Keysight N9912A FieldFox RF Analyzer 2 MHz to 4/6 GHz

Data Sheet

KEYSIGHT TECHNOLOGIES

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Definitions

Specification (spec.)

Warranted performance. Specifications include guardbands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions. The following conditions must be met:

- FieldFox has been turned on at least 90 minutes
- FieldFox is within its calibration cycle
- Storage or operation at 25°C ±5 °C range (unless otherwise stated)

Typical (typ.)

Expected performance of an average unit over a 20 °C to 30 °C temperature range after being at ambient temperature for two hours, unless otherwise indicated; does not include guardbands. It is not covered by the product warranty. The FieldFox must be within its calibration cycle.

Nominal (nom.)

A general, descriptive term or design parameter. It is not tested, and not covered by the product warranty.

Calibration

The process of measuring known standards to characterize an instrument's systematic (repeatable) errors.

Corrected (residual)

Indicates performance after error correction (calibration). It is determined by the quality of calibration standards and how well "known" they are, plus system repeatability, stability, and noise.

Uncorrected (raw)

Indicates instrument performance without error correction. The uncorrected performance affects the stability of a calibration.

Cable and Antenna Analyzer

Description	Specification	Typical		Supplemental Information
		10 minute warm up	90 minute warm up	
Frequency Range				
Option 104	2 MHz to 4 GHz			
Option 106	2 MHz to 6 GHz			
Frequency Reference				
Accuracy	±2 ppm	±2 ppm		
Aging Rate	±1 ppm/yr	±1 ppm/yr		
Temperature Stability	±1 ppm over 0 to 55 °C	±1 ppm		
Frequency Resolution				
2 MHz to 1.6 GHz	2.5 kHz			
> 1.6 GHz to 3.2 GHz	5 kHz			
> 3.2 GHz to 6 GHz	10 kHz			
Resolution (Number of data points)				
	101, 201, 401, 601, 801, 1001, 1601, 4001, 10001 Custom number of points can be set using SCPI			
Measurement Speed				
Return Loss				
1.75 GHz – 3.85 GHz, 1001 points, Cal ON				1.5 ms/point (nominal)
DTF				
0 to 500 ft, 601 points, Cal ON				2.4 ms/point (nominal)
Output Power (RF Out Port)				
High				
2 MHz to 4 GHz				< +8 dBm, +6 dBm (nominal)
> 4 GHz to 6 GHz				< +7 dBm, +2 dBm (nominal)
Low (Typically 31 dB below high power)				
2 MHz to 4 GHz				< –23 dBm, –25 dBm (nominal)
> 4 GHz to 6 GHz				< –24 dBm, –25 dBm (nominal)
Immunity to Interfering Signals				
				+16 dBm (nominal)

Cable and Antenna Analyzer (continued)

Description	Specification	Typical	
		10 minute warm up	90 minute warm up
Directivity			
Corrected with OSL calibration [1]	>42 dB	>42 dB	
Corrected with QuickCal (Option 111) [3]			≥42 dB
Raw			
2 MHz to 3.5 GHz			> 20 dB
> 3.5 GHz to 6 GHz			> 14 dB
Source Match			
Corrected with OSL calibration [1]	> 36 dB	> 36 dB	
Corrected with QuickCal (Option 111) [3]			≥35 dB
Raw			
2 MHz to 3 GHz			> 25 dB
> 3 GHz to 6 GHz			> 16 dB
Reflection Tracking			
Corrected with OSL calibration [1]	±0.06 dB	±0.06 dB	
Corrected with QuickCal (Option 111) [3]			±0.15 dB
Reflection Dynamic Range			
Reflection (RF Out port) (High power out)			
2 MHz to 4 GHz		60 dB	
> 4 GHz to 6 GHz		55 dB	
Maximum Measurable Cable Loss Using 1–Port CAT Measurement Model [2]			
		Refl Dyn Range /2	
Transmission Dynamic Range (Option 110)			
300 Hz IF Bandwidth			
2 MHz to 2 GHz		72 dB	
> 2 GHz to 3 GHz		67 dB	
> 3 GHz to 5 GHz		58 dB	
> 5 GHz to 6 GHz		49 dB	
Return Loss			
Display Range	0 to 100 dB		
Resolution	0.01 dB		
VSWR			
Display Range	1 to 500		
Resolution	0.01		

Cable and Antenna Analyzer (continued)

Cable Loss	
Display Range	0 to 100 dB
Resolution	0.01 dB

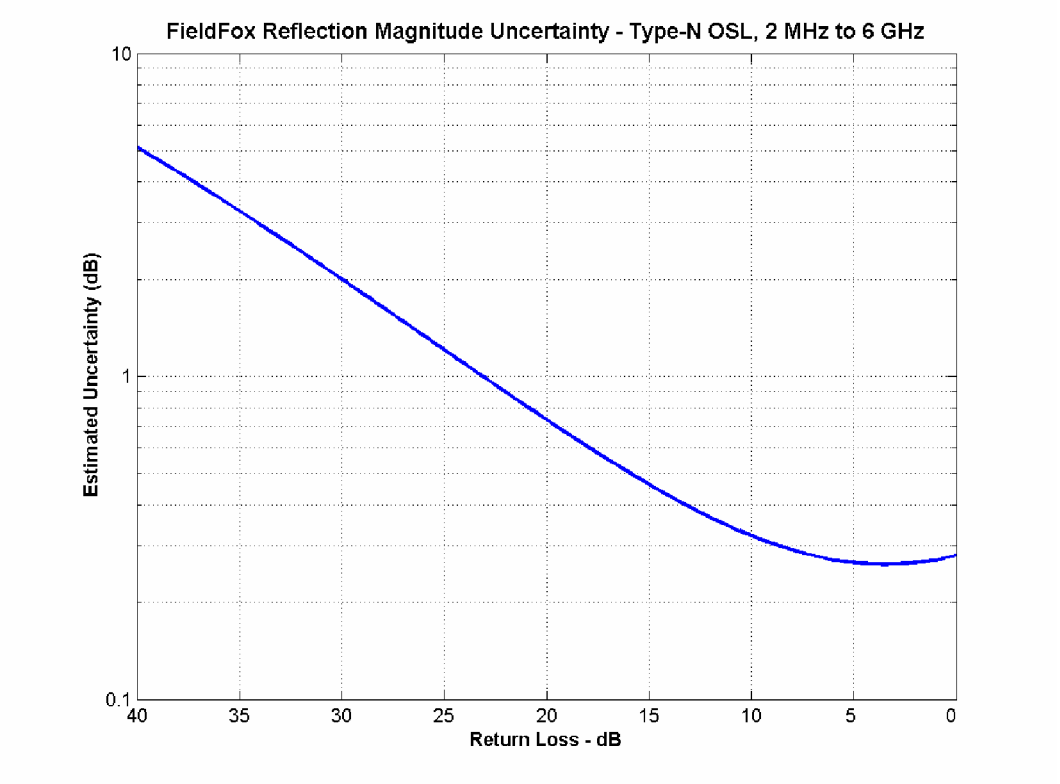
Description	Specification	Supplemental Information
Distance–to–Fault		
Horizontal Range	Range = [(number of points – 1) / frequency span * 2] * velocity factor * speed of light	Number of points auto coupled according to start and stop distance entered
Horizontal Resolution	Resolution = Range / (number of points – 1)	Number of points settable by user
Bandpass Mode Window Types		Maximum, medium, and minimum windows

[1] Using recommended calibration kits.

[2] Higher cable losses can be measured using transmission or S21 measurements. Cable losses measured in transmission mode limited by transmission dynamic range.

[3] QuickCal is performed with the connect LOAD step.

Figure 1: CAT Mode, Type–N Calibration Kit – Magnitude (Specification)



Cable and Antenna Analyzer (continued)

Figure 2: CAT Mode, QuickCal – Magnitude (Typical)

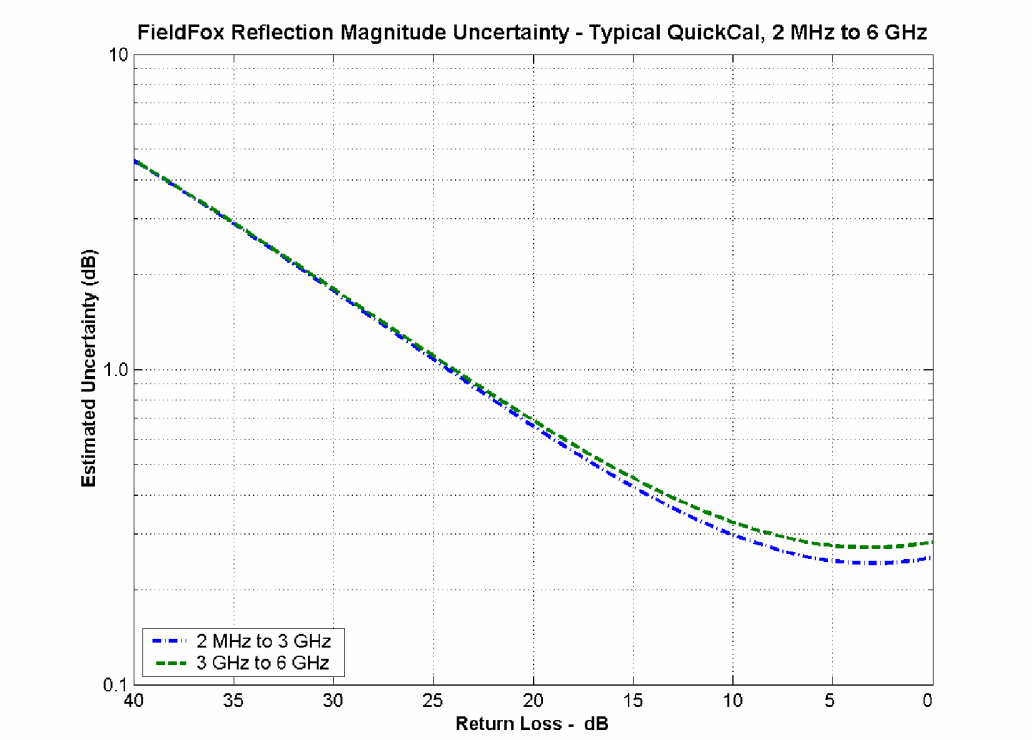
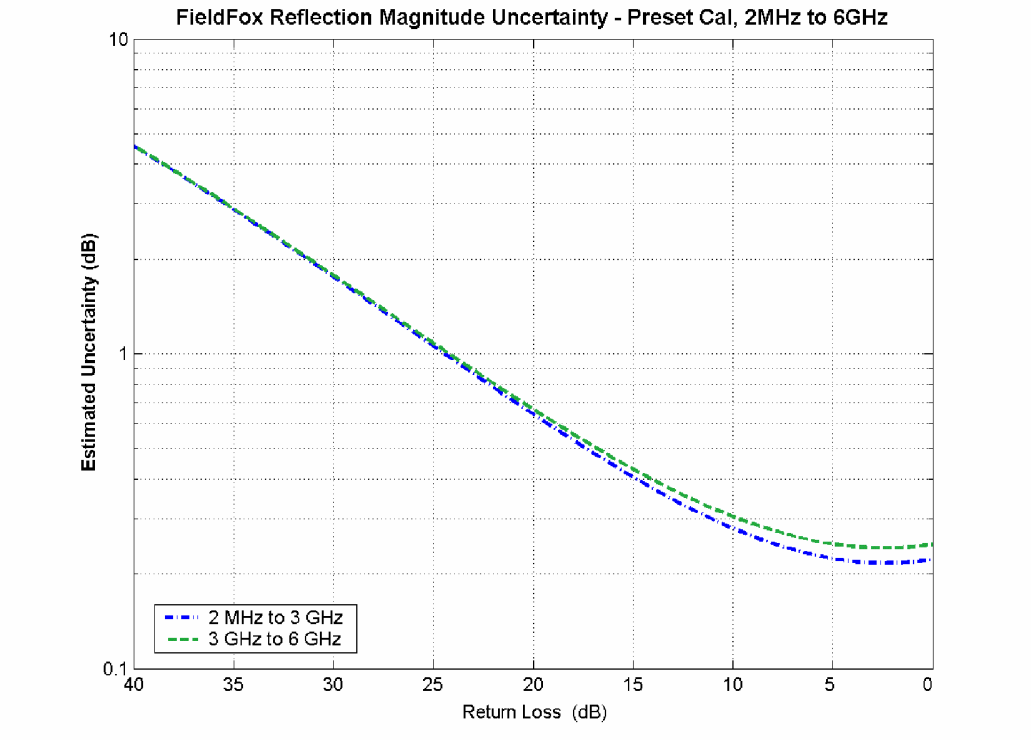


Figure 3: CAT Mode, Preset Cal – Magnitude (Typical)



Network Analyzer (Option 303)

The following CAT mode performance parameters apply to NA mode: frequency accuracy, frequency resolution, output power, directivity, source match, reflection tracking, and reflection and transmission dynamic range. NA mode performance that is in addition to CAT mode is listed in the table below.

Description	Specification	Supplemental Information
Frequency Range		
	2 MHz to 4 GHz	Option 104
	2 MHz to 6 GHz	Option 106
Measurement Speed		
S11: 1.75 GHz – 3.85 GHz, 1001 Points, Cal ON		1.5 ms/point (nominal)
S21: 1.78 GHz – 2.06 GHz, 201 Points, Cal ON		1.9 ms/point (nominal)
S11 Phase Uncertainty[1]		
	See Figure 5 on following page	
Display Range	–180° to +180°	
System Impedance		
	50Ω (nominal)	75Ω with appropriate adapter and Cal Kit

[1] Using recommended calibration kits.

Description	Information
Measurements	S11 magnitude and phase
	S21 magnitude (option 110)
	A receiver magnitude
	R receiver magnitude
Formats	Log magnitude, Linear magnitude Available ONLY for S11: VSWR, Phase, Smith Chart, Polar, Group delay, Unwrapped phase
Resolution (Number of data points)	101, 201, 401, 601, 801, 1001, 1601, 4001, 10001
	Custom number of points can be set using SCPI
Averaging	Sweep and point averaging; 2 to 999 points.
Number of traces	Four traces available. Tr1, Tr2, Tr3, Tr4
Data markers	Each trace has six independent markers that can be displayed simultaneously. 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, Min Search, Peak Excursion, Peak Threshold, Target, Bandwidth, Tracking
Display formats	Single-trace
	Dual-trace overlay (both traces on one graticule)

	Dual-trace split (each trace on separate graticules) Three-trace overlay (all three traces on one graticule) Three-trace split (each trace on separate graticules) Quad-trace split (each trace on separate graticules)
Display data	Display data, memory, data and memory, or data math
Trace math	Vector division or subtraction of current linear measurement values and memory data.
Scale	Autoscale, scale, reference level, reference position Autoscale: Automatically selects scale resolution and reference value to center the trace. Autoscale all scales all visible traces.
Title	Add custom titles to the display.
Limit lines	Define test limit lines that appear on the display for go/no go testing. Lines may be any combination of horizontal, sloping lines, or discrete data points. Each trace can have its own limit line. Limit Lines can be Fixed, Relative to center frequency and reference level, and can be built from existing traces.

Time Domain (Option 010)

Using time domain, data from transmission or reflection measurements in the frequency domain are converted to the time domain. The time-domain response shows the measured parameter value versus time.

Description	Information
Time stimulus modes	
Low-pass step	Similar to a traditional time domain reflectometer (TDR) stimulus waveform, Low-pass step is used to measure low-pass devices. The frequency-domain data should extend from DC (extrapolated value) to a higher value.
Low-pass impulse	Also used to measure low-pass devices
Bandpass impulse	Stimulates a pulsed RF signal and is used to measure the time-domain response of band-limited devices
Windowing	Windowing is used to filter the frequency-domain data and thereby reduce overshoot and ringing in the time-domain response.
Gating	Gating is used to selectively remove reflection or transmission time-domain responses. When converted back to the frequency domain, the effects of the responses outside the gate are removed.

Network Analyzer (continued)

Figure 4: NA Mode, Type–N Calibration Kit – Magnitude (Specification)

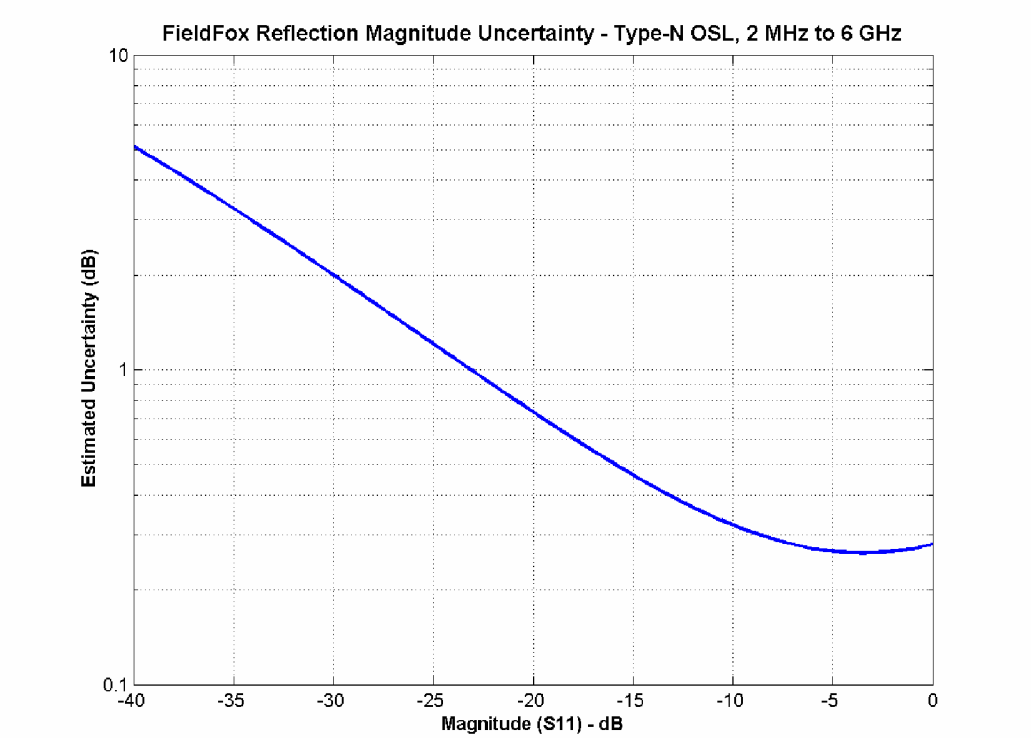
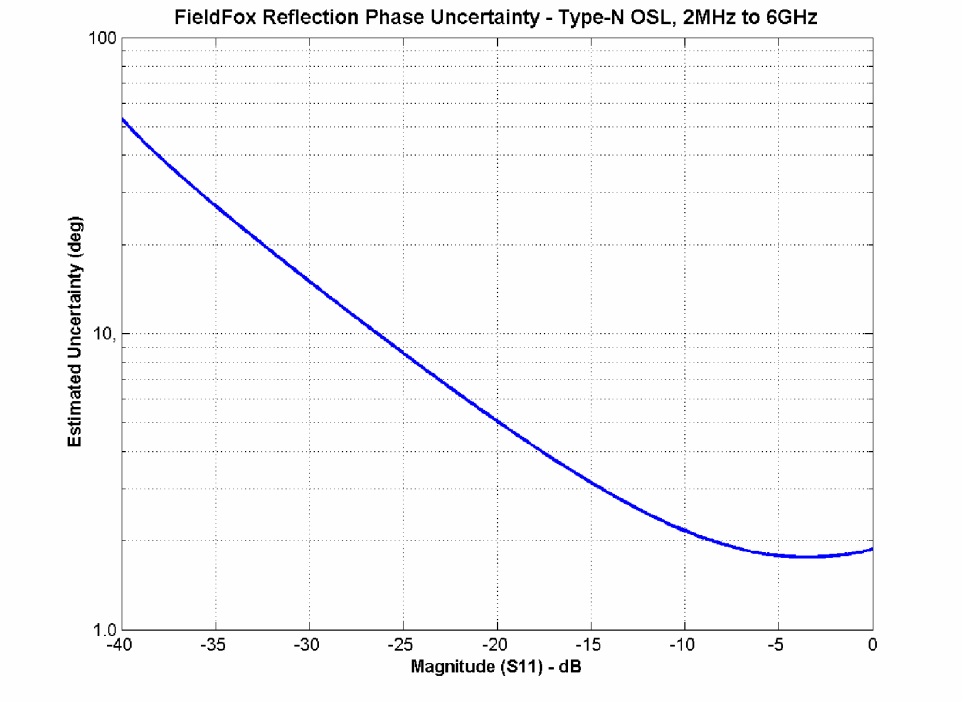
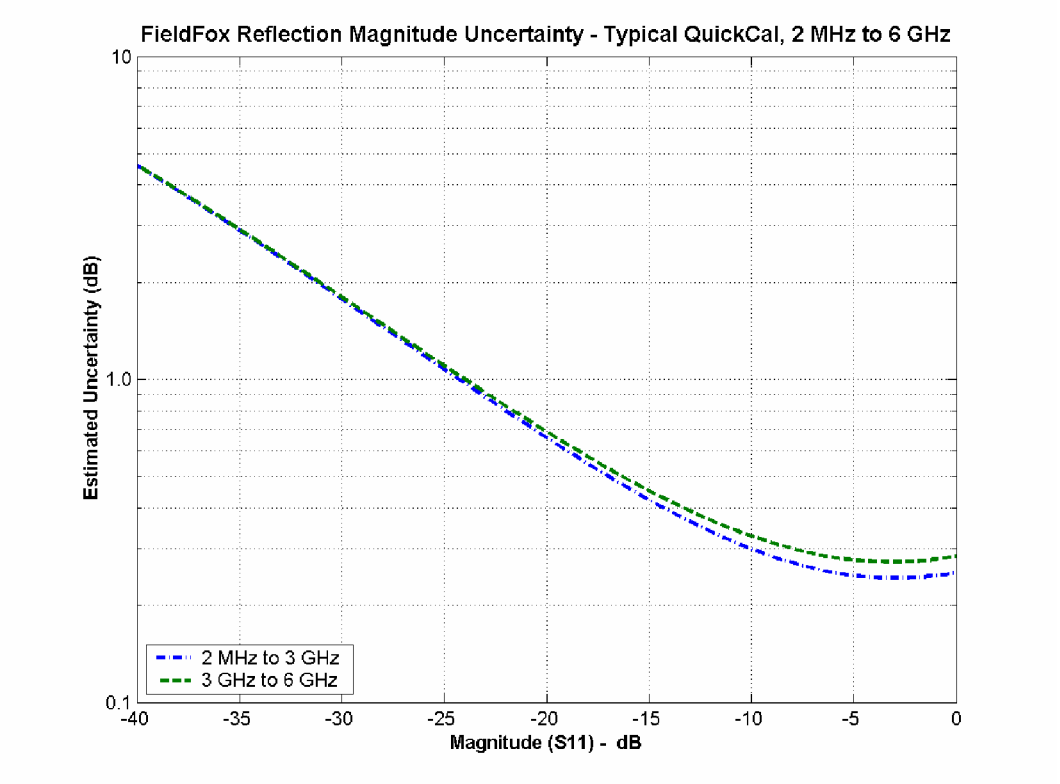


Figure 5: NA Mode, Type–N Calibration Kit – Phase (Specification)



Network Analyzer (continued)

Figure 6: NA Mode, QuickCal – Magnitude (Typical)



Network Analyzer (continued)

Figure 7: NA Mode, Preset Cal – Magnitude (Typical)

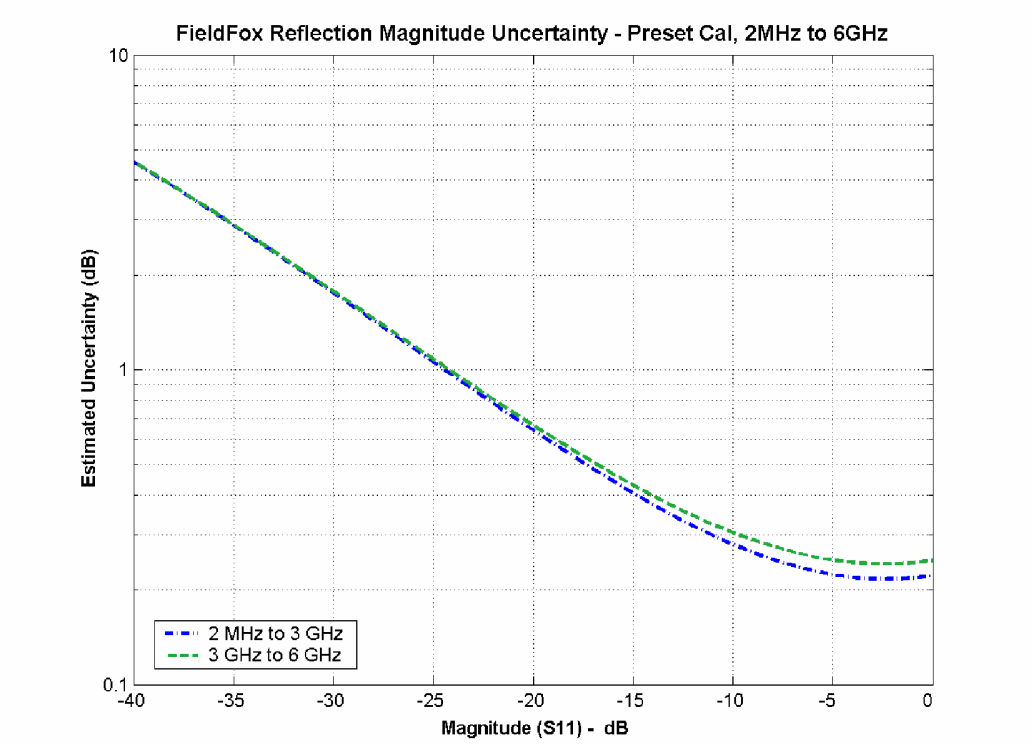
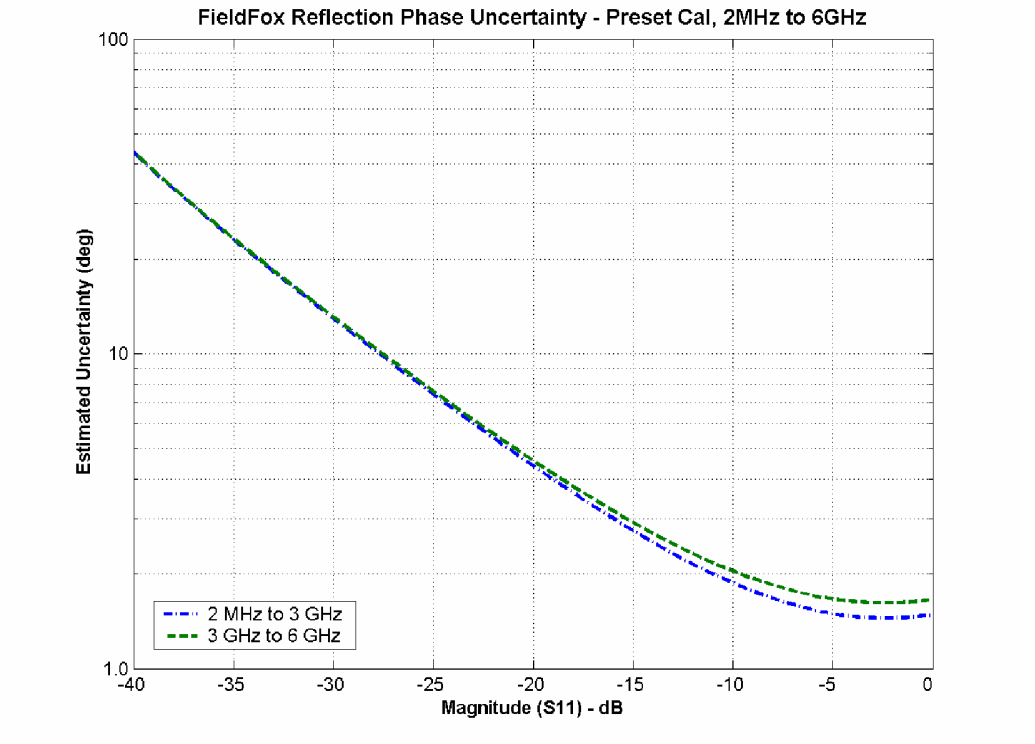


Figure 8: NA Mode, Preset Cal – Phase (Typical)



Spectrum Analyzer (Option 230 and 231)

Description	Specification	Supplemental Information
FREQUENCY		
Frequency Range		
Option 230	100 kHz to 4 GHz	Usable to 5 kHz [1]
Option 231	100 kHz to 6 GHz	Usable to 5 kHz [1] Tunable to 6.1 GHz
Frequency Reference		
Accuracy	±2 ppm	
Aging Rate	± 1 ppm/yr	
Temperature Stability	± 1 ppm over –10 to 55 °C	
Frequency Readout Accuracy (start, stop, center, marker)		
	± (readout frequency x frequency reference accuracy + RBW centering + 0.5 x horizontal resolution)	Horizontal resolution = span/(trace points – 1) RBW centering : 5% x RBW, FFT mode (nominal) 16% x RBW, Step mode (nominal)
Frequency Span		
Range	0 Hz (zero span), 10 Hz to max freq	
Accuracy	±(2 x RBW centering + horizontal resolution)	±(2 x RBW centering +2 x horizontal resolution) for detector = Normal
Resolution	1 Hz	
Sweep Time, Span = 0 Hz		
Range		
Minimum	1.0 us	
Maximum		
RBW = 2 MHz	2.18 ms	
RBW = 1 MHz	3.28 ms	
RBW = 300 kHz	5.46 ms	
RBW = 100 kHz	16.38 ms	
RBW = 30 kHz	54.60 ms	
RBW = 10 kHz	163.84 ms	
RBW = 3 kHz	546.00 ms	
RBW = 1 kHz	1.64 s	
RBW = 300 Hz	2.54 s	
Resolution	100.0 ns	
Readout	Entered value representing trace horizontal scale range.	

[1]With signal at center frequency.

Spectrum Analyzer (continued)

Description	Specification	Supplemental Information
Sweep Acquisition, Span > 0 Hz		
Range	1 to 5000. Number of data acquisitions per trace point. Value is normalized to the minimum required to achieve amplitude accuracy with CW signals.	Auto coupled. For pulsed RF signals, manually increase the sweep acquisition value to maximize the pulse spectrum envelope.
Resolution	1	
Readout	Measured value representing time required to tune receiver, acquire data, and process trace.	
Trigger		
Trigger Type	Free Run, Video, External	
Trigger Slope	Positive, Negative edge	
Trigger Delay		
Range	0 to 10 sec	
Resolution	100 nsec	
Auto Trigger	**Forces a periodic acquisition in the absence of a trigger event**	
Auto Trigger Range	0 sec (OFF) to 10 sec	
Time Gating		
Gate Method	Triggered FFT	
Gate Delay Range	Same as Trigger Delay	
Trace Update		
Span = 20 MHz, RBW = 3 kHz		1.5 updates/s (nominal)
Span = 100 MHz, RBW auto coupled		7 updates/s (nominal)
Span = 6 GHz, RBW auto coupled		1 update/s (nominal)
Trace Points		
	101, 201, 401, 601, 801, 1001 (Defaults to 401)	

Spectrum Analyzer (continued)

Description	Specification	Supplemental Information
Resolution Bandwidth (RBW)		
Range (–3 dB bandwidth)		
Zero Span	300 Hz to 1 MHz in 1–3–10 sequence; 2 MHz	
Non–Zero Span	10 Hz to 300 kHz in 1/1.5/2/3/5/7.5/10 sequence; 1 MHz, 2 MHz	Step keys change RBW in 1–3–10 sequence
Accuracy		
1 kHz to 1 MHz		± 5% (nominal)
10 Hz to 100 kHz non–zero span		± 1% (nominal)
2 MHz		± 10% (nominal)
300 Hz zero span		± 10% (nominal)
Selectivity (–60 dB/ –3 dB)		4:1 (nominal)
Video Bandwidth (VBW)		
Range	1 Hz to 2 MHz in 1/1.5/2/3/5/7/10 sequence	VBW ≥ RBW in zero span

Description	Specification	Typical	
		10 minute warm up	90 minute warm up
Stability			
Noise Sidebands, CF = 1 GHz			
10 kHz offset	< –85 dBc/Hz	–88 dBc/Hz	–88 dBc/Hz
30 kHz offset		–89 dBc/Hz	–89 dBc/Hz
100 kHz offset		–95 dBc/Hz	–95 dBc/Hz
1 MHz offset		–115 dBc/Hz	–115 dBc/Hz
Measurement Range			
	Displayed average noise level (DANL) to +20 dBm		
Input Attenuator Range	0 to 31 dB		
Resolution	1 dB steps		
Maximum Safe Input Level			
Average Continuous Power	+27 dBm (0.5 W)		
DC	±50 VDC		

Spectrum Analyzer (continued)

Description	Specification	Typical	
		10 minute warm up	90 minute warm up
Displayed Average Noise Level (DANL)			
10 Hz RBW, 10 Hz VBW, 50 ohm termination on input, 0 dB attenuation, average detector			
Preamplifier OFF			
20 to 30 °C:			
10 MHz to 2.4 GHz			–130 dBm
> 2.4 GHz to 5.0 GHz			–125 dBm
> 5.0 GHz to 6.0 GHz			–119 dBm
Preamplifier ON (Option 235)			
20 to 30 °C:			
10 MHz to 2.4 GHz	< –143 dBm		–148 dBm
> 2.4 GHz to 5.0 GHz	< –140 dBm		–145 dBm
> 5.0 GHz to 6.0 GHz	< –132 dBm		–138 dBm
–10 to 55 °C:			
10 MHz to 2.4 GHz	< –141 dBm		
> 2.4 GHz to 5.0 GHz	< –138 dBm		
> 5.0 GHz to 6.0 GHz	< –130 dBm		
Display Range			
Log Scale	Ten divisions displayed; 0.1 to 1.0 dB/division in 0.1 dB steps, and 1 to 20 dB/division in 1 dB steps		
Trace Detectors			
	Normal, Positive Peak, Negative Peak, Sample, Average		
Trace States			
	Clear/Write, Max Hold, Min Hold, Average, View, Blank		
Number of Traces			
	4		
Number of Averages			
	1 to 10,000		
Reference Level			
Range	–170 dBm to +30 dBm		
Resolution	0.1 dB		

Description	Specification	Typical	
		10 minute warm up	90 minute warm up
Accuracy	0 dB		

Spectrum Analyzer (continued)

Description	Specification	Typical	
		10 minute warm up	90 minute warm up
Absolute Amplitude Accuracy at 50 MHz			
Peak detector, 10 dB attenuation, preamplifier off, RBW < 2 MHz, input signal –5 dBm to –50 dBm, all settings auto–coupled			
20 to 30 °C	±0.8 dB	±0.8 dB	±0.4 dB
–10 to 55 °C	±1.1 dB		±0.8 dB
Frequency Response			
Relative to 50 MHz, Peak detector, 10 dB attenuation, preamplifier off, RBW = 30 kHz, input signal 0 dBm to –50 dBm, all settings auto–coupled			
20 to 30 °C:			
2 MHz to 10 MHz	±1.1 dB	±1.0 dB	±0.5 dB
> 10 MHz to 3.0 GHz	±0.9 dB	±0.6 dB	±0.3 dB
> 3.0 GHz to 5.0 GHz	±1.3 dB	±1.1 dB	±0.5 dB
> 5.0 GHz to 6.0 GHz	±1.5 dB	±1.5 dB	±0.5 dB
–10 to 55 °C:			
2 MHz to 10 MHz	±2.0 dB		±1.0 dB
> 10 MHz to 3.0 GHz	±1.5 dB		±0.6 dB
> 3.0 GHz to 5.0 GHz	±2.0 dB		±1.1 dB
> 5.0 GHz to 6.0 GHz	±2.6 dB		±1.5 dB
Preamplifier ON (Option 235)			
20 to 30 °C:			
2 MHz to 10 MHz			±0.7 dB
> 10 MHz to 3.0 GHz			±0.5 dB
> 3.0 GHz to 5.0 GHz			±0.7 dB
> 5.0 GHz to 6.0 GHz			±0.7 dB
–10 to 55 °C:			
2 MHz to 10 MHz			±1.2 dB
> 10 MHz to 3.0 GHz			±0.8 dB
> 3.0 GHz to 5.0 GHz			±1.3 dB
> 5.0 GHz to 6.0 GHz			±1.7 dB

Spectrum Analyzer (continued)

Description	Specification	Typical		Supplemental Information
		10 minute warm up	90 minute warm up	
Resolution Bandwidth Switching Uncertainty				
RBW < 2 MHz				0.0 dB 0.7 dB peak–to–peak [3]
Total Absolute Amplitude Accuracy [1]				
Peak detector, 10 dB attenuation, preamplifier off, RBW < 2 MHz, input signal 0 dBm to –50 dBm, all settings auto coupled	Absolute Amplitude at 50 MHz + Frequency Response [4]			
20 to 30 °C:				
2 MHz to 10 MHz	±1.8 dB	±1.28 dB	±0.60 dB	
> 10 MHz to 3.0 GHz	±1.5 dB	±1.0 dB	±0.50 dB	
> 3.0 GHz to 5.0 GHz	±1.9 dB	±1.36 dB	±0.60 dB	
> 5.0 GHz to 6.0 GHz	±2.1 dB	±1.7 dB	±0.60 dB	
RF Input VSWR				
At all attenuation settings				1.5:1 (nominal)
Second harmonic distortion (SHI)				
–30 dBm signal at input mixer [2]				
2 MHz to 1.35 GHz				< –70 dBc +40 dBm SHI (nominal)
1.35 GHz to 3.0 GHz				< –80 dBc +50 dBm SHI (nominal)
Third Order Intermodulation Distortion (TOI)				
Two –30 dBm tones at input mixer				< –96 dBc +18 dBm TOI (nominal)

[1] With signal at center frequency.

[2] Mixer level = RF input level – input attenuation

[3] For signals not at center frequency.

[4] The specification for Total Absolute Amplitude Accuracy is less than the sum of the Absolute Amplitude Accuracy and Frequency Response specifications because redundant uncertainty is removed.

Spectrum Analyzer (continued)

Description	Supplemental Information
Residual Responses	
Input terminated, 0 dB attenuation, preamplifier off, RBW ≤ 1 kHz, VBW auto coupled	
20 MHz to 3 GHz	–90 dBm (nominal)
> 3 GHz to 6 GHz	–85 dBm (nominal)
Spurious Responses	
Input Mixer level –30 dBm	
RFsig = RFtune + 417 MHz	–70 dBc (nominal)
RFsig = RFtune + 1.716 GHz	–80 dBc (nominal)
Input Mixer level –10 dBm; First IF Image Response	
Rfsig = Rftune – 2 x 0.8346 GHz for Rftune 5.7 to 6.0 GHz	–50 dBc (nominal)
Sidebands	–80 dBc (nominal) –60 dBc (nominal) when battery charging, 260 kHz offset

Figure 10

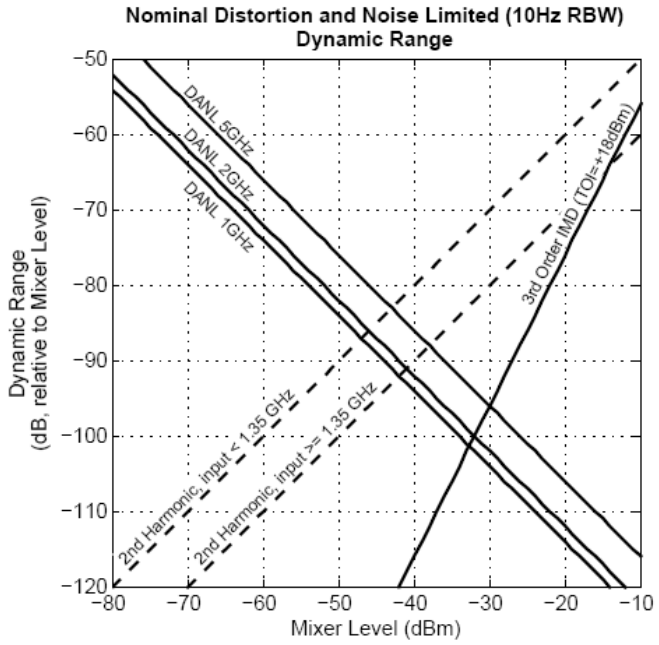
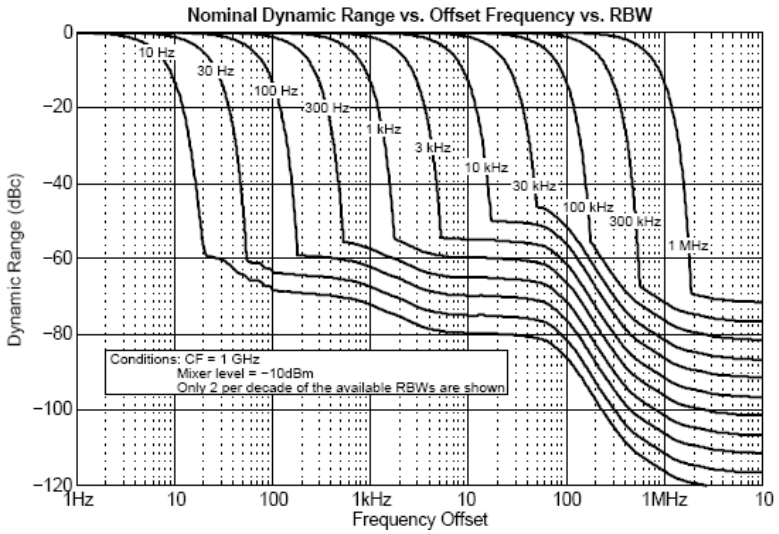


Figure 11



Description	Specification
Independent Signal Source or Tracking Generator	
The independent source or tracking generator is included with either spectrum analyzer option. The source can be used in continuous wave (CW) or stimulus/response (S/R) mode. In CW mode, the source frequency is independent of the receiver frequency. The source can be tuned to a frequency that is different from the receiver. In stimulus/response mode, the source operates the same as a traditional tracking generator - the receiver tracks the source.	
Frequency range	
2 MHz to 4 GHz (Option 230) or 2 MHz to 6 GHz (Option 231)	
Amplitude	
High power	2 MHz to 4 GHz < +8 dBm, +6 dBm (nominal) >4 GHz to 6 GHz <+7 dBm, +2 dBm (nominal)
Low power	2 MHz to 4 GHz <-23 dBm, -25 dBm (nominal) >4 GHz to 6 GHz < -24 dBm, -29 dBm (nominal)
Attenuation	0 to 31 dB
Functions	Continuous wave, stimulus / response

Spectrum Analyzer (continued)

Description	Specification	Supplemental Information
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 sec.
Audio Signal Strength Indicator	
	Audio Signal Strength Indicator helps locate signals. The tone and frequency of the beep varies with signal strength.
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. Custom Radio Standards can also be defined, imported, and applied to the FieldFox.	
FieldFox Power Suite Measurement types	
	Channel Power Occupied Bandwidth Adjacent Channel Power Ratio

Preamplifier (Option 235)

Description	Specification	Typical 10 minute warm up
Frequency Range		
Option 230	100 kHz to 4 GHz	
Option 231	100 kHz to 6 GHz	
Gain		22 dB

Interference Analyzer (Option 236)

Description	Specification	Supplemental Information
Display Types		
Spectrogram	Overlay, full screen, top, or bottom with active trace	
Waterfall		
Markers		
	Time, delta time	

Channel Power Meter (Option 311)

Channel power meter is a built-in power measurement that application does not require an external power sensor. Set the center frequency and channel bandwidth. The results are shown on a large analog display.

Description	Specification	Typical
Frequency range:		
	100 kHz to 4/6 GHz	
Power accuracy		
2 MHz to 10 MHz	±1.8 dB	±0.60 dB
> 10 MHz to 3.0 GHz	±1.5 dB	±0.50 dB
> 3.0 GHz to 5.0 GHz	±1.9 dB	±0.60 dB
> 5.0 GHz to 6.0 GHz	±2.1 dB	±0.60 dB

External USB Power Sensor Support (Option 302)

The external USB power sensor option supports various Keysight USB Power Sensors.
Supported power sensors: www.keysight.com/find/usbsensorsforfieldfox

Power Sensor Measurements vs. Frequency (Option 208)

This feature allows the FieldFox source frequency to be set independently from the power sensor (receiver) frequency. With frequency-offset using power sensor (FOPS), the frequency of both the source and receiver are swept, and the two track each other. The offset frequency can be negative, zero, or positive.

FOPS can be used to characterize the scalar transmission response of devices such as mixers and converters. This frequency-offset capability is necessary for conversion loss/gain measurements on frequency-translating devices, since by definition, the input and output frequencies of the DUT are different. The FieldFox source stimulates the DUT and the power sensor is used as the measurement receiver.

Since power sensors are inherently broadband devices (not frequency-selective), the user should ensure that only the signal of interest is present at the power sensor input and that all others signals are filtered appropriately.

Setup parameters

Source frequency:	center/span or start/stop. Range determined by FieldFox.
Receiver frequency:	range determined by power sensor range.
Frequency offset:	0, > 0, < 0
Frequency step size:	30 kHz minimum
Number of points:	2 to 1601

Combination of number of points and frequency step size limited by span.

Dwell time/point:	0 to 1.0 sec

Source frequency span must be equal to receiver frequency span.

Receiver sweep direction: forward (default setting) or reverse.

For some DUTs, the output frequency may sweep in a reverse direction, as compared to the source frequency. The basic relationships between the source, receiver and offset frequencies are shown in the table below. The FieldFox analyzer includes an offset calculator that ensures a fast measurement setup.

Src sweep direction	Rx sweep direction	Frequency calculations
Forward $f2_{rc} > f1_{src}$	Forward $f2_{rx} > f1_{rx}$	Receiver frequency = Source frequency ± Offset
Forward $f2_{src} > f1_{src}$	Reverse $f2_{rx} < f1_{rx}$	Receiver frequency = Offset – Source frequency Offset > Source frequency

Measurements

Source power, gain/loss and receiver (Rx) power

Gain = Rx power / source power (memory). Source power (memory) is measured during setup.

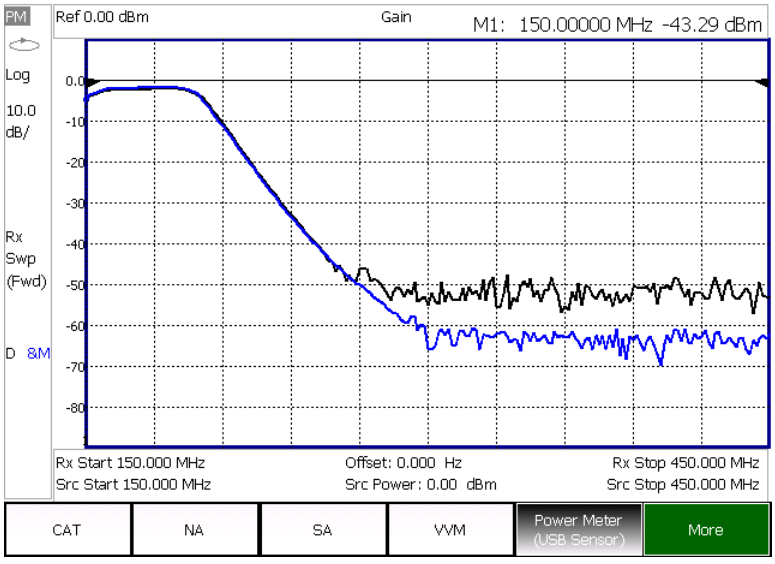
Dynamic range

Output power: See FieldFox source output power supplemental information on page 5.

Dynamic range: The dynamic range with FOPS is dependent on FieldFox's output power and the power sensor's dynamic range. Supported USB power sensors: www.keysight.com/find/fieldfoxsupport

Dynamic range example

The graph below shows a filter measurement using two different power sensors, the U2002A (-60 to +20 dBm) and the U2021XA (-45 to +20 dBm). While a filter is not commonly measured using FOPS, it is a useful device for demonstrating dynamic range. For both measurements, the FieldFox source power was set to 0 dBm, the maximum available in the selected frequency range of 150 to 450 MHz.



Pulse Measurements (Option 330)

The FieldFox 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 Keysight's UBS 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.keysight.com/find/usbsensorsforfieldfox

Setup parameters:

Frequency, time (center), time/division, gating, triggering, video bandwidth, resolution averaging

Functions:

Average power, peak power, and peak to average ratio, standard and gated

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

Remote Control Capability (Option 030)

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.

- iOS device requirements
- iPhone, iPad, or iPod Touch
- iOS of 6.1 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 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.

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

General Information

Description	Specification	Typical	Supplemental Information
Calibration Cycle			
	1 Year		
Environmental			
	▪ Keysight Technologies Environmental Test manual (ETM) for Outdoor Equipment[1] ▪ MIL–PRF–28800F class 2		
Altitude – Operating	9,144 m (30,000 ft)		Under battery operation AC to DC adapter rated at 3000m
Altitude – Non–Operating	15,240 m (50,000 ft)		
IP Class	30		
Temperature Range			
Operating			
AC Power	–10 to 55 °C		
Battery	–10 to 50 °C	–10 to 55 °C	
Storage	–51 to 71 °C		With the battery pack removed. 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.
EMC			
Complies with European EMC Directive 2004/108/EC	▪ IEC/EN 61326–2–1 ▪ CISPR Pub 11 Group 1, class A ▪ AS/NZS CISPR 11 ▪ ICES/NMB–001		When subjected to continuously present radiated electromagnetic phenomena, some degradation of performance may occur
ESD			
	▪ IEC/EN 61000–4–2		Functional up to 20 kV test [1]
Safety			
Complies with European Low Voltage Directive 2006/95/EC	▪ IEC/EN 61010–1 2nd Edition ▪ Canada: CSA C22.2 No. 61010–1–04 ▪ USA: UL 61010–1 2nd Edition		

General Information (continued)

Description	Specification	Typical	Supplemental Information
Power			
Power Supply			
External DC Input	15 to 19 VDC		40 W 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			
On		12 W	
Battery			
	10.8 V, 4.6 A–h		Lithium ion
Operating Time		4 hours	
Charge Time	A fully discharged battery takes about 1.5 hours to recharge to 80%, 4 hours to 100%		
Discharge Temperature Limits	–10 to 60 °C[2], ≤ 85% RH		
Charge Temperature Limits	0 to 45 °C[2], ≤ 85% RH		
Storage Temperature Limits	–20 to 50 °C[2], ≤ 85% RH		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
Data Storage			
Internal	Minimum 16 MB		Up to 1000 instrument states and trace
External			Supports USB 2.0 compatible memory devices; Supports miniSD and miniSDHC memory cards
Display			
	6.5" transflective color VGA LED–backlit 640 x 480 with anti–glare coating		
Weight			
	2.8 kg (6.2 lbs) including battery		
Dimensions (H x W x D)			
	292 x 188 x 72 mm (11.5" x 7.4" x 2.8")		

General Information (continued)

Description	Specification	Typical	Supplemental Information
Inputs & Outputs			
RF Out Port			
Connector	Type–N, female		
Impedance	50 Ω (nominal)		
Damage Level	> +23 dBm, > ±50 VDC		
RF In Port			
Connector	Type–N, female		
Impedance	50 Ω (nominal)		
Damage Level	> +27 dBm, > ±50 VDC		
LO Emissions			
0 dB attenuation, preamplifier off			–65 dBm (nominal)
Headphone Jack Connector	3.5 mm (1/8 inch) miniature audio jack		
USB			
USB–A (2 ports)	Hi–speed USB 2.0		
Mini USB (1 port)	Hi–speed USB 2.0		Provided for future use.
LAN	100Base-T ONLY RJ–45 connector		10Base-T is NOT supported
External Reference /Trigger Input			
Connector	BNC female		
External Reference			
Input Frequency	10 MHz		
Input Amplitude Range			–5 dBm to +10 dBm (nominal)
Impedance			50 Ω (nominal)
Lock Range			±10 ppm of external reference frequency (nominal)
Trigger Input			
Impedance			10 KΩ (nominal)
Level Range			
Rising Edge			1.7 V (nominal)
Falling Edge			1 V (nominal)

1 Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual (ETM) for outdoor equipment (OE) and verified to be robust against the environmental stresses of storage, transportation and end use ; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power line conditions.

2 Charge and discharge temperatures are internal temperatures of the battery as measured by a sensor embedded in the battery. The Battery screen displays temperature information. To access the screen, select System, Service Diagnostics, and Battery

Supported Cal Kits

The following list of calibration kits are loaded in the FieldFox. You can add additional calibration kits to the FieldFox using FieldFox Data Link Software.

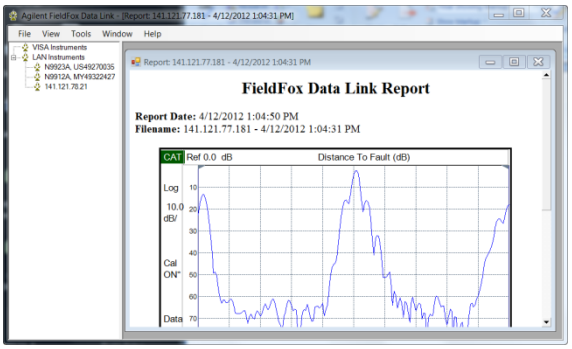
The basic 50-ohm QuickCal does not require cal standards. However, for higher accuracy, perform QuickCal with a load. 75-ohm QuickCal does require a 75-ohm load.

Model number	Description
N9910X-800	3-in-1 OSL calibration kit, DC to 6 GHz, Type-N (m) 50 ohm
N9910X-801	3-in-1 OSL calibration kit, DC to 6 GHz, Type-N (f) 50 ohm
N9910X-802	3-in-1 OSL calibration kit, DC to 6 GHz, 7/16 DIN (m)
N9910X-803	3-in-1 OSL calibration kit, DC to 6 GHz, 7/16 DIN (f)
85031B	Economy calibration kit, DC to 6 GHz, 7 mm
85032E	Economy calibration kit, DC to 6 GHz, Type-N, 50-ohm
85032F	Standard calibration kit, DC to 9 GHz, Type-N, 50-ohm
85033E	Standard calibration kit, DC to 9 GHz, 3.5 mm
85036B	Standard calibration kit, DC to 3 GHz, Type-N 75-ohm
85036E	Economy calibration kit, DC to 3 GHz, Type-N 75-ohm
85038A	Standard calibration kit, DC to 7.5 GHz, 7-16
85039B	Economy calibration kit, DC to 3 GHz, Type-F, 75-ohm
85052D	Economy calibration kit, DC to 26.5 GHz, 3.5 mm
85054B	Standard calibration kit, DC to 18 GHz, Type-N, 50-ohm
85054D	Economy calibration kit, DC to 18 GHz, Type-N, 50-ohm
85514A	Calibration kit, 4-in-1, open, short, load and through, DC to 9 GHz, Type-N(m), 50
85515A	Calibration kit, 4-in-1, open, short, load and through, DC to 9 GHz, Type-N(f), 50
85516A	Calibration kit, 4-in-1, open, short, load and through, DC to 3 GHz, Type-N(m), 75 ohm
85517A	Calibration kit, 4-in-1, open, short, load and through, DC to 3 GHz, Type-N(f), 75 ohm

FieldFox Data Link Software

FieldFox Data Link software, installed on a PC, provides the following capabilities:

- Capture of current trace and settings
- Opening of data files (s1p, s2p, csv, sta, and png) residing on the instrument
- Editing cal kit and cable files on the instrument, or creating new cal kits and cables
- Transferring files to/from the instrument
- Annotating plots for documentation purposes
- Marker, limit line, and format changes on the PC
- Report generation
- Printing function



FieldFox Data Link software is available from the following website:

http://www.keysight.com/find/fieldfoxsupport

www.keysight.com/find/myKeysight
A personalized view into the information most relevant to you.

www.axiestandard.org
AdvancedTCA© Extensions for Instrumentation and Test (AXIe) is an open standard that extends the AdvancedTCA for general purpose and semiconductor test. Keysight is a founding member of the AXIe consortium.

www.lxistandard.org
LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

www.pxisa.org
PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Three-Year Warranty
www.keysight.com/find/ThreeYearWarranty
Keysight'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.

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

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

www.keysight.com/find/contactus

Americas	
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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

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