

Keysight

FieldFox Handheld Analyzers

4/6.5/9/14/18/26.5/32/44/50 GHz

Configuration Guide



The FieldFox Analyzer Family

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 below shows a comparison of the functions available in the FieldFox family of analyzers.

The following accessories are included with every FieldFox: AC/DC adapter, battery, soft carrying case, LAN cable and Quick Reference Guide.

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

FieldFox family and options

		RF and microwave (combination) analyzer	Microwave vector network analyzer (VNA)	Microwave spectrum analyzer (SA)
Option	Description	N991xA N995xA	N992xA	N993xA N996xA
CAT/vector network analysis				
010	VNA time domain	√	√	—
112	QuickCal	√ on N991xA - on N995xA	√	—
210	VNA transmission/reflection	√	Base model	—
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	√	Note 1
308	Vector voltmeter	√	√	—
320	Reflection meas. (RL, VSWR and scalar meas.)	Note 2	Note 2	√
Spectrum analysis				
209	Extended range transmission analysis (ERTA)	√	—	√
220	Tracking generator	Note 3	—	√
233	Spectrum analyzer	√	—	Base model
235	Pre-amplifier	√	—	√
236	Interference analyzer and spectrogram	√	—	√
238	Spectrum analyzer time gating	√	—	√
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	√	√	√
System features				
030	Remote control capability	√	√	√
307	GPS receiver	√	√	√
309	DC bias variable-voltage source	√	√	√

Notes:

Base model means that the functionality listed is the primary function of that instrument. For example, on the N991xA or N995xA combo analyzers, cable and antenna analysis is the standard function included with every N991xA or N995xA.

- Option 305 is not available on the N993xA or N996xA. However, a subset of cable and antenna analyzer measurements, return loss and VSWR, is available as Option 320.
- Option 320 is not applicable to N991xA, N995xA, or N992xA. The reflection measurements of return loss and VSWR are included with every N991xA, N995xA, and N992xA. So there is no need for an Option 320 on these analyzers.
- On the N991xA or N995xA analyzers, order Options 233 and 210 to obtain a tracking generator with the spectrum analyzer. There is no Option 220 on the N991xA or N995xA analyzers. To obtain tracking generator capability, you need Options 233 and 210. Option 233 provides the spectrum analyzer capability and Option 210 the "tracking" capability.

FieldFox Microwave (Combination) Analyzers

FieldFox microwave (combination) analyzer models

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

Model	Description	CAT and VNA frequency	SA frequency ¹	Test port connectors
N9913A	4 GHz FieldFox RF analyzer	30 kHz to 4 GHz	100 kHz to 4 GHz	Type-N (f)
N9914A	6.5 GHz FieldFox RF analyzer	30 kHz to 6.5 GHz	100 kHz to 6.5 GHz	Type-N (f)
N9915A	9 GHz FieldFox microwave analyzer	30 kHz to 9 GHz	100 kHz to 9 GHz	Type-N (f)
N9916A	14 GHz FieldFox microwave analyzer	30 kHz to 14 GHz	100 kHz to 14 GHz	Type-N (f)
N9917A	18 GHz FieldFox microwave analyzer	30 kHz to 18 GHz	100 kHz to 18 GHz	Type-N (f)
N9918A	26.5 GHz FieldFox microwave analyzer	30 kHz to 26.5 GHz	100 kHz to 26.5 GHz	3.5 mm (m)
N9950A	32 GHz FieldFox microwave analyzer	300 kHz to 32 GHz	9 kHz to 32 GHz	NMD 2.4 mm (m)
N9951A	44 GHz FieldFox microwave analyzer	300 kHz to 44 GHz	9 kHz to 44 GHz	NMD 2.4 mm (m)
N9952A	50 GHz FieldFox microwave analyzer	300 kHz to 50 GHz	9 kHz to 50 GHz	NMD 2.4 mm (m)

Step 2. Select optional measurement capabilities.

Any of these options can easily be added as a software upgrade in the future.

Exception: Option 112 is only applicable to N991xA models. It is not applicable to N995xA models.

FieldFox microwave (combination) analyzer options

Option	Description	Prerequisite options/notes
CAT/vector network analysis		
010	VNA time domain	Requires 210, recommend 211
112	QuickCal	Not available for N995xA models. See page 4, FAQ #9
210	VNA transmission/reflection	Recommend ordering a cal kit
211	VNA full 2-port S-parameters	Requires 210, recommend ordering a cal kit
212	1-port mixed-mode S-parameters	Requires 210 and 211
215	TDR cable measurements	-
308	Vector voltmeter	210 and 211 required to obtain full VVM functionality. See page 4, FAQ #8
Spectrum analysis		
209	Extended range transmission analysis (ERTA)	Requires 233 and 210. Recommend 307. Requires two FieldFoxes. See page 5, FAQ # 10.
233	Spectrum analyzer	-
235	Pre-amplifier	Requires 233
236	Interference analyzer and spectrogram	Requires 233
238	Spectrum analyzer time gating	Requires 233
Power measurements		
208	USB power sensor meas. versus frequency	Requires 302
302	USB power sensor support	Need to order USB power sensor ²
310	Built-in power meter	No power sensor required. See page 7, FAQ #1
330	Pulse meas. with USB peak power sensor	Need to order USB peak power sensor. See page 8, FAQs #7 and #8
System features		
030	Remote control capability	Requires an iOS device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See page 8, FAQ #3
309	DC bias variable-voltage source	-

1. Usable to 5 kHz

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

FieldFox Combo Analyzer FAQs

Question	Answer
1. What is included with a base N991xA/N995xA analyzer?	<ul style="list-style-type: none"> – 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 <p>Note: 2-port insertion loss is NOT included with the base model, if 2-port insertion loss is needed, order Option 210</p> <p>Note: There is no phase information with the base analyzer, to obtain S11 or S21 phase, order Option 210</p>
2. What is included with N991xA/N995xA Option 233?	<ul style="list-style-type: none"> – Basic spectrum analysis, four traces, different detector types, radio standard selection, limit lines – Channel power, occupied bandwidth, adjacent channel power – AM/FM tune and listen, field strength measurements, antenna factors, frequency counter marker – Tracking generator (TG)/Independent source: <ul style="list-style-type: none"> – TG CW mode (source CW frequency can be set independent of SA frequency) - included – TG CW coupled mode (source CW frequency is autocoupled 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 N991xA/N995xA Option 236?	<ul style="list-style-type: none"> – Interference analyzer and spectrogram – Trace playback and recording
4. What is included with N991xA/N995xA Option 210?	<ul style="list-style-type: none"> – 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 N991xA/N995xA Option 211?	<ul style="list-style-type: none"> – 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 N991xA/N995xA 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.
7. What is included with N991xA/N995xA Option 010?	<ul style="list-style-type: none"> – 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 N991xA/N995xA Option 308?	<ul style="list-style-type: none"> – 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 <p>Note: A/B and B/A measurements require an external source</p>
9. What is included with N991xA Option 112?	<ul style="list-style-type: none"> – Option 112 (QuickCal), is not available for N995xA analyzers. It is available for N991xA analyzers. – QuickCal is included with Option 112. <ul style="list-style-type: none"> – 1-port QuickCal with a base analyzer. – 1-port and enhanced response QuickCal with a T/R analyzer (one that has Option 210). – 1-port, enhanced response, and 2-port QuickCal with a full 2-port analyzer (one that has Option 211). – 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.

FieldFox Combo Analyzer FAQs (continued)

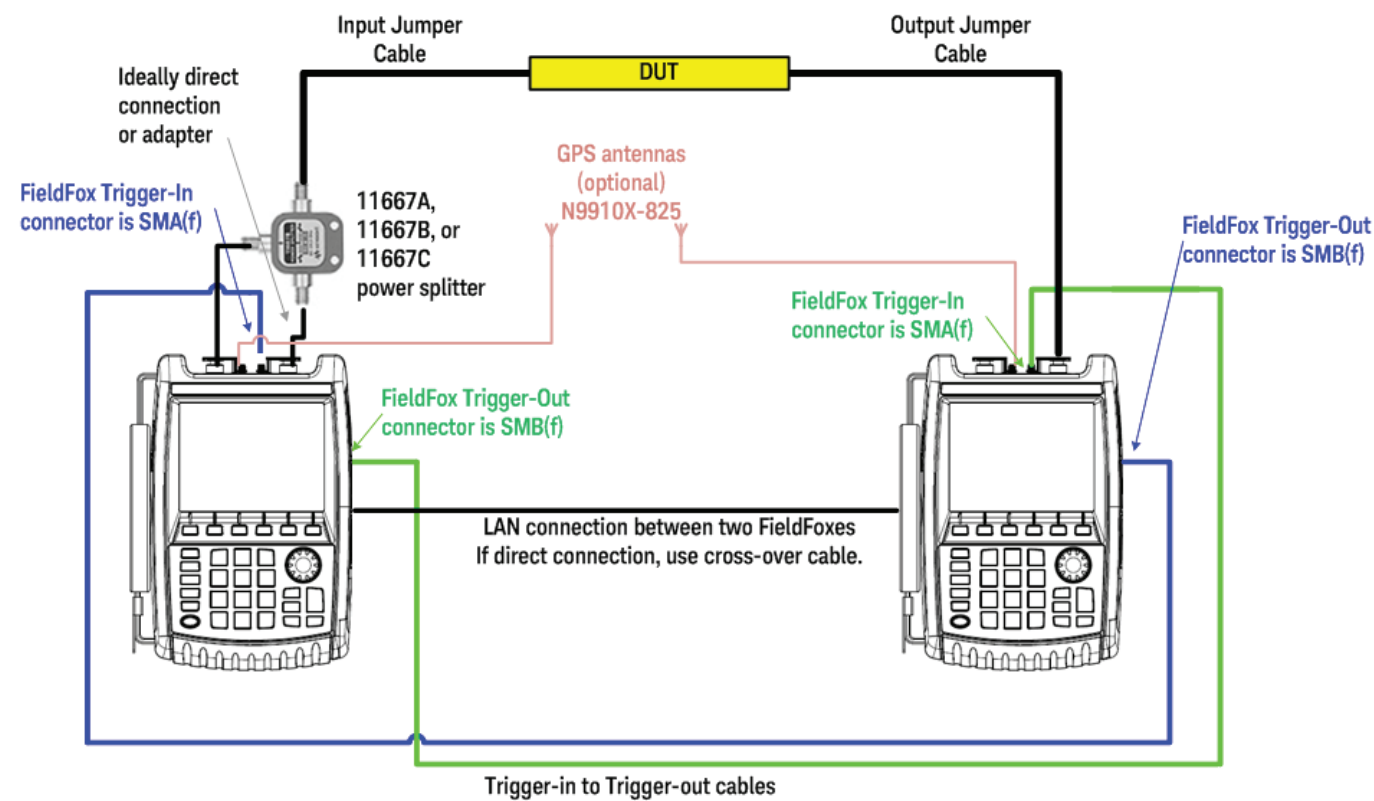
Question	Answer
10. What are the requirements for Option 209?	<p>Extended Range Transmission Analysis (ERTA) or Option 209 is a scalar measurement system based on the use of two FieldFoxes. One FieldFox acts as the source and reference receiver, while the second FieldFox acts as the <i>measurement</i> receiver.</p> <p>Required hardware</p> <p>A. Two FieldFoxes. FieldFoxes can be any of these models:</p> <ul style="list-style-type: none"> – FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A, N9950A, N9951A, N9952A – FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A, N9960A, N9961A, N9962A – ERTA cannot use N9912A, N9923A, N9925A, N9926A, N9927A or N9928A <p>The two FieldFoxes used in ERTA do not have to be the same model.</p> <p>ERTA requires the following options on Combo FieldFoxes. (N9913A, N9914A, N9915A, N9916A, N9917A, N9918A, N9950A, N9951A, N9952A)</p> <ul style="list-style-type: none"> – Option 210, VNA transmission/reflection – Option 233, spectrum analyzer <p>ERTA requires the following options on SA FieldFoxes. (N9935A, N9936A, N9937A, N9938A, N9960A, N9961A, N9962A)</p> <ul style="list-style-type: none"> – Option 220, tracking generator <p>Both FieldFoxes (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 an SA analyzer.</p> <p>With either the Combo or SA FieldFoxes, the following options are highly recommended:</p> <ul style="list-style-type: none"> – 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. <p>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.</p> <p>C. N9910X-712, Trigger/Reference-in cable, SMA (m) to BNC(f), 1 m, quantity two</p> <p>D. N9910X-713, Trigger/Reference-out cable, SMB (m) to BNC (m), 1 m, quantity two</p> <p>E. LAN connection – For ERTA, the two FieldFoxes communicate via a LAN connection. For a direct connection, a cross-over LAN cable is required. Alternately, both analyzers can be on a local area network.</p> <p>Recommended accessory</p> <p>F. N9910X-825, GPS Antenna</p>

FieldFox Combo Analyzer FAQs (continued)

ERTA System Typical Configuration

Item	Description/Options	Quantity
FieldFox	Combo analyzer: required Option 210, 233. Recommended: 235, 307 SA analyzer: required: Option 220, recommended: 235, 307	2
Power splitter	11667A (Type-N) or 11667B (3.5 mm) or 11667C (2.4 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 FieldFoxes directly, or the analyzers must be on the LAN	1
N9910X-825	GPS antenna, recommended. Necessary if Option 307 is ordered.	2

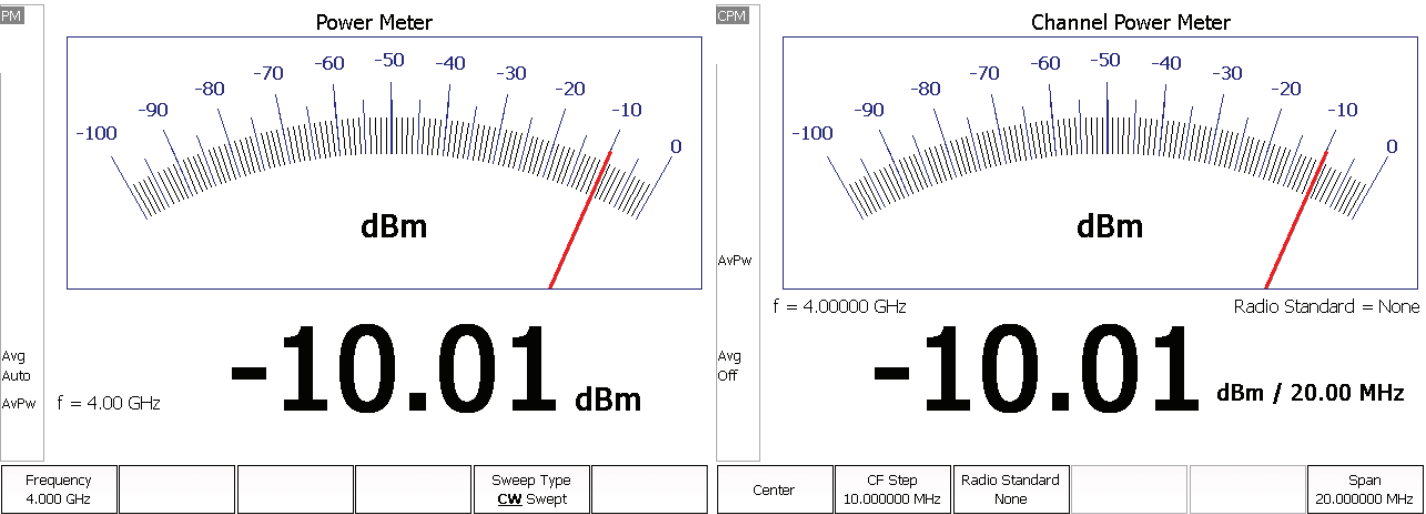
1. The trigger cables and LAN cables must be at least as long as the separation distance between the two ends of the DUT.



ERTA system diagram

FAQs – Applicable To All FieldFox Microwave Analyzers

Question		
1. 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 a 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



FAQs – Applicable To All FieldFox Microwave Analyzers (continued)

Question	Answer
3. What do I need to get GPS information?	<p>(1) The recommended GPS solution is to order:</p> <ul style="list-style-type: none"> – 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) <p>(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.</p>
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?	<p>The connector for the Ref/Trig In is SMA (f). Recommend ordering N9910X Option 712 Trig/Ref in SMA (m) to BNC (f) cable.</p> <p>The connector for the Ref/Trig Out is SMB (m). Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m).</p>
6. What is Option 030 Remote control capability?	<p>(1) Option 030 provides a license for FieldFox to allow remote control via an iOS device.</p> <p>(2) Not supplied by user, but necessary for operation of Option 030 are:</p> <ul style="list-style-type: none"> – 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?	<p>Average power, peak power, and peak to average ratio</p> <p>Analog gauge display and digital display, dBm and watts</p> <p>Relative/absolute measurements, dB or %, minimum and maximum limits</p> <p>Trace graph for pulse profiling with gating</p> <p>Rise time, fall time, pulse width, pulse period, pulse repetition frequency</p>
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 Microwave Vector Network Analyzers

FieldFox microwave vector network analyzer models

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

Model	Description	Frequency	Test port connectors
N9925A	9 GHz FieldFox microwave VNA	30 kHz to 9 GHz	Type-N (f)
N9926A	14 GHz FieldFox microwave VNA	30 kHz to 14 GHz	Type-N (f)
N9927A	18 GHz FieldFox microwave VNA	30 kHz to 18 GHz	Type-N (f)
N9928A	26.5 GHz FieldFox microwave VNA	30 kHz to 26.5 GHz	3.5 mm (m)

A standard N992xA FieldFox microwave VNA includes transmission/reflection measurement capability. Additional functionality such as full 2-port S-parameters can be added using the options listed below.

Step 2. Select optional measurement capabilities.

Any of these options can easily be added as a software upgrade in the future.

FieldFox microwave vector network analyzer options

Option	Description	Prerequisite options/notes
Vector network analysis / CAT		
010	VNA time domain	Recommend 211
112	QuickCal	See page 10, FAQ #7
211	VNA full 2-port S-parameters	
212	1-port mixed-mode S-parameters	Requires 211
215	TDR cable measurements	Requires 305
305	Cable and antenna analyzer	
308	Vector voltmeter	211 required to obtain full VVM functionality. See page 10, FAQ #5
Power measurements		
208	USB power sensor meas. versus frequency	Requires 302
302	USB power sensor support	Need to order USB power sensor ¹
310	Built-in power meter	No power sensor required. See page 7, FAQ #1
330	Pulse meas. with USB peak power sensor	Need to order USB peak power sensor. See page 8, FAQs #7 and #8
System features		
030	Remote control capability	Requires an iOS device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See page 8, FAQ #3
309	DC bias variable-voltage source	-

1. List of compatible sensors available from www.keysight.com/find/fieldfoxsupport

FieldFox Microwave Vector Network Analyzer FAQs

Question	Answer
1. What is included with a base N992xA analyzer?	<ul style="list-style-type: none"> – Measurements: Transmission/reflection or S21 and S11, magnitude and phase – Calibrations: CalReady, OSL, response, and enhanced response cal
2. What is included with N992xA Option 211?	<ul style="list-style-type: none"> – Option 211 adds full 2-port S-parameter capability – Measurements: All four S-parameters (S11, S21, S22, S12), magnitude and phase – Calibrations: CalReady, OSL, response, enhanced response, and full 2-port cal
3. What is included with N992xA Option 010?	<ul style="list-style-type: none"> – S11/S21 in time domain. 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, normal, and maximum window – Gating
4. What is included with N992xA Option 305?	<ul style="list-style-type: none"> – Measurements: DTF (dB, linear, VSWR), return loss and DTF, return loss (dB), and 1-port cable loss, 2-port insertion loss, TDR (linear, ohm) – Calibrations: CalReady, OSL, and response cal
5. What is included with N992xA Option 308?	<ul style="list-style-type: none"> – N992xA with Option 308: 1-port cable trimming, 2-port transmission – N992xA with Options 308 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
6. If I have the full 2-port VNA with time domain, why would I order Option 305? What additional functionality is available?	<p>CAT mode's basic measurements are similar to VNA measurements. The features listed below are often used for distance-to-fault cable testing and are only available in CAT mode:</p> <ul style="list-style-type: none"> – 3-peak marker tracking for finding faults for DTF measurements – 1-port cable loss – Cable type selection and editing, includes the cable's velocity factor and loss
7. What is included with N992xA Option 112?	<ul style="list-style-type: none"> – QuickCal is included with Option 112. <ul style="list-style-type: none"> – 1-port and enhanced response QuickCal with a base analyzer – 1-port, enhanced response, and 2-port QuickCal with a full 2-port analyzer (one that has Option 211). – 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.
Additional FAQs on pages 7 and 8.	FAQs on pages 7 and 8 apply to all microwave FieldFox models.

FieldFox Microwave Spectrum Analyzers

FieldFox microwave spectrum analyzer models

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

Model	Description	Frequency range ¹	Test port connectors
N9935A	9 GHz FieldFox microwave spectrum analyzer	100 kHz to 9 GHz	Type-N (f)
N9936A	14 GHz FieldFox microwave spectrum analyzer	100 kHz to 14 GHz	Type-N (f)
N9937A	18 GHz FieldFox microwave spectrum analyzer	100 kHz to 18 GHz	Type-N (f)
N9938A	26.5 GHz FieldFox microwave spectrum analyzer	100 kHz to 26.5 GHz	Type-N (f) ²
N9960A	32 GHz FieldFox microwave spectrum analyzer	9 kHz to 32 GHz	NMD 2.4 mm (m)
N9961A	44 GHz FieldFox microwave spectrum analyzer	9 kHz to 44 GHz	NMD 2.4 mm (m)
N9962A	50 GHz FieldFox microwave spectrum analyzer	9 kHz to 50 GHz	NMD 2.4 mm (m)

Step 2. Select optional measurement capabilities.

Any of these options can easily be added as a software upgrade in the future.

FieldFox microwave spectrum analyzer options

Option	Description	Prerequisite options/notes
Spectrum analyzer		
100	3.5 mm (m) connectors	Only available on N9938A. 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 FieldFoxes. See page 5, FAQ # 10.
220	Full-band tracking generator	CW, CW coupled, and tracking
235	Pre-amplifier	-
236	Interference analyzer and spectrogram	-
238	Spectrum analyzer time gating	-
320	Reflection measurements	320 requires 220 on all models. On N9938A specifically, 320 also requires 100.
Power measurements		
208	USB power sensor meas. vs. frequency	Requires 302
302	USB power sensor support	Need to order USB power sensor ³
310	Built-in power meter	No power sensor required. See page 7, FAQ #1
330	Pulse meas. with USB peak power sensor	Need to order USB peak power sensor. See page 8, FAQs #7 and #8
System features		
030	Remote control capability	Requires an iOS device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See page 8, FAQ #3
309	DC bias variable-voltage source	-

1. The spectrum analyzer can be tuned to 5 kHz.

2. Order Option 100 for 3.5 mm (m) test port connectors. With N9938A-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 N9938A.

3. List of compatible power sensors available from www.keysight.com/find/fieldfoxsupport

FieldFox Spectrum Analyzer FAQs

Question	Answer
1. What is included with the basic spectrum analyzer?	<ul style="list-style-type: none"> – Basic spectrum analysis, four traces, different detector types, radio standard selection, limit lines – Channel power, occupied bandwidth, adjacent channel power – AM/FM tune and listen, field strength measurements, antenna factors, frequency counter marker
2. What is included with Option 236?	<ul style="list-style-type: none"> – Interference analyzer and spectrogram – Trace playback and recording
3. What is included with Option 320?	<ul style="list-style-type: none"> – 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 N993xA/N996xA SA offers RL and VSWR. CAT mode on the N991xA/N995xA combo analyzers offers RL and VSWR, DTF, insertion loss, and also various calibration capabilities such as QuickCal and OSL.
Additional FAQs on pages 7 and 8.	FAQs on pages 7 and 8 apply to all microwave FieldFox models.

Warranty and Service

All FieldFox analyzers come standard with a 3 year warranty.

Documentation

A printed copy of the User's Guide is included with all FieldFox orders. If you do not wish to receive the printed User's Guide, order N99xxA Option 0B0.

Option	Description	Notes
N99xxA-0B0	Do not include User's Guide	
N99xxA-ABA	Printed User's Guide in English	Default option

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.

Upgrades

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

FieldFox microwave (combination) upgrades

N9913AU, N9914AU, N9915AU, N9916AU, N9917AU, N9918AU, N9950AU, N9951AU, N9952AU

Option	Description	Upgrade contents	Additional requirements
010	VNA time domain analysis	License key	210
030	Remote control capability	License key	None
112	Enable QuickCal	License key	None (Does not apply to N995xAU)
208	USB power sensor measurements versus frequency	License key	302
209	Extended range transmission analysis (ERTA)	License key	233 and 210 ¹
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	None
309	DC bias variable-voltage source	License key	None
310	Built-in power meter	License key	None
330	Pulse measurements	License key	None

1. 209 is a system based on two FieldFoxes. See page 6, FAQ # 10, for a detailed description of the system requirements.

FieldFox VNA upgrades

N9925AU, N9926AU, N9927AU, N9928AU

Option	Description	Upgrade contents	Additional requirements
010	VNA time domain analysis	License key	None
030	Remote control capability	License key	None
112	Enable QuickCal	License key	None
208	USB power sensor measurements versus frequency	License key	302
211	VNA full 2-port S-parameters	License key	None
212	Mixed-mode S-parameters	License key	211
215	TDR cable measurements	License key	305
302	External USB power sensor support	License key	None
305	Cable and antenna analyzer	License key	None
307	GPS receiver	License key	None
308	Vector voltmeter	License key	None
309	DC bias variable-voltage source	License key	None
310	Built-in power meter	License key	None
330	Pulse measurements	License key	None

Upgrades (continued)

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

FieldFox SA upgrades

N9935AU, N9936AU, N9937AU, N9938AU,
N9960AU, N9961AU, N9962AU

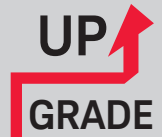
Option	Description	Upgrade contents	Additional requirements
030	Remote control capability	License key	None
100	3.5 mm connectors	Not applicable	Not applicable
208	USB power sensor measurements versus frequency	License key	302
209	Extended range transmission analysis (ERTA)	License key	220 ¹
220	Full-band tracking generator	License key	None
235	Preamplifier function	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	License key	None
310	Built-in power meter	License key	None
320	Reflection measurements	License key ²	<ul style="list-style-type: none"> – Option 220 for all models – Option 100 and 220 for N9938A
330	Pulse measurements	License key	None

1. 209 is a system based on two FieldFoxes. See page 6, FAQ # 10, for a detailed description of the system requirements.

2. On N9938A, 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.

You Can Upgrade!

Options can be
added after your
initial purchase.



Most FieldFox options are
license-key upgradeable.

Calibration Kits

FieldFox analyzers support most standard HP/Agilent/Keysight mechanical calibration kits and all Keysight USB ECal modules. Custom calibration kits can be created and uploaded to FieldFox using Data Link software.

Model	Description	Connector	Frequency range	Components ¹
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	3-in-1 OSL cal kit	Type-N (m)	DC to 6 GHz	open, short, load (all male)
N9910X-801	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 (both female and male)
85054B	Standard cal kit	Type-N	DC to 18 GHz	open, short, fixed load, sliding load (both 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
Type-N, 75 Ω ²				
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	3.4 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
2.92 mm (same as K connector)				
85056KE01 ³	Standard cal kit	2.92 mm	DC to 40 GHz	open, short, fixed load, sliding load (both female and male)
85056KE02 ⁴	Economy cal kit	2.92 mm	DC to 40 GHz	open, short, fixed load (both female and male)
N4692A	ECal	2.92 mm	10 MHz to 40 GHz	connectors configurable

1. Component list shows calibration components. Some cal kits also include adapters.

2. Recommend ordering quantity 2 of N9910X Option 846, 50 to 75 Ω adapter.

3. Same as Maury's 8770C47

4. Same as Maury's 8770D47

Calibration Kits (continued)

FieldFox analyzers support most standard HP/Agilent/Keysight mechanical calibration kits and all Keysight USB ECal modules. Custom calibration kits can be created and uploaded to FieldFox using Data Link software.

Model	Description	Connector	Frequency range	Components
2.4 mm				
85056D	Economy cal kit	2.4 mm	DC to 50 GHz	open, short, fixed load (both 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
Waveguide				
N9911X-11x	Econ. waveguide cal kit	WR-137	5.38 to 8.18 GHz	short, termination, offset length
N9911X-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
N9911X-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
R11644A	Waveguide cal kit	WR-28	26.5 to 40 GHz	short, shim, termination two straight sections
Q11644A	Waveguide cal kit	WR-22	33 to 50 GHz	short, shim, termination, two straight sections
U11644A	Waveguide cal kit	WR-19	40 to 60 GHz	short, shim, termination, two straight sections

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-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-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
Antennas					
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)				
RF and microwave adapters					
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-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				
Other RF and microwave accessories					
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	External bias-tee, 2.5 MHz to 6 GHz, 1 W, 0.5 A				
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					
N9910X-870	Extra 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-886	Torque wrench, 17 mm, 90 N-cm (8in-lb), recommended for N995x and N996x analyzers				

Accessories (continued)










Below are images for a subset of FieldFox accessories. Complete list of accessories are on pages 15 to 17 of this document.

Description	Accessory
N9910X-701 Type-N (m) to Type-N (f) cable, 3.28 ft	
N9910X-708 3.5 mm (m) to 3.5 mm (f) cable, 3.28 ft	
N9910X-820 Antenna, directional	
N9910X-823 Antenna, cellular narrowband	
N9910X-822 Antenna, directional	
N9910X-825 Antenna, GPS, active	
N9910X-870 Extra battery	
N9910X-872 External battery charger	
N9910X-881 Hard transit case	

Description	Accessory
N9910X-811 Type-N (m) to Type-N (f) cable, 5 ft	
N9910X-812 Type-N (m) to Type-N (m) cable, 12 ft	
N9910X-816 Type-N (m) to Type-N (f) cable, 3.28 ft	
N9910X-824 Antenna, cellular narrowband	
N9910X-848 Coaxial adapter, Type-N(f) to 3.5 mm (f)	
N9910X-875 DC car charger and adapter	
N9910X-873 AD/DC adapter	
N9910X-874 External bias-tee	

Accessories (continued)

Below are images for a subset of FieldFox accessories. Complete list of accessories are on pages 15 to 17 of this document.

Description	Accessory
N4690B 2-port ECal, Type-N, 18 GHz	
N9910X-800 3-in-1 OSL cal kit, Type-N (m), 6 GHz	
N991X0-801 3-in-1 OSL cal kit, Type-N (f), 6 GHz	
85514A 4-in-1 OSLT cal kit, Type-N (m) 9 GHz	
85515A 4-in-1 OSLT cal kit, Type-N (f), 9 GHz	
85518A 4-in-1 OSLT cal kit, Type-N (m), 18 GHz	
85519A 4-in-1 OSLT cal kit, Type-N (f), 18 GHz	
85054D Economy cal kit, Type-N, 18 GHz	
N9911X-211/212/213/214 WR-90 economical cal kit	

Description	Accessory
N4691B 2-port ECal, 3.5 mm, 26.5 GHz	
85520A 4-in-1 OSLT cal kit, 3.5 mm (m), 26.5 GHz	
85521A 4-in-1 OSLT cal kit, 3.5 mm (f), 26.5 GHz	
85033D/E 3.5 mm cal kit, 9 GHz	
85052D 3.5 mm cal kit, 26.5 GHz	
N4692A 2.92 mm, 2-port ECal, 40 GHz	
N4693A 2.4 mm 2-port ECal, 50 GHz	
85056D 2.4 mm cal kit, 50 GHz	
X11644A WR-90 standard cal kit	

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