurements	Requires hardware option 021.
S96029A	Noise figure measurements with vector correction	Standard receivers are used.
S96082A	Scalar mixer/converter measurements	Provides ability to independently set the frequency of internal sources and receivers, and to configure external sources. Provides SMC measurement class.
S96084A	Embedded-LO capability	
S96086A	Gain-compression measurements	
S96090A	Spectrum analysis	Requires hardware option 09x.
S94701A S94702A KS8400A	Automated Measurement Expert (AMX)	A smart software solution for automated multiport S-parameter measurements with the E5080B and E5092A[2]. Order each software model and install in a PC or the analyzer.

1. Supported software license types: node-locked perpetual (1FP), node-locked 12 month (1FL). 1FP is the only type that can be ordered as part of the instrument. The other types have to be ordered as separate items and installed from the web after the receipt of the instruments.
2. A 4-port ECal module (i.e. N4431B or N4433A) is recommended for multiport measurements.

Calibration options

Option Number	Description	Additional information
E5080B-1A7	ISO 17025 compliant calibration	
E5080B-A6J	ANSI Z540 compliant calibration	

Accessories

Option Number	Description	Additional information
E5080B-1CM	Rack mount kit for installation without handles	Adds a rackmount flange kit and a rail kit for use without handles.
E5080B-1CP	Rack mount kit for installation with handles	Adds handles, a rack mount flange kit, and a rail kit for use with handles.
E5080B-181	Add keyboard	
E5080B-182	Add mouse	

Measurement Application Software
Automatic fixture removal (S96007A)

Many devices do not have coaxial connectors and are put in fixtures in order to measure them in a coaxial environment. Accurately removing the effects of the fixture is required to get a good measurement of the device under test (DUT). This application adds a powerful application wizard to guide you through characterizing a fixture and removing it from the measurement. Devices can be single-ended or differential. Files can be saved in a variety of formats for later use in ENA, PNA, PXI VNA, USB VNA, ADS, and PLTS.

Time domain analysis (S96010A)

This application enables the analyzer to view reflection and transmission responses in time or distance. Use time domain to tune filters, gate out the response of fixtures and cables, characterize the impedance of transmission lines and more.

Time domain analysis (S96011A)

This application enables the analyzer to perform enhanced time domain analysis for high-speed data applications. All functionality of the S96010A are included (TDR/TDT mode). In addition, the S96011A enables more detailed measurements and evaluations, such as eye-diagram/mask modes, without adding PLTS software. Jitters and/or emphasis/equalization capabilities enables simulation of real-world signals and environment. The S96011A covers up to 20 GHz bandwidth with xxx psec rise time. Full calibration is available and the automatic deskew ensures easy removal of fixture and probe effects. To get the best accuracy, mechanical calibration kits or ECal with DC option (i.e. N469xD with Option 0DC) are recommended.

Basic Pulsed-RF measurements (S96025A)

This application enables internal pulse generators that can be used to control the internal pulse modulators, and it provides an integrated pulse application that uses the wideband-detection method. The software requires hardware option 021 pulse modulator hardware.

The pulse application provides an easy way to set up point-in-pulse measurements with pulse width as narrow as 1 us, and pulse-profile measurements with 40 ns minimum timing resolution. Using the built-in pulse modulators, the E5080B is a complete pulsed-RF measurement solution, eliminating the need for external test sets and pulse generators. S96025A also controls external pulse generators and modulators and can synchronize to external master pulses. The application I/O connector on the rear panel of the analyzer is recommended if using external master pulses or external pulse modulators.

Noise figure measurements with vector correction (S96029A)

This software application enables high-accuracy noise figure and noise-power measurements of amplifiers utilizing Keysight's unique vector-source-correction technique that uses a source-impedance tuner to remove the effects of imperfect system-source match. This approach yields accuracy that surpasses that provided by the Y-factor method and other cold-source implementations, especially for in-fixture, on-wafer, and automated-test environments. A scalar-calibrated method is also available that offers less accuracy but is faster and does not require an impedance tuner.

The analyzer's standard receivers are used for noise figure measurements with the S96029A. An external preamplifier and filter(s) are required for devices with < 30 dB of excess noise (gain plus noise figure in dB). S96029A controls Keysight N469x Series[1] ECal modules configured as impedance tuners for use with the USB VNA.

For calibration, a standard mechanical cal kit or ECal module is required for the S-parameter portion of the cal (an ECal used as a tuner cannot be shared for calibration). To calibrate a standard receiver for noise figure measurements, a power meter is required. All calibration accessories must be ordered separately.

Scalar mixer/converter measurements (S96082A)

With a simple setup and calibration, this application delivers the highest accuracy for scalar conversion-loss/gain measurements by combining one-port and power-meter calibrations to remove mismatch errors. S96082A provides an intuitive and easy-to-use user interface for setting up mixer and converter measurements, with single or dual conversion stages. It can control external signal generators for use as LO signals. Supported external sources include the Keysight ESG, PSG, EXG, and MXG Series, as well as other SCPI-controlled signal generators.

S96082A is compatible with S96084A, which enables measurements of converters with internal LOs.

Embedded LO capability (S96084A)

This application tunes the analyzer's receivers to the output frequency of the converter under test without the need for access to internal LOs or a common reference signal. S96084A is intended to work with S96082A measurement applications.

Gain compression measurements (S96086A)

The gain compression application (GCA) provides input power, output power, gain, and phase at the compression point of an amplifier over a specified frequency range. GCA's SMART Sweep is very fast and easy-to-use. GCA also includes a guided calibration that corrects for absolute power levels, frequency response, and mismatch errors.

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1. 8509x, N443x or N755xA Series ECal modules are not supported.

Spectrum analysis (S96090A)

The spectrum analyzer (SA) application adds high-performance microwave spectrum analysis to the analyzer. With fast stepped-FFT sweeps resulting from optimized data processing, the SA application provides quick spurious searches over broad frequency ranges. Simultaneous spectrum measurements can be done using test and reference receivers. This multi-channel SA can be used with the internal swept-signal generators for efficient measurements of spurious signals emanating from mixers and frequency converters. The SA application employs source-power and receiver-response calibration as well as fixture de-embedding, providing in-fixture and on-wafer spectrum measurements with the highest level of accuracy. Optional external attenuators should be connected with the VNA's test ports to avoid receiver compression when measuring large signals.

The S96090A software requires option 09x spectrum analysis hardware of the E5080B.

Material measurements

The Keysight N1500A materials measurement suite streamlines the process of measuring complex permittivity and permeability with a vector network analyzer. Various type of measurements, such as transmission line and free space, arch reflectivity, resonant cavity, and coaxial probe are available as options. The easy-to-use software guides the user through setup and measurement, instantly converting S-parameter network analyzer data into the data format of your choice and displaying the results within seconds. Results can be charted in a variety of formats: ε_r', ε_r'', tand, μ_r', μ_r'', tand$_\mu$, and Cole-Cole.

N1930B Physical Layer Test System (PLTS) Software

The PLTS software platform has become an industry standard for calibration, measurement, and analysis of linear passive interconnects such as cables, connectors, backplanes, and printed circuit boards. Utilizing either a vector network analyzer (VNA) or a time domain reflectometer (TDR), fast and accurate measurements can be obtained without in-depth knowledge of microwave measurement techniques. Refer to www.keysight.com/find/plts or the technical overview (literature number 5989-6841EN) for more details.

Automated Measurement Expert (AMX)

This software package is a smart software solution for automated multiport S-parameter measurements with the 4-port E5080B and E5092A. The S94701A AMX test plan builder provides an interactive GUI which helps you edit your multiport DUT test plans and generate test sequence files for the network analyzers. The S94702A and KS8400A software running on the analyzer executes the test sequences according to the optimized test sequence files generated by the S94701A.

A 4-port ECal module (i.e. N4431B or N4433A) is recommended for calibration wizard.

Figure 1. Multiport setup using the E5092A

E5080B Hardware Configurations

Pulse modulation hardware (Requires Option 021)

Internal pulse modulator hardware is added for each source port with Option 021. The modulators can be controlled via the Application I/O D-sub connector on the rear panel of the analyzer using an external pulse generator, or by using one of the internal pulse generators. The S96025A is required to enable the internal pulse modulators.

High stability time base (Requires Option 1E5)

The option improves specification of frequency accuracy within $\pm$0.45 ppm.

Internal bias tees (Requires Option 120 or 140)

Broadband internal bias tees are integrated for each test port with Option 120 or 140. Order Option 120 for 2-port options and order Option 140 for 4-port options. DC power can be provided via BNC female connectors on the rear panel of the analyzer for the operation of active components under test such as tower mounted amplifiers (TMAs).

Analog input and output (Requires Option 175)

The E5080B Option 175 adds analog input and output ports with BNC female connectors on the rear panel of the analyzer to enable DC measurements with the E5080B. Two integrated variable DC sources provide ±10 VDC with maximum current of 200 mA. Synchronized DC voltage sweep is performed using the E5080B's firmware.

For more comprehensive analysis, four analog inputs with BNC female connectors are provided to allow sensing of DC voltages from the DUT.

Device Test I/O

Device test I/O with a 25-pin D-sub connector on the rear panel of the analyzer allows users to control the device under test (DUT) directly with serial or parallel digital interface. Signals from the I/O are applied to select operation modes of the RF front-end module which integrates power amplifiers, switches, low noise amplifiers, duplexers or filters in a single component.

The device test I/O has two independent 8-bit digital I/Os (DIOs). Each 8-bit DIO can provide either 8-bit parallel signals or 4-channels of RFFE-like interface. Output DC voltage or clock rate (25 MHz maximum) are selectable according to the specification of DUTs.

Quick and easy setup of DUT control signals can be done with the E5080B's firmware, and the operation of the device test I/O is synchronized with the measurement sweep of the analyzer.

Application I/O

Application I/O with a 15-pin D-sub connector on the rear panel of the analyzer provides required signals for synchronized measurement using the E5080B and external peripherals such as pulse generators, pulse modulators, RF switches, or signal generators.

The N1966A pulse I/O adapter is recommended if using an external pulse generator. The N1966A enables coaxial connections between the Application I/O D-sub connector on the rear panel of the analyzer and the coaxial inputs and outputs of external pulse generators and external pulse modulators. Coaxial connectors are SMB male. A connector saver (P/N: Z2342-37605) and hex standoff (P/N: 0380-5625) are required for the connection of the E5080B and N1966A.

E5092A Configurable Multiport Test Set

The E5092A configurable multiport test set is offered for use with the 4-port E5080B to extend the number of test ports. Multiport measurements from 50 MHz to 20 GHz can be made by connecting the optional interconnect semi-rigid cables to the E5092A's front panel.

Test set options

Choose Option 020. Option 020 is the only test set option for the E5092A.

Option Number	Description	Additional Information
E5092A-020	20 GHz switching test set	Up to 22-port or 10-port full crossbar measurement.

Cable and adapter options

Choose one of the interconnect cable and adapter set for your 4-port ENA.

Option Number	Description	Additional Information
E5092A-08C	Cables and adapters for connection to E5071C Option 440/445/460/465/480/485	Adds SMA semi-rigid cables and type-N-to-SMA adapters for connection to the E5071C with type-N connectors.
E5092A-20C	Cables and adapters for connection to E5071C Option 4D5/4K5	Adds SMA semi-rigid cables and 3.5 mm-to-3.5 mm adapters for connection to the E5071C with 3.5-mm connectors.
E5092A-09A	Cable and adapters for connection to E5080A Option 445/465/495	Adds SMA semi-rigid cables and type-N-to-SMA adapters for connection to the E5080A with type-N connectors.
E5092A-09B[1]	Cable and adapters for connection to E5080B Option 440/460/490	Adds SMA semi-rigid cables and type-N-to-SMA adapters for connection to the E5080B with type-N connectors.
E5092A-20B[1]	Cable and adapters for connection to E5080B Option 4D0/4K0	Adds SMA semi-rigid cables and 3.5 mm-to-3.5 mm adapters for connection to the E5080B with 3.5-mm connectors.

Accessories, calibration options

Option Number	Description	Additional Information
E5092A-1CM	Rack mount kit only	Adds a rack mount kit for use without handles.
E5092A-1CN	Front handle kit only	Adds a front handle kit.
E5092A-1CP	Rack mount kit with handle kit	Adds a rack mount and front handle kit.
E5092A-1A7	ISO 17025 compliant calibration	
E5092A-A6J	ANSI Z540 compliant calibration	

1. Docking plates (P/N: E5092-60105 and E5092-60106) are offered for the connection of the E5080B and E5092A.

Measurement Accessories

A complete list of RF and microwave test accessories is available on our Web site:
www.keysight.com/find/mta

Accessories are available in these connector types: 50 Ω Type-N, 3.5 mm, 7 mm, 2.4 mm, 2.92 mm, 1.85 mm, 1.0 mm, and waveguide. Test port cables and a calibration kit should be added for a complete measurement system. A verification kit is used to verify corrected system performance.

Cable and adapter sets

Keysight offers cables in the following types:

- Single cables in semi-rigid and flexible
- Cable sets in semi-rigid and flexible

There are also adapter sets available that protect the test port and convert the port to the desired connector interface. These kits contain:

- One male adapter
- One female adapter

To attain the best mechanical rigidity for device connection, use a single cable and the appropriate special adapter set. To attain the greatest flexibility for device connection, use a cable set.
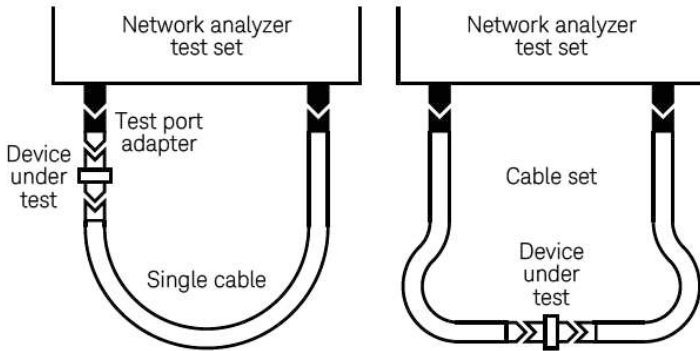
Calibration kits

Coaxial measurements

Mechanical calibration kits include standards, such as opens, shorts and loads, which are measured by the network analyzer for increased measurement accuracy.

Choose a calibration kit for each connector type to be used.

Economy, includes:

- Open standards (male and female)
- Short standards (male and female)
- Fixed-termination standards (male and female)

Standard, includes the devices in the economy kit and adds:

- Sliding load standards (male and female) or a series of offset shorts

Precision, includes the devices in the economy kit and adds:

- 50 Ω airline(s) for TRL calibration
- TRL adapters

Electronic calibration (ECal) kits replace mechanical calibration standards with one solid-state calibration module that is controlled by the network analyzer via USB, to present many different impedances to the test ports. A full two-port calibration can be performed quickly with a single connection. This technique reduces operator errors and connector wear and abrasion.

For more information about ECal modules, refer to the technical overview 5963-3743E (N4690, 85090, N4430 and N7550 Series).

Waveguide measurements

For waveguide measurements, Keysight offers mechanical calibration kits that include:

- Waveguide-to-coax adapters (X, P, K, R, Q, U, V)
- Precision waveguide section
- Flush short circuit
- Fixed terminations
- Straight section

For devices with 3.5 mm or SMA connectors

Mechanical calibration kits

85033E economy: DC to 9 GHz. Includes:

- 85033-60016 3.5 mm (m) load
- 85033-60017 3.5 mm (f) load
- 85033-60018 3.5 mm (m) open
- 85033-60019 3.5 mm (f) open
- 85033-60020 3.5 mm (m) short
- 85033-60021 3.5 mm (f) short
- 8710-1761 torque wrench

Option 85033E-100 adds:

- 85027-60005 3.5 mm (f) to 3.5 mm (f) adapter

Option 85033E-200 adds:

- 85027-60007 3.5 mm (m) to 3.5 mm (m) adapter

Option 85033E-300 adds:

- 85027-60006 3.5 mm (m) to 3.5 mm (f) adapter

Option 85033E-400 adds:

- 1250-1744 3.5 mm (f) to 50 Ω Type-N (m) adapter
- 1250-1743 3.5 mm (m) to 50 Ω Type-N (m) adapter
- 1250-1745 3.5 mm (f) to 50 Ω Type-N (f) adapter
- 1250-1750 3.5 mm (m) to 50 Ω Type-N (f) adapter

Option 85033E-500 adds:

- 1250-1746 3.5 mm (m) to 7 mm adapter (two included)
- 1250-1747 3.5 mm (f) to 7 mm adapter (two included)

85052B standard: DC to 26.5 GHz. Includes:

- 00902-60003 3.5 mm (m) fixed load
- 00902-60004 3.5 mm (f) fixed load
- 00911-60019 3.5 mm (m) sliding load
- 00911-60020 3.5 mm (f) sliding load
- 85052-60006 3.5 mm (m) short
- 85052-60007 3.5 mm (f) short
- 85052-60008 3.5 mm (m) open
- 85052-60009 3.5 mm (f) open
- 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
- 85052-60013 3.5 mm (f) to 3.5 mm (m) adapter
- 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

85052C precision TRL: DC to 26.5 GHz. Includes:

- 00902-60003 3.5 mm (m) fixed load
- 00902-60004 3.5 mm (f) fixed load
- 85052-60006 3.5 mm (m) short
- 85052-60007 3.5 mm (f) short
- 85052-60008 3.5 mm (m) open
- 85052-60009 3.5 mm (f) open
- 85052-60032 3.5 mm (f) to 3.5 mm (f) adapter
- 85052-60033 3.5 mm (m) to 3.5 mm (m) adapter
- 85052-60034 3.5 mm (f) to 3.5 mm (m) adapter
- 85052-60035 3.5 mm short TRL line
- 85052-60036 3.5 mm long TRL line

85052D economy: DC to 26.5 GHz. Includes:

- 00902-60003 3.5 mm (m) fixed load
- 00902-60004 3.5 mm (f) fixed load
- 85052-60006 3.5 mm (m) short
- 85052-60007 3.5 mm (f) short
- 85052-60008 3.5 mm (m) open
- 85052-60009 3.5 mm (f) open
- 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
- 85052-60013 3.5 mm (f) to 3.5 mm (m) adapter
- 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

Electronic calibration (ECal) modules

85093C RF ECal: 300 kHz to 9 GHz, 2-ports. Standard module includes:

- Option 00F: Both 3.5 mm connectors are female
- Option 00M: Both 3.5 mm connectors are male
- Option M0F: One female and one male connector, both 3.5 mm
- Option 00A adds:
    - 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
    - 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter
- Option 150: Replaces standard storage container with a wooden box

85093C mixed-connector options

Port A Option			Port B Option		
Connector type	Female	Male	Connector type	Female	Male
3.5 mm	101	102	Type-N 50 Ω	203	204
			7-16	205	206

N4431B ECal: 300 kHz to 13.5 GHz, 4-ports.

Connector Type	Port A Option	Port B Option	Port C Option	Port D Option
Four 3.5 mm (f)	010			
Four Type-N 50 Ω (f)	020			
3.5 mm (f)	101	201	301	401
3.5 mm (m)	102	202	302	402
Type-N 50 Ω (f)	103	203	303	403
Type-N 50 Ω (m)	104	204	304	404
7-16 (f)	105	205	305	405
7-16 (m)	106	206	306	406

Option 150: Replaces standard storage container with a wooden box

N4433A ECal: 300 kHz to 20 GHz, 4-ports.

Connector Type	Port A Option	Port B Option	Port C Option	Port D Option
Four 3.5 mm (f)	010			
3.5 mm (f)	101	201	301	401
3.5 mm (m)	102	202	302	402

Option 150: Replaces standard storage container with a wooden box

N4691D Microwave ECal, DC or 300 kHz to 26.5 GHz, 2-ports. Includes:

- Option F0F: Both 3.5 mm connectors are female
- Option M0F: One female and one male connector, both 3.5 mm
- Option M0M: Both 3.5 mm connectors are male
- Option 0DC: DC to 26.5 GHz
- Option 003: 300 kHz to 26.5 GHz
- Option 00A adds:
  - 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
  - 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

N755XA Series Economy ECal, 2-ports:

- N7550A DC to 4 GHz, 2-ports
- N7551A DC to 6.5 GHz, 2-ports
- N7552A DC to 9 GHz, 2-ports
- N7553A DC to 14 GHz, 2-ports
- N7554A DC to 18 GHz, 2-ports
- N7555A DC to 26.5 GHz, 2-ports

N755xA Series includes:

- Option 3FF: Both 3.5 mm connectors are female
- Option 3MF: One female and one male connector, both 3.5 mm
- Option 3MM: Both 3.5 mm connectors are male
- Option 150: Plastic storage box
- N7550X-151: 3.5 mm or 2.92 mm torque wrench

Cables

85131C[1] single, semi-rigid:

- 3.5 mm (f) to PSC-3.5 mm (f), 81 cm, 32 inches

85131D[1] set, semi-rigid:

- 85131-60009 One 3.5 mm (f) to 3.5 mm (m), 53 cm, 21 inches
- 85131-60010 One 3.5 mm (f) to PSC-3.5 mm (f), 53 cm, 21 inches

85131E[1] single, flexible:

- 3.5 mm (f) to PSC-3.5 mm (f), 96.5 cm, 38 inches

85131F[1] set, flexible:

- 85131-60012 One 3.5 mm (f) to 3.5 mm (m), 62.2 cm, 24.5 inches
- 85131-60013 One 3.5 mm (f) to PSC-3.5 mm (f), 62.2 cm, 24.5 inches

85131H[1] single, flexible:

- 3.5 mm (f) to 3.5 mm (m), 62.2 cm, 24.5 inches

85134E[1] single, flexible:

- PSC-3.5 mm (f) to 2.4 mm (f), 96 cm, 38 inches

85134F[1] set, flexible:

- 85134-60004 One 2.4 mm (f) to PSC-3.5 mm (f), 53 cm, 21 inches
- 85134-60003 One 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches

1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

85134H[1] single, flexible:

- 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches

N4419AK20 single, flexible:

- 3.5 mm (m) to 3.5 mm (f), 91.4 cm, 36 inches

Z5623A-K20 single, flexible:

- 3.5 mm (m) to 3.5 mm (m), 91.4 cm, 36 inches

Adapter sets

- 85130D 3.5 mm[1] to 3.5 mm

For devices with Type-N connectors

Mechanical calibration kits

85032F standard, DC to 9 GHz Includes:

- 85032-60017 Type-N (m) fixed load
- 85032-60018 Type-N (f) fixed load
- 85032-60013 Type-N (m) open
- 85032-60014 Type-N (f) open
- 85032-60016 Type-N (m) short
- 85032-60015 Type-N (f) short

Option 85032F-100 adds:

- 85032-60021 Type-N (f) to Type-N (f) adapter

Option 85032F-200 adds:

- 85032-60019 Type-N (m) to Type-N (m) adapter

Option 85032F-300 adds:

- 85032-60020 Type-N (m) to Type-N (f) adapter

Option 85032F-500 adds:

- 85054-60001 Type-N (f) to 7 mm adapter (two included)
- 85054-60009 Type-N (m) to 7 mm adapter (two included)

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1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

85054B standard: DC to 18 GHz. Includes:

- 00909-60011 Type-N (m) fixed lowband load
- 00909-60012 Type-N (f) fixed lowband load
- 85054-60025 Type-N (m) short
- 85054-60026 Type-N (f) short
- 85054-60027 Type-N (m) open
- 85054-60028 Type-N (f) open
- 85054-60031 Type-N (f) to 7mm adapter
- 85054-60032 Type-N (m) to 7mm adapter
- 85054-60037 Type-N (f) to Type-N (f) adapter
- 85054-60038 Type-N (m) to Type-N (m) adapter
- 85054-80010 Type-N (f) sliding load
- 85054-80009 Type-N (m) sliding load
- 85054-60050 Type-N (f) connector gage
- 85054-60052 Type-N (f) gage master
- 85054-60051 Type-N (m) connector gage
- 85054-60053 Type-N (m) gage master

85054D economy: DC to 18 GHz. Includes:

- 85054-60025 Type-N (m) short
- 85054-60026 Type-N (f) short
- 85054-60027 Type-N (m) open
- 85054-60028 Type-N (f) open
- 85054-60031 Type-N (f) to 7mm adapter
- 85054-60032 Type-N (m) to 7mm adapter
- 85054-60037 Type-N (f) to Type-N (f) adapter
- 85054-60038 Type-N (m) to Type-N (m) adapter
- 85054-60046 Type-N (m) fixed load
- 85054-60047 Type-N (f) fixed load

Electronic calibration (ECal) modules

85092C RF ECal: 300 kHz to 9 GHz, 2 ports. Includes:

- Option 00F: both Type-N connectors are female

- Option 00M: both Type-N connectors are male

- Option M0F: one female and one male connector, both Type-N

- Option 00A adds:
    - 85054-60037 Type-N (f) to Type-N (f) adapter
    - 85054-60038 Type-N (m) to Type-N (m) adapter

N4432A ECal: 300 kHz to 18 GHz, 4-ports.

Connector Type	Port A Option	Port B Option	Port C Option	Port D Option
Four Type-N 50 Ω (f)	020			
3.5 mm (f)	101	201	301	401
3.5 mm (m)	102	202	302	402
Type-N 50 Ω (f)	103	203	303	403
Type-N 50 Ω (m)	104	204	304	404

Option 150: Replaces standard storage container with a wooden box

N4690D Microwave ECal, DC or 300 kHz to 18 GHz, 2-ports. Includes:

- Option F0F: Both Type-N connectors are female

- Option M0F: One female and one male connector, both Type-N connectors

- Option M0M: Both Type-N connectors are male

- Option 0DC: DC to 18 GHz

- Option 003: 300 kHz to 18 GHz

- Option 00A adds:
    - 85054-60037 Type-N (f) to Type-N (f) adapter
    - 85054-60038 Type-N (m) to Type-N (m) adapter

N755XA Series Economy ECal, 2-ports:

- N7550A DC to 4 GHz, 2-ports
- N7551A DC to 6.5 GHz, 2-ports
- N7552A DC to 9 GHz, 2-ports
- N7553A DC to 14 GHz, 2-ports
- N7554A DC to 18 GHz, 2-ports

N755xA Series includes:

- Option NFF: Both Type-N connectors are female
- Option NMF: One female and one male connector, both Type-N
- Option NMM: Both Type-N connectors are male
- Option 150: Plastic storage box
- N7550X-152: Type-N torque wrench

Cables

N6314A 50 Ω Type-N RF cable, DC to 12.4 GHz Includes:

- 8120-8862 one 610 mm (24 in) cable with male connectors

N6315A 50 Ω Type-N RF cable, DC to 12.4 GHz Includes:

- 8121-0027 one 610 mm (24 in) cable with both female and male connectors

Adapter sets

11853A 50 Ω Type-N accessory kit. Includes:

- 1250-1472 Type-N (f) to Type-N (f) adapter (two included)
- 1250-1475 Type-N (m) to Type-N (m) adapter (two included)
- 11511A Type-N (f) short
- 11512A Type-N (m) short

11878A Type-N to 3.5 mm adapter kit. Includes:

- 1250-1744 3.5 mm (f) to 50 Ω Type-N (m) adapter
- 1250-1743 3.5 mm (m) to 50 Ω Type-N (m) adapter
- 1250-1745 3.5 mm (f) to 50 Ω Type-N (f) adapter
- -1250-1750 3.5 mm (m) to 50 Ω Type-N (f) adapter

11524A 7 mm to Type-N (f) adapter

11525A 7 mm to Type-N (m) adapter

85130C 3.5 mm to Type-N Includes:

- 85054-60029 3.5 mm to Type-N (f)
- 85054-60030 3.5 mm to Type-N (m)

For devices with 7 mm connectors

Mechanical calibration kits

85050B standard: DC to 18 GHz. Includes:

- 00909-60008 7 mm coax termination
- 85050-60006 7 mm fixed broadband load
- 85050-80007 7 mm short
- 85050-80010 7 mm open
- 85050-80011 7 mm sliding load

85050C precision TRL: DC to 18 GHz. Includes:

- 00909-60008 7 mm coax termination
- 85050-60003 7 mm to 7 mm airline
- 85050-60005 7 mm to 7 mm TRL adapter
- 85050-60006 7 mm fixed broadband load
- 85050-80008 7 mm short
- 85050-80009 7 mm short with collect
- 85050-80010 7 mm open

85050D economy: DC to 18 GHz. Includes:

- 85050-60006 7 mm fixed broadband load
- 85050-80007 7 mm short
- 85050-80010 7 mm open

Electronic calibration (ECal) modules

N4696D Microwave ECal: DC or 300 kHz to 18 GHz, 2-ports, 7 mm connectors. Includes:

- Option 0DC: DC to 18 GHz
- Option 003: 300 kHz to 18 GHz

For devices with waveguide

Mechanical calibration kits

X-Band

X11644A standard, WR-90: 8.2 to 12.4 GHz. Includes:

- 00896-60008 X-band standard section
- 00910-60003 X-band termination
- 11644-20018 X-band short
- 11644-20021 X-band shim
- X281C adapter (included in calibration kit): WR-90 to 7 mm

P Band

P11644A standard, WR-62: 12.4 to 18 GHz. Includes:

- 00896-60007 P-band standard section
- 00910-60002 P-band termination
- 11644-20017 P-band short
- 11644-20020 P-band shim
- P281C adapter (included in calibration kit): WR-62 to 7 mm

K Band

K11644A standard, WR-42: 18 to 26.5 GHz. Includes:

- 00896-60006 K-band standard section
- 00910-60001 K-band termination
- 11644-20016 K-band short
- 11644-20019 K-band shim

K281C adapter (included in calibration kit): WR-42 to 3.5 mm (f) Option 012 WR-42 to 3.5 mm (m)

R Band

R11644A standard, WR-28: 26.5 to 40 GHz. Includes:

- 00914-20028 R-band termination
- 11644-20005 R-band short
- 11644-20003 R-band shim
- 11644-60001 R-band 10 cm straight waveguide
- 11644-60016 R-band 5 cm straight waveguide

Q Band

Q11644A standard, WR-22: 33 to 50 GHz. Includes:

- 11644-60005 Q-band termination
- 11644-20004 Q-band short
- 11644-20001 Q-band shim
- 11644-60002 Q-band 10 cm straight waveguide
- 11644-60017 Q-band 5 cm straight waveguide

U Band

U11644A standard, WR-19: 40 to 60 GHz. Includes:

- 11644-60006 U-band termination
- 11644-20004 U-band short
- 11644-20002 U-band shim
- 11644-60003 U-band 10 cm straight waveguide
- 11644-60018 U-band 5 cm straight waveguide

Verification kits

All Keysight verification kits include:

- Precision Z0 airline or match thru
- Mismatched airline or mismatch thru
- Fixed attenuators (except 85059V)
- Traceable measured data and uncertainties

85051B 45 MHz to 18 GHz 7 mm kit

Includes attenuators, airline and mismatch airline with data on a USB drive for use in confirming calibrated system performance, traceable to national standards. Test procedure is provided in the service manual.

85053B 300 kHz to 26.5 GHz 3.5 mm kit

Includes attenuators, airline and mismatch airline with data on a USB drive for use in confirming calibrated system performance, traceable to national standards. Test procedure is provided in the service manual.

85055A 300 kHz to 18 GHz Type-N kit

Includes attenuators, airline and mismatch airline with data on a USB drive for use in confirming calibrated system performance, traceable to national standards. Test procedure is provided in the service manual.

85057B 45 MHz to 50 GHz 2.4 mm kit

Includes attenuators, airline and mismatch airline with data on a USB drive for use in confirming calibrated system performance, traceable to national standards. Test procedure is provided in the service manual.

85058V 45 MHz to 67 GHz 1.85 mm kit

Includes attenuators, match thru and mismatch thru with data on a USB drive for use in confirming calibrated system performance, traceable to national standards. Test procedure is provided in the service manual.

Literature Information

Keysight E5080B ENA Series Vector Network Analyzer – Data Sheet, 5992-3843EN

Keysight E5071C to E5080B Code Migration Guide, 5992-3873EN

Keysight Vector Network Analyzer – Selection Guide, 5989-7603EN

Electric Calibration (ECal) Modules – Technical Overview, 5963-3743E

Application Note, "Drive Down the Cost of Test Using the ENA", 5992-0195EN

Web Resources

www.keysight.com/find/ena

www.keysight.com/find/na

www.keysight.com/find/vnasoftware

www.keysight.com/find/ecal

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

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