Keysight
FieldFox Combination Analyzers
4/6.5/9/14/18/26.5 GHz

Technical Overview

N9913A
N9914A
N9915A
N9916A
N9917A
N9918A

KEYSIGHT TECHNOLOGIES

Get Keysight-Quality Microwave Measurements in the Field

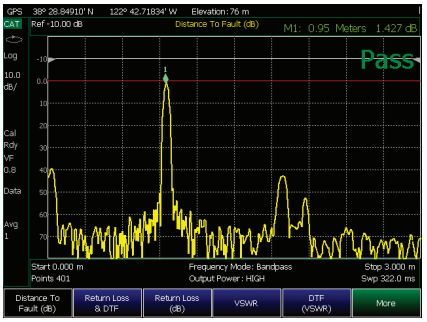
Every piece of gear in your field kit had to prove its worth. Measuring up and earning a spot is the driving idea behind Keysight's FieldFox microwave analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Keysight-quality microwave measurements—wherever you need to go.

On land, sea and air, FieldFox is ready for a wide range of applications: satellite communications, microwave backhaul, military communications, radar systems, and more. In harsh conditions and hard-to-reach locations, FieldFox delivers precise results that are consistent with those you'd see on a benchtop analyzer. To get you out of the elements sooner, the task-driven user interface will help you finish the job faster.

For maximum functionality, FieldFox analyzers integrate the microwave capabilities you need in a single, compact instrument. They also give you—and your budget—more flexibility: configure an instrument with the features you need today and add others in the future.

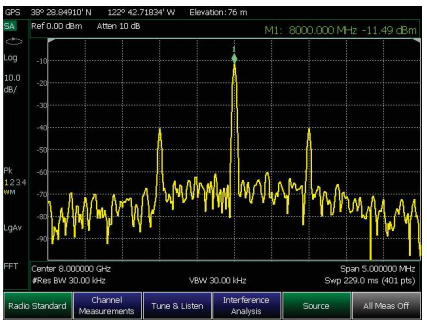
Cable and antenna analyzer

- Distance-to-fault, return loss, and cable loss (1-port and 2-port)
- Integrated QuickCal – no calibration kit required
- 30 kHz to 26.5 GHz



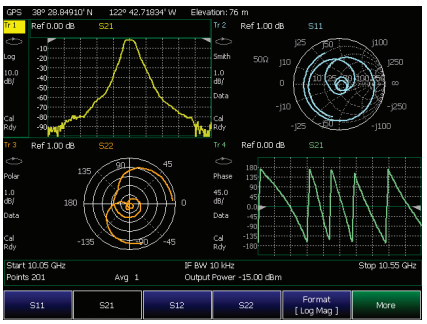
Spectrum analyzer

- Unprecedented amplitude accuracy (± 0.5 dB) with InstAlign [1] – no warm up required
- Tracking generator, independent source, and preamplifier covering the full frequency range
- 5 kHz to 26.5 GHz

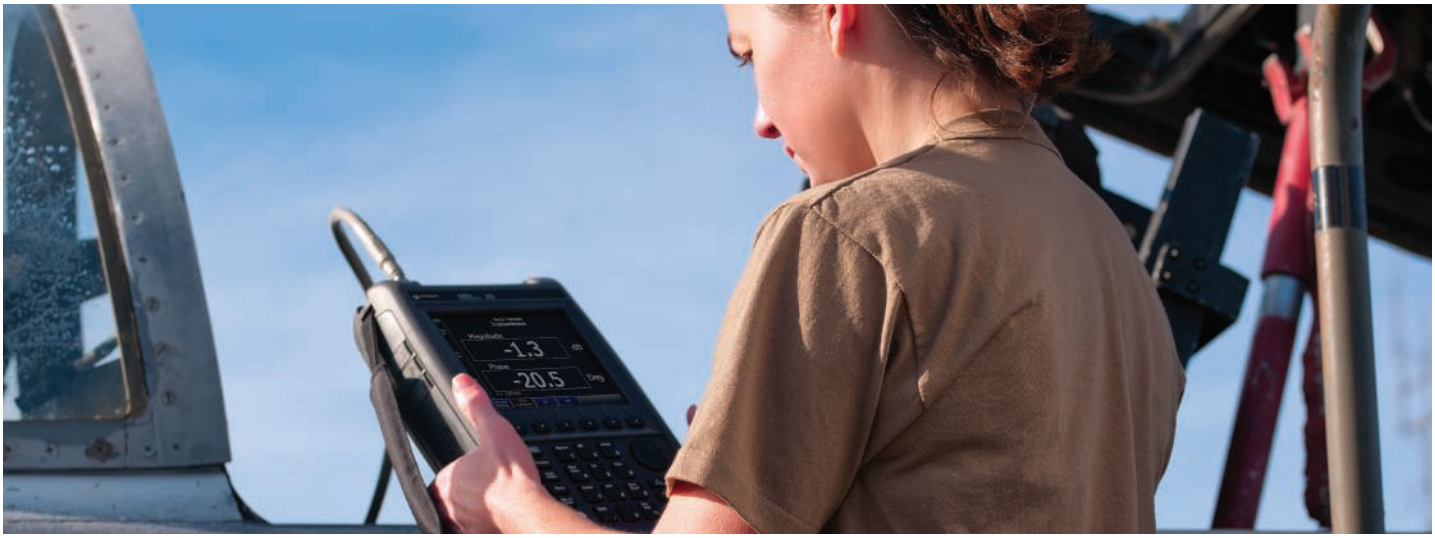


Vector network analyzer (VNA)

- All four S-parameters, magnitude and phase
- Guided Calibration Wizard, full 2-port cal, TRL, waveguide calibration
- Mixed-mode reflection S-parameters
- 30 kHz to 26.5 GHz

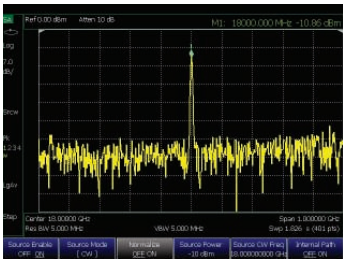


1. With FieldFox InstAlign, internal amplitude alignments occur automatically as environmental conditions change, without any user intervention.



Add the World's Most Precise Handheld Microwave Analyzer to Your Kit

Tracking generator and built-in independent signal source



- CW, CW coupled, and tracking
- Flat output power across whole frequency span, in 1 dB steps
- 30 kHz to 26.5 GHz

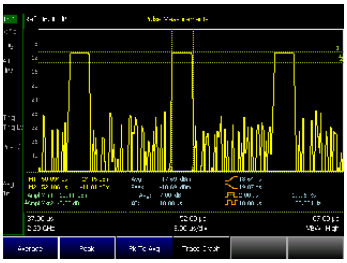
Built-in power meter

- Easy to view analog and digital display
- ± 0.5 dB accuracy with InstAlign
- 5 kHz to 26.5 GHz

CW and swept-frequency power measurements with USB power sensor

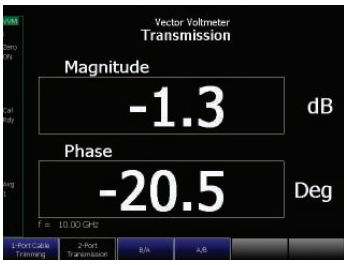
- Measure power at a CW frequency
- Measure power versus frequency, including frequency-offset
- Frequency and power range dependent on USB power sensor

Pulse measurements using a USB peak power sensor



- Measure peak power, average power and peak to average ratio
- Pulse profile characterization with gating
- 50 MHz to 40 GHz (frequency range sensor dependent)

Vector voltmeter



- Cable trimming, phase shift and electrical length measurements
- A/B and B/A ratio measurements
- 30 kHz to 26.5 GHz

Designed For You and the Work You Do Everyday

Carry FieldFox wherever you need to go

- Kit friendly 3.0 kg or 6.6 lbs
- Large buttons are easy to operate, even when wearing gloves
- Field swappable battery lasts up to 3 1/2 hours
- Non-slip rubber grip securely fits in your hands and won't slide off the hood of your vehicle
- Vertical "portrait" orientation makes it easy to hold and operate at the same time

Field-proof usability for better answers in less time

- Bright, low-reflection display and backlit keys enable easy viewing in direct sunlight or darkness
- Intuitive user interface is designed for your workflow, enabling measurements in fewer key presses
- One-button measurements simplify complex setups and ensure quick, accurate results with confidence
- Calibration Wizard guides user to ensure simple and accurate calibrations
- 3-year warranty ensures field confidence - especially in harsh environments

Transflective display makes it easy to read measurements in direct sunlight

Large buttons make it easy to perform spectrum analysis measurements – even with gloves on

Rugged Enough to Meet MIL-Specs

- Completely sealed instrument enclosure provides measurement stability in harsh environments
- Specially designed connector bay protects RF connectors from damage due to drops or other external impacts (designed to withstand 4' drop on concrete surface on all 6 faces)
- Water-resistant chassis, keypad and case withstand wide temperature ranges and salty, humid environments
  - Case withstands shock and vibration
  - Wide operating temperature -10 to +55 °C (14 to 131 °F)
  - Wide storage temperature -51 to +71 °C (-60 to 160 °F)
- Meets MIL-PRF-28800F Class 2 requirements
- Type tested and meets MIL-STD-810G, Method 511.5, Procedure I requirements for operation in explosive environments
- Meets IEC/EN 60529 IP53 requirements for protection from dust and water

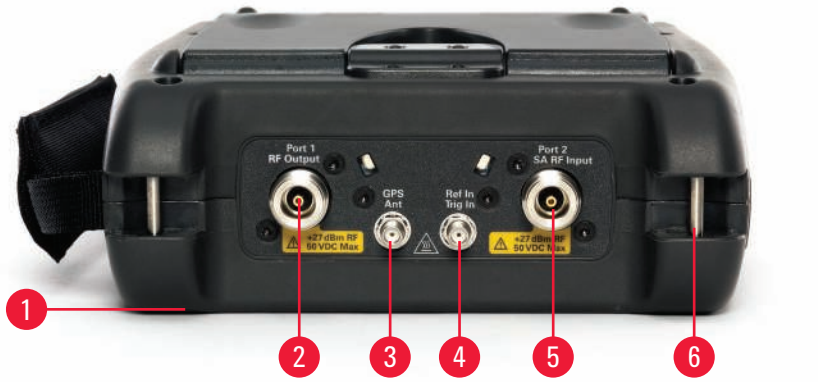
Dust-free design with no vents or fans helps extend instrument reliability

Pick Up FieldFox For Its Ergonomics

Number	Description
	Portrait design and large buttons for easy operation – even with gloves on
1	Convenient side strap makes it easy to hold and carry
2	Task-driven keys are grouped to easily perform field measurements
3	Dedicated marker keys for quick marker function access
4	Anti-glare 6.5 inch LCD display with LED backlight
5	Backlit keypad

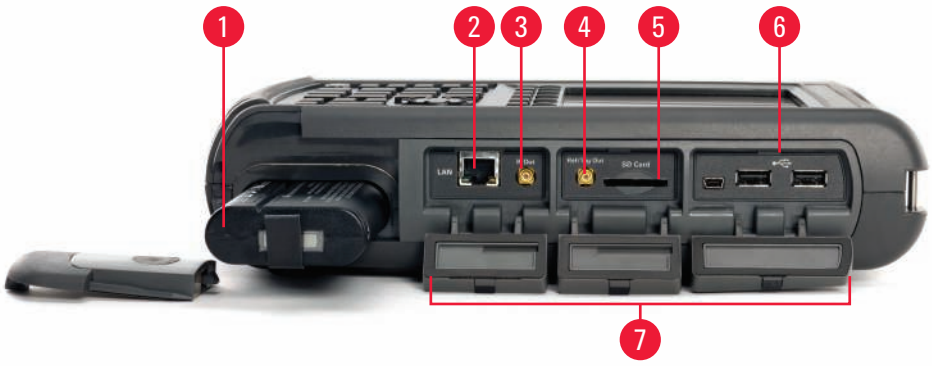
...and Depend On Its Durability and Convenience

Top view



Number	Description
1	Connector bay protects RF connectors
2	Port 1/RF output
3	Get precise location using the built-in GPS receiver
4	External reference and external trigger input
5	Port 2/SA RF input
6	Quick connect shoulder strap clips

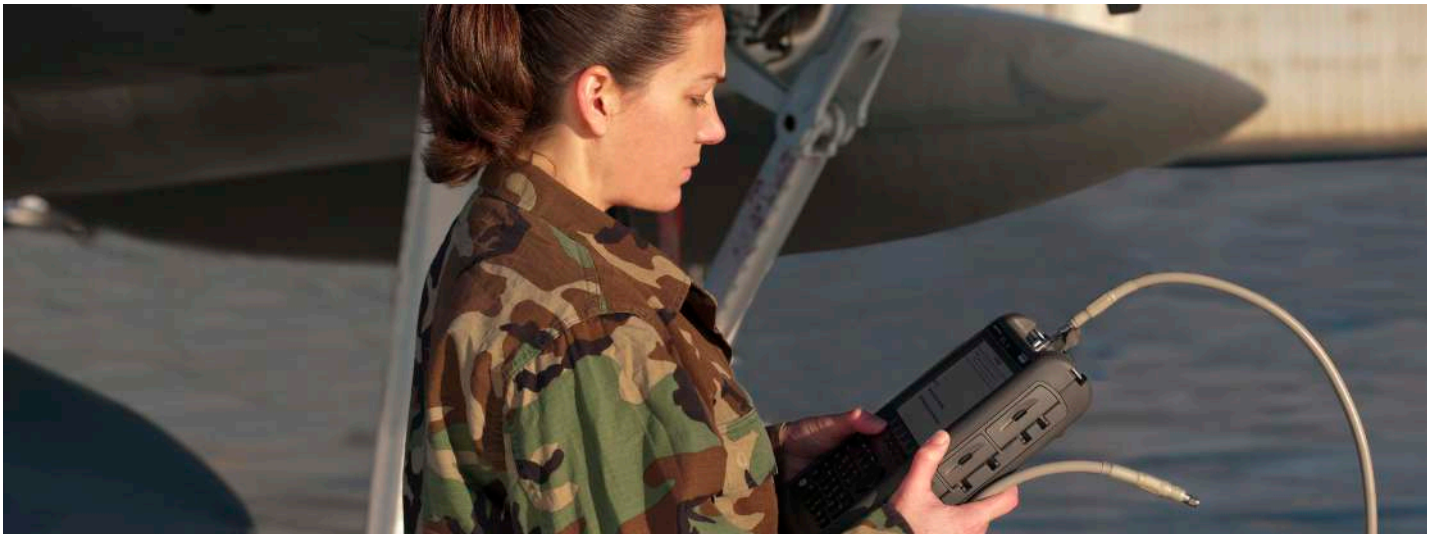
Right side



Number	Description
1	Keep going with field-swappable batteries that last up to 3 1/2 hours
2	LAN port for data transfer and SCPI programming
3	Spectrum analyzer 25 MHz IF out usable for signal analysis
4	External reference and data storage external trigger output
5	SD flash card for data storage
6	USB ports for easy data storage
7	Gasketed doors protect ports from moisture

Left side

Number	Description
1	Simplify interference analysis with AM/FM tune and listen
2	Built-in DC supply for powering external bias-tees, probes, and active devices

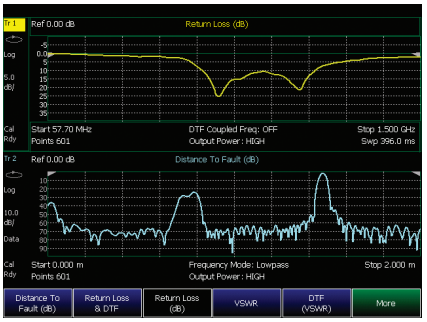


Cable and Antenna Analyzer

Cable and antenna analyzer

Fifty to sixty percent of microwave-link equipment issues are related to cables, antennas and connectors. Degraded feeder lines cause poor coverage, link failures, and reduced sensitivity on the receive path. To maintain the quality of a microwave link, it is critical to keep the cable and antenna systems in good working condition.

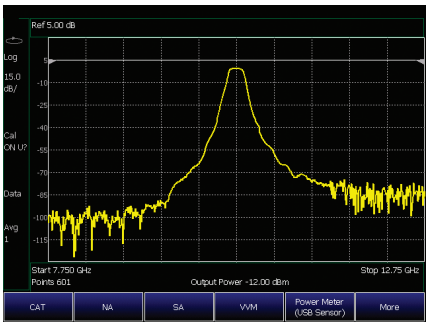
Use FieldFox to make return loss, VSWR, insertion loss, 1-port cable loss, and distance-to-fault measurements. You can test antennas, cables, filters, and amplifiers with a single instrument. The amplifiers can be biased using FieldFox's built-in DC source.



Return loss and DTF display

Return loss and distance-to-fault (DTF) measurements

Measuring and viewing return loss and distance-to-fault simultaneously allows you to fix and tune systems much faster. Optionally, you can utilize FieldFox's range of calibrations to ensure the instrument is always calibrated and ready to make consistent and worry-free measurements. The built-in cable editor allows you to edit existing cable types on-site, save them as new cable types with user defined names, and share the cable files with your team.



Filter insertion loss display

Cable and Antenna Analyzer (continued)

CalReady-calibrated at power on and ready to go

Save time and get right to work with FieldFox's CalReady feature. With CalReady, the analyzer is already calibrated and ready to make measurements such as S11, S22, 1-port cable loss, and DTF measurements without having to connect/disconnect additional calibration devices.

Hassle-free calibration in the field with the industry's first and only QuickCal

FieldFox is the industry's first and only handheld network analyzer with a built-in calibration capability that allows you to calibrate the network analyzer without carrying a calibration kit (cal kit) into the field.

With any other test instrument, when you add additional devices to the test port, such as jumper cables or adapters, you need to recalibrate using a cal kit. QuickCal eliminates the need to carry and use a cal kit, and also provides worry-free accuracy.

FieldFox's QuickCal supports measurements such as insertion loss/gain, 1-port cable loss, return loss, and DTF.

Broadband calibration

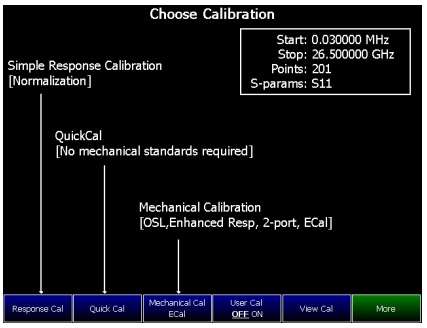
FieldFox allows you to make broadband calibrations, which means the instrument is calibrated over the maximum frequency range. After a broadband calibration, you can change the frequency range or number of points without recalibrating the instrument. The calibration is interpolated, and accuracy is maintained.

User cal kit support

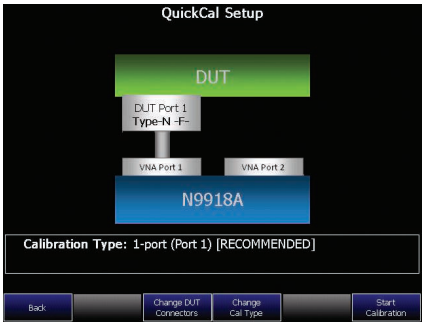
For users who wish to use traditional mechanical calibration kits, FieldFox supports most HP/Agilent/Keysight cal kits, and also allows you to define your own custom calibration kits.

Fast and accurate calibration with ECal

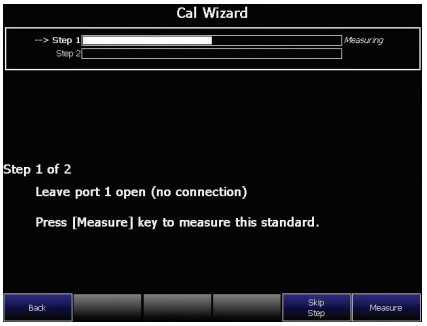
The FieldFox calibration engine supports Keysight's USB ECal modules. ECal support reduces calibration time and the need to make multiple connections during testing, while also providing for greater consistency between measurements. For FieldFox users, that translates into fewer human errors and increased accuracy.



Step 1. FieldFox's QuickCal allows you to perform calibrations without carrying a cal kit



Step 2



Step 3

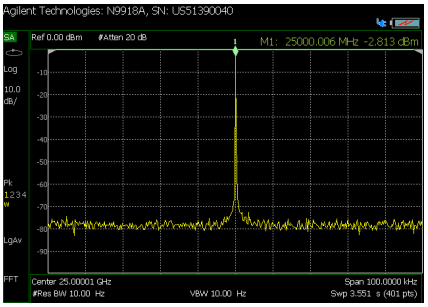
Spectrum Analyzer

Spectrum analyzer

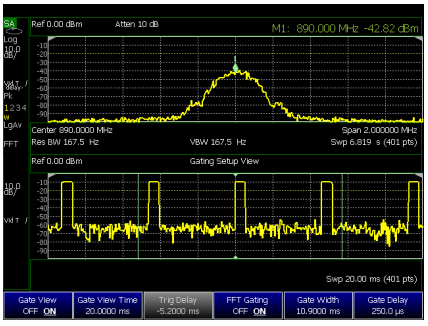
In microwave, radar, and satellite communications, and commercial microwave backhaul, engineers are responsible not only for hardware installation and maintenance, but also over-the-air signal quality. They need to regularly monitor for rogue signals and perform signal surveillance.

FieldFox's spectrum analyzer is optimized to excel in the dynamic spectral environment seen commonly in the field. In the field, users face measurement challenges such as the need to detect a low-level signal under strong signal conditions (requiring high dynamic range), or close-in small interference signals (requiring excellent phase noise).

FieldFox's superior dynamic range (TOI > +15 dBm), close in phase noise (–111 dBc/Hz at 10 kHz), and fast sweep time make these challenging tasks easier. FieldFox's spectrum analyzer also provides a full power measurement suite and complete trace and state control.



Monitor the spectrum using the FieldFox analyzers



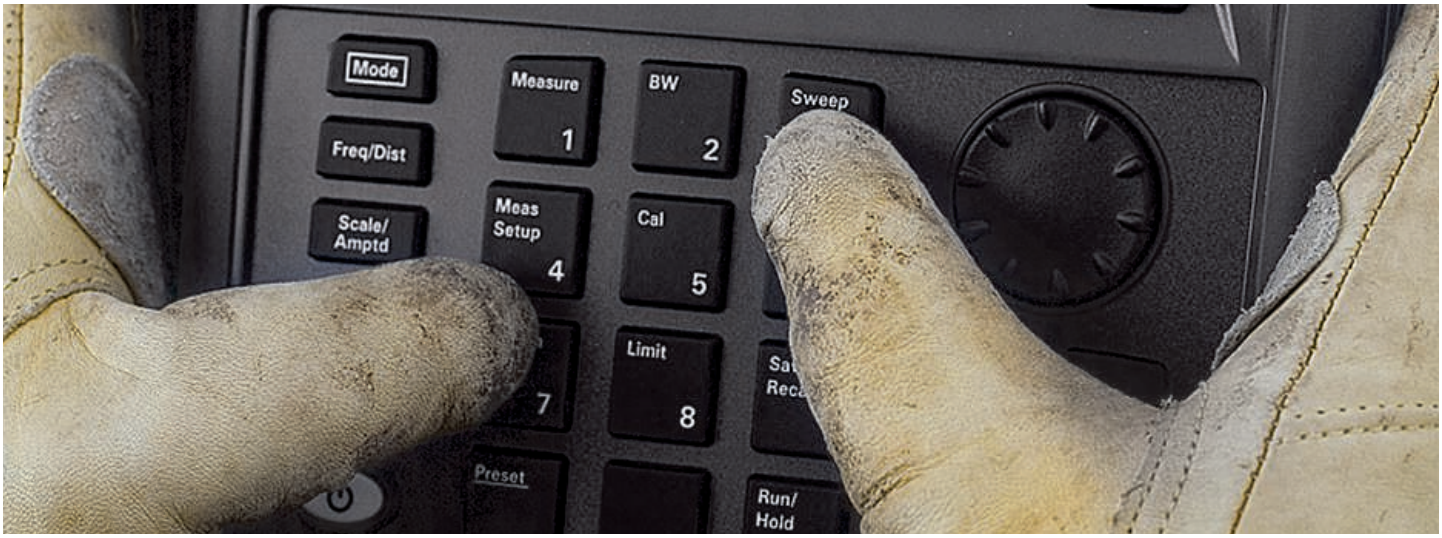
Analyze pulsed-RF signals using the spectrum analyzer time gating option

Unprecedented amplitude accuracy without instrument warm up – InstAlign

With FieldFox InstAlign, internal amplitude alignments occur automatically as the environmental conditions change, without any user intervention. This provides unprecedented amplitude accuracy up to ± 0.5 dB for spectrum analysis and power measurements. Better yet, FieldFox provides this accuracy immediately upon instrument turn on – no warm up required.

Spectrum analyzer time gating

FieldFox's time gating is designed for engineers testing the pulse characteristics of their radar systems. FieldFox's gated FFT time gating allows for signals with pulse widths as narrow as 8 µs to be measured. Triggering functions such as burst trigger and pre-trigger delay further ease pulse signal measurements.



Spectrum Analyzer (continued)

Field strength measurements

To characterize the electric and magnetic fields, the gain and loss of the antenna and cables need to be accounted for. With FieldFox, antenna factors and cable loss data can be loaded using either the front panel or the complimentary Data Link software.

Interference analyzer

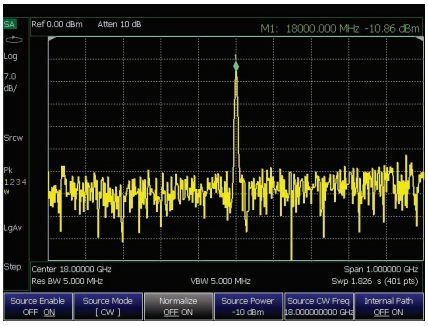
Interference can be internal or external, uplink or downlink, and has a direct impact on the Quality of Service of a communication network. FieldFox's interference analyzer is designed to identify interfering signals quickly. Spectrogram and waterfall displays detect intermittent signals or monitor signals over a period of time. Signal traces can be recorded into internal memory or external flash memory devices, and the saved traces can be played back for offline processing. It has excellent dynamic range with very fast sweep times under narrow resolution bandwidths (RBWs).

Independent signal source

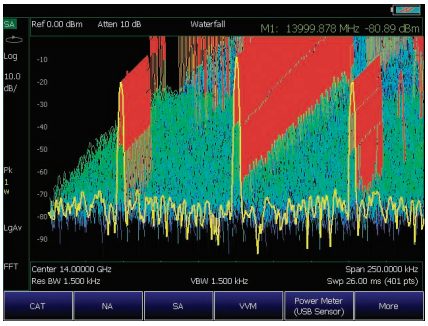
FieldFox has a built-in independent signal source, with a frequency range of 30 kHz to 26.5 GHz. The signal source can be tuned to any frequency, independent of the spectrum analyzer frequency. The signal source can be used to create a test signal to measure coverage, antenna isolation, antenna direction alignment, shielding effectiveness or attenuation, transponder and frequency offset device verification, and long cable loss measurement.

IF signal output

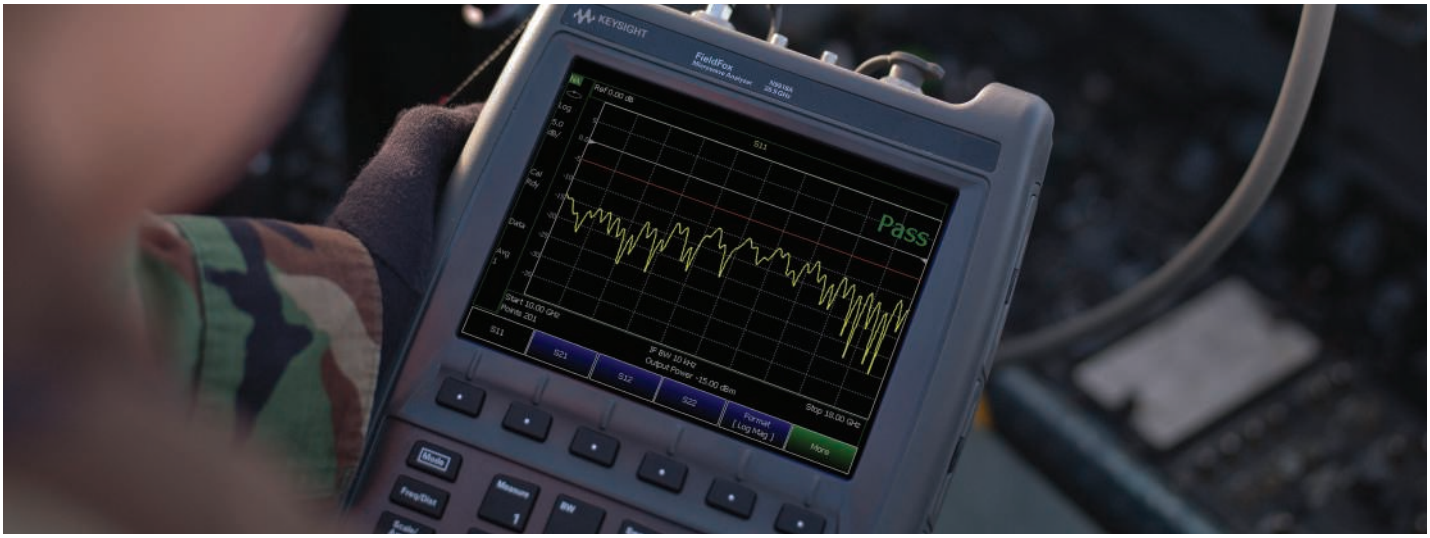
FieldFox provides a spectrum analyzer IF output with 25 MHz bandwidth for use as a frequency down-converter, and to perform wideband signal analysis.



Use the internal microwave signal source for transponder testing



Waterfall display makes interference hunting easier



Vector Network Analyzer

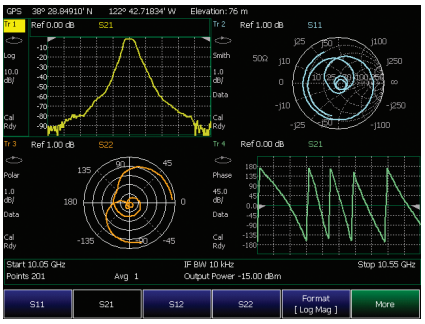
Vector network analyzer

FieldFox's Option 210 provides vector transmission and reflection measurement (T/R), or S11 and S21, with magnitude and phase. Adding Option 211 (full 2-port S-parameters) brings new levels of accuracy and convenience for testing microwave components.

With a full 2-port network analyzer, you can measure the forward and reverse characteristics of your component without having to disconnect, turn around, and reconnect it to the analyzer. The full 2-port calibration gives you the best measurement accuracy possible.

FieldFox's four independent, sensitive receivers provide 94 dB of dynamic range for measurement of high rejection, narrowband devices such as cavity filters. The receivers also enable full 2-port error correction with the unknown thru method, allowing users to measure non-insertable devices accurately and easily.

FieldFox's calibration engine is the same engine that powers the well-respected Keysight ENA and PNA network analyzers. FieldFox leverages Keysight microwave expertise to deliver consistent measurements with Keysight benchtop VNAs.

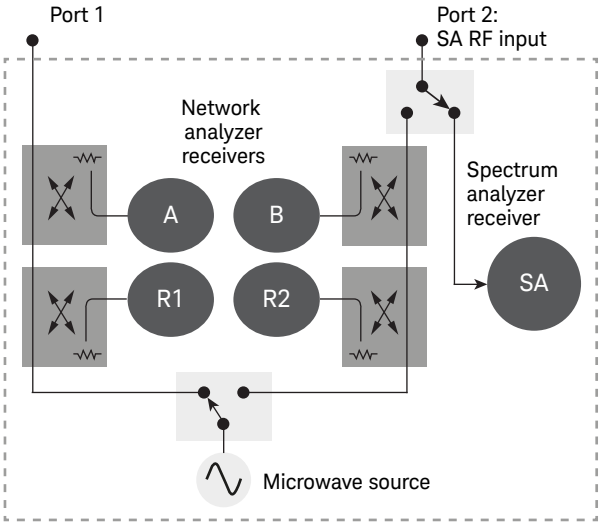


Simultaneously measure and view all four S-parameters, with a single connection

Calibrations

FieldFox's guided Cal Wizard takes guessing out of calibration and allows you to easily perform the following calibrations:

- Full 2-port
- OSL, response, enhanced response
- TRL, LRL, offset short

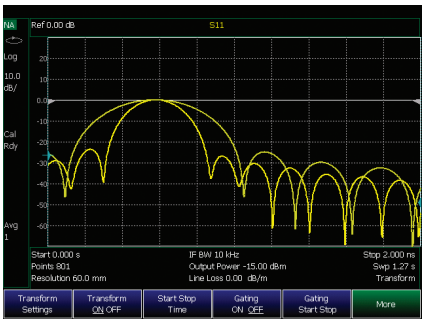


FieldFox microwave analyzer architecture

Vector Network Analyzer (continued)

Network analyzer time domain

With the time domain option, FieldFox computes the inverse fourier transform of the frequency-domain data to display reflection or transmission coeficients versus time. Time domain gating can be used to remove unwanted responses such as connector mismatch or cable discontinuities, and the results can be displayed in either time or frequency domain.



Time domain measurements provide insight into the device under test

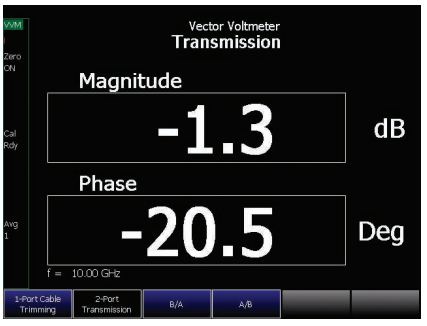
Waveguide support

Waveguides are widely used to provide transmission links between microwave transmitters and antennas, as waveguides have less loss than coax. Keysight offers both high-performance and also economical waveguide calibration kits. The economical kits are ideal for field maintenance and troubleshooting, as they provide good measurement results at lower costs.

Vector voltmeter

Using FieldFox's vector voltmeter (VVM), the phase shift and electrical length of a device can be measured. You can view results on the large display as far as ten feet or three meters away. VVM also provides ratio measurements of magnitude and phase of two channels, A/B or B/A. You can use this capability to verify the magnitude and phase differences between multiple signal paths such as in an antenna or phased array.

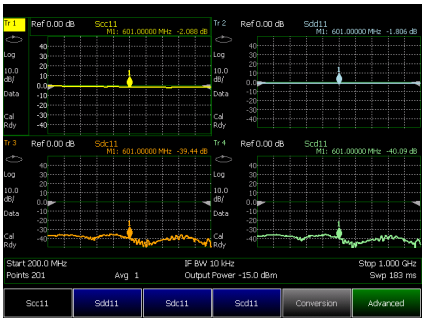
FieldFox offers all the key functionalities of the HP 8508A, in a handheld form factor, and without the need for the source/bridge/accessories required with HP 8508A.



Vector voltmeter used for cable trimming

Mixed-mode S-parameters

With FieldFox, you can measure the common and differential mode reflections of a device. Mixed-mode S-parameters are also known as balanced measurements. This measurement requires the full 2-port VNA and 2-port cal functionality.



Mixed-mode S-parameter measurements with FieldFox

Completing the All-In-One

Built-in power meter

By leveraging InstAlign technology, FieldFox is able to make very accurate channel power measurements. The channel bandwidth can be set wide to simulate average power meter measurements. This measurement function provides the flexibility to make user definable channel power measurements with accuracy up to ± 0.5 dB.

Easily measure power levels using the built-in channel power meter

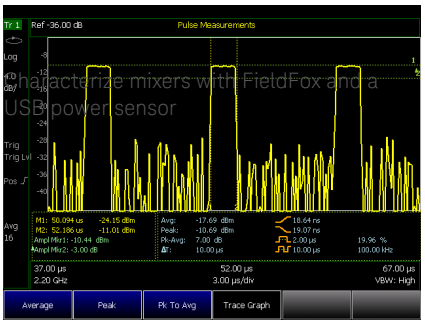
USB power sensor support

FieldFox can connect with the Keysight USB power sensors to make microwave power measurements. Using USB peak power sensors, users can measure both the average and the peak power of a modulated signal.

USB power measurements versus frequency

In addition to power measurements at a single CW frequency, users can measure power versus frequency, a swept measurement. FieldFox's source frequency can be set equal to the sensor/receiver frequency, or with an offset. The frequency of both the source and receiver are swept, and the two track each other. The offset frequency can be negative, zero, or positive.

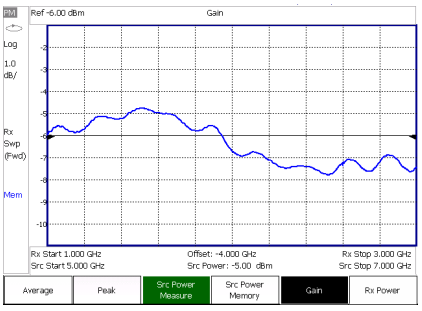
This capability is useful for characterization of the scalar transmission response of devices such as mixers and converters. The FieldFox source stimulates the DUT and the power sensor is used as the measurement receiver.



Use FieldFox to characterize pulses

Pulse measurements

FieldFox's pulse measurement option allows users to efficiently characterize pulsed-RF signals such as those used in radar and electronic warfare systems, leveraging the Keysight USB peak power sensors (available in 18 and 40 GHz models). Measurements include peak power, peak to average ratio, and pulse profile parameters such as rise time, fall time and pulse repetition frequency.



Characterize mixers with FieldFox and a USB power sensor

Completing the All-In-One (continued)

Remote control capability with iPad or iPhone

Engineers and technicians can now remotely monitor and control their FieldFox using their iOS device such as an iPhone, iPad, or iPod Touch. FieldFox's Remote Viewer iOS app emulates the front panel of the unit, so users can simply press any FieldFox key right from their iOS device. The app also allows users to instantly access technical documents such as data sheets.

FieldFox's Data Link software makes report generation and documentation easier

FieldFox's complimentary Data Link software provides data transfer, data definition and report generation. Markers and limit lines can be added to the traces. Cable files and antenna factors can also be loaded using Data Link.

Remote control via LAN and FieldFox programming

FieldFox analyzers are fully SCPI compliant and can be controlled over the LAN.

Built-in GPS

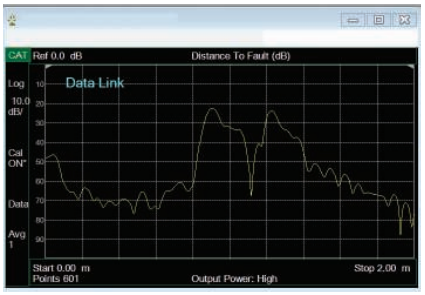
A built-in GPS receiver provides geolocation tags to measurements. The geo data – time, latitude, longitude, and elevation – can be displayed and saved in data files. In addition to location information, the GPS provides an accurate frequency reference to improve accuracy.

Built-in variable voltage DC bias

FieldFox has a built-in variable voltage DC bias source. The source provides 1 to 32 VDC with maximum current of 650 mA and 8 W maximum power.

The DC bias source can provide DC power to amplifiers under test and bias tower mounted amplifiers (TMA) when engineers need to sweep through the TMA to reach the antenna (bias-tees available separately).

Control and view your FieldFox via your iPad



Use the complimentary Data Link software to generate reports

Use the built-in GPS to obtain geo-location data

Specifications In Brief

See the FieldFox Handheld Analyzer Data Sheet for a complete listing of the specifications:
http://literature.cdn.keysight.com/litweb/pdf/5990-9783EN.pdf

See FieldFox Configuration Guide for option information. Many capabilities listed in this Data Sheet require options.

Cable and antenna analyzer and vector network analyzer

Models	**Frequency range**
N9913A	30 kHz to 4 GHz
N9914A	30 kHz to 6.5 GHz
N9915A, N9925A	30 kHz to 9 GHz
N9916A, N9926A	30 kHz to 14 GHz
N9917A, N9927A	30 kHz to 18 GHz
N9918A, N9928A	30 kHz to 26.5 GHz
Data points or resolution	101, 201, 401, 601, 801, 1001, 1601, 4001, 10,001
	Arbitrary number of points settable through SCPI
System impedance	50 Ω (nominal), 75 Ω with appropriate adapter and calibration kit
Test port output power	**Port 1 or port 2, high power, 23 ± 5 °C**
Frequency	**Typical**
30 kHz to 300 kHz	–11 dBm
> 300 kHz to 2 MHz	–3 dBm
> 2 MHz to 625 MHz	–2 dBm
> 625 MHz to 3 GHz	+1 dBm
≥ 3 to 6.5 GHz	–1 dBm
≥ 6.5 to 9 GHz	–2 dBm
≥ 9 to 14 GHz	–4 dBm
≥ 14 to 18 GHz	–6 dBm
≥ 18 to 23 GHz	–10 dBm
≥ 23 to 26.5 GHz	–12 dBm
Power level accuracy	± 1.5 dB at –15 dBm (typical)
Power range	CAT: High, low and manual. Low power is –45 dBm (nominal)
	VNA: High, low and manual. Low power is –45 dBm (nominal)
Power step size	Flat power, in 1 dB steps, is available across the whole frequency span (nominal)

Specifications In Brief (continued)

System dynamic range [1]: Port 1 or port 2, high power, 300 Hz IF bandwidth, –10 to 55 °C		
Frequency	**Spec**	**Typical**
> 300 kHz to 9 GHz [2]	95 dB	100 dB
≥ 9 to 14 GHz	91 dB	97 dB
≥ 14 to 18 GHz	90 dB	94 dB
≥ 18 to 20 GHz	87 dB	90 dB
≥ 20 to 25 GHz	74 dB	79 dB
> 25 to 26.5 GHz	65 dB	70 dB
Trace noise [3]: Port 1 or port 2, high power, 300 Hz IF bandwidth, spec, –10 to 55 °C		
Frequency	**Magnitude**	**Phase**
> 300 kHz to 10 GHz	± 0.002 dB (rms)	± 0.014 degrees
> 10 to 20 GHz	± 0.004 dB (rms)	± 0.027 degrees
> 20 to 26.5 GHz	± 0.010 dB (rms)	± 0.066 degrees
Measurements		
CAT	Distance-to-fault (dB), return loss, VSWR, distance-to-fault (VSWR), cable loss (1-port), insertion loss (2-port) [4], distance-to-fault (linear or Rho)	
VNA T/R	S11, S21 [5]	
VNA S-parameters	S11, S21, S22, S12 [6]	
Connectors	Type-N 50 Ω, Type-N 75 Ω, 7/16, TNC, 3.5 mm, 2.4 mm, waveguide bands: X-band WR-90, P-band WR-62, K-band WR-42. Custom coaxial or waveguide calibration kits can be added to any FieldFox analyzer.	

1. For CAT mode “Insertion loss (2-port)”, decrease listed dynamic range specifications by 20 dB, as CAT mode IFBW is fixed at 10 kHz. Can obtain full dynamic range by using S21 measurement in VNA mode with 100 Hz IFBW.
2. < 300 kHz, 63 dB (nominal), 2 MHz to 9 MHz: 85 dB spec, 90 dB typical
3. For CAT mode, increase trace noise by a factor of 5.7, as CAT mode IFBW is fixed at 10 kHz. Can use averaging in CAT mode to reduce trace noise, or use VNA mode with 300 Hz IFBW.
4. All measurements standard are on N991xA analyzers except insertion loss (2-port). Insertion loss (2-port) requires Option 210. All measurements are available on N992xA analyzers with Option 305.
5. Standard on N992x VNAs. Option 210 required on N991xA analyzers.
6. Option 211 required to obtain all four S-parameters.

Specifications In Brief (continued)

Vector voltmeter (VVM)		
Models	Frequency range	
N9913A	30 kHz to 4 GHz	
N9914A	30 kHz to 6.5 GHz	
N9915A, N9925A	30 kHz to 9 GHz	
N9916A, N9926A	30 kHz to 14 GHz	
N9917A, N9927A	30 kHz to 18 GHz	
N9918A, N9928A	30 kHz to 26.5 GHz	
Spectrum analyzer		
Models	Frequency range	
N9913A	100 kHz to 4 GHz	Usable to 5 kHz
N9914A	100 kHz to 6.5 GHz	Usable to 5 kHz
N9915A, N9935A	100 kHz to 9 GHz	Usable to 5 kHz
N9916A, N9936A	100 kHz to 14 GHz	Usable to 5 kHz
N9917A, N9937A	100 kHz to 18 GHz	Usable to 5 kHz
N9918A, N9938A	100 kHz to 26.5 GHz	Usable to 5 kHz
The spectrum analyzer is tunable to 0 Hz or DC.		
The preamplifier covers the full band with nominal gain of 20 dB.		
Frequency reference: –10 to 55 °C		
Accuracy	± 0.7 ppm (spec) + aging	
	± 0.4 ppm (typical) + aging	
Accuracy, when locked to GPS	± 0.025 ppm (spec)	
Aging rate	± 1 ppm/yr for 20 years (spec), will not exceed ± 3.5 ppm	
Frequency span		
	Spec	
Resolution	1 Hz	
	Spec	
Resolution bandwidth (RBW) Range (–3 dB bandwidth)	Zero span: 10 Hz to 5 MHz	
	Non-zero span: 1 Hz to 5 MHz	
Video bandwidth (VBW)	1 Hz to 5 MHz	
	Non-zero span: 1, 1.5 ,2, 3, 5, 7.5, 10 sequence	
	Zero span: RBW/VBW ≤ 100	

Specifications In Brief (continued)

Phase noise: Stability, SSB phase noise at 1 GHz				
Offset	**Spec (23 ± 5 °C)**	**Spec (–10 to 55 °C)**	**Typical (23 ± 5 °C)**	**Typical (–10 to 55 °C)**
10 kHz	–106 dBc	–106 dBc	–111 dBc	–111 dBc
30 kHz	–106 dBc	–104 dBc	–108 dBc	–110 dBc
100 kHz	–100 dBc	–99 dBc	–104 dBc	–105 dBc
1 MHz	–110 dBc	–110 dBc	–113 dBc	–113 dBc
3 MHz	–119 dBc	–118 dBc	–122 dBc	–122 dBc
5 MHz	–120 dBc	–120 dBc	–123 dBc	–123 dBc
Displayed average noise level (DANL): RMS detection, log averaging, reference level of –20 dBm, normalized to 1 Hz RBW				
Preamp on	**Spec (23 ± 5 °C)**	**Spec (–10 to 55 °C)**	**Typical (23 ± 5 °C)**	**Typical (–10 to 55 °C)**
2 MHz to 4.5 GHz [1]	–153 dBm	–151 dBm	–155 dBm	–154 dBm
> 4.5 to 7 GHz	–149 dBm	–147 dBm	–151 dBm	–150 dBm
> 7 to 13 GHz	–147 dBm	–145 dBm	–149 dBm	–148 dBm
> 13 to 17 GHz	–143 dBm	–141 dBm	–145 dBm	–144 dBm
> 17 to 22 GHz	–140 dBm	–139 dBm	–143 dBm	–142 dBm
> 22 to 25 GHz	–134 dBm	–132 dBm	–137 dBm	–134 dBm
> 25 to 26.5 GHz	–128 dBm	–126 dBm	–131 dBm	–129 dBm
50 MHz absolute amplitude accuracy				
	50 MHz, verified with input level of 0 to –35 dBm, peak detector, 10 dB attenuation, preamplifier off, 30 kHz RBW, all settings auto-coupled, no warm-up required, –10 to 55 °C			
	± 0.3 dB (spec)			
	± 0.10 dB (typical)			
Total absolute amplitude accuracy				
Verified with input level of –5 dBm. Peak detector, 10 dB attenuation, preamplifier off, 30 kHz RBW, all settings auto-coupled, no warmup required. Includes frequency response uncertainties.				
	Spec (23 ± 5 °C)	**Spec (–10 to 55 °C)**	**Typical (23 ± 5 °C)**	**Typical (–10 to 55 °C)**
100 kHz to 18 GHz	± 0.8 dB	± 1.0 dB	± 0.35 dB	± 0.50 dB
> 18 GHz to 26.5 GHz	± 1.0 dB	± 1.2 dB	± 0.50 dB	± 0.60 dB
Third order intermodulation distortion (TOI)				
Two –20 dBm signals, 100 kHz spacing at input mixer, –10 to 55 °C		**Spec**	**Typical**	
		At 2.4 GHz, +15 dBm	< 1 GHz, +10 dBm	
			1 to 7.5 GHz, +15 dBm	
			> 7.5 GHz, +21 dBm	

1. Increase the noise floor 4 dB for frequencies between 2.1 and 2.8 GHz.

Specifications In Brief (continued)

Tracking generator or independent source		
Model	Tracking generator or independent source frequency range	
N9913A	30 kHz to 4 GHz	
N9914A	30 kHz to 6.5 GHz	
N9915A, N9935A	30 kHz to 9 GHz	
N9916A, N9936A	30 kHz to 14 GHz	
N9917A, N9937A	30 kHz to 18 GHz	
N9918A, N9938A	30 kHz to 26.5 GHz	
Dynamic range: Typical, –10 to 55 °C		
Frequency	**Preamp off**	**Preamp on**
2 MHz to 2 GHz	97 dB	112 dB
> 2 to 7 GHz	93 dB	108 dB
> 7 to 11 GHz	88 dB	103 dB
> 11 to 16 GHz	79 dB	94 dB
> 16 to 21 GHz	71 dB	86 dB
> 21 to 23 GHz	55 dB	70 dB
> 23 to 25 GHz	50 dB	65 dB
> 25 to 26.5 GHz	45 dB	60 dB
Built-in power meter		
Models	Frequency range	
N9913A	100 kHz to 4 GHz	Usable to 5 kHz
N9914A	100 kHz to 6.5 GHz	Usable to 5 kHz
N9915A, N9925A, N9935A	100 kHz to 9 GHz	Usable to 5 kHz
N9916A, N9926A, N9936A	100 kHz to 14 GHz	Usable to 5 kHz
N9917A, N9927A, N9937A	100 kHz to 18 GHz	Usable to 5 kHz
N9918A, N9928A, N9938A	100 kHz to 26.5 GHz	Usable to 5 kHz

Amplitude accuracy				
	Spec (23 ± 5 °C)	**Typical (23 ± 5 °C)**	**Spec (-10 to 55 °C)**	**Typical (–10 to 55 °C)**
100 kHz to 18 GHz	± 0.8 dB	± 0.35 dB	± 1.0 dB	± 0.50 dB
> 18 GHz to 26.5 GHz	± 1.0 dB	± 0.50 dB	± 1.2 dB	± 0.60 dB

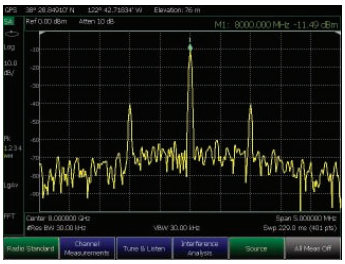
General information	
Calibration cycle	1 year
Weight	3.0 kg or 6.6 lbs including battery
Dimensions: H x W x D	292 x 188 x 72 mm (11.5” x 7.4” x 2.8”
Environmental	
MIL-PRF-28800F Class 2	Operating temperature
	Storage temperature
	Operating humidity
	Random vibration
	Functional shock
	Bench drop
MIL-STD-810G, Method 511.5	Type tested and meets Procedure I requirements for operation in explosive environments
Altitude – operating	9144 m or 30,000 ft (using battery)
Altitude – non-operating	15,240 m or 50,000 ft
Complies with European EMC directive	IEC/EN 61326–1
	CISPR Pub 11 Group 1, class B, Group 1 limit of CISPR 11:203/EN
	55011:2007
	AS/NZS CISPR 11
	ICES/NMB–001
Battery	Lithium ion, 10.8 V, 4.6 A-h, 3.5 hours (typical)
Warranty	3-year warranty standard on all FieldFox instruments

Configuration Information in Brief

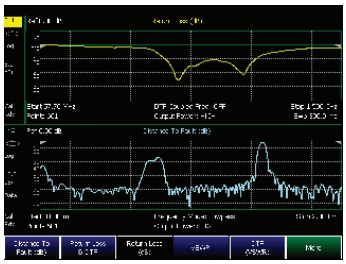
See the FieldFox Configuration Guide for complete information on all FieldFox products and accessories.
http://literature.cdn.keysight.com/litweb/pdf/5990-9836EN.pdf

Model	Description	Test port connector
N9913A	FieldFox RF combination analyzer, 4 GHz	Type-N (f) test ports, 50 ohm
N9914A	FieldFox RF combination analyzer, 6.5 GHz	Type-N (f) test ports, 50 ohm
N9915A	FieldFox microwave combination analyzer, 9 GHz	Type-N (f) test ports, 50 ohm
N9916A	FieldFox microwave combination analyzer, 14 GHz	Type-N (f) test ports, 50 ohm
N9917A	FieldFox microwave combination analyzer, 18 GHz	Type-N (f) test ports, 50 ohm
N9918A	FieldFox microwave combination analyzer, 26.5 GHz	3.5 mm (m) test ports, 50 ohm
Options	**Descriptions**	**Measurements /functions**
Base unit for N9913/4/5/6/7/8A analyzers	Cable and antenna analyzer	VSWR, distance-to-fault, Cable loss (1-port), Insertion loss (2-port, requires Option 210)
Option 010 (requires Option 210, recommend 211)	Vector network analyzer time domain	Time domain and distance domain data
		Gating/windowing
Option 030	Remote control capability	Remote viewing and control using iPhone, iPad or iPod Touch
Option 112	QuickCal	Calibration without using external calibration kit
Option 208 (requires Option 302)	USB power sensor measurements versus frequency	Includes frequency offset capability
Option 210	Vector network analyzer – transmission and relection	S11, S21 magnitude and phase
		Response cal and enhanced response cal
Option 211 (requires Option 210)	Vector network analyzer – full 2-port S-parameters	Adds reverse S-parameters, S12 and S22, and full
Option 212 (requires Option 211)	Mixed-mode S-parameters	Scc11, Sdd11, Scd11, Sdc11
Option 233	Spectrum analyzer	Spectrum analyzer, independent source
		CHP, ACPR, OBW, field strength measurements
Option 235 (requires Option 233)	Preamplifier	20 dB gain nominal
Option 236 (requires Option 233)	Interference analyzer and spectrogram	Spectrogram and waterfall display
		Record / playback
Option 238 (requires Option 233)	Spectrum analyzer time gating	Analyze pulsed signals
Option 302	External USB power sensor support	Requires Keysight U2000 series power sensor
Option 307	GPS receiver (receiver built-in, external antenna required)	Geo location information
		Lock internal reference to GPS
Option 308 (for A/B and B/A, requires Option 210 and Option 211)	Vector voltmeter	Cable trimming, 2-port transmission, A/B and B/A
Option 309	DC bias variable-voltage source	+1 to 32 VDC for external bias-tee and other devices
Option 310	Built-in power meter	Built-in power measurement, using the built-in receiver without a power sensor
Option 330	Pulse measurements	Requires Keysight USB peak power sensor

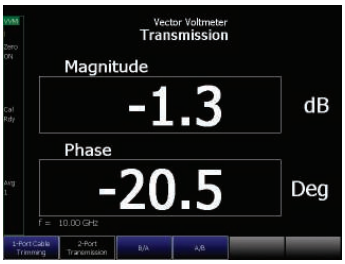
FieldFox Analyzers



Spectrum analysis

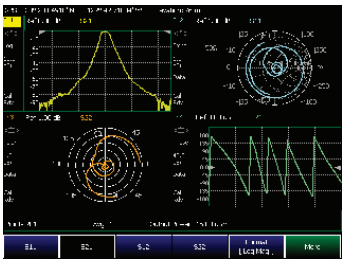


Cable and antenna analysis

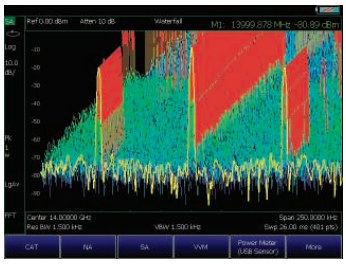


Vector voltmeter measurements

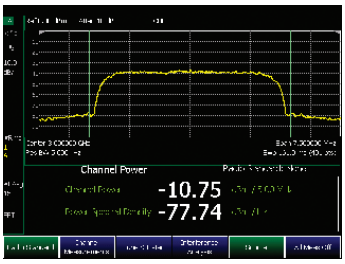
Built-in power meter



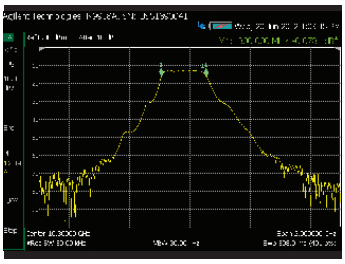
Vector network analysis



Interference analysis



Channel power measurement

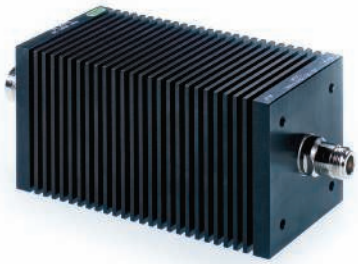


Tracking generator

FieldFox	RF & microwave combination analyzers	Microwave vector network analyzers	Microwave spectrum analyzers
Model number	N9913/4/5/6/7/8A	N9925/6/7/8A	N9935/6/7/8A
Maximum frequency range	4, 6.5, 9, 14, 18, 26.5 GHz	9, 14, 18, 26.5 GHz	9, 14, 18, 26.5 GHz
Cable and antenna analyzer	√	√	VSWR and reflection
Vector network analyzer	√	√	
Mixed-mode S-parameters	√	√	
Spectrum analyzer	√		√
Interference analyzer	√		√
Tracking generator	√	√	
Independent source	√	√	√
Vector voltmeter	√	√	√
Built-in power meter	√	√	√
Power meter with USB sensor	√	√	√
USB powers sensor measurements versus frequency	√	√	√
Pulse measurements	√	√	√
Remote control using iOS device	√	√	√

Accessories

The accessories shown here are a subset of the available accessories. For a complete list, visit www.keysight.com/find/n9910x

Description	Instrument
N9910X-709 Phase stable cable – 3.5 mm(f) to 3.5 mm(f) – 26.5 GHz	
N9910X-810 Phase stable cable – Type-N(m) to Type-N(m) – 6 GHz	
N9910X-845 Adaptor kit	
N9910X-860 Fixed attenuator – 40 dB – 100 W	
N9910X-870 Extra battery	
N9910X-872 External battery charger	

Description	Instrument
N990X-873 AC/DC adaptor	
N9910X-874 Bias-tee	
N9910X-875 DC car charger and adapter	
N9910X-881 Hard transit case – FieldFox its inside hard transit case	
N9910X-880 Soft transit case – Comes standard with each FieldFox – Includes backpack and shoulder straps	

Accessories (continued)

The accessories shown here are a subset of the available accessories. For a complete list, visit www.keysight.com/find/n9910x

Description	Instrument
N9910X-800 3-in-1 – OSL – 6 GHz – Type-N(m) – 50 ohm	
85515A 4-in-1 – OSLT – 9 GHz – Type-N(f) – 50 ohm	
85518A 4-in-1 – OSLT – 18 GHz – Type-N(m) – 50 ohm	
85519A 4-in-1 – OSLT – 18 GHz – Type-N(f) – 50 ohm	

Description	Instrument
85520A 4-in-1 – OSLT – 26.5 GHz – 3.5mm (m) – 50 ohm	
85521A 4-in-1 – OSLT – 26.5 GHz – 3.5mm (f) – 50 ohm	
N9910X-820 Directional antenna	
N9910X-821 Telescopic whip antenna	

Carry Precision With You

Every piece of gear in your field kit had to prove its worth. Measuring up and earning a spot is the driving idea behind Keysight's FieldFox microwave analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Keysight-quality microwave measurements - wherever you need to go. Add FieldFox to your kit and carry precision with you.

Related literature	Publication number
FieldFox Handheld Analyzers, Brochure	5990-9779EN
FieldFox Spectrum Analyzers, Technical Overview	5990-9782EN
FieldFox Vector Network Analyzers, Technical Overview	5990-9781EN
FieldFox Handheld Analyzers, Data Sheet	5990-9783EN
FieldFox Handheld Analyzer, Coniguration Guide	5990-9836EN
FieldFox N9912A RF Analyzer, Technical Overview	5989-8618EN
FieldFox N9912A RF Analyzer, Data Sheet	N9912-90006
FieldFox N9923A RF Vector Network Analyzer, Technical Overview	5990-5087EN
FieldFox N9923A RF Vector Network Analyzer, Data Sheet	5990-5363EN

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