# Agilent FieldFox Handheld Analyzers

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

Data Sheet

N9913A

N9914A

N9915A

N9916A

N9917A

N9918A

N9925A

N9926A

N9927A

N9928A

N9935A

N9936A

N9937A

N9938A

This data sheet provides the specified and typical performance of the FieldFox family of portable analyzers. This data sheet should be used in conjunction with the technical overviews and configuration guide, for a complete description of the analyzers.

*Carry precision with you.*

*Anticipate ___Accelerate ___Achieve*

Agilent Technologies

# Table of contents



The specifications and measurement capabilities listed in this document require certain options on the FieldFox analyzer. Refer to the **FieldFox Configuration Guide** to obtain option information. The configuration guide (http://cp.literature.agilent.com/litweb/pdf/5990-9836EN.pdf) is the main resource for option/measurement capability information.

# 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:

FieldFox microwave combination analyzers: **N9913A, N9914A, N9915A, N9916A, N9917A, N9918A**
FieldFox microwave vector network analyzers: **N9925A, N9926A, N9927A, N9928A**

## Specification (spec)

Specifications include guardbands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions. Warranted performance. FieldFox must be within its calibration cycle. No warm-up required for the specifications listed on pages 3 through 7.

## Typical

Expected performance of an average unit; does not include guardbands. It is not covered by the product warranty. FieldFox must be within its calibration cycle.

## Nominal

A general, descriptive term or design parameter. It is not tested, and not covered by the product warranty. FieldFox must be within its calibration cycle.

| 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 |

| **Frequency reference** | -10 to 55 ºC |
|---|---|
| Accuracy | ± 0.7 ppm (spec) + aging<br>± 0.4 ppm (typical) + aging |
| Accuracy, when locked to GPS | ± 0.010 ppm (spec) |
| Accuracy, when GPS antenna is disconnected | ± 0.2 ppm (nominal)[1] |
| Aging rate | ± 1 ppm/yr for 20 years (spec), will not exceed ± 3.5 ppm |

| **Frequency resolution** | **Spec** |
|---|---|
| Frequency ≤ 5 GHz | 1 Hz |
| Frequency ≤ 10 GHz | 1.34 Hz |
| Frequency ≤ 20 GHz | 2.68 Hz |
| Frequency ≤ 26.5 GHz | 5.36 Hz |

| | |
|---|---|
| **Data points or resolution** | 101, 201, 401, 601, 801, 1001, 1601, 4001, 10,001<br>Arbitrary number of points settable through SCPI |
| **IF bandwidth[2]** | 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 |

*[1] The maximum drift expected in the frequency reference applicable when the ambient temperature changes ± 5 ºC from the temperature when the GPS signal was last connected.*
*[2] VNA mode only. Recommend using averaging in CAT mode.*

| Test port output power | Port 1 or port 2, high power, 23 ± 5 °C | |
|---|---|---|
| **Frequency** | **Typical** | **Nominal** |
| 30 kHz to 300 kHz | -11 dBm | |
| > 300 kHz to 2 MHz | -3 dBm | -2 dBm |
| > 2 MHz to 625 MHz | -2 dBm | -1 dBm |
| > 625 MHz to 3 GHz | +1 dBm | +3 dBm |
| ≥ 3 to 6.5 GHz | -1 dBm | +1 dBm |
| ≥ 6.5 to 9 GHz | -2 dBm | 0 dBm |
| ≥ 9 to 14 GHz | -4 dBm | -2.5 dBm |
| ≥ 14 to 18 GHz | -6 dBm | -4.5 dBm |
| ≥ 18 to 23 GHz | -10 dBm | -8.5 dBm |
| ≥ 23 to 26.5 GHz | -12 dBm | -11 dBm |

| | |
|---|---|
| **Power level accuracy** | ± 1.5 dB at -15 dBm, for frequencies > 250 kHz, typical |
| **Power range** | CAT: High, low and manual. Low power is -45 dBm, nominal. Default power is high. VNA: High, low and manual. Low power is -45 dBm, nominal. Default power is manual power of -15 dBm. |
| **Power step size** | Power settable in 1 dB steps across power range. Flat power, in 1 dB steps, is available across the whole frequency span, nominal. |

| System dynamic range[1] | Port 1 or port 2, high power, 100 Hz IF bandwidth, 100 point average, -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 | ± 0.003 dB (rms) | ± 0.020 degrees |
| > 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 |

| Temperature stability | Nominal |
|---|---|
| Magnitude | ± 0.018 dB/°C ≤ 15 GHz, ± 0.08 dB/°C > 15 GHz |

| Receiver compression | Port 1 or port 2, typical, 23 ± 5 °C |
|---|---|
| 500 MHz to 1 GHz | +10 dBm, 0.15 dB compression |
| > 1 GHz to 26.5 GHz | +10 dBm, 0.10 dB compression |

| Port 1 or port 2 maximum input level | |
|---|---|
| Average CW power | +27 dBm, 0.5 watts |
| DC | ± 50 VDC |

| | |
|---|---|
| **Immunity to interfering signals** | +16 dBm (nominal) |

*[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.*

| **Measurement speed** | |
|---|---|
| Includes hardware sweep time, re-trace and display update. | |
| **CAT** | |
| Return loss, 30 kHz to 26.5 GHz, 1-port cal, 1001 points | 850 µs/pt |
| Distance-to-fault, 100 meter cable, 1-port cal, 1001 points | 850 µs/pt |
| **VNA** | |
| S11 and S21, 30 kHz to 26.5 GHz, enhanced response cal, 100 kHz IF bandwidth, 1001 points | 850 µs/pt |

| **Measurements** | |
|---|---|
| CAT | Distance-to-fault (dB), return loss, VSWR, distance-to-fault (VSWR), cable loss (1-port), insertion loss (2-port), distance-to-fault (linear or Rho) |
| VNA T/R | S11, S21 |
| VNA S-parameters | S11, S21, S22, S12 |
| **Number of traces** | Four traces available, Tr1, Tr2, Tr3, Tr4 |
| **Display formats** | Single-trace<br>Dual-trace overlay (both traces on one graticule)<br>Dual-trace split (each trace on separate graticule)<br>Three-trace overlay (all three traces on one graticule)<br>Three-trace split (each trace on separate graticule)<br>Quad-trace split (each trace on separate graticule) |
| **Trace formats** | Log magnitude, linear magnitude, VSWR, phase, Smith chart, polar, group delay, unwrapped phase, real impedance, imaginary impedance |
| **Frequency settings** | Start, stop, center, span |
| **Frequency sweep type** | Linear |
| **Sweep trigger** | Continuous, single |
| Trigger type | Internal or external trigger input<br>Edge trigger<br>Sweep begins when external TTL signal occurs at the trigger input port |
| Polarity | Positive edge, negative edge |
| **CAT mode distance-to-fault settings** | Start distance, stop distance. Units: meters or feet |
| **Sweep time** | Set sweep time in seconds |
| **Averaging** | Sweep and point averaging<br>2 to 1000 |
| **Smoothing** | 0.25 to 25% of trace width<br>Computes the moving average of adjacent data points. Smoothing aperture defines the trace width (number of points) to be averaged. |
| **Group delay** | |
| Aperture (selectable) | Frequency span / (number of points -1) |
| Maximum aperture | 25% of frequency span |
| Minimum delay | Limited to measuring no more than 180 degrees of phase change within the minimum aperture. |
| **Electrical delay** | 0 to 10 seconds |

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

| **Measurements** *continued* | |
|---|---|
| **Port extension** | For both port 1 and port 2, delay settings. Port extensions apply to all measurements. |
| **Title** | Add custom titles to the display |
| **Display data** | Display data, memory, data and memory, or data math<br>One memory trace per data trace. Total of 4 memory traces |
| **Trace math** | Vector division or subtraction of current linear measurement values and memory data |
| **Scale** | Autoscale, scale, reference level, reference position<br>Autoscale: Automatically selects scale resolution and reference value to center the trace.<br>Autoscale all: Scales all visible traces. |
| **Display range** | Start, stop, center, span |
| Return loss, log magnitude | -1000 to 1000 dB |
| Log magnitude resolution | 0.01 dB |
| Phase | -180 to +180 degrees (unwrapped phase can show larger values) |
| Phase resolution | 0.01 degrees |
| Phase offset | -360 to +360 degrees |
| VSWR | 1.01 to 1000 |
| VSWR resolution | 0.01 |
| **Data markers** | Each trace has six independent markers that can be displayed simultaneously.<br>Delta markers are available for each marker. |
| **Marker formats** | Default marker format is the trace format. In Smith chart or polar format, [Real + Imag] or [Mag and Phase] formats are also available. |
| **Marker functions** | Peak, Next Peak, Peak Left, Peak Right, Mkr→ Center, Mkr→Delay, Min Search, Peak Excursion, Peak Threshold, Target, Bandwidth (BW, Q, Loss), Tracking CAT mode only: Tracking 3 peaks (CAT mode), Marker→ Start distance, Marker→ Stop distance |
| **Marker table** | On/Off |
| **Marker types** | Normal, delta, data trace and memory trace markers |
| **Marker coupling** | On/Off (coupling between traces) |

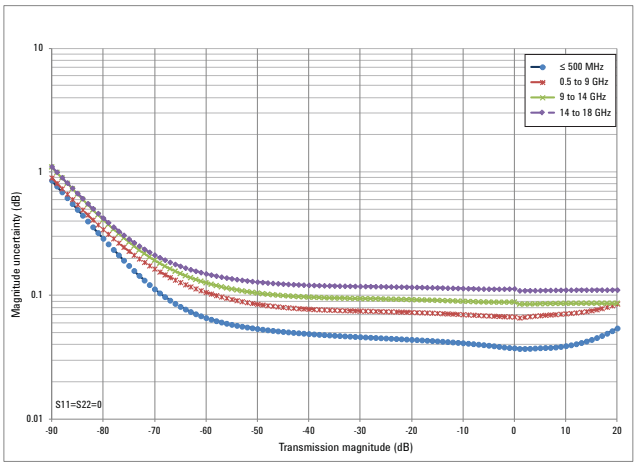
| Calibration types | |
|---|---|
| CalReady | Each FieldFox is calibrated at the test ports, at room temperature, so users can make basic measurements upon power up. |
| QuickCal, 1-port | Uses internal and a subset of external standards. QuickCal is most accurate for DUTs with 7/16 and Type-N connectors and measurement uncertainties are provided for frequencies ≤ 18 GHz. Reduced accuracy for DUTs with 3.5 mm (m), SMA (m), or other male coaxial connectors; performance is unspecified. QuickCal is not recommended for DUTs with 3.5 mm (f), SMA (f), or other similar female connectors. QuickCal is not applicable to waveguide. |
| SOL, 1-port | Traditional short, open and load 1-port calibration for reflection measurements. |
| Frequency response | Simultaneous magnitude and phase correction of frequency response errors for either reflection or transmission measurements. |
| Enhanced response (also known as one-path, two-port) | Corrects for frequency response and source match for transmission measurements, and reflection frequency response, directivity and source match for reflection measurements. Partial correction for load match for low-loss reciprocal devices. |
| QuickCal, 2-port | Full 12-term error correction using internal and a subset of external standards. QuickCal is most accurate for DUTs with 7/16 and Type-N connectors and measurement uncertainties are provided for frequencies ≤ 18 GHz. Reduced accuracy for DUTs with 3.5 mm (m), SMA (m), or other male coaxial connectors; performance is unspecified. QuickCal is not recommended for DUTs with 3.5 mm (f), SMA (f), or other similar female connectors. QuickCal is not applicable to waveguide. |
| SOLT or offset short, 2-port | Traditional short, open, load and thru (or using offset short standards) for calibration. Full 12-term error correction. |
| QSOLT calibration, 2-port | Full 12-term error correction. Requires fewer connections, compared to traditional SOLT (4 compared to 7). Applicable to insertable devices. |
| Unknown thru calibration, 2-port | Full 12-term error correction. Applicable to both insertable and non-insertable devices. Easily characterize non-insertable devices such as Type-N to 3.5 mm, or female-female devices with unknown thru calibration. |
| ECal | FieldFox supports Agilent's USB ECal modules. |
| Guided calibration wizard | FieldFox's calibration wizard recommends a calibration type and calibration kit based on selected parameters and connector types. Alternatively, users can select their own calibration type and calibration kit. |
| Interpolated error correction | With any type of accuracy enhancement applied, interpolated mode recalculates the error coefficients when the test frequencies are changed. The number of points can be increased or decreased and the start/stop frequencies can be changed, but the resulting frequency span must be a subset of the original calibration frequency span. |
| 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<br>Custom coaxial or waveguide calibration kits can be added to any FieldFox analyzer. |

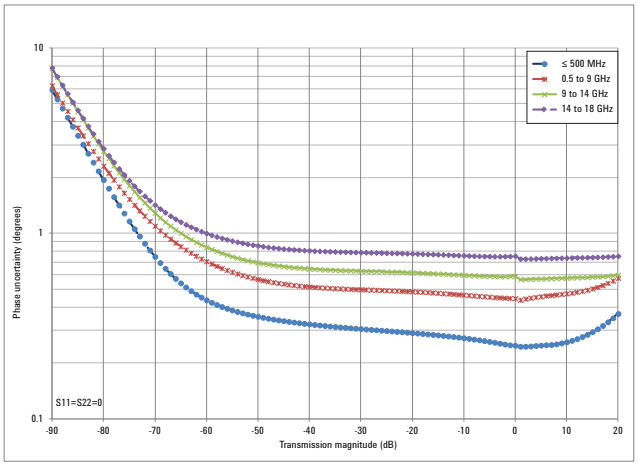
| Distance-to-fault | |
|---|---|
| Range | Range = velocity factor x speed of light x (number of points -1) / frequency span x 2<br>Number of points auto coupled according to start and stop distance entered. |
| Range resolution | Resolution = range / (number of points -1)<br>Number of points settable by user |
| Transform modes | Bandpass, low-pass |
| Window types | Maximum, medium, and minimum |
| Alias-free range indicator for bandpass mode | On/Off |
| Dispersion compensation | Yes |

## Corrected measurement uncertainty

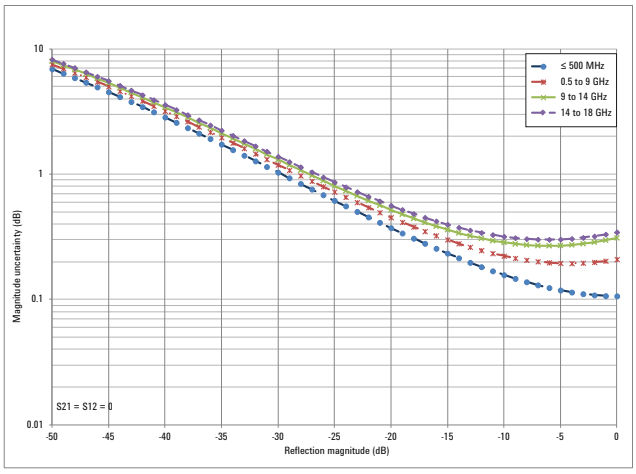
Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

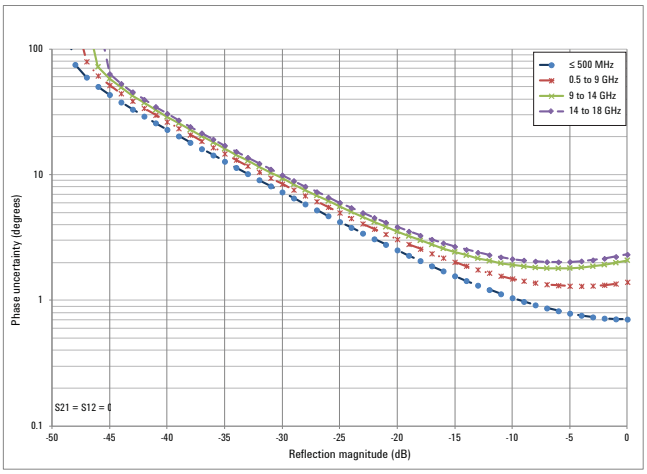
### CalReady, Type-N test ports; applies to N9913/4/5/6/7A and N9925/6/7A[1]




**Transmission uncertainty (S21, S12)**




**Reflection uncertainty (S11, S22)**

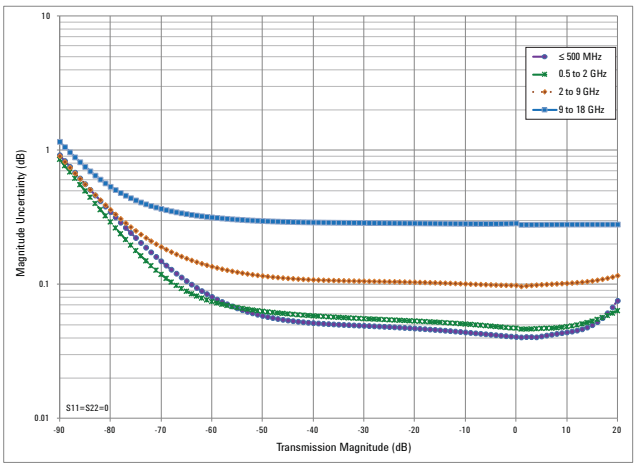
[1] *Uncertainties shown based on a factory calibration using data-based calibration kits.*

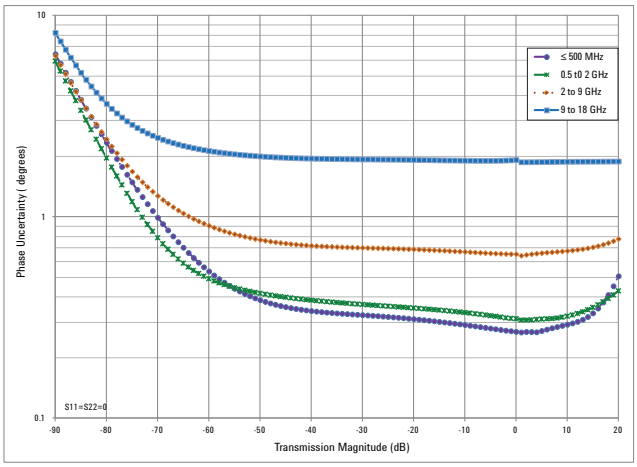
## Corrected measurement uncertainty

Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

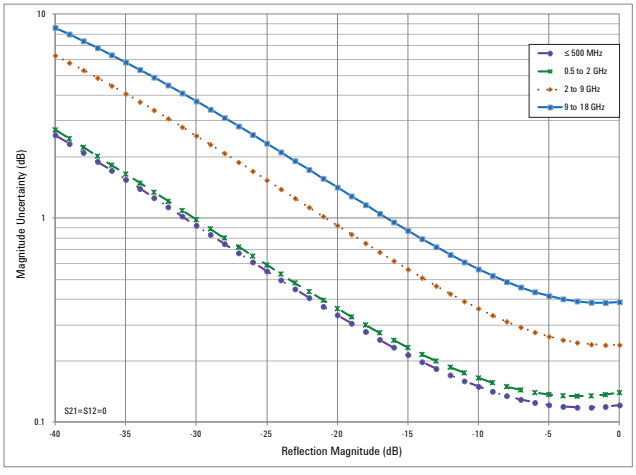
### Full 2-port calibration, 85518A or 85519A Type-N (m) 4-in-1 calibration kit, spec

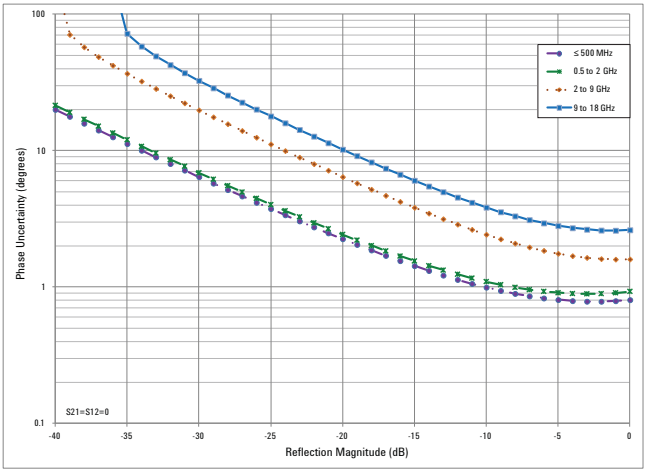
| Corrected performance | ≤ 0.5 GHz | 0.5 to 2 GHz | 2 to 9 GHz | 9 to 18 GHz |
|---|---|---|---|---|
| Directivity | 44 dB | 42 dB | 35 dB | 32 dB |
| Source match | 37 dB | 36 dB | 33 dB | 30 dB |
| Load match | 38 dB | 37 dB | 31 dB | 27 dB |
| Reflection tracking | ± 0.05 dB | ± 0.06 dB | ± 0.07 dB | ± 0.1 dB |
| Transmission tracking | ± 0.07 dB | ± 0.1 dB | ± 0.18 dB | ± 0.5 dB |




**Transmission uncertainty (S21, S12)**



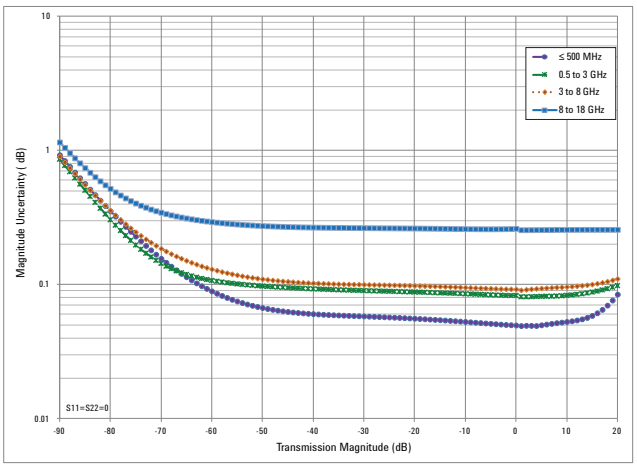

**Reflection uncertainty (S11, S22)**

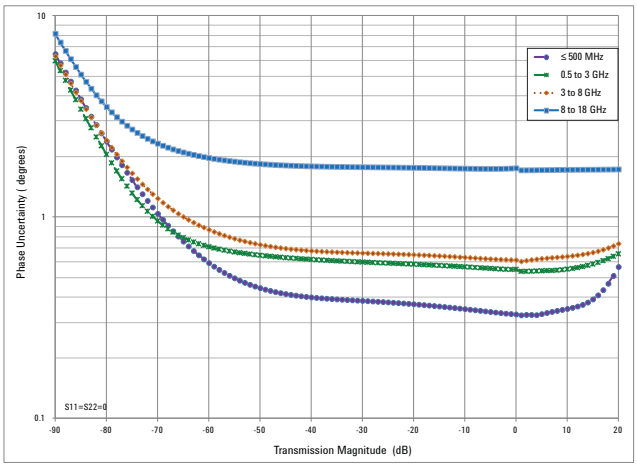
## Corrected measurement uncertainty

Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

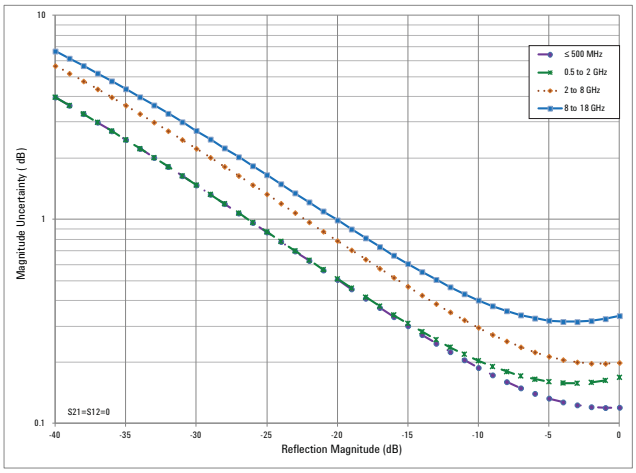
### Full 2-port calibration, 85054D Type-N (m) calibration kit, spec

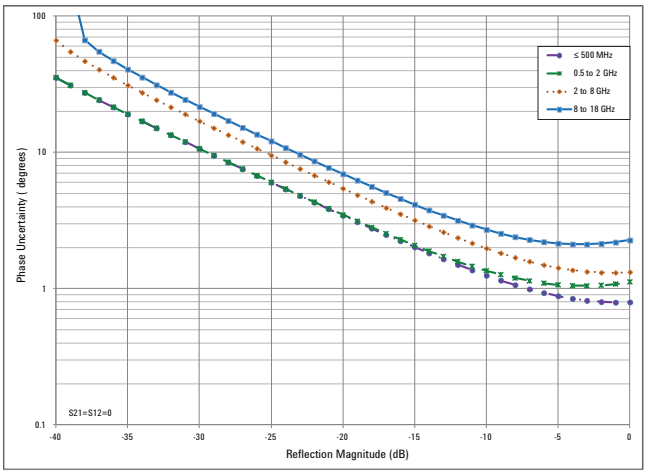
| Corrected performance | ≤ 0.5 GHz | 0.5 to 2 GHz | 2 to 8 GHz | 8 to 18 GHz |
|---|---|---|---|---|
| Directivity | 40 dB | 40 dB | 36 dB | 34 dB |
| Source match | 38 dB | 33 dB | 33 dB | 27 dB |
| Load match | 37 dB | 35 dB | 32 dB | 27 dB |
| Reflection tracking | ± 0.006 dB | ± 0.006 dB | ± 0.009 dB | ± 0.027 dB |
| Transmission tracking | ± 0.08 dB | ± 0.1 dB | ± 0.15 dB | ± 0.43 dB |




**Transmission uncertainty (S21, S12)**



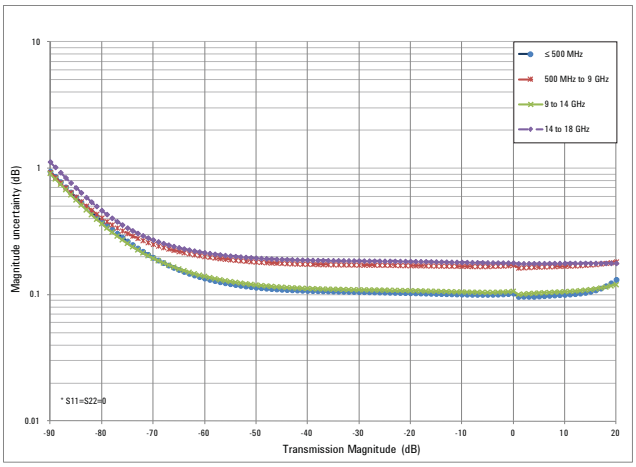



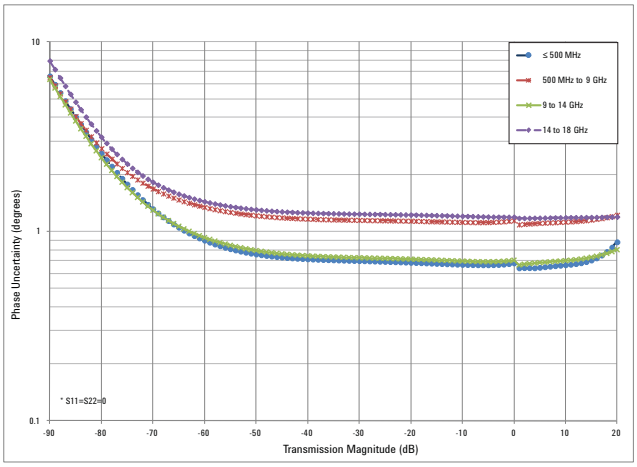

**Reflection uncertainty (S11, S22)**

## Corrected measurement uncertainty

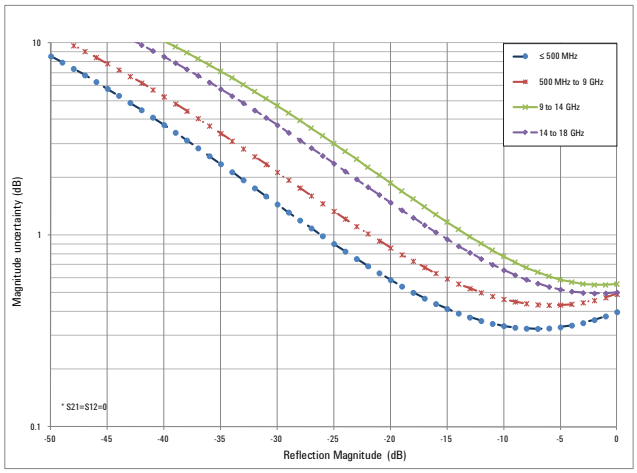
Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

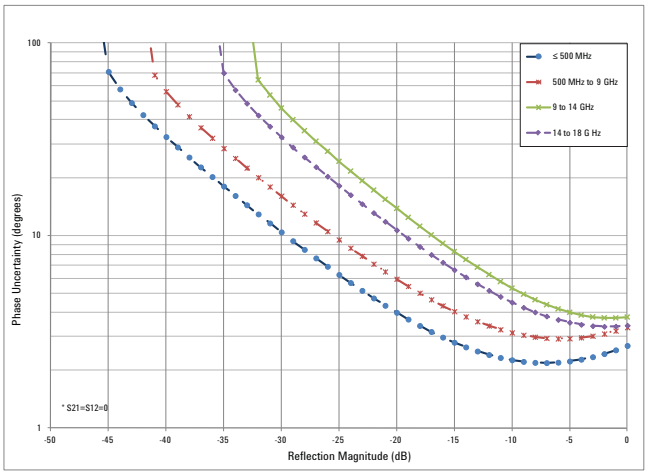
### Full 2-port QuickCal calibration with load, Type-N (m) device[1]




**Transmission uncertainty (S21, S12)**



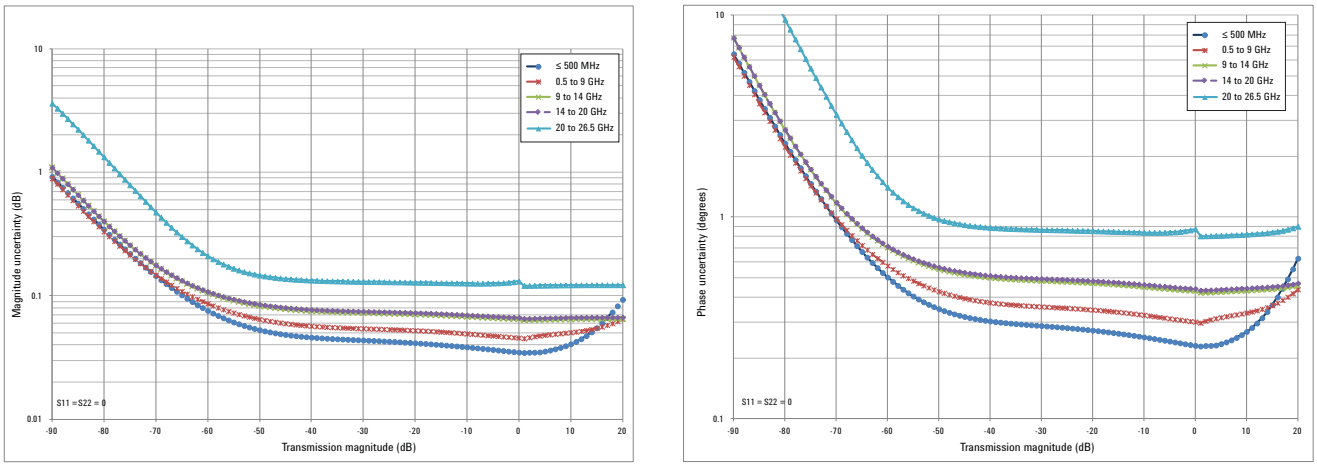

**Reflection uncertainty (S11, S22)**

[1] *Uncertainties shown based on a factory calibration using data-based calibration kits.*

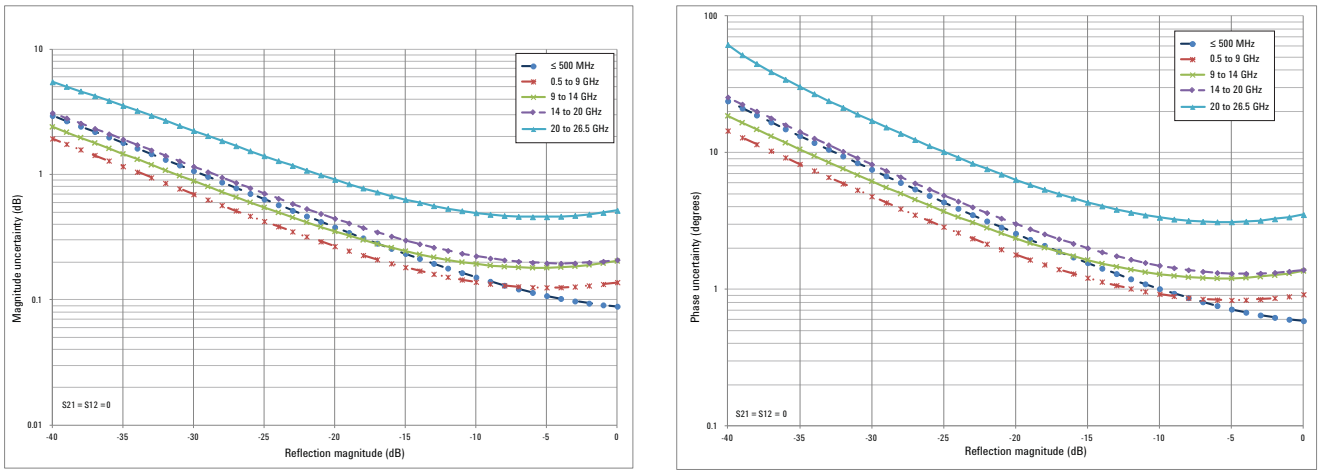
## Corrected measurement uncertainty

Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

### CalReady, 3.5 mm test ports; applies to N9918A, N9928A[1]




**Transmission uncertainty (S21, S12)**




**Reflection uncertainty (S11, S22)**

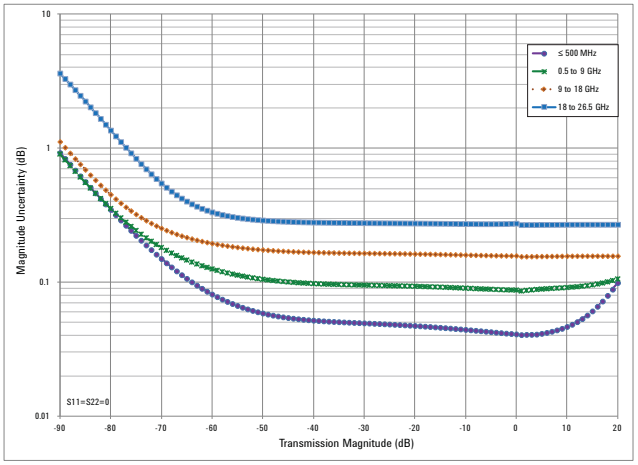
[1] *Uncertainties shown based on a factory calibration using data-based calibration kits.*

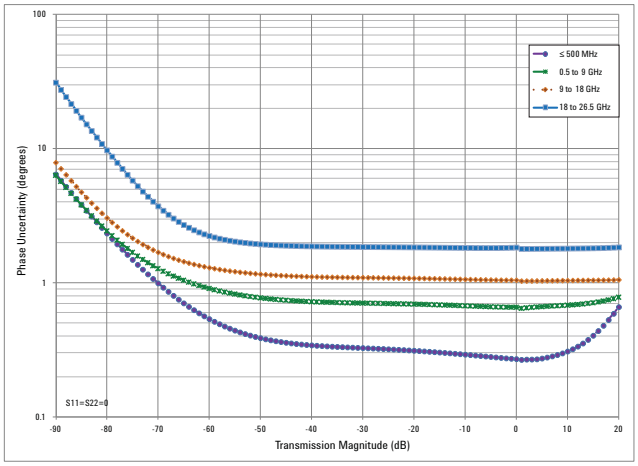
## Corrected measurement uncertainty

Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

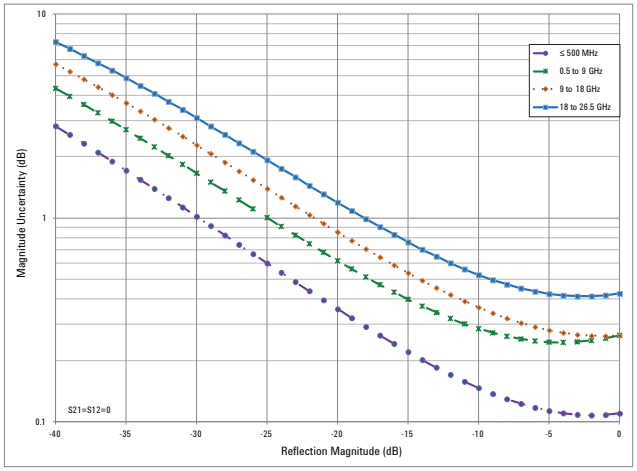
### Full 2-port calibration, 85520A or 85521A 3.5 mm (m) 4-in-1 OSLT calibration kit, spec

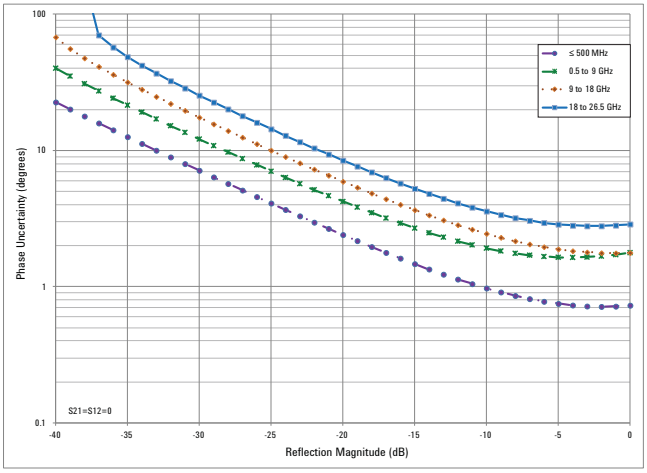
| Corrected performance | ≤ 0.5 GHz | 0.5 to 9 GHz | 9 to 18 GHz | 18 to 26.5 GHz |
|---|---|---|---|---|
| Directivity | 42 dB | 36 dB | 32 dB | 32 dB |
| Source match | 37 dB | 30 dB | 28 dB | 27 dB |
| Load match | 37 dB | 30 dB | 28 dB | 24 dB |
| Reflection tracking | ± 0.035 dB | ± 0.13 dB | ± 0.14 dB | ± 0.21 dB |
| Transmission tracking | ± 0.07 dB | ± 0.29 dB | ± 0.33 dB | ± 0.52 dB |




**Transmission uncertainty (S21, S12)**



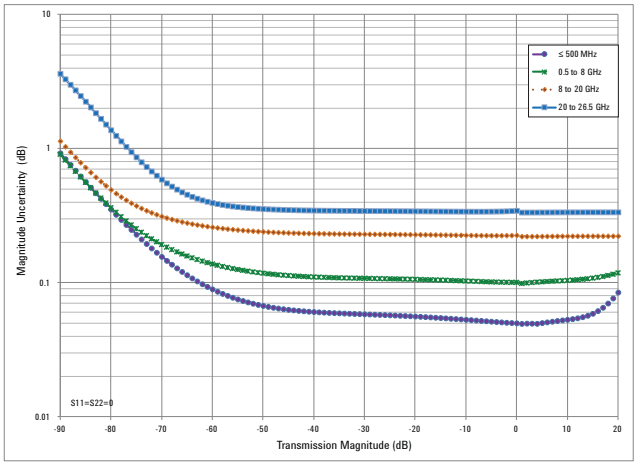

**Reflection uncertainty (S11, S22)**

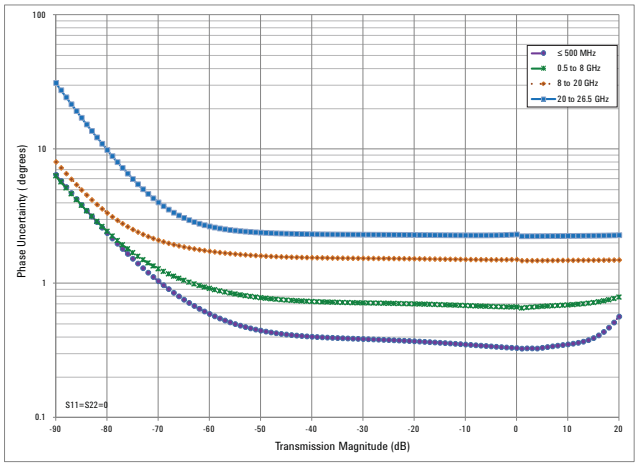
## Corrected measurement uncertainty

Power level of -15 dBm, 10 Hz IF bandwidth, no averaging, and 30-minute warm-up time. Includes uncertainties due to drift, noise, compression, and dynamic accuracy. Coverage factor of x1 applied to uncertainties, for ease of comparison with other industry handheld analyzers.

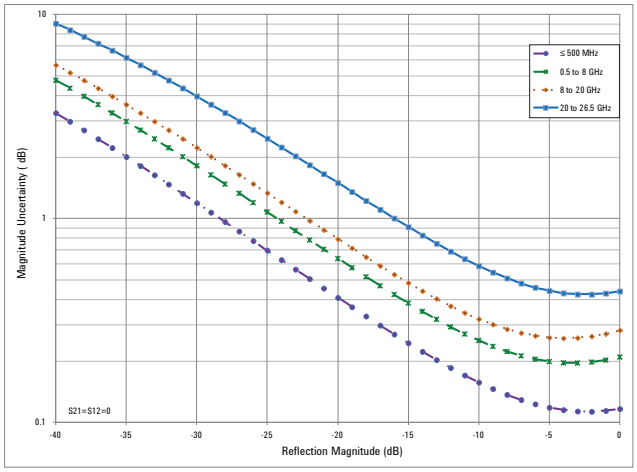
### Full 2-port calibration, 85052D 3.5 mm calibration kit, spec

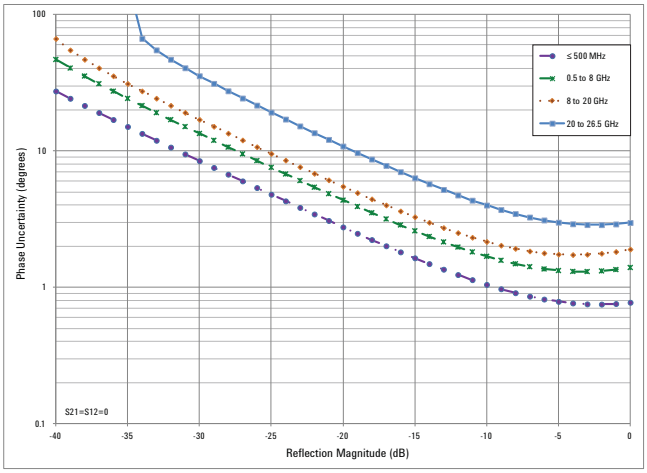
| Corrected performance | ≤ 0.5 GHz | 0.5 to 8 GHz | 8 to 20 GHz | 20 to 26.5 GHz |
|---|---|---|---|---|
| Directivity | 42 dB | 38 dB | 36 dB | 30 dB |
| Source match | 37 dB | 31 dB | 28 dB | 25 dB |
| Load match | 38 dB | 33 dB | 29 dB | 24 dB |
| Reflection tracking | ± 0.005 dB | ± 0.006 dB | ± 0.009 dB | ± 0.012 dB |
| Transmission tracking | ± 0.07 dB | ± 0.135 dB | ± 0.32 dB | ± 0.50 dB |




**Transmission uncertainty (S21, S12)**




**Reflection uncertainty (S11, S22)**

# Time domain

The performance listed in this section applies to the time domain 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**

In time-domain mode, FieldFox computes the inverse Fourier transform of the frequency-domain data to display reflection or transmission coefficients versus time.

## Setup parameters

- Time: start, stop, center, span
- Gating: start, stop, center, span, and on/off
- Number of points, velocity factor, line loss, window shape, independent control for all four traces

| **Time stimulus modes** | |
|---|---|
| Low-pass step | Low-pass step is similar to a traditional time domain reflectometer (TDR) stimulus waveform. It is used to measure low-pass devices. The frequency-domain data should extend from DC (extrapolated value) to a higher value. |
| Low-pass impulse | Low-pass impulse response is used to measure low-pass devices. |
| Bandpass impulse | The bandpass impulse simulates a pulsed RF signal and is used to measure the time domain response of band-limited devices. |
| **Windows**<br>The windowing function can be used to filter the frequency domain data and thereby reduce overshoot and ringing in the time domain response. | |
| Windows | Minimum, medium and maximum, manual entry of Kaiser Beta and impulse width. |
| **Gating**<br>The gating function can be used to selectively remove reflection or transmission time domain responses. In converting back to the frequency domain the effects of the responses outside the gate are removed. The results can be viewed with gating on and off, using two traces. | |
| Gate types | Notch, bandpass |
| Gate shapes | Maximum, wide, normal, minimum |

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

# Vector voltmeter (VVM)

The performance listed in this section applies to the VVM 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**

With vector voltmeter mode, you can characterize the difference between two measurements easily. The zeroing function allows you to create a reference signal, and characterize the difference between two device measurements. The results are shown on a large display in digital format.

| 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 |

## Setup parameters

- 1-port cable trimming - reflection or S11 measurement, magnitude and phase
- 2-port transmission - transmission or S21 measurement, magnitude and phase
- A/B and B/A - ratio of two receivers or channels, magnitude and phase – Need an external signal generator for the A/B or B/A measurement.
- Frequency (one CW frequency point)
- IF bandwidth - 10 Hz to 100 kHz
- Output power - Low or high

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

# 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**

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

## Specification (spec)

Specifications include guardbands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions. Warranted performance. FieldFox must be within its calibration cycle. No warm-up required.

## Typical

Expected performance of an average unit; does not include guardbands. It is not covered by the product warranty. FieldFox must be within its calibration cycle.

## Nominal

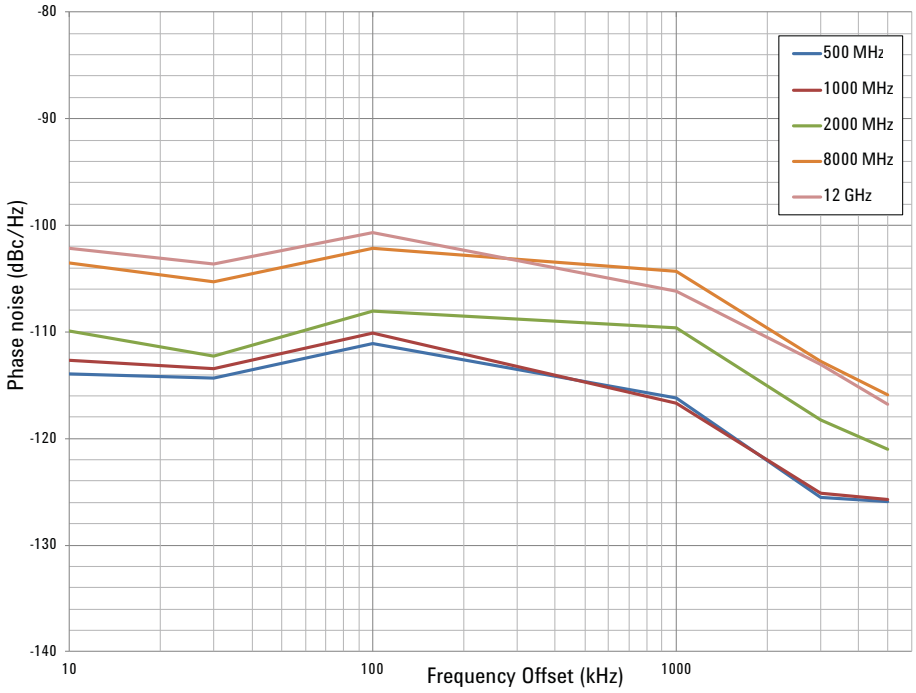
A general, descriptive term or design parameter. It is not tested, and not covered by the product warranty. FieldFox must be within its calibration cycle.

| **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.<br>The preamplifier covers the full band. 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 | ± 0.010 ppm (spec) | |
| Aging rate | ± 1 ppm/yr for 20 years (spec), will not exceed ± 3.5 ppm | |
| **Frequency span** | **Spec** | |
| Range | 0 Hz (zero span), 10 Hz to maximum frequency range of instrument | |
| Resolution | 1 Hz | |
| Accuracy | ±(2 x RBW centering + horizontal resolution) | ±(2 x RBW centering +2 x horizontal resolution) for detector = Normal |
| **Frequency readout accuracy Start, stop, center, marker** | ± (readout frequency x frequency reference accuracy + RBW centering + 0.5 x horizontal resolution) | Horizontal resolution = frequency span/ (trace points – 1)<br>RBW centering:<br>5% x RBW, FFT mode (nominal)<br>16% x RBW, step mode (nominal) |
| **Marker frequency counter** | | |
| Accuracy | ± (marker frequency x frequency reference accuracy + counter resolution) | |
| Resolution | 1 Hz | |

| **Sweep Acquisition, span > 0 Hz** | **Spec** |
|---|---|
| Range | 1 to 5000. Number of data acquisitions per measurement. Value is normalized to the minimum required to achieve amplitude accuracy with CW signals.<br>Auto coupled. For pulsed RF signals, manually increase the sweep acquisition value to maximize the pulse spectrum envelope. |
| Resolution | 1 |
| Sweep time readout | Measured value representing time required to tune receiver, acquire data, and process trace. |
| **Trace update** | **Nominal** |
| Span = 20 MHz, RBW/VBW = 3 kHz | 1.7 updates per second |
| Span = 100 MHz, RBW/VBW auto coupled | 12 updates per second |
| **Sweep time, zero-span** | **Nominal** |
| Range | 1 µs to 1000 s |
| Resolution | 100 ns |
| Readout | Entered value representing trace horizontal scale range |
| **Trigger (for zero-span & FFT sweeps)** | |
| Trigger type | Free run, external, video, RF burst |
| Trigger slope | Positive edge, negative edge |
| Trigger delay | Range: -150 ms to 10 s<br>Resolution: 100 ns |
| Auto trigger | Forces a periodic acquisition in the absence of a trigger event<br>Range: 0 (off) to 10 s |
| Trigger position (zero-span) | Controls the horizontal position of the pulse edge; use sweep time to zoom into pulse edge<br>Range: 0 to 10, integer steps; 0 is left edge of graticule, 10 is right edge of graticule |
| **RF burst trigger** | **Nominal** |
| Dynamic range | 40 dB |
| Bandwidth | 20 MHz |
| Operating frequency range | 20 MHz to maximum instrument frequency |
| **Trace points** | 101, 201, 401, 801, 1001 (defaults to 401)<br>10,001 points settable through SCPI |
| **Resolution bandwidth (RBW)** | **Spec** |
| Range (-3 dB bandwidth) | |
| Zero span | 10 Hz to 5 MHz<br>1,3,10 sequence |
| Non-zero span | 1 Hz to 5 MHz<br>1, 1.5, 2, 3, 5, 7.5, 10 sequence < 300 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz<br>Step keys change RBW in 1, 3, 10 sequence |
| **Accuracy** | **Nominal** |
| Zero span RBWs | |
| 10 Hz to 1 MHz | ± 5% |
| 3 MHz | ± 10% |
| 5 MHz | ± 15% |
| Non-zero span RBWs | |
| 1 Hz to 100 kHz | ± 1% |
| 300 kHz to 1 MHz | ± 5% |
| 3 MHz | ± 10% |
| 5 MHz | ± 15% |
| **Selectivity (-60 dB/-3 dB)** | 4:1 |
| **Video bandwidth (VBW)** | **Spec** |
| | 1 Hz to 5 MHz in 1, 1.5, 2, 3, 5, 7, 10 sequence |

| 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/Hz | -106 dBc/Hz | -111 dBc/Hz | -111 dBc/Hz |
| 30 kHz | -106 dBc/Hz | -104 dBc/Hz | -108 dBc/Hz | -110 dBc/Hz |
| 100 kHz | -100 dBc/Hz | -99 dBc/Hz | -104 dBc/Hz | -105 dBc/Hz |
| 1 MHz | -110 dBc/Hz | -110 dBc/Hz | -113 dBc/Hz | -113 dBc/Hz |
| 3 MHz | -119 dBc/Hz | -118 dBc/Hz | -122 dBc/Hz | -122 dBc/Hz |
| 5 MHz | -120 dBc/Hz | -120 dBc/Hz | -123 dBc/Hz | -123 dBc/Hz |

### Phase noise at different center frequencies (nominal)




| Measurement range | Spec |
|---|---|
| 100 kHz to 26.5 GHz | DANL to +20 dBm |
| **Input attenuator range** | 0 to 30 dB, in 5 dB steps |
| **Maximum input safe level** | |
| Average CW power | +27 dBm, 0.5 watts |
| DC | ± 50 VDC |

| **Displayed average noise level (DANL)** | RMS detection, log averaging, reference level of -20 dBm, normalized to 1 Hz RBW | | | |
|---|---|---|---|---|
| **Preamp off** | 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] | -137 dBm | -135 dBm | -139 dBm | -138 dBm |
| > 4.5 to 7 GHz | -133 dBm | -131 dBm | -136 dBm | -135 dBm |
| > 7 to 13 GHz | -129 dBm | -127 dBm | -132 dBm | -130 dBm |
| > 13 to 17 GHz | -124 dBm | -122 dBm | -126 dBm | -125 dBm |
| > 17 to 22 GHz | -119 dBm | -117 dBm | -122 dBm | -121 dBm |
| > 22 to 25 GHz | -114 dBm | -111 dBm | -117 dBm | -114 dBm |
| > 22 to 26.5 GHz | -110 dBm | -108 dBm | -112 dBm | -111 dBm |
| **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 |

| | **Spec** |
|---|---|
| **Display range** | Log scale<br>10 divisions<br>1 to 100 dB/division in 0.01 dB steps |
| **Amplitude scale units** | dBm, dBmV, dBµV, W, V, A, dBmA, dBµA |
| **Trace detectors** | Normal, positive peak, negative peak, sample, average (RMS) |
| **Trace states** | Clear/write, max hold, min hold, average, view, blank |
| **Number of traces** | 4 |
| **Number of averages** | 1 to 10,000 |
| **Reference level** | -150 to + 30 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<br>± 0.3 dB, spec<br>± 0.10 dB, typical |

| **Total absolute amplitude accuracy** | Verified with input level of -10 to -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.*

| Resolution bandwidth switching uncertainty | Nominal |
|---|---|
| RBW < 5 MHz | 0.0 dB |
| For signals not at center frequency | 0.7 dB peak-to-peak |

| RF input VSWR, 10 dB attenuation | Nominal |
|---|---|
| 10 MHz to 2.7 GHz | 1.7 : 1 |
| > 2.7 to 7.5 GHz | 1.5 : 1 |
| > 7.5 GHz | 2.2 : 1 |

| Second harmonic distortion | Nominal |
|---|---|
| -30 dBm signal at mixer input | |
| ≤ 4 GHz | <-60 dBc or +30 dBm |
| > 4 GHz | <-80 dBc or +50 dBm |

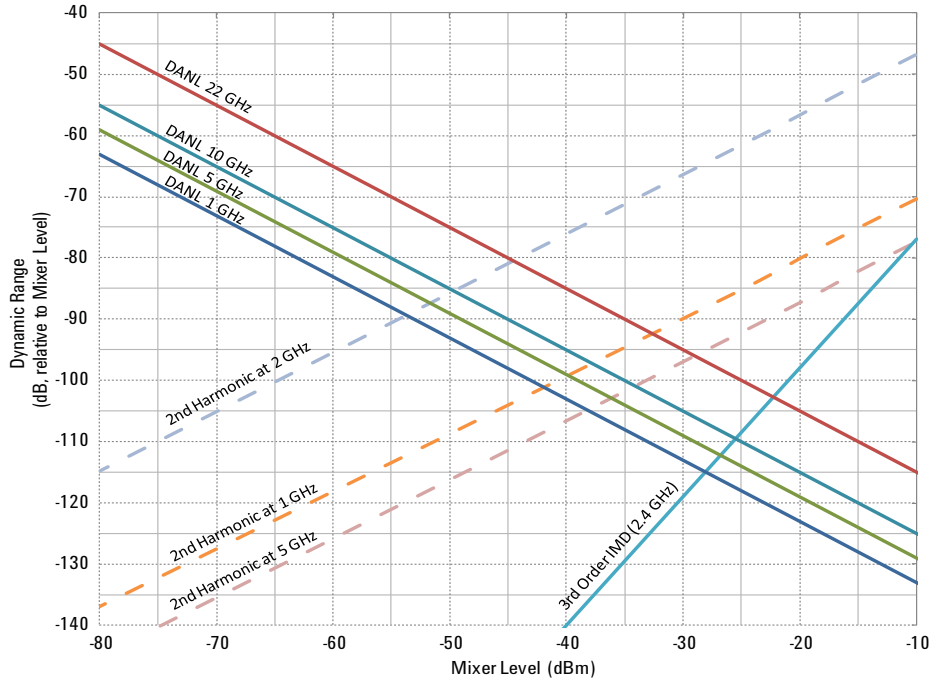
| Third order intermodulation distortion (TOI) | Spec | Typical |
|---|---|---|
| | at 2.4 GHz, +15 dBm | < 1 GHz, +10 dBm<br>1 to 7.5 GHz, +15 dBm<br>> 7.5 GHz, +21 dBm |

| Spur free dynamic range | at 2.4 GHz > 105 dB nominal<br>2/3 (TOI-DANL) in 1 Hz RBW |
|---|---|

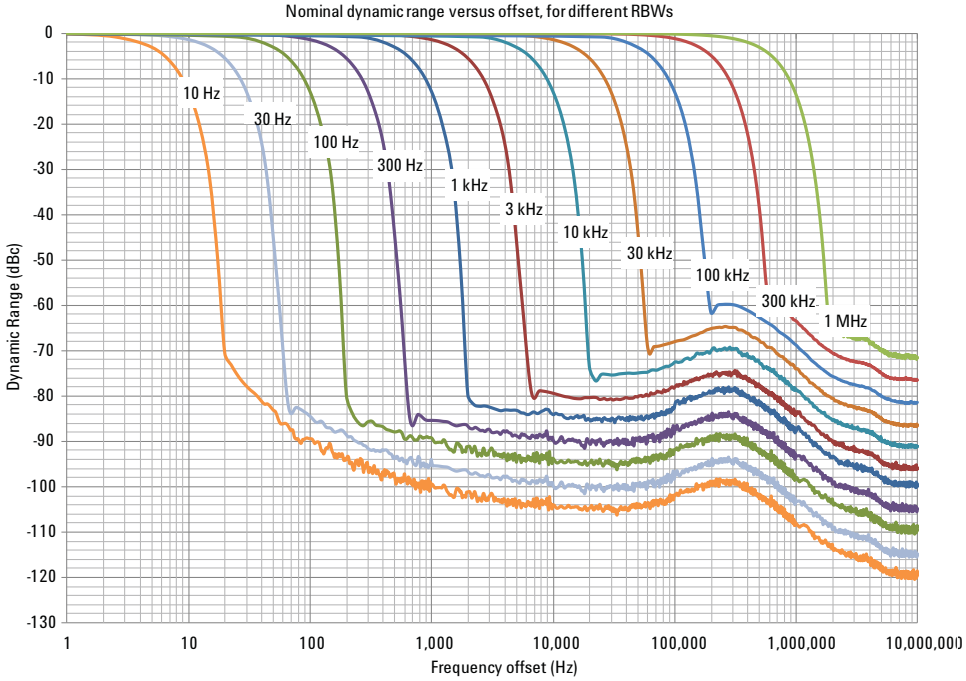
| Residual responses | Nominal |
|---|---|
| Preamp off, 0 dB attenuation | |
| 100 kHz to 13 GHz[1] | -110 dBm |
| >13 to 20 GHz | -90 dBm |
| >20 to 26.5 GHz | -80 dBm |
| **Input related spurs** | |
| -30 dBm signal at mixer input<br>(excludes frequencies listed below) | -80 dBc |
| f = center frequency | |
| < 2.6 GHz, f + 2 x 33.75 MHz | -80 dBc |
| < 2.6 GHz, f – 2 x 866.25 MHz | -80 dBc |
| < 2.6 GHz, f + 2 x 3.63375 GHz | -85 dBc |
| | |
| ≥ 2.6 to 7.5 GHz, f + 2 x 33.75 MHz | -80 dBc |
| ≥ 2.6 to 7.5 GHz, f + 2 x 866.25 MHz | -80 dBc |
| ≥ 2.6 to 7.5 GHz, f + 2 x 9.86625 GHz | -80 dBc |
| | |
| ≥ 7.5 to 16.3 GHz, f + 2 x 3.63375 GHz | -65 dBc |
| ≥ 16.3 to 26.5 GHz, f – 2 x 3.63375 GHz | -60 dBc |
| ≥ 7.5 to 26.5 GHz, f + 2 x 33.75 MHz | -80 dBc |
| ≥ 7.5 to 26.5 GHz, f – 2 x 866.25 MHz | -80 dBc |
| **LO related spurs** | -60 dBc |
| **Sideband** | -80 dBc |

[1] *Excludes 4.5 MHz, -95 dBm at 4.5 MHz.*

## Nominal distortion and noise limited (10 Hz RBW) dynamic range




## Dynamic range versus offset frequency versus RBW (nominal)



# 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**.

Note: Traditional tracking generators track the receiver frequency. In FieldFox analyzers, the tracking generator frequency can be set to either track the receiver frequency, or act as an independent CW source.

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

| **Models** | **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 |

| **Output power, maximum** | **23 ± 5 °C** | |
|---|---|---|
| **Frequency** | **Typical** | **Nominal** |
| 30 kHz to 300 kHz | -11 dBm | |
| 300 kHz to 2 MHz | -3 dBm | -2 dBm |
| > 2 MHz to 625 MHz | -2 dBm | -1 dBm |
| > 625 MHz to 3 GHz | +1 dBm | +3 dBm |
| ≥ 3 to 6.5 GHz | -1 dBm | +1 dBm |
| ≥ 6.5 to 9 GHz | -2 dBm | 0 dBm |
| ≥ 9 to 14 GHz | -4 dBm | -2.5 dBm |
| ≥ 14 to 18 GHz | -6 dBm | -4.5 dBm |
| ≥ 18 to 23 GHz | -10 dBm | -8.5 dBm |
| ≥ 23 to 26.5 GHz | -12 dBm | -11 dBm |

| | |
|---|---|
| **Power level accuracy** | ± 1.5 dB at -15 dBm, for frequencies > 250 kHz, typical<br>Power flattened across frequency range |
| **Power step size** | Power settable in 1 dB steps across power range |
| **Functions** | Continuous wave (CW), CW coupled, tracking |

| **RF output VSWR, 10 dB attenuation** | **Nominal** |
|---|---|
| 10 MHz to 2.7 GHz | 1.7 : 1 |
| > 2.7 to 7.5 GHz | 1.5 : 1 |
| > 7.5 GHz | 2.2 : 1 |

| **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 |

## Spectrum analyzer IF output

| | |
|---|---|
| **Center frequency** | 33.75 MHz |
| **IF bandwidth** | 5 MHz (default), 25 MHz |
| **Connector** | SMB male |
| **Conversion loss** | 0 to 27 dB nominal<br>The loss increases approximately linearly as frequency increases, with ~27 dB loss at 26.5 GHz. Conversion loss is defined from RF input to SA output with -10 dBm input power, 0 dB attenuation, and preamp off. |

## AM/FM tune and listen

| | |
|---|---|
| **Audio demodulation types** | AM, FM narrow, FM wide |
| **Audio bandwidth** | 16 kHz |
| **Receiver IF bandwidth** | |
| AM | 35 kHz |
| FM narrow | 12 kHz |
| FM wide | 150 kHz |
| Listen time range | 0 to 100 seconds |

## Preamplifier

| | |
|---|---|
| **Preamplifier** | Full band; nominal gain 20 dB |

## Interference analyzer and spectrogram

The capabilities listed in this section apply to the interference 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**

| **Interference analyzer** | |
|---|---|
| Spectrogram | Overlay, full screen, top, or bottom with active trace |
| Waterfall | |
| Markers | Time, delta time |
| Trace playback and recording | Record all spectrum analyzer measurements<br>Store data internally or on USB or SD card<br>Playback recorded data using FieldFox<br>Frequency mask trigger allows recording to occur upon trigger |

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

## Spectrum analyzer time gating

The capabilities listed in this section apply to the time gating features available in the following models:

FieldFox microwave combination analyzers: **N9913A, N9914A, N9915A, N9916A, N9917A, N9918A**
FieldFox microwave spectrum analyzers: **N9935A, N9936A, N9937A, N9938A**

With time gating, you can measure the spectrum of a periodic signal during a specified time interval. Pulsed-RF signals are an example of a periodic signal that can be measured with time gating. For example, you can measure the pulse during the on period, not the transition or the off period. Or you can exclude interfering signals such as a periodic transient. Time gating allows you to view spectral components that would otherwise be hidden. FieldFox's time gating method is a Gated FFT.

| | |
|---|---|
| Gate method | Gated FFT |
| Span range | Any span |
| RBW range | 1 Hz to 300 kHz (derived from gate width) |
| Gate delay range | -150 ms to 10 s |
| Gate width (length) range | 6 µs to 1.8 s |
| Gate sources | External, RF burst, Video |

## Reflection measurements (RL, VSWR)

The capabilities listed in this section apply to the reflection measurements in the following models:

FieldFox microwave spectrum analyzers: **N9935A, N9936A, N9937A, N9938A**

| Models | Reflection measurements |
|---|---|
| N9935A | 30 kHz to 9 GHz |
| N9936A | 30 kHz to 14 GHz |
| N9937A | 30 kHz to 18 GHz |
| N9938A | 30 kHz to 26.5 GHz |

Measurements: Return loss, VSWR
Normalization using data/memory

## Radio standards

With a radio standard applied, pre-defined frequency bands, channel numbers or uplink / downlink selections can be used instead of manual frequency entry. The pre-defined FieldFox radio standards include bands such as W-CDMA, LTE, and GSM. Alternately, users can create custom standards and import them into FieldFox analyzers.

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

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**

## Built-in power meter

Using the built-in power meter, 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.

Setup parameters:
Center frequency, including selection of radio standards and channel selection, span or channel width
Functions:
Relative/absolute measurements, offsets, units of dBm or watts, or dB or %, minimum and maximum limits

| **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 |

## External USB power sensor support

The external USB power sensor option supports various Agilent USB power sensors. For an up-to-date listing of the supported power sensors, visit http://www.agilent.com/find/fieldfoxsupport

Setup parameters: Frequency
Functions:
Relative/absolute measurements, offsets, units of dBm or watts, or dB or %, minimum and maximum limits
Internal source: FieldFox's internal source can be turned on in the USB power sensor mode. CW frequency and nominal power level control are available.

## Built-in GPS receiver

| | |
|---|---|
| GPS receiver | The internal GPS receiver can be used as a frequency reference.[1] |
| Modes | Off, internal, external |
| Sync clock | On, off |
| Functionality | Geo-location: latitude, longitude, altitude, time, sync time/date |
| Connector for antenna | SMA (f), 3.3 V |

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

[1] *External GPS USB receivers can be used to provide geo-location data. However, they cannot be used for frequency reference locking.*

## Pulse measurements

FieldFox's pulse measurement option can be used to characterize RF pulses such as those used in radar and electronic warfare systems. Measurements are made using FieldFox and Agilent's USB peak power sensors.

Performance specifications such as frequency, dynamic range and minimum pulse width depend on the peak power sensor. Supported peak power sensors: www.agilent.com/find/usbsensorsforfieldfox.

Setup parameters:
Frequency, time (center), time/division, gating, triggering, video bandwidth, averaging
Functions:
Average power, peak power, and peak to average ratio
Analog gauge display and digital display, dBm and watts
Relative/absolute measurements, dB or %, minimum and maximum limits
Trace graph for pulse profiling with gating
Rise time, fall time, pulse width, pulse period, pulse repetition frequency

## DC Bias variable-voltage source

| | **Nominal** |
|---|---|
| Connector | SMB (m) |
| Voltage | +1 to +32 V |
| Resolution | 0.1 V |
| Maximum current[1] | 0.65 A |
| DC current readout resolution | 0.01 A |
| Maximum power[1] | 7 watts |
| Display read out | Voltage, current |

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

[1] *Battery life will be reduced when DC source is used. A trip function turns off the power supply when the rated current or power is exceeded.*

## Remote control capability

Option 030 adds remote *control* capability to FieldFox analyzers, so that FieldFox can be controlled via an iOS device. The FieldFox app, running on the iOS device, combined with Option 030 on the FieldFox analyzer provides full control of the instrument from a remote location. The app emulates the front panel of FieldFox, so users can press the FieldFox hardkeys or softkeys using their iPhone or iPad, and make measurements remotely.

For example, a tower climber can be on the tower with a FieldFox analyzer, while the technician controls and makes the measurements down below, using an iPad. The iPad and FieldFox communicate via a network connection.

iOS device requirements

- *iPad*, *iPhone*, or *iPod Touch*
- iOS of 5.1 or higher
- A WiFi or 3G/4G connection

The FieldFox app communicates with FieldFox via a network connection, so both the iOS device and FieldFox need to be on a network where both devices can reach the other. For example, a company intranet or a site installation using a wireless router. FieldFox can directly be connected to a LAN cable, or if wired LAN is not available, a user supplied wireless router can be configured to work with FieldFox. FieldFox does not include a wireless router.

*FieldFox app without Option 030*

The FieldFox app can be installed on an iOS device independent of the presence of Option 030 on the analyzer. Without Option 030, users can *view* the live display screen of their FieldFox remotely, but cannot *control* the instrument. With 030 purchased and installed on their FieldFox, users can both *view* and *control* their FieldFox. Control refers to the ability to press hardkeys, softkeys, make or change measurements, etc.

Option 030 does not include the iOS device itself. Users must supply their own iOS device. Option 030 is a license on the FieldFox analyzer.

Option 030 and the FieldFox app are not applicable to Android, BlackBerry, or Windows phone/tablet devices.

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

# 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 |
| Maximum humidity | 95% |
| Altitude – operating | 9144 m or 30,000 ft (using battery) |
| Altitude – Non-operating | 15,240 m or 50,000 ft |
| Altitude – AC to DC adapter | 3000 m or 9840 ft |
| **Ingress protection** | IP53 IEC/EN 60529 (IP rating for instrument by itself, with no cover) |
| **Temperature range** | |
| Operating, AC power, spec | -10 to 55 °C<br>14 to 131 °F |
| Operating, battery, spec | -10 to 50 °C<br>14 to 122 °F |
| Operating, battery, typical | -10 to 55 °C<br>14 to 131 °F |
| Storage, spec[1] | -51 to 71 °C<br>-60 to 160 °F |
| **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 |
| **Complies with European low voltage directive 2006/95/EC** | IEC/EN 61010–1 2nd Edition<br>Canada: CSA C22.2 No. 61010–1–04<br>USA: UL 61010–1 2nd Edition |
| **Explosive environment** | This product has been type tested to meet the requirements for operation in explosive environments in accordance with MIL-STD-810G, Method 511.5, Procedure I.″ |

[1] *The battery packs should be stored in an environment with low humidity. Extended exposure to temperature above 45 °C could degrade battery performance and life.*

# General information *continued*

| | |
|---|---|
| **Power supply** | |
| External DC input | 15 to 19 VDC, 40 watts maximum when battery charging |
| External AC power adapter | Efficiency level IV, 115 VAC |
| Input | 100 to 250 VAC, 50 to 60 Hz, 1.25-0.56 A |
| Output | 15 VDC, 4 A |
| Power consumption | 14 watts typical |
| **Battery** | |
| Lithium ion | 10.8 V, 4.6 A-h |
| Operating time | 3.5 hours (typical) |
| Charge time: A fully discharged battery takes about 1.5 hours to recharge to 80%. Four hours to 100%. | |
| Discharge temperature limits | -10 to 60 °C, ≤ 85% RH |
| Charge temperature limits | 0 to 45 °C, ≤ 85% RH |
| Storage temperature limits | -20 to 50 °C, ≤ 85 % RH<br>The battery packs should be stored in an environment with low humidity. Extended exposure to temperature above 45 °C could degrade battery performance and life. |
| **Test port connectors** | |
| **Models ≤ 18 GHz** | Type-N (f) |
| **Models > 18 GHz** | 3.5 mm (m), unless Type-N (f) option ordered |
| **Display** | 6.5″ transflective color VGA-LED backlit |
| **Headphone jack connector** | 3.5 mm (⅛ inch) miniature audio jack |
| **USB-A, 2-ports** | Hi-speed USB 2.0 |
| **Mini USB, 1-port** | Hi-speed USB 2.0; provided for future use |
| **LAN** | 100 base-T, RJ-45 connector<br>Used for programming, data saving, and connection to Data Link software |
| **Programming** | SCPI, using the built-in LAN interface |
| **Languages** | English, Spanish, German, Italian, French, Russian, Japanese, Chinese, and Turkish |
| **Preset** | User preset for both mode preset and complete system preset |

| Limit lines |
|---|
| The limit line capabilities listed in this section apply to the cable and antenna analyzer, network analyzer and spectrum analyzer modes in all FieldFox analyzers. |
| Limit lines can be a combination of horizontal lines, sloping lines, or discrete data points |
| Limit types: Fixed or relative |
| Each trace can have its own limit line |
| Limit lines can be built from a current trace |
| Limit segments > 100, limited by memory size |
| Max limit line number of points: 10,001 |
| Beep: Beep off, Beep on fail, Beep on pass |
| Pass/fail warning: on/off |
| Offset and margin: An increase or decrease in the limit line |
| Save/recall limit lines |

| Data storage | |
|---|---|
| Internal | Minimum: 4 GB<br>Minimum states and traces: 1000 |
| External | Supports USB 2.0 compatible memory devices and SD/SDHC memory cards |
| Data types | Trace, trace+state, picture (png), data (csv), S2P |
| **Secure operation** | |
| Frequency blanking | For protection of sensitive data all frequency information can be turned off. |
| Erase user data | All user data can be erased on a FieldFox analyzer. For more information visit: http://www.agilent.com/find/securefieldfox |
| **Reference out/trigger out** | |
| Connector | SMB (m), 50 ohm |
| Output amplitude | ≥ 0 dBm |
| Frequency | 10 MHz (1 + frequency reference accuracy) |
| Trigger out | Reserved for future use |
| **Reference in/trigger in** | |
| Connector | SMA(f), 50 ohm |
| Reference input | 10 MHz, -5 to +10 dBm |
| Trigger input | 3.3 or 5 V TTL logic levels |

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

| Literature | Number |
|---|---|
| FieldFox Handheld Analyzers, Brochure | 5990-9779EN |
| FieldFox Combination Analyzers, Technical Overview | 5990-9780EN |
| FieldFox Microwave Spectrum Analyzers, Technical Overview | 5990-9782EN |
| FieldFox Microwave Vector Network Analyzers, Technical Overview | 5990-9781EN |
| FieldFox Handheld Analyzers, Data Sheet | 5990-9783EN |
| FieldFox Handheld Analyzers, Configuration Guide | 5990-9836EN |
| FieldFox RF Analyzer, Technical Overview | 5989-8618EN |
| FieldFox RF Analyzer, Data Sheet | N9912-90006 |
| FieldFox RF Vector Network Analyzer, Technical Overview | 5990-5087EN |
| FieldFox RF Vector Network Analyzer, Data Sheet | 5990-5363EN |

Download application notes, watch videos, and learn more:
www.agilent.com/find/fieldfox

### myAgilent

**www.agilent.com/find/myagilent**

A personalized view into the information most relevant to you.

### Agilent Channel Partners

**www.agilent.com/find/channelpartners**

Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.


### Three-Year Warranty

**www.agilent.com/find/ThreeYearWarranty**

Agilent's combination of product reliability and three-year warranty coverage is another way we help you achieve your business goals: increased confidence in uptime, reduced cost of ownership and greater convenience.

### Agilent Advantage Services

**www.agilent.com/find/AdvantageServices**

Accurate measurements throughout the life of your instruments.

Agilent Electronic Measurement Group
DEKRA Certified
ISO 9001:2008
Quality Management System

**www.agilent.com/quality**

**www.agilent.com**
**www.agilent.com/find/fieldfox**

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

**www.agilent.com/find/contactus**

**Americas**

| | |
|---|---|
| Canada | (877) 894 4414 |
| Brazil | (11) 4197 3600 |
| Mexico | 01800 5064 800 |
| United States | (800) 829 4444 |

**Asia Pacific**

| | |
|---|---|
| Australia | 1 800 629 485 |
| China | 800 810 0189 |
| Hong Kong | 800 938 693 |
| India | 1 800 112 929 |
| Japan | 0120 (421) 345 |
| Korea | 080 769 0800 |
| Malaysia | 1 800 888 848 |
| Singapore | 1 800 375 8100 |
| Taiwan | 0800 047 866 |
| Other AP Countries | (65) 375 8100 |

**Europe & Middle East**

| | |
|---|---|
| Belgium | 32 (0) 2 404 93 40 |
| Denmark | 45 45 80 12 15 |
| Finland | 358 (0) 10 855 2100 |
| France | 0825 010 700* |
| | *0.125 €/minute |
| Germany | 49 (0) 7031 464 6333 |
| Ireland | 1890 924 204 |
| Israel | 972-3-9288-504/544 |
| Italy | 39 02 92 60 8484 |
| Netherlands | 31 (0) 20 547 2111 |
| Spain | 34 (91) 631 3300 |
| Sweden | 0200-88 22 55 |
| United Kingdom | 44 (0) 118 972 6201 |

*For other unlisted countries:*
**www.agilent.com/find/contactus**

*(BP-3-1-13)*

Product specifications and descriptions in this document subject to change without notice.


Published in USA, September 13, 2013
5990-9783EN

Agilent Technologies