# Agilent FieldFox Combination Analyzers

## 4/6.5/9/14/18/26.5 GHz

## Technical Overview

N9913A

N9914A

N9915A

N9916A

N9917A

N9918A


*Carry precision with you.*

*Anticipate ___Accelerate ___Achieve*

Agilent Technologies

# Get Agilent-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 Agilent's FieldFox microwave analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Agilent-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.

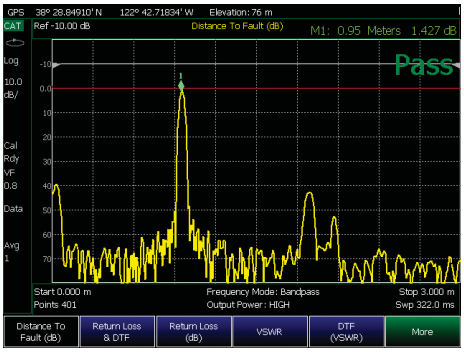
## Key Measurements

### Cable and antenna analyzer

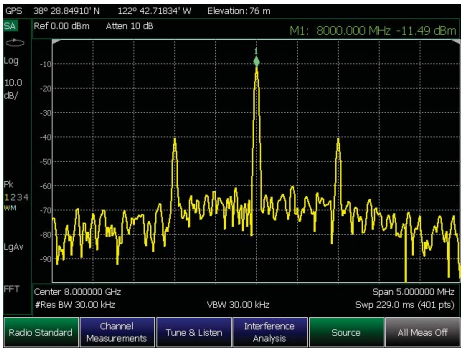
- Distance-to-fault, return loss, and cable loss (1-port and 2-port)
- Integrated QuickCal – no calibration kit required
- Immediate cable and antenna and vector network analysis at the test port with CalReady
- 30 kHz to 26.5 GHz

### Spectrum analyzer

- Unprecedented amplitude accuracy (± 0.5 dB) with InstAlign[1] – no warm up required
- Interference analysis with spectrogram and record and playback
- Superior spur-free dynamic range and phase noise (-111 dBc/Hz at 10 kHz offset)
- Tracking generator, independent source, and preamplifier covering the full frequency range
- 5 kHz to 26.5 GHz




*Cable and antenna analyzer*



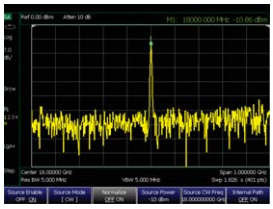

*Spectrum analyzer*

*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

**Vector network analyzer (VNA)**

- All four S-parameters, magnitude and phase
- Guided Calibration Wizard, full 2-port cal, TRL, waveguide calibration
- Best trace noise and superior dynamic range for handheld VNAs
- 30 kHz to 26.5 GHz



**Tracking generator and built-in independent signal source**

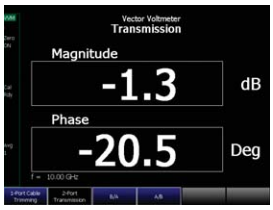
- CW, CW coupled, and tracking
- Flat output power across whole frequency span, in 1 dB steps
- 30 kHz to 26.5 GHz


**Built-in power meter**

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


**Power meter using a USB power sensor**

- Measure power with USB power sensors
- -60 to +44 dBm (sensor dependent)
- 9 kHz to 24 GHz




**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

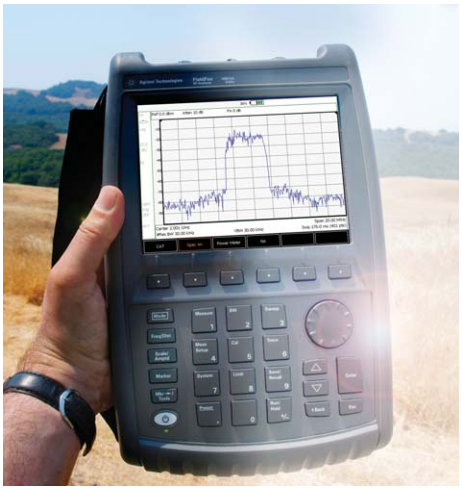
## Carry FieldFox wherever you need to go

- 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

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

## 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*

# 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

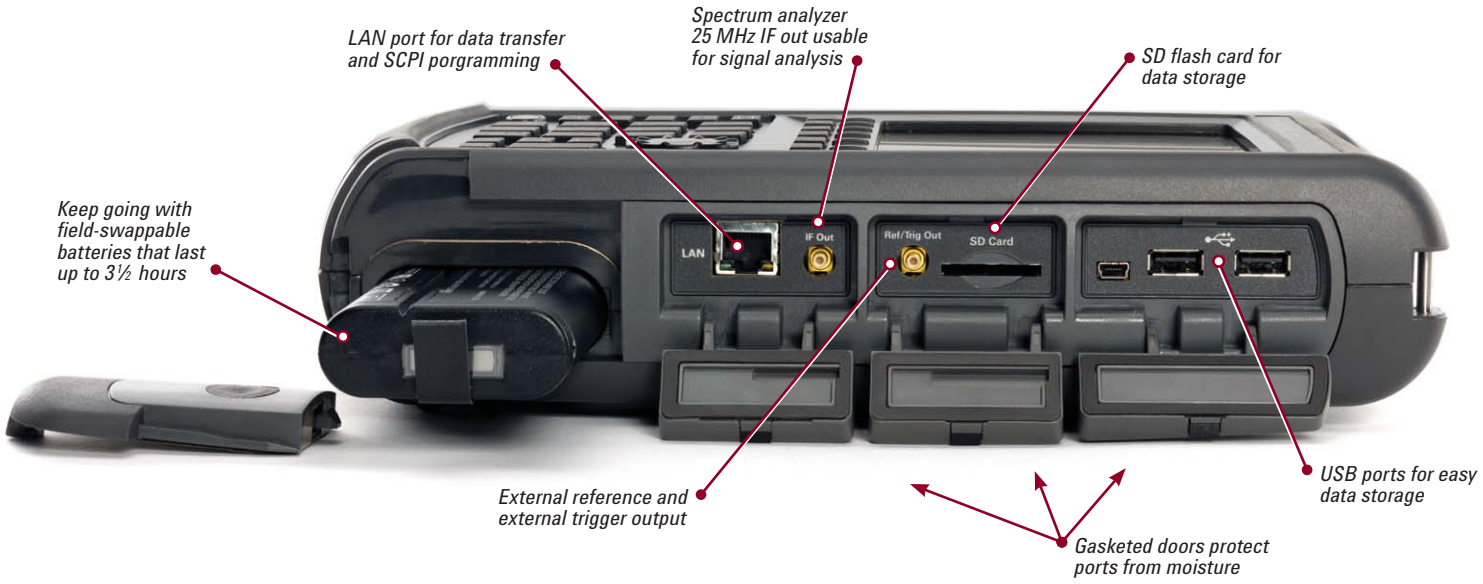
*Dust-free design with no vents or fans helps extend instrument reliability*

# Pick up FieldFox for its ergonomics

# ...and depend on its durability and convenience

## TOP


## RIGHT SIDE




## LEFT SIDE

# Cable and antenna analyzer

## Cable and antenna analyzer

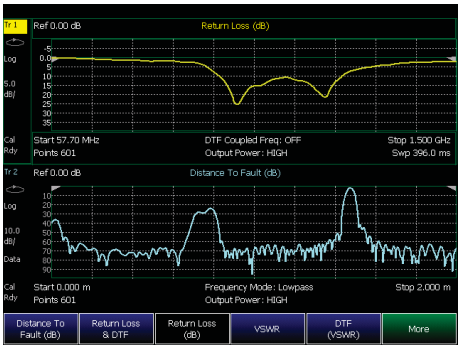
Fifty to sixty percent of microwave-link equipment issues are related to cables, antennas and connectors. Degraded feeder lines cause poor coverage, link failures, and reduced sensitivity on the receive path. To maintain the quality of a microwave link, it is critical to keep the cable and antenna systems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

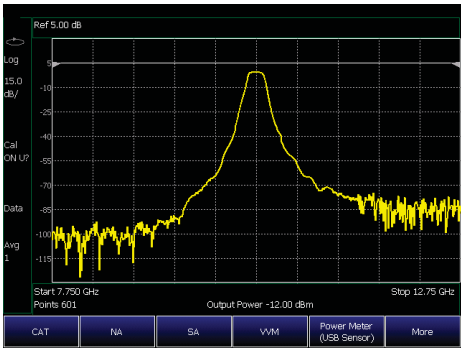
## Return loss and distance-to-fault (DTF) measurements

Measuring and viewing return loss and distance-to-fault simultaneously allows you to fix and tune systems much faster. Optionally, you can utilize QuickCal or CalReady 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.




*Return loss and DTF display*




*Filter insertion loss display*

# Cable and antenna analyzer

## 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 accurate 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 and excellent reliability.

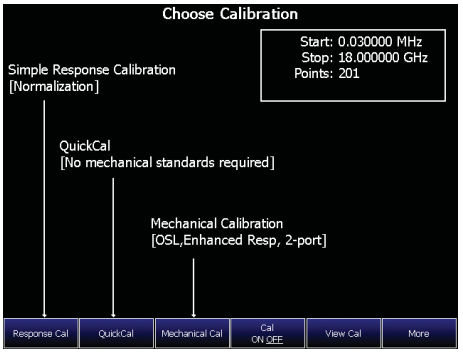
FieldFox's QuickCal supports measurements such as insertion loss/gain, 1-port cable loss, return loss, and DTF.

## Broadband calibration

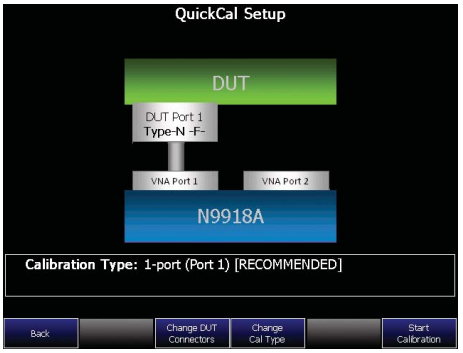
FieldFox allows you to make broadband calibrations, which means the instrument is calibrated over the maximum frequency range. After a broadband calibration, you can change the frequency range or number of points without recalibrating the instrument. The calibration is interpolated, and accuracy is maintained.

## User cal kit support

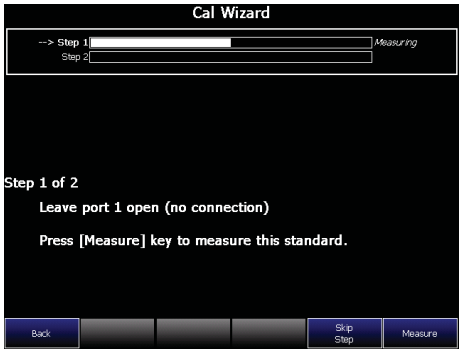
For users who wish to use traditional mechanical calibration kits, FieldFox supports most HP/Agilent cal kits, and also allows you to define your own custom calibration kits.



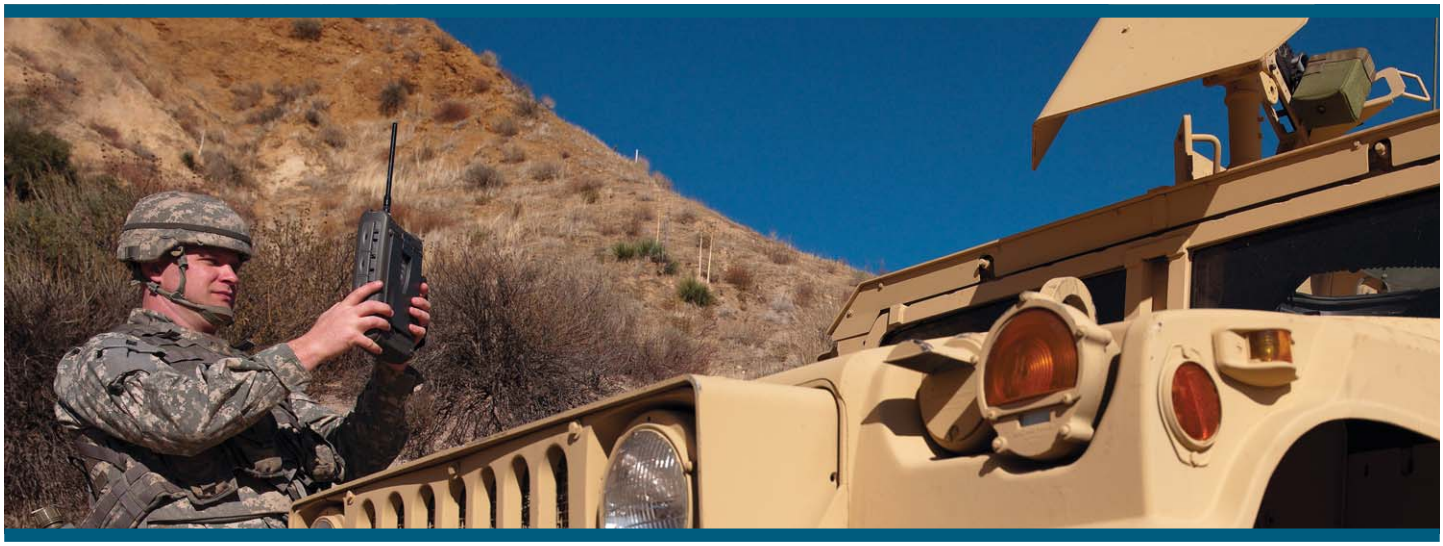

**STEP 1** *FieldFox's QuickCal allows you to perform calibrations without carrying a cal kit*




**STEP 2**




**STEP 3**



# Spectrum analyzer

## Spectrum analyzer

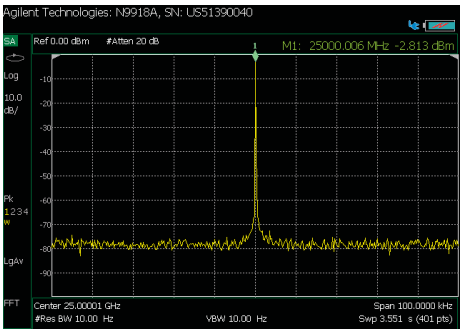
In microwave, radar, and satellite communications, and commercial microwave backhaul, engineers are responsible not only for hardware installation and maintenance, but also over-the-air signal quality. They need to regularly monitor for rogue signals and perform signal surveillance.

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.

## 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.




*Monitor the spectrum using the FieldFox analyzers*


# Spectrum analyzer

## 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

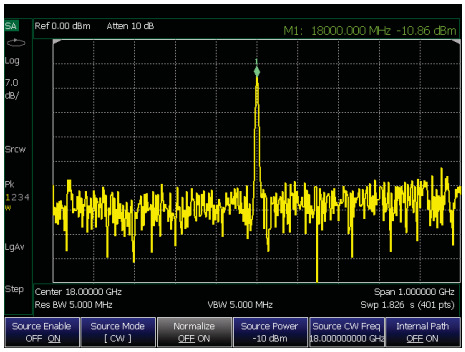
Interference can be internal or external, uplink or downlink, and has a direct impact on the Quality of Service of a communication network. FieldFox's interference analyzer is designed to identify interfering signals quickly. Spectrogram and waterfall displays detect intermittent signals or monitor signals 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

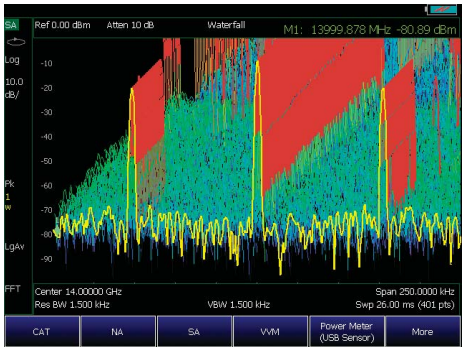
FieldFox has a built-in independent signal source, with a frequency range of 30 kHz to 26.5 GHz. The signal source can be tuned to any frequency, independent of the spectrum analyzer frequency. The signal source can be used to create a test signal to measure coverage, antenna isolation, antenna direction 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.

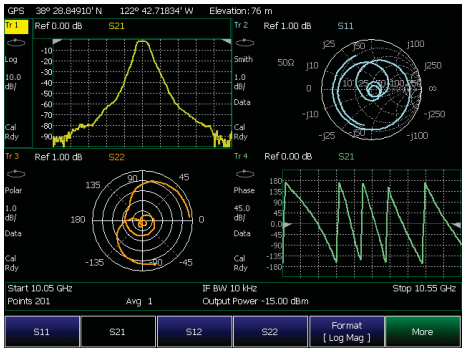
FieldFox's four independent, sensitive receivers provide 94 dB of dynamic range for measurement of high rejection, narrowband devices such as cavity filters. The receivers also enable full 2-port error correction with the unknown thru method, allowing users to measure non-insertable devices accurately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

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

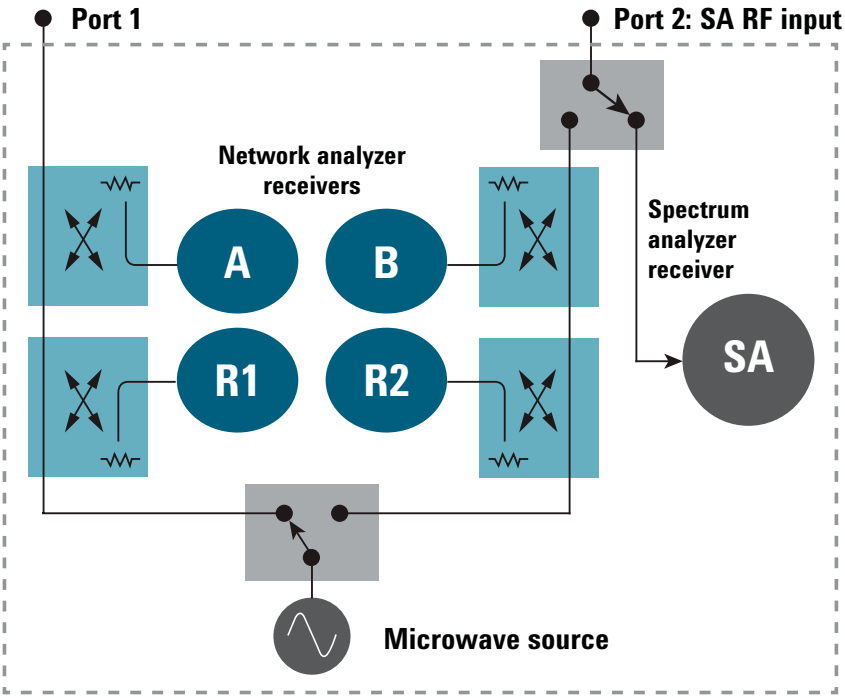
## Calibrations

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




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




*FieldFox microwave analyzer architecture*

# Vector network analyzer

## 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 coefficients 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.

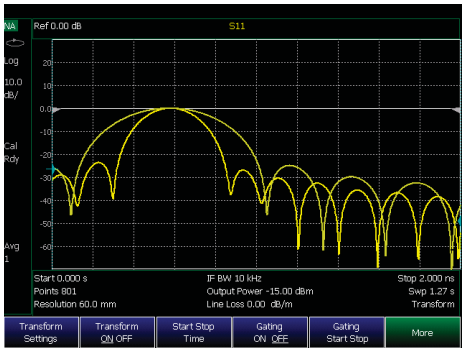
## Waveguide support

Waveguides are widely used to provide transmission links between microwave transmitters and antennas, as waveguides have less loss than coax. FieldFox can be used with Agilent waveguide calibration kits and adapters. FieldFox also provides support for non-Agilent waveguide calibration kit and adapters.

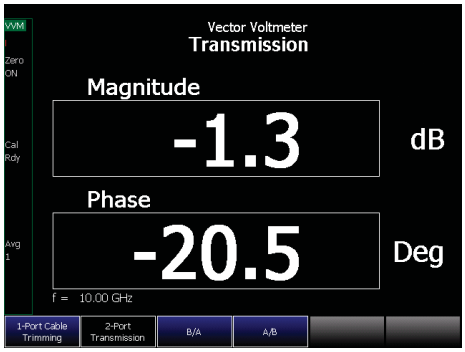
## Vector voltmeter

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.




*Time domain measurements provide insight into the device under test*




*Vector voltmeter used for cable trimming*


# 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.

## USB Power sensor support

FieldFox can connect with the Agilent U2000 Series USB power sensors to make RF/microwave power measurements up to 24 GHz. FieldFox provides true average power measurements with a wide dynamic range from -60 dBm to +44 dBm.

## Built-in GPS

A built-in GPS receiver provides geo-location 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).

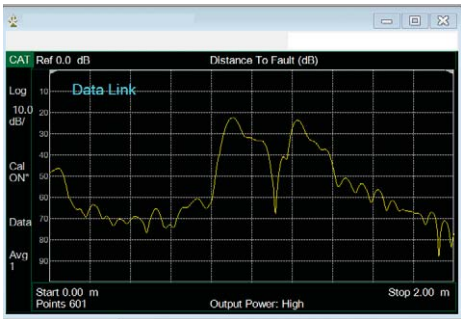
## FieldFox's Data Link software makes report generation and documentation easier

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.


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




*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://cp.literature.agilent.com/litweb/pdf/5990-9783EN.pdf

## Cable and antenna analyzer and vector network analyzer

The performance listed in this section applies to the cable and antenna analyzer (referred to as CAT) and vector network analyzer (VNA) capabilities available in the following models (may require options – see configuration guide):
FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A
FieldFox microwave vector network analyzers: N9925A, N9926A, N9927A, N9928A

| 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<br>Arbitrary number of points settable through SCPI |
| **IF bandwidth**[1] | 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz |
| **System impedance** | 50 ohm (nominal), 75 ohm 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). |

1. VNA mode only. Recommend using averaging in CAT mode.

**System dynamic range:** Port 1 or port 2, high power, 300 Hz IF bandwidth, -10 to 55 °C

| Frequency | Spec | Typical |
|---|---|---|
| > 300 kHz to 9 GHz[1] | 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:** 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)[2], distance-to-fault (linear or Rho) |
| VNA T/R | S11, S21[3] |
| VNA S-parameters | S11, S21, S22, S12[4] |
| Calibration types | CalReady, 1-port, QuickCal, 1-port , SOL, 1-port, frequency response, enhanced response (also known as one-path, two-port), CalReady, 2-port QuickCal, 2-port SOLT or offset short, 2-port SOLT calibration, 2-port unknown thru calibration |
| Connectors | Type-N 50 ohm, Type-N 75 ohm, 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. < 300 kHz, 63 dB (nominal)
   2 MHz to 9 MHz: 85 dB spec, 90 dB typical

2. 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.

3. Standard on N992x VNAs. Option 210 required on N991xA analyzers.

4. Option 211 required to obtain all four S-parameters.

## Vector voltmeter (VVM), Option 308

The performance listed in this section applies to the VVM mode capabilities available in the following models:
FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A
FieldFox microwave vector network analyzers: N9925A, N9926A, N9927A, N9928A

| 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

The specifications in this section apply to the spectrum analyzer capabilities available in the following models:
FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A
FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A

| 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<br>± 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)**<br>Range (-3 dB bandwidth) | 10 Hz to 5 MHz<br>Non-zero span: 1, 1.5, 2, 3, 5, 7.5, 10 sequence < 300 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz<br>Zero span: 1, 3, 10 sequence |
| **Video bandwidth (VBW)** | 1 Hz to ≥ 3 MHz<br>Non-zero span: 1, 1.5 ,2, 3, 5, 7.5, 10 sequence<br>Zero span: RBW/VBW ≤ 100 |

**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 warm-up 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 |

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

**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<br>1 to 7.5 GHz, +15 dBm<br>> 7.5 GHz, +21 dBm |

## Tracking generator or independent source

The specifications in this section apply to the tracking generator or independent source capabilities available in the following models:
FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A.
FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A.

| 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 18 GHz | 79 dB | 94 dB |
| > 18 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, Option 310

The specifications in the sections that follow apply to these FieldFox analyzers:
FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A
FieldFox microwave vector network analyzers: N9925A, N9926A, N9927A, N9928A
FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A

| 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<br>11.5" x 7.4" x 2.8" |

### Environmental

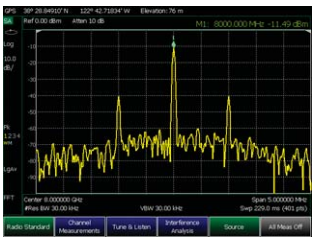
| | |
|---|---|
| MIL-PRF-28800F Class 2 | Operating temperature<br>Storage temperature<br>Operating humidity<br>Random vibration<br>Functional shock<br>Bench drop |
| MIL-STD-810G, Method 511.5 | Type tested and meets Procedure I requirements<br>for operation in explosive environments |
| Altitude – operating | 9144 m or 30,000 ft (using battery) |
| Altitude – non-operating | 15,240 m or 50,000 ft |
| Complies with European EMC directive 2004/108/EC | IEC/EN 61326–1<br>CISPR Pub 11 Group 1, class B, Group 1 limit of CISPR 11:203/EN 55011:2007<br>AS/NZS CISPR 11<br>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

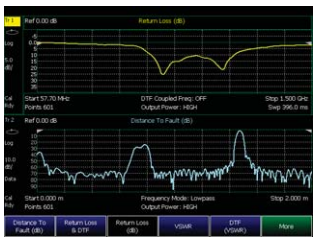
See the FieldFox Configuration Guide for complete information on all FieldFox products and accessories. http://cp.literature.agilent.com/litweb/pdf/5990-9836EN.pdf

| 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 |

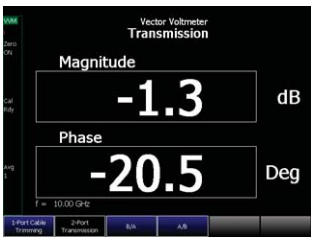
| Options | Descriptions | Measurements /functions |
|---|---|---|
| Base unit for N9913/4/5/6/7/8A analyzers | Cable and antenna analyzer | Return loss, VSWR, distance-to-fault<br>Cable loss (1-port)<br>Insertion loss (2-port, requires Option 210) |
| Option 210 | Vector network analyzer – transmission and reflection | S11, S21 magnitude and phase<br>Log and linear display, Smith chart, group delay<br>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 2-port calibration |
| Option 010 (requires Option 210, recommend 211) | Vector network analyzer time domain | Time domain and distance domain data<br>Gating/windowing |
| Option 112 | QuickCal | Calibration without using external calibration kit |
| Option 233 | Spectrum analyzer | Spectrum analysis<br>Channel power (CHP), adjacent channel power (ACP), occupied bandwidth (OBW)<br>AM/FM tune and listen<br>Field strength measurements<br>Frequency marker counter, band power marker<br>Independent source |
| Option 235 (requires Option 233) | Preamplifier | 20 dB gain nominal |
| Option 236 (requires Option 233) | Interference analyzer and spectrogram | Spectrogram and waterfall display<br>Record / playback |
| Option 302 | External USB power sensor support | Supports Agilent U2000 series power sensor |
| Option 307 | GPS receiver (receiver built-in, external antenna required) | Geo location information<br>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 |



*Spectrum analysis*



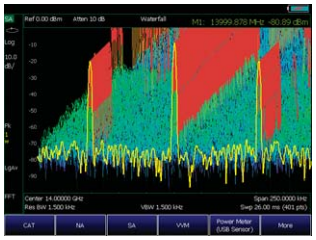
*Cable and antenna analysis*



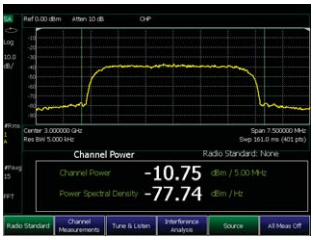

*Vector voltmeter measurements*


*Built-in power meter*

*Vector network analysis*



*Interference analysis*




*Channel power measurement*

*Tracking generator*

# FieldFox analyzers

| 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 | ✓ | ✓ | |
| Spectrum analyzer, Interference analyzer | ✓ | | ✓ |
| Tracking generator, Independent source | ✓ | | ✓ |
| Vector voltmeter | ✓ | ✓ | |
| Built-in power meter | ✓ | ✓ | ✓ |
| Power meter with USB sensor | ✓ | ✓ | ✓ |

# Accessories

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

**N9910X-704 Phase stable cable**

- Type-N(m) to TNC(f)
- 13 GHz

**N9910X-709 Phase stable cable**

- 3.5 mm(f) to 3.5 mm(f)
- 26.5 GHz

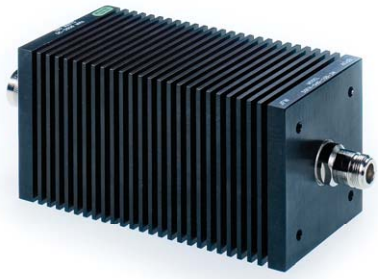
**N9910X-810 Phase stable cable**

- 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**

**N990X-873 AC/DC adaptor**

**N9910X-874 Bias-tee**

**N9910X-875 DC car charger and adapter**

**N9910X-881 Hard transit case**

- FieldFox fits inside hard transit case

**N9910X-880 Soft transit case**

- Comes standard with each FieldFox
- Includes backpack and shoulder straps

# Accessories

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

**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


**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 Agilent's FieldFox microwave analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Agilent-quality microwave measurements - wherever you need to go. Add FieldFox to your kit and carry precision with you.

| Related literature | 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, Configuration 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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*For other unlisted countries:*
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