FieldFox Handheld Analyzers

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

This configuration guide describes configurations, options and accessories for the FieldFox family of portable analyzers. This guide should be used in conjunction with the technical overview and data sheet for a complete description of the analyzers. The table on Page 3 titled "FieldFox Family and Options" shows a comparison of the functions available in the FieldFox family of analyzers.

Note: Combination analyzer (combo) = Cable and antenna tester (CAT) + Vector network analyzer (VNA) + Spectrum analyzer (SA)

Included Accessories

The following accessories are included with every FieldFox:

- AC/DC adapter
- Battery
- Soft carrying case
- LAN cable
- Quick Reference Guide

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FieldFox Family and Options

Option	Description	Combination Analyzers N9913/4/5/6/7/8B	Spectrum Analyzers N9933/4/5/6/7/8B
CAT / vector network analysis			
010	VNA time domain	✓	—
210	VNA transmission/reflection	✓	—
211	VNA full 2-port S-parameters	✓	—
212	1-port mixed-mode S-parameters	✓	—
215	TDR cable measurements	✓	—
305	Cable and antenna analyzer	Base model[1]	—[2]
308	Vector voltmeter	✓	—
320	Reflection meas. (RL, VSWR and scalar meas.)	—[3]	✓
Spectrum analysis			
209	Extended range transmission analysis (ERTA)	✓	✓
220	Tracking generator	—[4]	✓
233	Spectrum analyzer	✓	Base model[1]
235	Pre-amplifier	✓	✓
236	Interference analyzer and spectrogram	✓	✓
238	Spectrum analyzer time gating	✓	✓
312	Channel scanner	✓	✓
350	Real-time spectrum analyzer (RTSA)	✓	✓
351	I/Q analyzer (IQA)	✓	✓
352	Indoor and outdoor mapping	✓	✓
355	Analog demodulation	✓	✓
356	Noise figure (NF)	✓	✓
358	EMF measurements	✓	✓
360	Phased array antenna support	✓	✓
370	Over-the-air (OTA) LTE FDD	✓	✓
377	Over-the-air (OTA) 5GTF	✓	✓
378	Over-the-air (OTA) 5G NR	✓	✓
B04	Analysis bandwidth, 40 MHz[5]	✓	✓
B10	Analysis bandwidth, 100 MHz[5]	✓	✓
Power measurements			
208	USB power sensor meas. versus frequency	✓	✓
302	USB power sensor support	✓	✓
310	Built-in power meter	✓	✓
330	Pulse meas. with USB peak power sensor	✓	✓

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[1] Base model functionality listed is the primary function of that instrument. For example, on the N991xB combo analyzers, cable and antenna analyzer is the standard function included with every N991xB.
[2] Option 305 is not available on the N993xB. A subset of measurements, return loss and VSWR, is available as Option 320.
[3] Option 320 is not applicable to N991xB. The reflection measurements of return loss and VSWR are included with every N991xB.
[4] On the N991xB analyzers, order Options 233 and 210 to obtain a tracking generator with the spectrum analyzer. There is no Option 220 on the N991xB analyzers. Option 233 provides the spectrum analyzer capability and Option 210 the "tracking" capability.
[5] 10 MHz standard.

Option	Description	Combination Analyzers N9913/4/5/6/7/8B	Spectrum Analyzers N9933/4/5/6/7/8B
System features			
030	Remote control capability	✓	✓
307	GPS receiver	✓	✓
309	DC bias variable-voltage source	✓	✓
—	Frequency extender support[1]	✓	✓
Windows based software			
89601B	PathWave VSA (89600 VSA) software	✓	✓
N6820ES	Surveyor 4D software	✓	✓

FieldFox RF and Microwave (Combination) Analyzers

Analyzer models

Step 1. Select the model that provides the desired frequency range.

Model	Description	CAT and VNA frequency	SA frequency [2]	Test port connectors
N9913B	4 GHz FieldFox RF analyzer	30 kHz to 4 GHz	9 kHz to 4 GHz	Type-N (f)
N9914B	6.5 GHz FieldFox RF analyzer	30 kHz to 6.5 GHz	9 kHz to 6.5 GHz	Type-N (f)
N9915B	9 GHz FieldFox microwave analyzer	30 kHz to 9 GHz	9 kHz to 9 GHz	Type-N (f)
N9916B	14 GHz FieldFox microwave analyzer	30 kHz to 14 GHz	9 kHz to 14 GHz	Type-N (f)
N9917B	18 GHz FieldFox microwave analyzer	30 kHz to 18 GHz	9 kHz to 18 GHz	Type-N (f)
N9918B	26.5 GHz FieldFox microwave analyzer	30 kHz to 26.5 GHz	9 kHz to 26.5 GHz	3.5 mm (m)

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[1] Frequency extenders are not currently supported on models N9913/33B, N9914/34B and N9915/35B since the starting LO frequency of these mixers is higher than 9 GHz and the LO is provided to the mixer from FieldFox Port 1. For a list of supported OML frequency extenders, see Accessories page 22.

[2] Useable to 5 kHz.

Analyzer options

Step 2. Select optional measurement capabilities.
Any of these options can easily be added as a software upgrade in the future.

Option	Description	Prerequisite options/notes
CAT / vector network analysis		
010	VNA time domain	Requires 210, recommend 211. See page 7, FAQ #7
210	VNA transmission/reflection	Recommend ordering a cal kit. See page 6, FAQ #4 and #6
211	VNA full 2-port S-parameters	Requires 210, recommend ordering a cal kit. See page 6, FAQ #5
212	1-port mixed-mode S-parameters	Requires 210 and 211
215	TDR cable measurements	—
308	Vector voltmeter	210 and 211 required for full VVM functionality. See page 7, FAQ #8
Spectrum analysis		
209	Extended range transmission analysis (ERTA)	Requires 233 and 210. Recommend 307. Requires two FieldFox units. See page 7, FAQ # 9. See page 10 for typical configuration.
233	Spectrum analyzer	—
235	Pre-amplifier	Requires 233
236	Interference analyzer and spectrogram	Requires 233
238	Spectrum analyzer time gating	Requires 233
312	Channel scanner	Requires 233
350	Real-time spectrum analyzer (RTSA)	Requires 233, Recommend 235. See page 8, FAQ # 11
351	I/Q Analyzer (IQA)	Requires 233
352	Indoor and outdoor mapping	Requires 233, 307, and at least one of 312, 360, 370, 377 or 378. See page 8, FAQ #15
355	Analog demodulation	Requires 233
356	Noise Figure (NF)	Requires 233, 235, 309 and accessory item N9910X-713 BNC to SMB cable. See page 8, FAQ #13 for external preamplifier and noise source requirements.
358	EMF measurements	Requires 233. Also requires triaxial antenna. See page 8, FAQ #16
360	Phased array antenna support	Requires 233 and external mixer. See page 8, FAQ #14
370	Over-the-air (OTA) LTE FDD	Requires 233, 307. Recommend 235.
377	Over-the-air (OTA) 5GTF	Requires 233, 307 and external mixer. Recommend 235. See page 8, FAQ #14
378	Over-the-air (OTA) 5G NR	Requires 233, B10, 307. Recommend 235. FR2 frequencies above 26.5 GHz require external mixer. See page 9, FAQ #18
B04	Analysis bandwidth, 40 MHz[1]	Requires 233. Recommend 350, 351 or 89600 VSA software.
B10	Analysis bandwidth, 100 MHz[1]	Requires 233. Recommend 350, 351, 378 or 89600 VSA software.
Power measurements		
208	USB power sensor meas. versus frequency	Requires 302. See page 12, FAQ #9
302	USB power sensor support	Need to order USB power sensor [2]. See page 11, FAQ #1
310	Built-in power meter	No power sensor required. See page 11, FAQ #2
330	Pulse meas. with USB peak power sensor	Requires USB peak power sensor. See page 12, FAQs #7 and #8

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[1] 10 MHz standard.

[2] List of compatible sensors available from www.keysight.com/find/fieldfoxsupport

Option	Description	Prerequisite options/notes
System features		
030	Remote control capability	Requires an iOS device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See page 12, FAQ #3
309	DC bias variable-voltage source	Recommend N9910X-713 cable, see page 12, FAQ #4
—	Frequency extender support	Requires 233. Optional 350, 351, 360, 370, 377, 378, PathWave VSA software. See Accessories, page 22
Windows based software		
89601B	PathWave VSA (89600 VSA) software	Requires 233
N6820ES	Surveyor 4D software	Requires 233, 235 and 307, see page 9, FAQ #17

FieldFox RF and Microwave (Combination) Analyzer FAQs

Question	Answer
1. What is included with a base N991xB analyzer?	The base model includes the cable and antenna analyzer
	Measurements: DTF (dB, linear, VSWR), return loss and DTF, return loss (dB), and 1-port cable loss
	Calibrations: CalReady, OSL, and response cal
	Note: 2-port insertion loss is NOT included with the base model, if 2-port insertion loss is needed, order Option 210
	Note: Base analyzer does not have phase information, for S11 or S21 phase, order Option 210
2. What is included with N991xB Option 233?	Basic spectrum analysis, four traces, different detector types, radio standard selection, limit lines
	Channel power, occupied bandwidth, adjacent channel power, spectrum emission mask
	AM/FM tune and listen, field strength measurements, antenna factors, frequency counter marker
	Tracking generator (TG)/Independent source: - TG CW mode (source CW frequency can be set independent of SA frequency) - included - TG CW coupled mode (source CW frequency auto coupled to SA's center frequency) - included - TG tracking mode (traditional TG operation, swept SA coupled to swept source) - (requires Option 210)
3. What is included with N991xB Option 236?	Interference analyzer and spectrogram, trace playback and recording
4. What is included with N991xB Option 210?	Option 210 adds a VNA with transmission/reflection (T/R) capability
	Measurements: S21, S11, magnitude and phase
	Additionally, in the CAT mode, you can measure 2-port insertion loss
	Calibrations: CalReady, OSL, response, and enhanced response cal
	If you need all four S-parameters, order Options 210 and 211
	If you need 2-port cal, order Options 210 and 211
	Adds tracking mode to the tracking generator/independent source included with Option 233, spectrum analyzer
5. What is included with N991xB Option 211?	Option 211 adds full 2-port S-parameter capability to the VNA mode
	Measurements: All four S-parameters (S11, S21, S22, S12), magnitude and phase
	Calibrations: CalReady, OSL, response, enhanced response, and full 2-port cal
6. Can I measure group delay on N991xB analyzers?	If you have phase measurement capability, then you can measure group delay. Option 210 is required for any phase measurement capability. So, if you do not have Option 210, you cannot measure group delay.

Question	Answer
7. What is included with N991xB Option 010?	S11/S21 in time domain, if Option 210 is ordered. To get time domain data for all four S-parameters and full 2-port cal, order Option 211.
	View both time and frequency domain data at the same time
	Low-pass, impulse, and band-pass modes
	Minimum, medium, and maximum window
	Gating
8. What is included with N991xB Option 308?	With Option 308: 1-port cable trimming
	With Options 308 and 210: 1-port cable trimming, 2-port transmission
	With Options 308, 210, and 211: 1-port cable trimming, 2-port transmission, A/B and B/A
	Note: A/B and B/A measurements require an external source
9. What are the requirements for Option 209?	Extended Range Transmission Analysis (ERTA) or Option 209 is a scalar measurement system based on the use of two (2) FieldFox units. One FieldFox acts as the *source* and reference receiver, while the second FieldFox acts as the *measurement* receiver. When different frequency models are used in an ERTA pair, the system frequency range is limited to the lowest of the pair.
	Required hardware
	A. Two (2) FieldFox units. FieldFox units can be any of these models: - FieldFox combination analyzers: N9913B, N9914B, N9915B, N9916B, N9917B, N9918B - FieldFox spectrum analyzers: N9933B, N9934B, N9935B, N9936B, N9937B, N9938B
	The two FieldFox units used in ERTA do not have to be the same model.
	- ERTA requires the following options on Combo FieldFox models (N9913B, N9914B, N9915B, N9916B, N9917B, N9918B): - Option 210, VNA transmission/reflection - Option 233, spectrum analyzer
	ERTA requires the following options on SA FieldFox models (N9933B, N9934B, N9935B, N9936B, N9937B, N9938B) - Option 220, tracking generator
	Both FieldFox units (the one used as the source, and the other used as the receiver) must have the options listed above. The ERTA option (209) cannot be installed unless 210 and 233 are present on a combo analyzer; or 220 is present on a SA analyzer.
	With either the Combo or SA FieldFox units, the following options are highly recommended: - Option 235, preamplifier – this option increases the measurement dynamic range by increasing the received signal power - Option 307, GPS receiver – this option increases the dynamic range by increasing the frequency accuracy and permitting the use of a narrower RBW
	B. Power splitter, two-resistor model, Keysight 11667A, 11667B, or 11667C. Other power splitters can be used but the specifications listed are based on the match and tracking performance of 11667A, 11667B, or 11667C. Three-resistor power splitters are not recommended.
	C. N9910X-712, Trigger/Reference-in cable, SMA (m) to BNC(f), 1 m, quantity two
	D. N9910X-713, Trigger/Reference-out cable, SMB (m) to BNC (m), 1 m, quantity two
	E. LAN connection – For ERTA, the two FieldFox units communicate via a LAN connection. For a direct connection, a LAN cable is required. Or, both analyzers can be on a local area network.
	Recommended accessory:
	F. N9910X-825, GPS Antenna

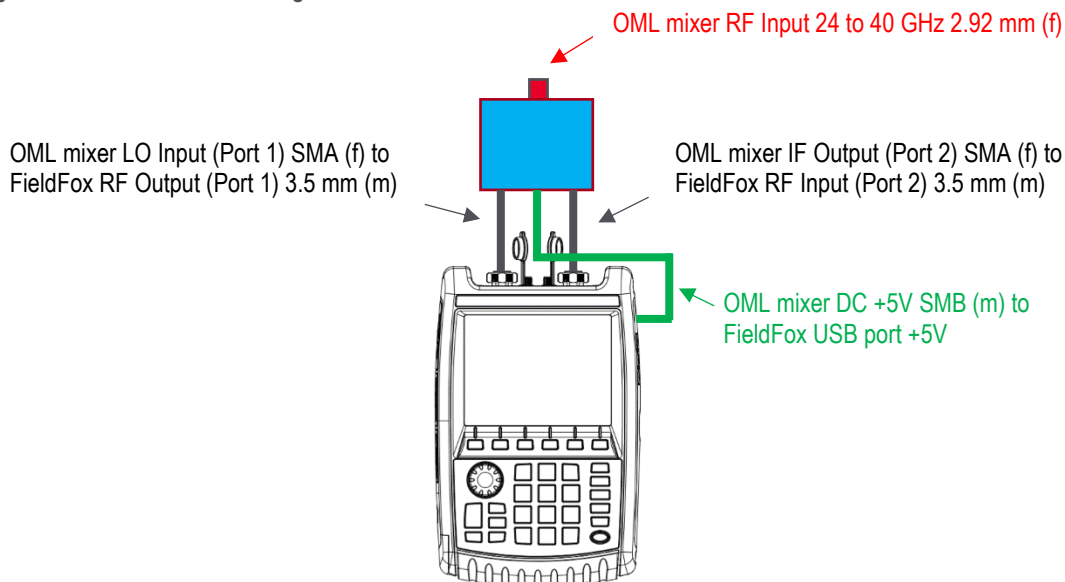| Question	Answer
10. What is included with Option 355?	FieldFox analog demodulation has two parts: (1) Tune and listen, and (2) AM/FM metrics. Tune and listen is available with the purchase of the spectrum analyzer option 233. AM/FM metrics becomes available when Option 355 is purchased. AM/FM metrics provides the user with RF spectrum view, demodulated baseband signal waveform, carrier power, frequency deviation, SINAD and more.
11. What is included with Option 350?	Real-time spectrum analyzer (RTSA) or Option 350 provides real-time measurements. The FieldFox must be equipped with spectrum analysis capability. The preamplifier option is recommended, as elusive signals often have low power levels. The real-time bandwidth options include 10 MHz (standard), 40 MHz (Option B04), or 100 MHz (Option B10). RTSA includes trace recording and playback capabilities. It does not include a frequency-mask trigger (FMT).
12. Is Spectrum Analyzer Trace Recording and Playback standard or an option?	Spectrum Analyzer mode (Option 233) does not include Trace Recording and Playback by default. To obtain this capability in SA mode, Option 236 Interference Analyzer and Spectrogram needs to be purchased.

RTSA mode (Option 350) does include Trace Recording and Playback by default in RTSA mode.

Purchasing RTSA mode (Option 350) does not enable Trace Recording and Playback in SA mode (Option 233).

Trace record/playback features	SA mode SA & Interference Analyzer Options 233 and 236	RTSA mode RTSA Option 350
Record and playback spectrum traces	Yes	Yes
Save trace data with GPS time stamp over time	Yes	Yes
Record and playback spectrogram data	Yes	No[1]

Question	Answer
13. What are the requirements for Noise figure (NF) Option 356?	Requires spectrum analyzer mode (Option 233 on combination models), internal preamplifier (Option 235) and DC bias variable voltage source (Option 309). An external noise source is also required and FieldFox supports Keysight noise source models 346A/B/C/K40/K01. Also recommended to improve accuracy is an external preamplifier Keysight models U7227A/C/F or U7228A/C/F. Requires accessory item N9910X-713 BNC to SMB cable for DC bias variable voltage source to noise source connection.
14. What is required for phased array antenna support (Option 360) and 5GTF over-the-air (OTA) measurements (Option 377)?	Requires spectrum analyzer mode (Option 233 on combination models). Recommend GPS receiver (Option 307) and internal preamplifier (Option 235). Also requires external mixer to down convert millimeter wave frequency to intermediate frequency (IF), since phased array antenna and 5GTF operates at 28 GHz. See Page 9, FAQ #16 for more OML mixer information.
15. What is included with indoor and outdoor mapping (Option 352)?	FieldFox's mapping function is available in the following modes: Channel Scanner (312), Phased-Array Antenna (360), and OTA LTE (370), OTA 5GTF (377), OTA 5G NR (378). Mapping is currently not available in SA or RTSA modes. Outdoor mapping requires the availability of GPS (Option 307). Maps can be saved to the FieldFox internal memory, SD card or USB drive. Using a direct wired LAN connection, FieldFox will automatically access OSM once location coordinates (latitude and longitude) and zoom levels have been entered the Map Explorer menu. If using the l FieldFox Map Support Tool , OSM map files can be downloaded to a .zip file and imported to FieldFox internal memory. If the FieldFox GPS receiver is enabled and OSM maps have been previously saved to FieldFox with those GPS coordinates, FieldFox can automatically load the corresponding map to match the current GPS coordinates.
16. What is required for EMF measurements (Option 358)?	Requires triaxial antenna, not sold or provided by Keysight. Supported antenna is AGOS advanced technologies Triaxial Isotropic Antenna model SDIA-6000 30 MHz to 6 GHz. EMF measurements are supported with spectrum analyzer mode (Option 233 on combination models) and OTA 5G NR (Option 378).

[1] RTSA trace recordings can be recalled and played back in SA mode Spectrogram. This has the added benefit that the measurements are shown 'slower', making it easier for the human eye to decipher the signal content.

Question	Answer
17. What is required for N6820ES Surveyor 4D Software?	Surveyor 4D software connected to FieldFox spectrum analyzer mode offers a versatile, truly portable spectrum monitoring system that covers VLF to 50 GHz, including 5G millimeter wave bands. The software runs on an external PC or tablet. FieldFox required options include spectrum analyzer mode (Option 233 on combination models), preamplifier (Option 235) and built-in GPS receiver (Option 307). Core Surveyor 4D software for Windows (Option N6820ES-114) is required to run the Surveyor 4D software. Other Surveyor 4D software optional licenses that are supported include basic modulation recognition application (N6820ES-MR1) and universal signal detection (N6820ES-USD). Requires Surveyor 4D software version 4.3 or later (May 2019). Frequencies above 26.5 GHz will require external mixer to down convert millimeter wave frequency to intermediate frequency (IF). For external mixer information, see page 9, FAQ #18. For millimeter wave FieldFox models that do not require an external mixer to tune to 50 GHz (N995xA and N996xA), please refer to the FieldFox A-Series Configuration Guide.
18. What is required for 5G NR over-the-air (OTA) measurements (Option 378)?	Requires spectrum analyzer mode (Option 233 on combination models) and 100 MHz analysis bandwidth (Option B10). Recommend GPS receiver (Option 307) and an internal preamplifier (Option 235). FR2 frequencies above 26.5 GHz will require external mixer to down convert millimeter wave frequency to intermediate frequency (IF). For Keysight direct sales, mixer is orderable as Keysight model N9910XM28-H2A. For indirect sales, the mixer is orderable as OML Inc. model M28H2ADC-K, please see website www.omlinc.com for more information or contact a Keysight representative. OML mixer RF input interface is 2.92 mm (f).

Keysight model: N9910XM28-H2A or OML model: M28H2ADC-K		
Supported on FieldFox models:	**N9916B, N9917B, N9918B, N9936B, N9937B, N9938B**	
RF input frequency range	24 to 40 GHz	
IF output frequency range	0.3 to 6.5 GHz	
LO harmonic number	2	
LO input frequency range	12 to 20 GHz	
LO input power	-18 to -5 dBm	
Conversion factor IF = 1 GHz	10 dB (typical)	
Noise figure	12 dB	(Includes internal IF amplifier)

Figure 1 – OML external mixer diagram

OML mixer RF Input 24 to 40 GHz 2.92 mm (f)

OML mixer LO Input (Port 1) SMA (f) to FieldFox RF Output (Port 1) 3.5 mm (m)

OML mixer IF Output (Port 2) SMA (f) to FieldFox RF Input (Port 2) 3.5 mm (m)

OML mixer DC +5V SMB (m) to FieldFox USB port +5V

ERTA System Typical Configuration

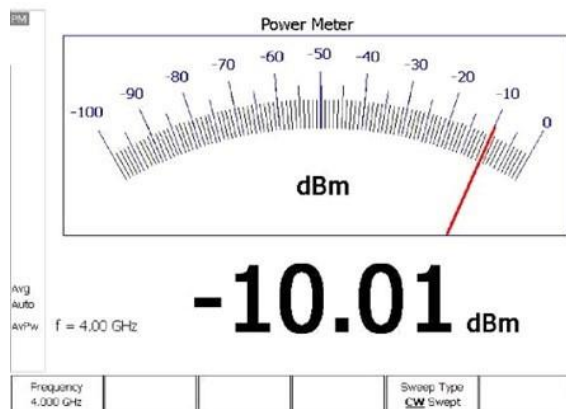| Item	Description/Options	Quantity
FieldFox	Combo analyzer: Required Options 210, 233. Recommended: 235, 307 SA analyzer: Required: Option 220. Recommended: 235, 307	2
Power splitter	11667A (Type-N) or 11667B (3.5 mm)	1
Type-N(m) to Type-N(m) adapter	N9910X-850 (for use with 11667A or Type-N systems)	1
Trigger cables[1]	N9910X-712, SMA(m) to BNC(f) N9910X-713, SMB(m) to BNC(m)	2 of each Total of 4 cables
RF test cable	Connecting FieldFox source port 1 to power splitter input	1
RF test cable or adapter	Connecting power splitter output arm to FieldFox port 2	1
RF jumper cable or adapter	Power splitter output arm to DUT input	1
RF jumper cable or adapter	DUT output to FieldFox receiver port 2	1
LAN cable	LAN cable to connect two FieldFox units directly, or the analyzers must be on the LAN	1
N9910X-825	GPS antenna, recommended. Necessary if Option 307 is ordered.	2
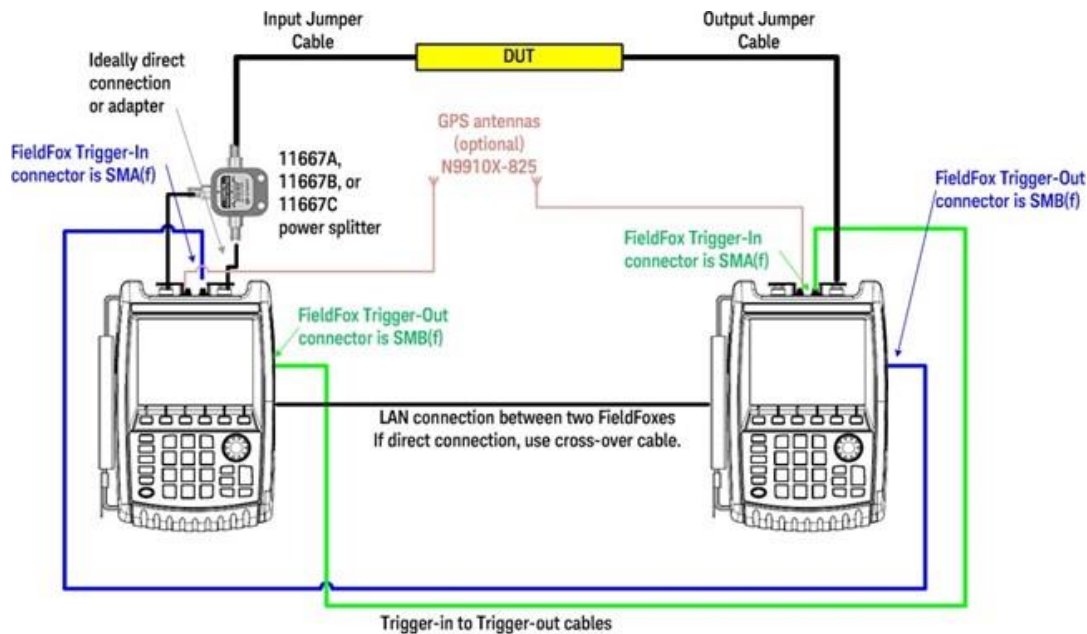
Figure 2 - ERTA system diagram

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[1] The trigger cables and LAN cables must be at least as long as the separation distance between the two ends of the DUT.

FAQs – Applicable To All FieldFox RF and Microwave Analyzers

Question	Answer
1. What USB power sensors work with Option 302?	All Keysight U2000x Series USB power sensors are supported with FieldFox. Visit: www.keysight.com/find/fieldfoxsupport for an up-to-date listing.

2. What is the difference between USB power sensor (Option 302) and built-in power meter (Option 310)?		Option 302 USB power sensor	Option 310 Built-in power meter (or channel power meter)
	Description	Option 302 allows users to connect a USB power sensor to FieldFox's USB port and make broadband power measurements	Option 310 is a channelized power measurement capability built into FieldFox analyzers. Maximum bandwidth is 100 MHz.
	External hardware	USB power sensor required	None. Uses internal receiver.
	Power measurement	Broadband diode detector measures all frequencies	Tuned receiver, so measures frequencies within defined channel bandwidth
	Frequency range	Depends on USB sensor	Frequency range of the analyzer
	Settings	Set CW frequency	Set CW frequency, set channel width/span
	Power range	Depends on USB sensor	Depends on channel width and attenuator setting
	Warm-up time	30 minutes to meet accuracy specifications	No warm-up time required
	Accuracy	Depends on USB sensor	InstAlign accuracy: ± 0.5 dB typical for a CW signal. Since the measurement is within a certain frequency channel or bandwidth, to make an accurate measurement, the user needs to know the exact center frequency and the signal's bandwidth and set those accurately.
	Programmable	Yes, via SCPI	Yes, via SCPI
	Physical connection	The power sensor can easily be moved to the measurement point, with a USB cable connecting the detector to FieldFox.	The measurement point needs to be connected to FieldFox's RF input port. If an RF jumper cable is used, the user needs to account for the loss of the cable with an offset value (can be entered into the analyzer).
	FieldFox source control	Yes, on/off, and nominal power level control	No access to FieldFox's source from the built-in power meter mode

Question	Answer
3. What do I need to get GPS information?	1. The recommended GPS solution is to order: - Option 307 - built-in GPS receiver - A GPS antenna such as N9910X-825 - Other GPS antennas can also be used - The GPS connector on the instrument is SMA (f) 2. Alternatively, you can purchase a USB-based GPS receiver. You do not need to purchase any FieldFox options for the USB-based GPS to work. However, the USB-based GPS only provides time and location data, and time synchronization capability. It cannot be used to increase the frequency accuracy of the instrument.
4. What is the connector for Option 309, DC output?	The DC output has a SMB (m) connector. Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m).
5. What are the connectors for the Reference/Trigger In and Reference/ Trigger Out?	The connector for the Ref/Trig In is SMA (f). Recommend ordering N9910X Option 712 Trig/Ref in SMA (m) to BNC (f) cable. The connector for the Ref/Trig Out is SMB (m). Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m).
6. What is Option 030 remote control capability?	1. Option 030 provides a license for FieldFox to allow remote control via an iOS device. 2. Not supplied by user, but necessary for operation of Option 030 are: - iOS device: iPad, iPhone, or iPod Touch with iOS 6.1 or higher with free FieldFox app - A WiFi or 3G/4G network connection between FieldFox and iOS device
7. What USB sensor is required for Option 330?	Option 330 or pulse measurements requires a Keysight USB peak power sensor. Visit www.keysight.com/find/usbsensorsforfieldfox for a list of supported peak power sensors. Average power sensors cannot be used with Option 330, only peak power sensors. The peak power sensor needs to be purchased separately.
8. What measurement capabilities are included with Option 330?	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
9. What is included with Option 208?	Option 302, USB power sensor measurements, includes **CW** power measurements (one frequency at a time). With Option 208 added, you can make **swept-frequency** power measurements. You can plot source power, gain, and receive power versus frequency. Additionally, the source frequency can be offset from the receiver frequency. The power sensor needs to be purchased separately.

FieldFox Signal Analyzers

Analyzer models

Step 1. Select the model that provides the desired frequency range.

Model	Description	Frequency range[1]	Test port connectors
N9933B	4 GHz FieldFox signal analyzer	9 kHz to 4 GHz	Type-N (f)
N9934B	6.5 GHz FieldFox signal analyzer	9 kHz to 6.5 GHz	Type-N (f)
N9935B	9 GHz FieldFox signal analyzer	9 kHz to 9 GHz	Type-N (f)
N9936B	14 GHz FieldFox signal analyzer	9 kHz to 14 GHz	Type-N (f)
N9937B	18 GHz FieldFox signal analyzer	9 kHz to 18 GHz	Type-N (f)
N9938B	26.5 GHz FieldFox signal analyzer	9 kHz to 26.5 GHz	Type-N (f) [2]

Analyzer options

Step 2. Select optional measurement capabilities.
Any of these options can easily be added as a software upgrade in the future.

Option	Description	Prerequisite options/notes
Spectrum analysis		
100[2]	3.5 mm (m) connectors	Only available on N9938B. Option 100 is only available at time of purchase. It is not available as an upgrade.
209	Extended range transmission analysis (ERTA)	Requires 220. Recommend 307. Requires two FieldFox units. See page 7, FAQ # 9. See page 10 for typical configuration.
220	Full-band tracking generator	CW, CW coupled, and tracking
235	Pre-amplifier	—
236	Interference analyzer and spectrogram	—
238	Spectrum analyzer time gating	—
312	Channel scanner	—
320	Reflection measurements (Return Loss, VSWR and Scalar)	320 requires 220 on all models. On N9938B, 320 also requires 100.
350	Real-time spectrum analyzer (RTSA)	Recommend 235. See page 8, FAQ # 11
351	I/Q Analyzer (IQA)	—
352	Indoor and outdoor mapping	Requires 307, and at least one of 312, 360, 370, 377 or 378. See page 8, FAQ #15
355	Analog demodulation	—
356	Noise Figure (NF)	Requires 235, 309 and accessory item N9910X-713 BNC to SMB cable. See page 8, FAQ #13 for external preamplifier and noise source requirements.
358	EMF measurements	Requires triaxial antenna. See page 8, FAQ #16
360	Phased array antenna support	Requires external mixer. See page 8, FAQ #14
370	Over-the-air (OTA) LTE FDD	Requires 307, recommend 235.
377	Over-the-air (OTA) 5GTF	Requires 307 and external mixer, recommend 235. See page 8, FAQ #14

[1] Useable to 5 kHz.

[2] Order Option 100 for 3.5 mm (m) test port connectors. With N9938B-100, the spectrum analyzer is built with 3.5 mm test port connectors instead of the standard Type-N (f). Option 100 is a prerequisite for Option 320 for N9938B.

Option	Description	Prerequisite options/notes
378	Over-the-air (OTA) 5G NR	Requires B10, 307. Recommend 235. FR2 frequencies above 26.5 GHz require external mixer. See page 9, FAQ #18
B04	Analysis bandwidth, 40 MHz[1]	Recommend 350, 351 or 89600 VSA software.
B10	Analysis bandwidth, 100 MHz[1]	Recommend 350, 351, 378 or 89600 VSA software.
Power measurements		
208	USB power sensor meas. versus frequency	Requires 302. See page 12, FAQ #9
302	USB power sensor support	Need to order USB power sensor [2]. See page 11, FAQ #1
310	Built-in power meter	No power sensor required. See page 11, FAQ #2
330	Pulse meas. with USB peak power sensor	Requires USB peak power sensor. See page 12, FAQs #7 and #8
320	Reflection measurements (Return Loss, VSWR and Scalar)	320 requires 220 on all models. On N9938B specifically, 320 also requires 100.
System features		
030	Remote control capability	Requires an iOS device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See page 12, FAQ #3
309	DC bias variable-voltage source	Recommend N9910X-713 cable, see page 12, FAQ #4
—	Frequency extender support	Optional 350, 351, 360, 370, 377, 378, PathWave VSA software. See Accessories, page 22
Windows based software		
89601B	PathWave VSA (89600 VSA) software	—
N6820ES	Surveyor 4D software	Requires 235 and 307, see page 9, FAQ #17

FieldFox Spectrum Analyzer FAQs

Question	Answer
1. What is included with the basic spectrum analyzer?	Basic spectrum analysis, four traces, different detector types, radio standard selection, limit lines
	Channel power, occupied bandwidth, adjacent channel power, spectrum emission mask
	AM/FM tune and listen, field strength measurements, antenna factors, frequency counter marker
2. What is included with Option 236?	Interference analyzer and spectrogram
	Trace playback and recording
3. What is included with Option 320?	Return loss and VSWR
	Normalization using data/memory
4. What is the difference between Option 320 and the CAT mode on the combo base model?	Option 320 on the N993xB SA offers RL and VSWR. CAT mode on the N991xB combo analyzers offer RL and VSWR, DTF, insertion loss, and also various calibration capabilities such as OSL.
5. What is included with Option 355?	FieldFox analog demodulation has two parts: (1) Tune and listen, and (2) AM/FM metrics. Tune and listen are available as a standard feature on all N993xB FieldFox spectrum analyzers. AM/FM metrics becomes available when Option 355 is purchased. AM/FM metrics provides the user with RF spectrum view, demodulated baseband signal waveform, carrier power, frequency deviation, SINAD and more.
Additional FAQs on pages 10 and 11.	**FAQs on pages 11 and 12 apply to all microwave FieldFox models.**

[1] 10 MHz standard.

[2] List of compatible sensors available from www.keysight.com/find/fieldfoxsupport

Upgrades

Information on upgrades is available from: www.keysight.com/find/fieldfoxsupport

FieldFox RF and Microwave (combination) Analyzer Upgrades
N9913BU, N9914BU, N9915BU, N9916BU, N9917BU, N9918BU

Option	Description	Upgrade contents	Additional requirements
010	VNA time domain analysis	License key	210, recommend 211
030	Remote control capability	License key	Requires an iOS device
208	USB power sensor measurements versus frequency	License key	302
209	Extended range transmission analysis (ERTA)	License key	233 and 210[1], recommend 307
210	VNA transmission and reflection	License key	None
211	VNA full 2-port S-parameters	License key	210
212	Mixed-mode S-parameters	License key	210 and 211
215	TDR cable measurements	License key	None
233	Spectrum analyzer	License key	None
235	Preamplifier	License key	233
236	Interference analyzer and spectrogram	License key	233
238	Spectrum analyzer time gating	License key	233
302	External USB power sensor support	License key	None
307	GPS receiver	License key	None
308	Vector voltmeter	License key	210 and 211 for full VVM functionality
309	DC bias variable-voltage source	License key	Recommend N9910X-713 cable
310	Built-in power meter	License key	None
312	Channel scanner	License key	233
330	Pulse measurements	License key	Need to order USB peak power sensor
350	Real-time spectrum analyzer (RTSA)	License key	233, recommend 235
351	I/Q Analyzer (IQA)	License key	233
352	Indoor and outdoor mapping	License key	233, 307, and at least one of 312, 360, 370, 377 or 378.
355	Analog demodulation	License key	233
356	Noise figure (NF)	License key[2]	233, 235, 309 and accessory cable N9910X-713
358	EMF measurements	License key	233. Also requires triaxial antenna. See page 8, FAQ #16
360	Phased array antenna support [3]	License key	233
370	Over-the-air (OTA) LTE FDD	License key	233 and 307, recommend 235
377	Over-the-air (OTA) 5GTF [3]	License key	233 and 307, recommend 235

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[1] 209 is a system based on two FieldFox units. See page 7, FAQ #9, for a detailed description of the system requirements.
[2] See page 8, FAQ #13 for external preamplifier and noise source requirements.
[3] Requires external mixer to down convert millimeter wave frequency to intermediate frequency (IF). See page 8, FAQ #14.

Option	Description	Upgrade contents	Additional requirements
378	Over-the-air (OTA) 5G NR	License key	233, B10 and 307, recommend 235. FR2 frequencies above 26.5 GHz require external mixer. See page 9, FAQ #18
B04	Analysis bandwidth, 40 MHz[1]	License key	Requires 233. Recommend 350, 351 or 89600 VSA software.
B10	Analysis bandwidth, 100 MHz[1]	License key	Requires 233. Recommend 350, 351, 378 or 89600 VSA software.

FieldFox Signal Analyzer Upgrades
N9933BU, N9934BU, N9935BU, N9936BU, N9937BU, N9938BU

Option	Description	Upgrade contents	Additional requirements
030	Remote control capability	License key	Requires an iOS device
100	3.5 mm connectors	Not applicable	Not applicable
208	USB power sensor measurements versus frequency	License key	302
209	Extended range transmission analysis (ERTA)	License key	220[2], recommend 307
220	Full-band tracking generator	License key	None
235	Preamplifier	License key	None
236	Interference analyzer and spectrogram	License key	None
238	Spectrum analyzer time gating	License key	None
302	External USB power sensor support	License key	None
307	GPS receiver	License key	None
309	DC bias variable-voltage source	License key	Recommend N9910X-713 cable
310	Built-in power meter	License key	None
312	Channel scanner	License key	None
320	Reflection measurements (Return Loss, VSWR and Scalar)	License key[3]	Option 220 for all models Option 100 and 220 for N9938B
330	Pulse measurements	License key	Need to order USB peak power sensor
350	Real-time spectrum analyzer (RTSA)	License key	Recommend 235
351	I/Q Analyzer (IQA)	License key	None
352	Indoor and outdoor mapping	License key	307, and at least one of 312, 360, 370, 377 or 378.
355	Analog demodulation	License key	None
356	Noise figure (NF)	License key[4]	235, 309 and accessory cable N9910X-713
358	EMF measurements	License key	Requires triaxial antenna. See page 8, FAQ #16

[1] 10 MHz standard.

[2] 209 is a system based on two FieldFox units. See page 7, FAQ #9, for a detailed description of the system requirements.

[3] On N9938B, Option 320 is only available as a software upgrade if the spectrum analyzer is already equipped with Option 100, which is 3.5 mm connectors on the test port. Option 100 must have been ordered at the time of original purchase. It cannot be upgraded later.

[4] See page 8, FAQ #13 for external preamplifier and noise source requirements.

Option	Description	Upgrade contents	Additional requirements
360	Phased array antenna support [1]	License key	External mixer
370	Over-the-Air (OTA) LTE FDD	License key	307, recommend 235
377	Over-the-Air (OTA) 5GTF [1]	License key	307, recommend 235
378	Over-the-air (OTA) 5G NR	License key	B10 and 307, recommend 235. FR2 frequencies above 26.5 GHz require external mixer. See page 9, FAQ #18
B04	Analysis bandwidth, 40 MHz[2]	License key	Recommend 350, 351 or 89600 VSA software.
B10	Analysis bandwidth, 100 MHz[2]	License key	Recommend 350, 351, 378 or 89600 VSA software.

[1] Requires external mixer to down convert millimeter wave frequency to intermediate frequency (IF). See page 8, FAQ #14.
[2] 10 MHz standard.

Documentation

By default, a printed copy of the User's Guide is not included in FieldFox orders. If you wish to receive the printed User's Guide, please order N99xxB Option ABA.

Option	Description	Notes
N99xxB-0B0	Do not include User's Guide	
N99xxB-ABA	Printed User's Guide in English	

The latest FieldFox User's Guide (manual) is available online from: www.keysight.com/find/fieldfoxsupport

The Service Guide, SCPI Programming Guide, Quick Reference Guide, and Data Link software help file can also be found via the website above.

Calibration Kits

FieldFox analyzers support most standard HP/Agilent/Keysight mechanical calibration kits and all Keysight USB ECal modules. Component list shows calibration components, some calibration kits also include adaptors. Custom calibration kits can be created and uploaded to FieldFox using Data Link software.

Model	Description	Connector	Frequency range	Components
7-16				
N9910X-802	3-in-1 OSL cal kit	7/16 (m)	DC to 4 GHz	Open, short, load (all male)
N9910X-803	3-in-1 OSL cal kit	7/16 (f)	DC to 4 GHz	Open, short, load (all female)
85038A	Standard cal kit	7/16	DC to 7.5 GHz	Open, short, load (both female and male)
Type-N, 50 Ω				
N9910X-800[1]	3-in-1 OSL cal kit	Type-N (m)	DC to 6 GHz	Open, short, load (all male)
N9910X-801[1]	3-in-1 OSL cal kit	Type-N (f)	DC to 6 GHz	Open, short, load (all female)
85032E	Economy cal kit	Type-N (m)	DC to 6 GHz	Open, short, load (all male)
85514A	4-in-1 OSLT cal kit	Type-N (m)	DC to 9 GHz	Open, short, load, thru (all male)
85515A	4-in-1 OSLT cal kit	Type-N (f)	DC to 9 GHz	Open, short, load, thru (all female)
85032F	Standard cal kit	Type-N	DC to 9 GHz	Open, short, load (both female and male)
85518A	4-in-1 OSLT cal kit	Type-N (m)	DC to 18 GHz	Open, short, load, thru (all male)
85519A	4-in-1 OSLT cal kit	Type-N (f)	DC to 18 GHz	Open, short, load, thru (all female)
85054D	Economy cal kit	Type-N	DC to 18 GHz	Open, short, load, thru (female and male)
85054B	Standard cal kit	Type-N	DC to 18 GHz	Open, short, fixed load, sliding load (female and male)
85092C	ECal, 2-ports	Type-N	300 kHz to 9 GHz	Connectors configurable
N4690B/C	ECal, 2-ports	Type-N	300 kHz to 18 GHz	Connectors configurable
N4690D	ECal, 2-ports	Type-N	300 kHz to 18 GHz or DC to 18 GHz	Connectors configurable
N7550A	ECal economy, 2-ports	Type-N	DC to 4 GHz	Connectors configurable
N7551A	ECal economy, 2-ports	Type-N	DC to 6.5 GHz	Connectors configurable
N7552A	ECal economy, 2-ports	Type-N	DC to 9 GHz	Connectors configurable
N7553A	ECal economy, 2-ports	Type-N	DC to 14 GHz	Connectors configurable
N7554A	ECal economy, 2-ports	Type-N	DC to 18 GHz	Connectors configurable

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[1] This calibration kit is not eligible for annual re-calibration. There are also no data report calibrations (UK6, 1A7 and A6J). If annual calibration is required, please order 85514A or 85515A.

Model	Description	Connector	Frequency range	Components
Type-N,75 Ω[1]				
85036B	Standard cal kit	Type-N 75 Ω	DC to 3 GHz	Open, short, load (both female and male)
85036E	Economy cal kit	Type-N(m) 75 Ω	DC to 3 GHz	Open, short, load, all male
85096C	ECal, 2-ports	Type-N(m) 75 Ω	300 kHz to 3 GHz	Connectors configurable
3.5 mm				
85520A	4-in-1 OSLT	3.5 mm (m)	DC to 26.5 GHz	Open, short, load, thru (all male)
85521A	4-in-1 OSLT	3.5 mm (f)	DC to 26.5 GHz	Open, short, load, thru (all female)
85033D/E	Economy cal kit	3.5 mm	DC to 6/9 GHz	Open, short, fixed load (both female and male)
85052D	Economy cal kit	3.5 mm	DC to 26.5 GHz	Open, short, fixed load (both female and male)
85052B	Standard cal kit	3.5 mm	DC to 26.5 GHz	Open, short, fixed load, sliding load (both female and male)
85052C	Precision TRL kit	3.5 mm	DC to 26.5 GHz	Open, short, fixed load (both female and male), two-line lengths
85093C	ECal, 2-ports	3.5 mm	300 kHz to 9 GHz	Connectors configurable
N4691B	ECal, 2-ports	3.5 mm	300 kHz to 26.5 GHz	Connectors configurable
N4691D	ECal, 2-ports	3.5 mm	300 kHz to 26.5 GHz or DC to 26.5 GHz	Connectors configurable
N7550A	ECal economy, 2-ports	3.5 mm	DC to 4 GHz	Connectors configurable
N7551A	ECal economy, 2-ports	3.5 mm	DC to 6.5 GHz	Connectors configurable
N7552A	ECal economy, 2-ports	3.5 mm	DC to 9 GHz	Connectors configurable
N7553A	ECal economy, 2-ports	3.5 mm	DC to 14 GHz	Connectors configurable
N7554A	ECal economy, 2-ports	3.5 mm	DC to 18 GHz	Connectors configurable
N7555A	ECal economy, 2-ports	3.5 mm	DC to 26.5 GHz	Connectors configurable
2.92 mm (same as K connector)				
85561A	4-in-1 OSLT cal kit	2.92 mm (f)	DC to 40 GHz	Open, short, fixed load, thru (all female)
85562A	4-in-1 OSLT cal kit	2.92 mm (m)	DC to 40 GHz	Open, short, fixed load, thru (all male)
85056KE01[2]	Standard cal kit	2.92 mm	DC to 40 GHz	Open, short, fixed load, sliding load (both female and male)
85056KE02[3]	Economy cal kit	2.92 mm	DC to 40 GHz	Open, short, fixed load (female and male)
N4692A	ECal	2.92 mm	10 MHz to 40 GHz	Connectors configurable
2.4 mm				
85563A	3-in-1 OSL cal kit	2.4 mm (f)	DC to 50 GHz	Open, short, fixed load (all female)
85564A	3-in-1 OSL cal kit	2.4 mm (m)	DC to 50 GHz	Open, short, fixed load (all male)
85056D	Economy cal kit	2.4 mm	DC to 50 GHz	Open, short, fixed load (female and male)
85056A	Standard cal kit	2.4 mm	DC to 50 GHz	Open, short, load, fixed load, sliding load (both female and male)
N4693A	ECal	2.4 mm	10 MHz to 50 GHz	Connectors configurable

[1] Recommend ordering quantity 2 of N9910X Option 846, 50 to 75 Ω adapter.
[2] Same as Maury's 8770C47
[3] Same as Maury's 8770D47

Model	Description	Connector	Frequency range	Components
Waveguide				
N9911X-11x	Econ. waveguide cal kit	WR-137	5.38 to 8.18 GHz	Short, termination, offset length
N9911 X-21x	Econ. waveguide cal kit	WR-90	8.2 to 12.5 GHz	Short, termination, offset length
N9911X-31x	Econ. waveguide cal kit	WR-62	11.9 to 18 GHz	Short, termination, offset length
N9911 X-41x	Econ. waveguide cal kit	WR-42	17.6 to 26.7 GHz	Short, termination, offset length
X11644A	Waveguide cal kit	WR-90	8.2 to 12.4 GHz	Short, shim, termination, standard section
P11644A	Waveguide cal kit	WR-62	12.4 to 18 GHz	Short, shim, termination, standard section
K11644A	Waveguide cal kit	WR-42	18 to 26.5 GHz	Short, shim, termination, standard section

Accessories

Cables					
All cables listed below are rugged phase-stable cables.					
Model	Cable connector	Other cable connector	Max frequency	Length (ft)	Length (m)
N9910X-700	Type-N (m)	Type-N (f)	18 GHz	3.28 ft	1 m
N9910X-701	Type-N (m)	Type-N (m)	18 GHz	3.28 ft	1 m
N9910X-704	Type-N (m)	TNC (f)	13 GHz	5 ft	1.5 m
N9910X-705	Type-N (m)	TNC (m)	13 GHz	5 ft	1.5 m
N9910X-708	3.5 mm (m)	3.5 mm (f)	26.5 GHz	3.28 ft	1 m
N9910X-709	3.5 mm (f)	3.5 mm (f)	26.5 GHz	3.28 ft	1 m
N9910X-714	2.4 mm (f)	2.4 mm (m)	50 GHz	3.28 ft	1 m
N9910X-715	2.4 mm (f)	2.4 mm (f)	50 GHz	3.28 ft	1 m
N9910X-716	Type-N (m)	Type-N (m)	18 GHz	2 ft	0.61 m
N9910X-718	2.4 mm (f)	K / 2.92 mm (m)	40 GHz	3.28 ft	1 m
N9910X-810	Type-N (m)	Type-N (m)	6 GHz	5 ft	1.5 m
N9910X-811	Type-N (m)	Type-N (f)	6 GHz	5 ft	1.5 m
N9910X-812	Type-N (m)	Type-N (m)	8 GHz	12 ft	3.6 m
N9910X-813	Type-N (m)	Type-N (f)	8 GHz	12 ft	3.6 m
N9910X-814	Type-N (m)	7/16 (m)	6 GHz	5 ft	1.5 m
N9910X-815	Type-N (m)	7/16 (m)	6 GHz	12 ft	3.6 m
N9910X-816	Type-N (m)	Type-N (f)	6 GHz	3.28 ft	1 m
N9910X-817	Type-N (m)	Type-N (m)	6 GHz	3.28 ft	1 m

Preamplifiers		
Model		
U7227A	USB preamplifier, 10MHz to 4 GHz	www.keysight.com/find/U7227A
U7227C	USB preamplifier, 100MHz to 26.5 GHz	www.keysight.com/find/U722CA
U7227F	USB preamplifier, 2 to 50 GHz	www.keysight.com/find/U7227F
U7228A	USB preamplifier, 10MHz to 4 GHz	www.keysight.com/find/U7228A
U7228C	USB preamplifier, 100MHz to 26.5 GHz	www.keysight.com/find/U7228C
U7228F	USB preamplifier, 2 to 50 GHz	www.keysight.com/find/U7228F

Noise sources

Model	
346A/B/C/K01/K40	346 Series noise source family www.keysight.com/find/346noisesources

Antennas

Model	
N9910X-820	Antenna, directional, multiband, 800 to 2500 MHz, 10 dBi, Type-N (f)
N9910X-821	Antenna, telescopic whip, 70 MHz to 1 GHz, BNC (m)
N9910X-822	Antenna, directional, log periodic, 600 MHz to 9 GHz, Type-N (f)
N9910X-823	Antenna, cellular narrowband, 824 to 869 MHz, Type-N (f)
N9910X-824	Antenna, cellular narrowband, PCS 1850 to 1990 MHz, Type-N (f)
N9910X-825	Antenna, GPS, active, SMA (m)
85571A-028	5G phased array antenna 28 GHz

RF and microwave adaptors

Model	
83059A	Coaxial adapter, 3.5 mm (m) to 3.5 mm (m), 26.5 GHz
83059B	Coaxial adapter, 3.5 mm (f) to 3.5 mm (f), 26.5 GHz
83059C	Coaxial adapter, 3.5 mm (m) to 3.5 mm (f), 26.5 GHz
N9910X-601	Coaxial adapter, NMD 2.4 mm (f) to Type-N (f), 50-ohm, 18 GHz
N9910X-602	Coaxial adapter, NMD 2.4 mm (f) to 2.92 mm/K (f), 40 GHz
N9910X-603	Coaxial adapter, NMD 2.4 mm (f) to 3.5 mm (f), 26.5 GHz
N9910X-604	3.5 mm NMD (f) to 3.5 mm (f) adapter, 26.5 GHz
N9910X-605	3.5 mm NMD (f) to Type-N (f) adapter, 18 GHz
N9910X-843	Coaxial adapter, Type-N (m) to 7/16 DIN (f)
N9910X-845	Adapter kit: Type-N (f) to 7/16 DIN (f), Type-N (f) to 7/16 DIN (m), Type-N (f) to Type-N (f)
N9910X-846	Coaxial adapter, Type-N (m) 50 ohm to Type-N (f) 75 ohm
N9910X-847	Adapter kit: Type-N (f) to TNC (m) adapter, Type-N (f) to TNC (f) adapter, 11 GHz
N9910X-848	Coaxial adapter, Type-N (f) to 3.5 mm (f), 18 GHz
N9910X-849	Coaxial adapter, Type-N (f) to 3.5 mm (m), 18 GHz
N9910X-850	Coaxial adapter, Type-N (m) to Type-N (m), 18 GHz
N9910X-851	Coaxial adapter, Type-N (f) to Type-N (f), 18 GHz
N9910X-852	Coaxial adapter, Type-N (m) to Type-N (f), 18 GHz
N9910X-856	Coaxial adapter, 2.4 mm (f) to 2.4 mm (f), 50 GHz
N9910X-857	Coaxial adapter, 2.4 mm (f) to 2.92 mm/K (f), 40 GHz

OML frequency extender modules

OML frequency extenders can be purchased directly through OML, Inc. One mixer, OML model number M28H2ADC-K (24 to 40 GHz), has been set up as a Keysight special handling part number **N9910XM28-H2A** and is available for sale directly through Keysight. Contact OML, Inc. directly (www.omlinc.com) for pricing, ordering and datasheet information or contact a Keysight representative for assistance.

FieldFox operating modes that support frequency extenders include: Spectrum analyzer, real-time spectrum analyzer, I/Q analyzer, over-the-air (5G NR, LTE FDD, 5GTF), phased array antenna support and PathWave vector signal analysis software (formerly 89600 VSA).

OML model number	OML mixer frequency range	Frequency range with FieldFox models N9918/38B and N9917B/37B	Frequency range with FieldFox models N9916/36B
M28H2ADC-K	24 to 40 GHz	24 to 40 GHz	24 to 34 GHz
M15H4ADC	50 to 75 GHz	50 to 75 GHz	50 to 62 GHz
M12H6ADC	60 to 90 GHz	60 to 90 GHz	60 to 90 GHz
M10H6ADC	75 to 110 GHz	75 to 110 GHz	75 to 90 GHz

Other RF and microwave accessories

Model	
N9910X-860	Fixed attenuator, 40 dB, 100 W, DC to 3 GHz, Type-N (m) to Type-N (f)
N9910X-861	Fixed attenuator, 40 dB, 50 W, DC to 8.5 GHz, Type-N (m) to Type-N (f)
N9910X-874[1]	External bias-tee, 2.5 MHz to 6 GHz, 1 W, 0.5 A
N9910X-886	Torque wrench, 17 mm, 90 N-cm, 8 in-lb.
N9910X-712	Trig/Ref in Cable SMA (m) to BNC (f), 1 m or 3.28 ft
N9910X-713	Bias-tee power cable SMB (f) to BNC (m), 1 m or 3.28 ft

Other FieldFox accessories

Model	
N9910X-876	Extra high capacity battery
N9910X-872	External battery charger
N9910X-873	AC/DC adapter
N9910X-875	DC car charger and adapter
N9910X-880	Extra soft carrying case with backpack and shoulder strap
N9910X-881	Hard transit case
N9910X-887	Fan replacement kit

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[1] Also recommend ordering N9910X-713 Bias-Tee Power Cable, SMB(f) to BNC(m), 3.28 ft., to connect to the FieldFox DC bias variable voltage source port.vsa

Description	Accessory	Description	Accessory
N9910X-701 Type-N (m) to Type-N (m) cable, 3.28 ft		N9910X-812 Type-N (m) to Type-N (m) cable, 12 ft	
N9910X-708 3.5 mm (m) to 3.5 mm (f) cable, 3.28 ft		N9910X-816 Type-N (m) to Type-N (f) cable, 3.28 ft	
N9910X-820 Antenna, directional		N9910X-821 Antenna, telescopic whip ™	
N9910X-823 Antenna, cellular narrowband		N9910X-848 Coaxial adapter, Type-N(f) to 3.5 mm (f)	
N9910X-822 Antenna, directional		N9910X-875 DC car charger and adapter	
N9910X-825 Antenna, GPS, active		N9910X-873 AD/DC adapter	
N9910X-876 Extra high capacity battery		N9910X-874 External bias-tee	
N9910X-872 External battery charger		N4690B 2-port ECal, Type-N, 18 GHz	
N9910X-881 Hard transit case		N9910X-800 3-in-1 OSL cal kit, Type-N (m), 6 GHz	
N9910X-811 Type-N (m) to Type-N (f) cable, 5 ft		N991X0-801 3-in-1 OSL cal kit, Type-N (f), 6 GHz	

Description	Accessory	Description	Accessory
85514A 4-in-1 OSLT cal kit, Type-N (m) 9 GHz		85520A 4-in-1 OSLT cal kit, 3.5 mm (m), 26.5 GHz	
85515A 4-in-1 OSLT cal kit, Type-N (f), 9 GHz		85521A 4-in-1 OSLT cal kit, 3.5 mm (f), 26.5 GHz	
85518A 4-in-1 OSLT cal kit, Type-N (m), 18 GHz		85033D/E 3.5 mm cal kit, 9 GHz	
85519A 4-in-1 OSLT cal kit, Type-N (f), 18 GHz		85052D 3.5 mm cal kit, 26.5 GHz	
85054D Economy cal kit, Type-N, 18 GHz		N4691B 2-port ECal, 3.5 mm, 26.5 GHz	
N9911X-211/212/213/214 WR-90 economical cal kit		N4692A 2.92 mm, 2-port ECal, 40 GHz	

Description	Accessory		Description	Accessory
N4693A 2.4 mm 2-port ECal, 50 GHz			85056D 2.4 mm cal kit, 50 GHz	
X11644A WR-90 standard cal kit				

Learn more at: www.keysight.com

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

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