

Streamline Series USB Vector Network Analyzers

P937xA Up to 26.5 GHz

P500xA & P502xA Up to 53 GHz

Compact Form. Zero compromise.



Table of Contents

Keysight Streamline series: exceptional performance in a small package	4
Keysight Streamline series vector network analyzer configurations	5
Test set options	6
Hardware options	6
Application software	7
Calibration options	8
Training options	8
Additional hardware	9
Accessories	9
Test cables	10
Measurement application software	11
Automatic fixture removal (S97007A)	11
Time domain analysis (S97010A)	11
Enhanced time domain analysis with TDR (S97011A)	11
Basic Pulsed-RF measurements (S97025A)	12
Noise figure measurements with vector correction (S97029A)	12
Scalar mixer/converter measurements (S97082A)	13
Vector and scalar mixer/converter measurements (S97083A)	14
Embedded LO capability (S97084A)	14
Gain compression measurements (S97086A)	15
Spectrum analysis (S97090A)	15
Multiple instrument measurements (S97551A)	16
Multiport calibration assistant (S97552A)	17
Multiport calibrated measurements with switch instruments (S97553A)	17
Material measurements	17
N1930B Physical Layer Test System (PLTS) software	17
Upgrading your system	18
Cable and adapter sets	20
Calibration kits	21
For devices with 1.85 mm connectors	22
For devices with 2.4 mm connectors	23
For devices with K connectors (2.92 mm)	23
For devices with 3.5 mm or SMA connectors	24
For devices with Type-N connectors	28
For devices with 7 mm connectors	32
For devices with waveguide	33

Verification kits	35
Accessories	34
PC requirements for USB VNA control	37
Literature information	37
Web resources	37

Keysight Streamline Series: Exceptional Performance in a Small Package

Balance deadlines, productivity, budget and bench space with the Streamline Series. You'll move confidently across every stage of your product's development lifecycle by leveraging accurate and repeatable measurements, automated code capability, and a consistent, intuitive user experience. With comprehensive Keysight Services including calibration, education and consulting, these instruments enhance your solution to help you accelerate technology adoption and lower costs.

This configuration guide describes standard configurations, options, accessories, upgrade kits and compatible peripherals for the Keysight Streamline Series vector network analyzer (VNA).



P937xA Series

P9370A	300 kHz to 4.5 GHz, 2-port
P9371A	300 kHz to 6.5 GHz, 2-port
P9372A	300 kHz to 9 GHz, 2-port
P9373A	300 kHz to 14 GHz, 2-port
P9374A	300 kHz to 20 GHz, 2-port
P9375A	300 kHz to 26.5 GHz, 2-port



P500xA Series

P5000A	9 kHz to 4.5 GHz, 2-port
P5001A	9 kHz to 6.5 GHz, 2-port
P5002A	9 kHz to 9 GHz, 2-port
P5003A	9 kHz to 14 GHz, 2-port
P5004A	9 kHz to 20 GHz, 2-port
P5005A	100 kHz to 26.5 GHz, 2-port
P5006A	100 kHz to 32 GHz, 2-port
P5007A	100 kHz to 44 GHz, 2-port
P5008A	100 kHz to 53 GHz, 2-port



P502xA Series

P5020A	9 kHz to 4.5 GHz, 4 or 6-port
P5021A	9 kHz to 6.5 GHz, 4 or 6-port
P5022A	9 kHz to 9 GHz, 4 or 6-port
P5023A	9 kHz to 14 GHz, 4 or 6-port
P5024A	9 kHz to 20 GHz, 4 or 6-port
P5025A	100 kHz to 26.5 GHz, 4-port
P5026A	100 kHz to 32 GHz, 4-port
P5027A	100 kHz to 44 GHz, 4-port
P5028A	100 kHz to 53 GHz, 4-port

Keysight Streamline Series Vector Network Analyzer Configurations

Model ¹	Description	Test port connectors
P937xA Series		
P9370A	300 kHz to 4.5 GHz, 2-port	3.5 mm (f)
P9371A	300 kHz to 6.5 GHz, 2-port	3.5 mm (f)
P9372A	300 kHz to 9 GHz, 2-port	3.5 mm (f)
P9373A	300 kHz to 14 GHz, 2-port	3.5 mm (f)
P9374A	300 kHz to 20 GHz, 2-port	3.5 mm (f)
P9375A	300 kHz to 26.5 GHz, 2-port	3.5 mm (f)
P500xA Series		
P5000A	9 kHz to 4.5 GHz, 2-port	3.5 mm (f)
P5001A	9 kHz to 6.5 GHz, 2-port	3.5 mm (f)
P5002A	9 kHz to 9 GHz, 2-port	3.5 mm (f)
P5003A	9 kHz to 14 GHz, 2-port	3.5 mm (f)
P5004A	9 kHz to 20 GHz, 2-port	3.5 mm (f)
P5005A	100 kHz to 26.5 GHz, 2-port	3.5 mm (f)
P5006A	100 kHz to 32 GHz, 2-port	2.4 mm (f)
P5007A	100 kHz to 44 GHz, 2-port	2.4 mm (f)
P5008A	100 kHz to 53 GHz, 2-port	1.85 mm (f)
P502xA Series		
P5020A	9 kHz to 4.5 GHz, 4 or 6-port	3.5 mm (f)
P5021A	9 kHz to 6.5 GHz, 4 or 6-port	3.5 mm (f)
P5022A	9 kHz to 9 GHz, 4 or 6-port	3.5 mm (f)
P5023A	9 kHz to 14 GHz, 4 or 6-port	3.5 mm (f)
P5024A	9 kHz to 20 GHz, 4 or 6-port	3.5 mm (f)
P5025A	100 kHz to 26.5 GHz, 4-port	3.5 mm (f)
P5026A	100 kHz to 32 GHz, 4-port	2.4 mm (f)
P5027A	100 kHz to 44 GHz, 4-port	2.4 mm (f)
P5028A	100 kHz to 53 GHz, 4-port	1.85 mm (f)

1. Keysight Streamline Series USB VNAs include: USB3.0 cable assembly (for connection with a host PC), power supply (external AC-DC adapter), and power cord.

Test set options

Choose one of the frequency models, and one test set option for the P500xA or P502xA Series. Option 2xx indicates two test ports, option 4xx indicates four test port and option 6xx indicates six test ports. To add options to a product, order the corresponding item number (ex. P500xA-2xx).

Description	2-port	4-port	6-port	Additional information
Option 200	X			Not available for the P937xA or P502xA Series.
Option 400		X		Not available for the P937xA or P500xA Series.
Option 402		X		4-port with second source Not available for the P937xA or P500xA Series.
Option 600			X	Not available for the P937xA or P500xA Series.

Hardware options

Description	For P937xA Series	For P500xA Series	For P502xA Series	Additional information
Add pulse modulator hardware to internal 1 st source	N/A	P500xA-021	P502xA-021	This option adds the internal pulse modulator on the analyzer's source. On the single source models, the pulse modulation works at port 1 and 2 (on 2-port models) and at all four/six ports (on 4-port/6-port models). On the second source models (P502xA-402), opt. 021 pulse modulator works only for the port 1 and 2. S97025A application software is required for pulsed-RF measurements.
Add pulse modulator hardware to internal 2 nd source	N/A	N/A	P502xA-022	This option adds the internal pulse modulators on the analyzer's source. This option is available only on the 4-port second source models (P502xA-402) and the pulse modulation works for the port 3 and 4. S97025A application software is required for pulsed-RF measurements.
Add spectrum analysis hardware	N/A	P500xA-090	P502xA-090	S97090A application software is required for spectrum analysis.

Application software

Description ¹	For P937xA Series	For P500xA and P502xA Series	Additional information
Automatic fixture removal	S97007A	S97007A	
Time domain analysis	S97010A	S97010A	
Enhanced time domain analysis with TDR	N/A	S97011A	Includes all capability of S97010A
Basic pulsed-RF measurements	N/A	S97025A	Requires hardware option 021 when internal pulse modulators are needed.
Noise figure measurements with vector correction ²	N/A	S97029A	Standard receivers are used.
Scalar mixer/converter measurements ²	S97082A	S97082A	Provides SMC measurement class.
Vector and scalar mixer/converter measurements ²	N/A	S97083A	Provides SMC + phase measurement class. Provides vector mixer characterization.
Embedded-LO capability ²	N/A	S97084A	
Gain-compression measurements ²	N/A	S97086A	
Differential and I/Q device measurements ²	N/A	S97089A	Requires option 402 (internal second source option) or multiple instrument measurements with S97551A.
Spectrum analysis ²	N/A	S97090A	Requires hardware option 090.
Multiple instruments measurements	S97551A	S97551A	Provides multipoint calibrated measurements using two USB VNAs. ^{3,4,5}
Multipoint calibration assistant	N/A	S97552A	Provides a tool to flexibly define cal sets of multipoint measurements. Requires one ECal module.
Multipoint calibrated measurements with switch instruments	N/A	S97553A	Provides multipoint calibrated measurements using P9164A/B or P9165A/B USB Solid-State Switch matrix. ⁶

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. Provides frequency offset mode (FOM) to independently set the frequency of internal source(s) and receivers, and to configure external sources using External Device Configuration.
3. When configuring a multipoint VNA using multiple USB VNAs, the Y1701A is recommended for each additional multipoint interconnection.
4. The P937xA and P50xxA Series cannot be combined in multipoint configurations.
5. A 4-port ECal module (i.e. N4431/32/33) is recommended for multipoint measurements (n > 4).
6. Only the 4-port ECal module (i.e. N4431/32/33) are supported for calibration with S97553A.

Calibration options

Description	For P937xA Series	For P500xA Series	For P502xA Series	Additional information
ISO 17025 compliant calibration	P937xA-1A7	P500xA-1A7	P502xA-1A7	
ANSI Z540 compliant calibration	P937xA-A6J	P500xA-A6J	P502xA-A6J	
Commercial calibration certificate with test data	P937xA-UK6	N/A	N/A	

Training options

Description	For P937xA Series	For P500xA Series	For P502xA Series	Additional information
Included - instrument care and operations starter training	N/A	PS-S40-01	PS-S40-01	Provides startup training service that reduces complexity associated with initial setup and enables users to get to measurements fast. Recommended topics are product overview, system setup and initial measurements. Can be delivered remotely or on-site.
Optional - technology and measurement science standard training	N/A	PS-S40-02	PS-S40-02	Provides customized technology and measurement science training. Enable users to get deeper insights into the VNA measurement theory and applications. Recommended topics are VNA theory and applications. Can be delivered on-site or in Keysight office.
Optional - premium functional and customer specific application training	N/A	PS-S40-03	PS-S40-03	Provides an integrated training experience that fits to the users' needs on applications or workflow. Custom topics based on the user needs. Discuss the training needs with the Keysight sales representative.

Additional hardware

Model Number	Description	Additional information
P9164A	Solid-state switch matrix module, 2x16 full crossbar, 300 kHz to 6.5 GHz	S97553A application software is required for multiport calibrated measurements.
P9164B	Solid-state switch matrix module, 2x16 full crossbar, 300 kHz to 9 GHz	
P9165A	Solid-state switch matrix module, 2x8 full crossbar, 300 kHz to 6.5 GHz	
P9165B	Solid-state switch matrix module, 2x8 full crossbar, 300 kHz to 9 GHz	

Accessories

Description	For P937xA Series	For P500xA Series	For P502xA Series	Additional information
Accessory and tool kit	Y1281A	Y1281A	Y1281A	Includes the tools for SMA and SMB connector removal.
Rack mount kit	Y1700A-001	Y1700A-001	Y1700A-002	Order Option 001 for 2-port USB VNA (P937xA or P500xA Series). Order Option 002 for 4 or 6-port USB VNA (P502xA Series).
Multiple USB instruments configuration kit	Y1701A-001	Y1701A-002 or 003 ¹	Y1701A-002 or 003 ¹	Includes interconnect cables for configurations using two USB VNAs. Add one kit for each additional VNA.
	Y1701A-101	Y1701A-101	Y1701A-202	Includes latch kit for connecting two USB instruments ² .
Hard transit case	Y1710A	Y1710A	Y1710A	
PXI adapter module ³	N/A	Y1731A-001	Y1731A-001	Includes PXI module to enable coaxial connections with control signals of the of the P500xA or P502xA Series USB VNA. Equipped with twelve SMB connectors. Includes 2 flexible control cables (500 mm and 175 mm) for connection with the control port of P500xA or P502xA.
SMB (f) to MCX (m) cable assembly	N/A	Y1730A-800 or 801	Y1730A-800 or 801	For connection with 10 MHz external reference ports (Ref In/Ref Out) of the P50xxA Series. Order option 800 with 300 mm or option 801 with 1000 mm.
BNC (f) to MCX (m) cable assembly	N/A	Y1730A-810	Y1730A-810	For connection with 10 MHz external reference ports (Ref In/Ref Out) of the P50xxA Series.

- Order Y1701A Option 002 for P500xA or P502xA Series up to 20 GHz. Order Y1701A Option 003 for greater than 20 GHz models.
- If P500xA Series and P502xA Series USB VNAs are connected for a multiport VNA, order Y1701A Option 102 latch kit for connecting 1-slot to 2-slot USB instruments.
- The Y1731A does not require power supply. PXI chassis is not needed for the operation.

Test cables

Option Number	Description	Additional information
Y1740A-100	Cable Assembly, 3.5 mm (m) to 3.5 mm (m), 26.5 GHz, 36 inch	
Y1740A-200	Cable Assembly, 2.92 mm (m) to 2.92 mm (m), 40 GHz, 36 inch	
Y1740A-300	Cable Assembly, 2.4 mm (m) to 2.4 mm (m), 50 GHz, 36 inch	
Y1740A-310	Cable Assembly, 2.4 mm (m) to 2.92 mm (m), 40 GHz, 36 inch	
Y1740A-400	Cable Assembly, 1.85 mm (m) to 1.85 mm (m), 67 GHz, 1 m	

Measurement Application Software

Solid black series name indicates the feature is available on that series, while gray series name with strikethrough indicates the feature is not available on that series. For example:

P500xA Series: Available on P500xA series

~~P937xA Series:~~ Not available on P937xA Series

Automatic fixture removal (S97007A)

P937xA Series

P500xA & P502xA Series

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 (S97010A)

P937xA Series

P500xA & P502xA Series

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.

Enhanced time domain analysis with TDR (S97011A)

~~P937xA Series~~

P500xA & P502xA Series

This application enables the analyzer to perform enhanced time domain analysis for high-speed data applications. All functionality of the S97010A are included (TDR/TDT mode). In addition, the S97011A 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 S97011A covers up to 53 GHz bandwidth with 8.42 psec rise time. Full calibration is available and 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. N443xD or N469xD with Option 0DC) are recommended.

Basic Pulsed-RF measurements (S97025A)

P937xA Series

P500xA & P502xA Series

This application enables internal pulse generators of P500xA or P502xA Series 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 USB VNAs are complete pulsed-RF measurement solutions, eliminating the need for external test sets and pulse generators. S97025A also controls external pulse generators and modulators and can synchronize to external master pulses. The Y1731A I/O Adapter Module is recommended if using external master pulses or external pulse modulators.

Noise figure measurements with vector correction (S97029A)

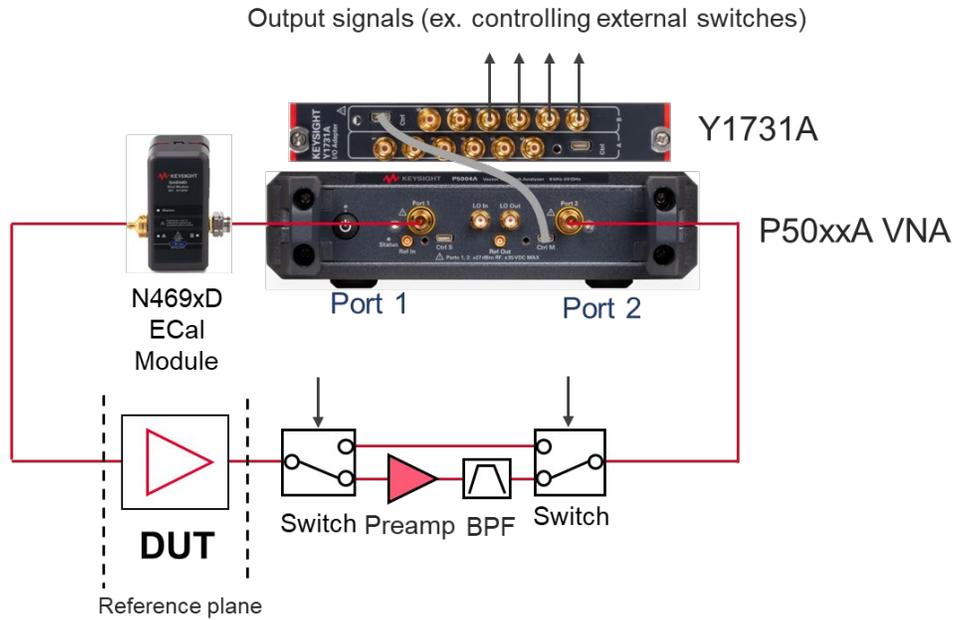
P937xA Series

P500xA & P502xA Series

This software application enables high-accuracy noise figure and noise-power measurements of amplifiers utilizing Keysight's unique vector-source-correction technique that uses Keysight N469x Series ECal module as a source-impedance tuner¹ 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. S97029A controls N469x Series ECal modules configured as impedance tuners for use with the P50xxA Series USB VNA.

A scalar-calibrated method is also available that offers less accuracy but is faster and does not require an impedance tuner. This method requires an external switch to isolate the P50xxA's source signal during noise figure measurements. A 50-ohm load must be connected to the DUT's input using the switch.

The instrument's standard receivers are used for noise figure measurements with the S97029A. An external preamplifier, filter(s) and switches are required for devices with < 30 dB of excess noise (gain plus noise figure in dB). The Y1731A I/O Adapter Module is recommended for synchronized measurements using the P50xxA VNA and external switches. A typical block diagram of vector-calibrated noise figure measurements is shown.



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/sensor is required. A 346-series noise source (Keysight 346C or 346C-K01 recommended) can be used for noise calibration of the instrument's receiver, when a preamplifier is located before the receiver. All calibration accessories and external hardware must be ordered separately.

Noise figure measurements with the P50xxA are verified between 50 MHz and 45 GHz. Noise figure measurements of frequency converting devices are not supported with the S97029A.

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

Scalar mixer/converter measurements (S97082A)

P937xA Series

P500xA & P502xA Series

The S97082A provides frequency offset mode (FOM) to set the frequency of the VNA's internal source(s) independently from where the receivers are tuned, and to configure external sources using External Device Configuration. This functionality is also included with S97029/083/084/086/089/090A.

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. S97082A 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.

S97082A is compatible with S97084A, which enables measurements of converters with internal LOs.

Vector and scalar mixer/converter measurements (S97083A)

P937xA Series

P500xA & P502xA Series

This application includes the scalar mixer/converter plus phase (SMC+Phase) measurement class that provides fully calibrated conversion gain/loss, relative phase, and absolute group delay measurements of mixers and converters without the need for reference or calibration mixers. Eliminating the calibration mixer requires a U9391C/F/G comb generator¹ and an external DC power supply capable of sourcing +15 V and 300 mA for U9391C/F or 800 mA for U9391G. A macro-based series-reference-mixer version of VMC is also included for measuring the phase difference between multiple paths or devices, or for measuring phase shifts within the frequency-converting device. The macro also supports characterization of the calibration mixer that is supplied by the user.

SMC+Phase with the S97083A 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 the analyzer's built-in source(s) as well as 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.

S97083A is a superset of S97082A, so they should not be installed together. S97083A is compatible with S97084A, which enables measurements of converters with internal LOs.

1. When a comb generator is used as a phase reference for calibration and the start frequency of the measurement is less than 630 MHz, a user-supplied calibration mixer is required.

Embedded LO capability (S97084A)

P937xA Series

P500xA & P502xA Series

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. S97084A is intended to work with S97082A and S97083A measurement applications.

Gain compression measurements (S97086A)

P937xA Series

P500xA & P502xA Series

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.

Gain compression measurements of frequency converting devices are not supported with the S97086A.

Differential and I/Q device measurements (S97089A)

P937xA Series

P500xA & P502xA Series

This application combines source-phase control of multiple internal or external sources with frequency-offset mode, enabling simplified test of I/Q modulators/converters and differential mixers, and harmonic measurements of differential amplifiers. The phase difference between sources can be fixed (for example, at 90 or 180 degrees), or swept between two specified phase values. Providing accurate control of the relative phase between sources eliminates the need for hybrid couplers and baluns to create quadrature or differential signals. After achieving the desired phase alignment, the instrument's receivers can be tuned to all frequencies needed to characterize the DUT. On an I/Q modulator for example, measurements can be made of both the desired and suppressed conversion bands, along with LO leakage, harmonics and other spurious signals. Phase sweeps can be used to determine a DUT's phase imbalance versus frequency. Users can specify measurements with individual receivers or multiple receivers combined with a wide range of mathematical operators. Power measurements can employ match correction for increased accuracy. S97089A works on the P502xA with option 402 (internal second source option), or multiple instrument measurements using two P50xxA VNAs with S97551A.

Spectrum analysis (S97090A)

P937xA Series

P500xA & P502xA Series

The spectrum analyzer (SA) application adds high-performance microwave spectrum analysis to USB VNAs. 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. Accurate and fast noise power ratio (NPR) measurement capability is also included in this software application. It provides the ability of setting up and controlling of external signal generator/arbitrary waveform generators and performing the calibration of the flatness of a wideband signal and distortion signals in notches, and achieving very fast NPR measurements. Optional external attenuators should be connected with the VNA's test ports to avoid receiver compression when measuring large signals.

The S97090A software requires option 090 spectrum analysis hardware.

Multiple instrument measurements (S97551A)

P937xA Series

P500xA & P502xA Series

Keysight USB VNA offers a capability to extend the number of ports for your measurements by using up to two instruments. When multiple instruments are used, they are configured for multipoint operation. The instruments may be identified by the firmware as one VNA by an external PC. At least one VNA instrument connected to your PC must have one S97551A license to maintain N-port capabilities with multiple instruments. The frequency of the multipoint array is determined by the lowest frequency instrument configured in the array. For example, a 4-port analyzer configuration using a P5002A (9 GHz) and a P5005A (26.5 GHz) would have a maximum frequency of 9 GHz when performing 4-port measurements. This behavior extends to other measurement application software (S97xxxA). In a multipoint configuration, only one instrument must have a valid license for these capabilities to function in multipoint mode.

Each instrument is connected into the array with Keysight cables. A Y1701A Multiple USB instruments configuration kit should be ordered for connection of two P937xA (with Y1701A Option 001) or two P50xxA instruments (with Y1701A Option 002 or 003). A single Y1281A accessory and tool kit should be ordered for easier cable connections.

While all models of the P500xA and P502xA Series can be connected for multipoint configurations, the P937xA and P500xA (or P502xA) cannot be combined to configure a multipoint VNA due to hardware difference.



Figure 1: 4-port configuration using two P937xA VNAs (left), 6-port configuration using 2-port P500xA and 4-port P502xA (right).

Multiport calibration assistant (S97552A)

P937xA Series

P500xA & P502xA Series

This S97552A provides a tool to flexibly create and manage cal sets for multiport measurements. For example, two cal sets with independent test ports can be combined as one cal set with a greater number of test ports. The software also offers a way to re-calibrate using a certain set of test ports to refresh the cal set.

At least one ECal module is required for the operation of S97552A.

Multiport calibrated measurements with switch instruments (S97553A)

P937xA Series

P500xA & P502xA Series

This application provides a macro which enables full multiport error correction and measurement capabilities using external switch instruments such as the P9164A/B or P9165A/B USB Solid-state Switch Matrix. The software delivers an easy-to-use measurement wizard that simplifies measurement procedures and reduces the setup time of complicated multiport measurements. Measured multiport S-parameters are displayed in the VNA viewer.

Multiport configurations using up to two P50xxA USB VNAs and up to two switch matrices are supported.

Only the 4-port ECal modules (i.e. N4431/32/33D) are supported for multiport calibration with the S97553A.

Material measurements

P937xA Series

P500xA & P502xA Series

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

P937xA Series

P500xA & P502xA Series

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.

Upgrading Your System

Upgrade kits are available to add options after initial purchase. To upgrade the USB VNAs, order the corresponding item number. To add application software, order the appropriate standalone model numbers (S97xxxA).

For P937xA Series

Description	Order for existing model number						User installable
	P9370A	P9371A	P9372A	P9373A	P9374A	P9375A	
Extend analyzer's frequency range to 6.5 GHz	P9370AU-706	N/A	N/A	N/A	N/A	N/A	No
Extend analyzer's frequency range to 9 GHz	P9370AU-709	P9371AU-709	N/A	N/A	N/A	N/A	No
Extend analyzer's frequency range to 14 GHz	P9370AU-714	P9371AU-714	P9372AU-714	N/A	N/A	N/A	No
Extend analyzer's frequency range to 20 GHz	P9370AU-720	P9371AU-720	P9372AU-720	P9373AU-720	N/A	N/A	No
Extend analyzer's frequency range to 26.5 GHz	P9370AU-726	P9371AU-726	P9372AU-726	P9373AU-726	P9374AU-726	N/A	No

For P500xA and P502xA Series

A complete list of upgrade kits is available on our Web site:

www.keysight.com/find/p50xxa-upgrades

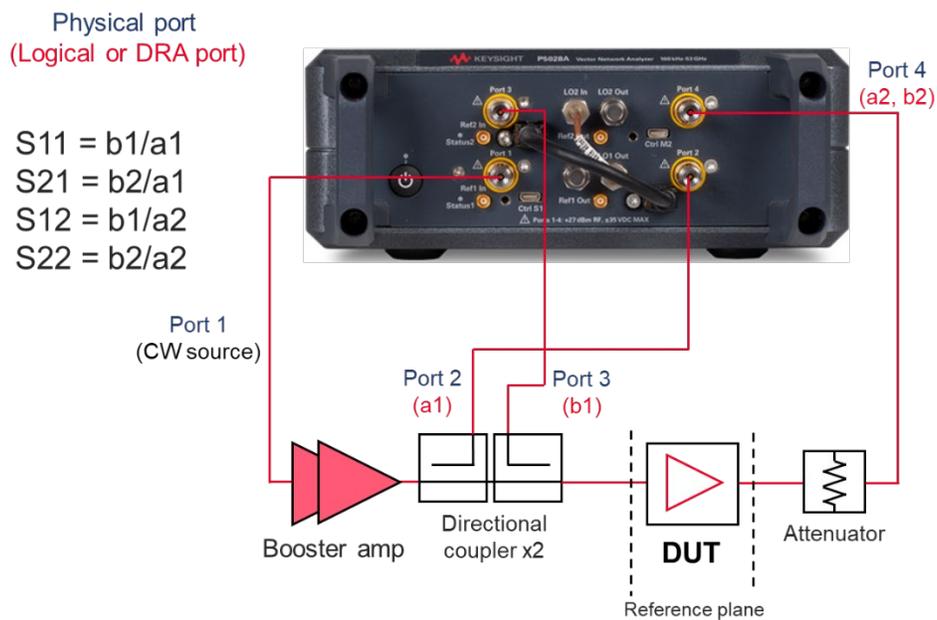
Direct Receiver Access (DRA) Configurations

The P500xA and P502xA Series support direct receiver access (DRA) configurations to flexibly set up test systems with optimized performance by integrating with external components¹ such as booster amplifiers, attenuators, or directional couplers. This function (included in the VNA firmware) combines three physical test ports of the USB VNA and defines as a single logical port. You can perform measurements including calibration and post processing using the logical ports.

DRA configuration with high-power

One example using the DRA configuration is S-parameter measurements with high power. When you need an input level higher than the analyzer's source can provide, pre-amplifiers are necessary to boost the power level prior to the DUT. However, the reference signal is measured before the booster amplifier with a standard configuration of a 2-port VNA, and temperature drift or high reverse isolation of a booster amplifier will prevent accurate reflection measurements of DUT's input.

A typical configuration for high-power measurements with the 4-port P502xA is shown. A 4-port P502xA (with option 400 or 402), or a 4-port VNA² using two 2-port P500xAs (with option 200) are needed to setup the DRA configuration on port 1. Reflected and transmitted signals of DUT are detected with all the logical receivers, and the VNA firmware provides measured high-power S-parameters.



External components should be selected based on their high-power limits or frequency range specifications. Be sure that these components can handle the output power level of the booster amplifier.

1. External components are not included in the P50xxA. Must be purchased separately.
2. The S97551A software is required to configure a multiport VNA with multiple P50xxA VNAs.

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

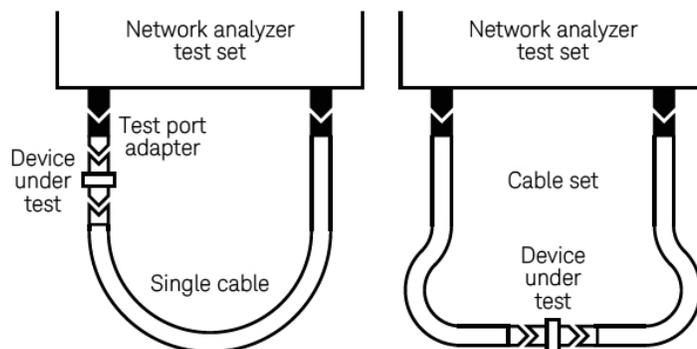
Keysight offers cables in the following types:

- 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 1.85 mm connectors

Mechanical calibration kit

85058B standard: DC to 67 GHz. Includes:

- 85058-60101 1.85 mm (m) short 5.4 mm
- 85058-60102 1.85 mm (m) short 6.3 mm
- 85058-60103 1.85 mm (m) short 7.12 mm
- 85058-60104 1.85 mm (m) short 7.6 mm
- 85058-60105 1.85 mm (f) short 5.4 mm
- 85058-60106 1.85 mm (f) short 6.3 mm
- 85058-60107 1.85 mm (f) short 7.12 mm
- 85058-60108 1.85 mm (f) short 7.6 mm
- 85058-60109 1.85 mm male open
- 85058-60110 1.85 mm female open
- 85058-60111 1.85 mm male load
- 85058-60112 1.85 mm female load
- 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
- 85058-60114 1.85 mm (f) to 1.85 mm (f) adapter
- 85058-60115 1.85 mm (m) to 1.85 mm (f) adapter

85058E economy: DC to 67 GHz. Includes:

- 85058-60101 1.85 mm (m) short 5.4 mm
- 85058-60105 1.85 mm (f) short 5.4 mm
- 85058-60109 1.85 mm male open
- 85058-60110 1.85 mm female open
- 85058-60123 1.85 mm male load
- 85058-60124 1.85 mm female load
- 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
- 85058-60114 1.85 mm (f) to 1.85 mm (f) adapter
- 85058-60115 1.85 mm (m) to 1.85 mm (f) adapter

Electronic calibration kits

N4694D Microwave ECal: DC or 10 MHz to 67 GHz, 2-ports. Includes:

- Option F0F: Both connectors are 1.85 mm female on module
- Option M0F: 1 female and 1 male 1.85 mm connector on module
- Option M0M: Both connectors are 1.85 mm male on module
- Option 0DC: DC to 67 GHz
- Option 100: 10 MHz to 67 GHz
- Option 00A adds:

- 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
- 85058-60114 1.85 mm (f) to 1.85 mm (f) adapter

For devices with 2.4 mm connectors

Mechanical calibration kit

85056A standard: DC to 50 GHz. Includes:

- 00901-60003 2.4 mm (m) fixed broadband load
- 00902-60004 2.4 mm (f) fixed broadband load
- 00915-60003 2.4 mm (m) sliding load
- 00915-60004 2.4 mm (f) sliding load
- 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
- 85056-60006 2.4 mm (f) to 2.4 mm (f) adapter
- 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter
- 85056-60020 2.4 mm (m) short
- 85056-60021 2.4 mm (f) short
- 85056-60022 2.4 mm (m) open
- 85056-60023 2.4 mm (f) open

85056D economy: DC to 50 GHz. Includes:

- 00901-60003 2.4 mm (m) fixed broadband load
- 00902-60004 2.4 mm (f) fixed broadband load
- 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
- 85056-60006 2.4 mm (f) to 2.4 mm (f) adapter
- 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter
- 85056-60020 2.4 mm (m) short
- 85056-60021 2.4 mm (f) short
- 85056-60022 2.4 mm (m) open
- 85056-60023 2.4 mm (f) open

Electronic calibration kits

N4693D¹ Microwave ECal: DC or 10 MHz to 50 GHz, 2-ports. Includes:

- Option F0F: Both connectors are 2.4 mm female on module
- Option M0F: 1 female and 1 male 2.4 mm connector on module
- Option M0M: Both connectors are 2.4 mm male on module
- Option 0DC: DC to 50 GHz
- Option 100: 10 MHz to 50 GHz
- Option 00A adds:
 - 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
 - 85058-60006 2.4 mm (f) to 2.4 mm (f) adapter

For devices with K connectors (2.92 mm)

Electronic calibration kits

N4692D Microwave ECal: DC or 10 MHz to 40 GHz, 2-ports. Includes:

- Option F0F: Both connectors are 2.92 mm female on module
- Option M0F: 1 female and 1 male 2.92 mm connector on module
- Option M0M: Both connectors are 2.92 mm male on module
- Option 0DC: DC to 40 GHz

Option 100: 10 MHz to 40 GHz

Option 00A adds: N4692-60021 2.92 mm (m) to 2.92 mm (m) adapter

N4692-60022 2.92 mm (f) to 2.92 mm (f) adapter

Adapters

11904A 2.4 mm (m) to 2.92 mm (m)

11904B 2.4 mm (f) to 2.92 mm (f)

11904C 2.4 mm (m) to 2.92 mm (f)

11904D 2.4 mm (f) to 2.92 mm (m)

11904S 2.4 mm to 2.92 mm: Adapter set, contains 4 matched adapters

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

N4431D Microwave ECal: DC to 13.5 GHz, 4 ports.

Frequency option (mandatory)

- Option 0DC: DC to 13.5 GHz

Connector options

- Option 010: 3.5 mm female connector on four ports on module
- Option 020: Type-N female connector on four ports on module

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
4.3-10 (f)	107	207	307	407
4.3-10 (m)	108	208	308	408

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

N4433D ECal: DC/300 kHz to 26.5 GHz, 4-ports.

Frequency options

- Option 0DC: DC to 26.5 GHz
- Option 003: 300 kHz to 26.5 GHz

Connector Options:

- Option 010: 3.5 mm female connector on four ports on module

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

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

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)

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

N4431D ECal: DC to 13.5 GHz, 4-ports.

Frequency option (mandatory)

- Option 0DC: DC to 13.5 GHz

Connector options

- Option 010: 3.5 mm female connector on four ports on module
- Option 020: Type-N female connector on four ports on module

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
4.3-10 (f)	107	207	307	407
4.3-10 (m)	108	208	308	408

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

N4432D ECal: DC or 300 kHz to 18 GHz, 4-ports.

Frequency options

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

Connector options

- Option 020: Type-N female connector on four ports on module

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

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

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

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.

Accessories

CalPod calibration refresh modules (8553xB/4xB)

P937xA Series

P500xA & P502xA Series

CalPod calibration refresh modules allow in-situ calibration refreshes to be performed at the push of a button without removing the DUT or re-connecting calibration standards. CalPods are designed for any measurement situation where it is desirable to ensure that a valid calibration is present before recording measurement data. For example, they are useful for removing environmental effects such as cable movement and thermal-based changes of cables, connectors, and adapters, as well as connector and switch-matrix repeatability errors. The modules are especially useful in temperature, or thermal-vacuum chamber testing. CalPod modules are equipped with 2.92 mm connectors.

- 85530B 20 GHz ambient-temperature CalPod
- 85531B 20 GHz temperature-compensated CalPod
- 85532B 20 GHz thermal-vacuum compatible CalPod
- 85540B 40 GHz ambient-temperature CalPod
- 85541B 40 GHz temperature-compensated CalPod
- 85542B 40 GHz thermal-vacuum compatible CalPod
- 85523B CalPod controller (provides control for up to 4 CalPods)
- 85556A CalPod drive-cable splitter (allows control for up to 12 CalPods)
- 85554A CalPod drive cable extension (10-meter cascable extension cable)

PC Requirements for USB VNA control

Requirement	For P937xA Series
Operating systems	Windows 7 ¹ or Windows 10 (64-bit)
Processor speed	Intel i5 6 th generation or newer/Intel Xeon E3 v3 or newer
Available memory	4 GB minimum, 16 GB recommended
Available disk space	2 GB available disk space minimum
Display resolution	1024 X 768 minimum
USB	USB 3.0 port directly connected to Intel chipset

1. For Windows 7 OS, SHA-2 code signing support must be installed.

Literature Information

Keysight P937xA Series USB Vector Network Analyzer – Data Sheet, 5992-2765EN

Keysight P500xA Series USB Vector Network Analyzer – Data Sheet, 5992-3606EN

Keysight Vector Network Analyzer – Selection Guide, 5980-7603EN

Electric Calibration (ECal) Modules – Technical Overview, 5963-7343E

Web Resources

www.keysight.com/find/usb-vna

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

