FieldFox Handheld Analyzers

14/18/26.5/32/44/50/54 GHz (D Series)

Introduction

This configuration guide describes configurations, options, and accessories for the new FieldFox D-Series handheld analyzers. Use this guide, along with the technical overview and data sheet, for a complete description of the analyzers. The table on page 3 titled “FieldFox D-Series Family and Options” shows a comparison of the functions available in the FieldFox D-Series family of analyzers.

Note: Combination analyzer (combo) = Cable and Antenna Tester (CAT) + Vector Network Analyzer (VNA) + Signal Analyzer (SA).

Included Accessories

The following accessories are included with every FieldFox:

- AC/DC adapter
- Battery
- Soft carrying case



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FieldFox D-Series Family and Options

Option	Description	Combination Analyzers N9916/17/18/50/51/52/53D	Signal Analyzers N9936/37/38/60/61/62/62D
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	✓	—
	Cable and antenna analyzer	Base model [1]	— [2]
308	Vector voltmeter	✓	—
Spectrum Analysis			
209	Extended Range Transmission Analysis (ERTA)	✓	✓
220	Tracking generator	✓[3]	✓
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	✓	✓
353	IQ streaming	✓	✓
355	Analog demodulation	✓	✓
356	Noise Figure (NF)	✓	✓
357	Pulse generator	✓	✓
358	EMF measurements	✓	✓
360	Phased array antenna support	✓ (for N995xD only)	✓ (for N996xD only)
361	EMI measurements	✓	✓
366	Interference finder (manual mode)	✓	✓
370/371	Over-the-Air (OTA) LTE FDD/TDD	✓	✓
378	Over-the-Air (OTA) 5G NR	✓	✓
390	Directional finding – TDOA node support	✓	✓
391	Directional finding – Angle of Arrival (AoA)	✓	✓
B04	Analysis bandwidth, 40 MHz[4]	✓	✓
B10	Analysis bandwidth, 120 MHz[4]	✓	✓
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 Power Supply (DCPS)	✓	✓
—	Frequency extender support	✓	✓
Windows Based Software			
89601C	PathWave VSA (89600 VSA) software	✓	✓
N6820ES	Surveyor 4D software	✓	✓
SJ002A	WaveJudge Wireless Analyzer Toolset	✓	✓
S9910A	Keysight Spectrum Management (KSMS)	✓	✓
S9911A	Directional Finding - TDOA	✓	✓
S9912A	Directional Finding - AoA	✓	✓

1. Base model functionality listed is the primary function of that instrument. For example, on the N991xD/5xD combo analyzers, cable and antenna analyzer is the standard function included with every N991xD/5xD.
2. Cable and antenna analyzer is not available on the N993xD/6xD.
3. On the N991xD/5xD combo analyzers, order Options 233 and 210 to obtain a tracking generator with the spectrum analyzer. There is no Option 220 on the N991xD/5xD analyzers. Option 233 provides the spectrum analyzer capability and Option 210 the “tracking” capability.
4. 10 MHz standard.

FieldFox D-Series 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	Test Port Connectors
N9916D	14 GHz FieldFox microwave analyzer	30 kHz to 14 GHz	9 kHz to 14 GHz	Type-N (f)
N9917D	18 GHz FieldFox microwave analyzer	30 kHz to 18 GHz	9 kHz to 18 GHz	Type-N (f)
N9918D	26.5 GHz FieldFox microwave analyzer	30 kHz to 26.5 GHz	9 kHz to 26.5 GHz	3.5 mm (m)
N9950D	32 GHz FieldFox microwave analyzer	300 kHz to 32 GHz	9 kHz to 32 GHz	2.4 mm (m)
N9951D	44 GHz FieldFox microwave analyzer	300 kHz to 44 GHz	9 kHz to 44 GHz	2.4 mm (m)
N9952D	50 GHz FieldFox microwave analyzer	300 kHz to 50 GHz	9 kHz to 50 GHz	2.4 mm (m)
N9953D	54 GHz FieldFox microwave analyzer	300 kHz to 54 GHz	9 kHz to 54 GHz	1.85 mm (m)

Analyzer Options

Step 2. Select optional measurement capabilities.

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

Option	Description	Prerequisite Options/Notes
CAT/Vector Network Analysis		
010	VNA time domain	Requires 210, recommend 211. See FAQ #7
210	VNA transmission/reflection	Recommend ordering a calibration kit. See FAQ #4 and FAQ #6
211	VNA full 2-port S-parameters	Requires 210, recommend ordering a calibration kit. See 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 FAQ #8
Spectrum Analysis		
209	Extended Range Transmission Analysis (ERTA)	Requires 233 and 210 for Combo analyzers (N991x/5x), or 220 for Signal analyzers (N993x/6x). Recommend 307. Requires two FieldFox units. See 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. Require the corresponding option to support a specific app. For example, to support EMF in channel scanner requires 358; to support indoor and outdoor mapping requires 352
350	Real-Time Spectrum Analyzer (RTSA)	Requires 233, Recommend 235. See FAQ # 11
351	I/Q Analyzer (IQA)	Requires 233
352	Indoor and outdoor mapping	Requires 233, 307, and at least one of 312, 370, 371, or 378. See FAQ #15
353	IQ streaming	Requires 233, 351. Data streaming bandwidth up to 120 MHz with B10
355	Analog demodulation	Requires 233
356	Noise Figure (NF)	Requires 233, 235, 309 and accessory item N9910X-713 BNC to SMB cable. See FAQ #13 for external preamplifier and noise source requirements.
357	Pulse generator	Requires 233
358	EMF measurements	Requires 233. Also requires triaxial antenna. See FAQ #16

Option	Description	Prerequisite Options/Notes
360	Phased array antenna support	Requires 233. Also requires phased array antenna. Only available on N995xD/N996xD.
361	EMI measurements	Requires 233
366	Interference finder (manual mode)	Requires 233, 307, and 85574A Handheld direction antenna
370	Over-the-Air (OTA) LTE FDD	Requires 233 and 307. Recommend 235.
371	Over-the-Air (OTA) LTE TDD	Requires 233 and 307. Recommend 235.
378	Over-the-Air (OTA) 5G NR	Requires B10 and 307. Recommend 235. For FR2 frequencies above 26.5 GHz, requires N995xB models. See FAQ #18
390	Directional finding – TDOA node support	Requires 233
391	Directional Finding - Angle of Arrival (AoA)	Requires 233, and 85573A AoA antenna
B04	Analysis bandwidth, 40 MHz [1]	Requires 233. Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software
B10	Analysis bandwidth, 120 MHz [1]	Requires 233. Recommend 350, 351, 378 or PathWave VSA (formerly 89600 VSA) software.
Power Measurements		
208	USB power sensor meas. versus frequency	Requires 302 See FAQ I
302	USB power sensor support	Need to order USB power sensor [2] See FAQ A
310	Built-in power meter	No power sensor required. See FAQ B
330	Pulse meas. with USB peak power sensor	Requires 302 and USB peak power sensor. See FAQ G and FAQ H
System Features		
030	Remote control capability	Requires an iOS or an Android device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See FAQ C
309	DC Power Supply (DCPS)	Recommend N9910X-713 cable. See FAQ D
—	Frequency extender support	Requires 233. Optional 350, 351, 370, 371, 378, PathWave VSA (formerly 89600 VSA) software. See Accessories pages
Windows Based Software		
89601C	PathWave VSA (89600 VSA) software	Requires 233
N6820ES	Surveyor 4D software	Requires 233, 235 and 307. See FAQ #17
SJ002A	WaveJudge Wireless Analyzer Toolset	Requires 233
S9910A	Keysight spectrum management software (KSMS)	Requires 233, 235 and 307
S9911A	Directional Finding - TDOA	Requires S9910A
S9912A	Directional Finding - AoA	Requires S9910A

1. 10 MHz standard.
2. List of compatible sensors available from www.keysight.com/find/fieldfoxsupport or page 20 of this document.

FieldFox D-Series RF and Microwave (Combination) Analyzer FAQs

Question	Answer
1. What is included with a base N991x/5xD 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 calibration
	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 N991x/5xD 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 is 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 N991x/5xD Option 236?	Interference analyzer and spectrogram, trace playback and recording
4. What is included with N991x/5xD 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 N991x/5xD 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 calibration
6. Can I measure group delay on N991x/5xD 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 N991x/5xD 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 N991x/5xD 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: N9916/17/18/50/51/52/53D • FieldFox signal analyzers: N9936/37/38/60/61/62/63D
	The two FieldFox units used in ERTA do not have to be the same model.
	ERTA requires the following options on Combo FieldFox models (N9916/17/18/50/51/52/53D): • Option 210, VNA transmission/reflection • Option 233, spectrum analyzer
	ERTA requires the following options on SA FieldFox models (N9936/37/38/60/61/62/63D) • 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:

Question	Answer
	• 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 cross-over LAN cable is required. Alternatively, both analyzers can be on a local area network.
	Recommended Accessory
	F. N9910X-825, GPS Antenna. Necessary if Option 307 is ordered.
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 become available when Option 355 is purchased. AM/FM metrics provide 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 SA measurements on FieldFox. The FieldFox must be equipped with spectrum analysis capability. The preamplifier option is recommended, as elusive signals often have low power levels. The maximum real-time bandwidth for Option 350 is up to 120 MHz with 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 need 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 And 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]

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 and USB smart noise sources models U1832A/B/C, and U1833A/B/C/D. 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 5G NR Over-the-Air (OTA) measurements (Option 378)?	Requires spectrum analyzer mode (Option 233 on combination models) and GPS receiver (Option 307). Highly recommend an internal preamplifier (Option 235). N995x/6xD models are requiredsince phased array antenna, which can be ordered as Keysight 85571A-028 or directly from Anokiwave as AWMF-0129, operates at 28 GHz.
15. What is included with indoor and outdoor mapping (Option 352)?	The FieldFox mapping function is available in the following modes: Channel Scanner (312), Phased-Array Antenna support (360), and OTA LTE FDD/TDD (370/371), 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 OpenStreetMap (OSM) once location coordinates (latitude and longitude) and zoom levels have been entered the Map Explorer menu. If using the I 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. Supported antenna is AGOS advanced technologies Triaxial Isotropic Antenna model SDIA-6000 30 MHz to 6 GHz. It can also be ordered as Keysight 85572A. EMF measurements are supported with spectrum analyzer mode (Opt 233 required on combination models), OTA LTE FDD/TDD (Opt 370/371) and OTA 5G NR (Opt 378).
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

Question	Answer
	(N6820ES-USD). Requires Surveyor 4D software version 4.3 or later (May 2019). Frequencies beyond 26.5 GHz will require N995x/6xD models.
18. What is required for 5G NR Over- the-Air (OTA) measurements (Option 378)?	Requires spectrum analyzer mode (Option 233 on combo analyzers), 120 MHz analysis bandwidth (Option B10) and GPS receiver (Option 307). Highly recommend an internal preamplifier (Option 235). FR2 frequencies above 26.5 GHz will require N995x/6xD.
19. What is required to expand the maximum frequency of FieldFox spectrum analyzer to WR15 (50 – 75 GHz) or WR12 (60 – 90 GHz)?	Requires spectrum analyzer mode (Option 233 on combo analyzers) and the N9910XVDI frequency extension module (Keysight model number for the VDI PSAX), along with appropriate adapters depending on the FieldFox model used.

N9910XVDI (VDI PSAX Frequency Extension Modules		
Supported on FieldFox Models	**N9917D, N9937D, N9938D (typ-N); N9918D, N9938D/Opt 100 (3.5 mm), N9950D, N9960D, N9951D, N9961D, N9952D, N9962D (2.4 mm)**	
Description	**N9910XVDI-W15 (VDI WR15 PSAX)**	**N9910XVDI-W12 (VDI WR12 PSAX)**
RF frequency band	50 to 75 GHz	60 to 90 GHz
RF power limits (P1dB, Damage)	-10 dBm (est.)/+17 dBm (typ.)	-10 dBm (est.)/+17 dBm (typ.)
IF frequency	100 MHz (min) to 7.5 GHz (max)	100 MHz (min) to 9 GHz (max)
SSB Conversion Loss (typ.)	-8 dB	-8 dB
Noise Figure (typ.)	12 dB	12 dB
LO harmonic factor	6	6
Displayed average noise level	-155 dBm/Hz (typ.)	-155 dBm/Hz (typ.)

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.

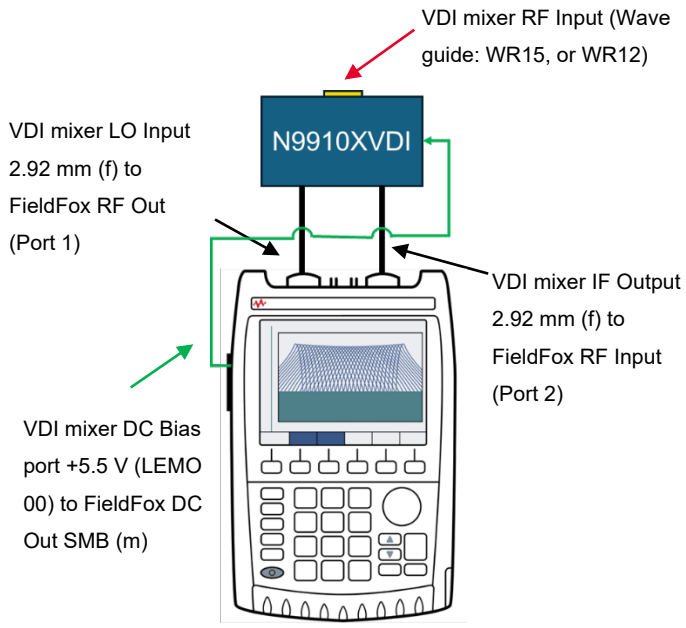


Figure 1. VDI PSAX frequency extender diagram

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) 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)	2 of each
	N9910X-713, SMB(f) to BNC(m)	2 of each
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

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

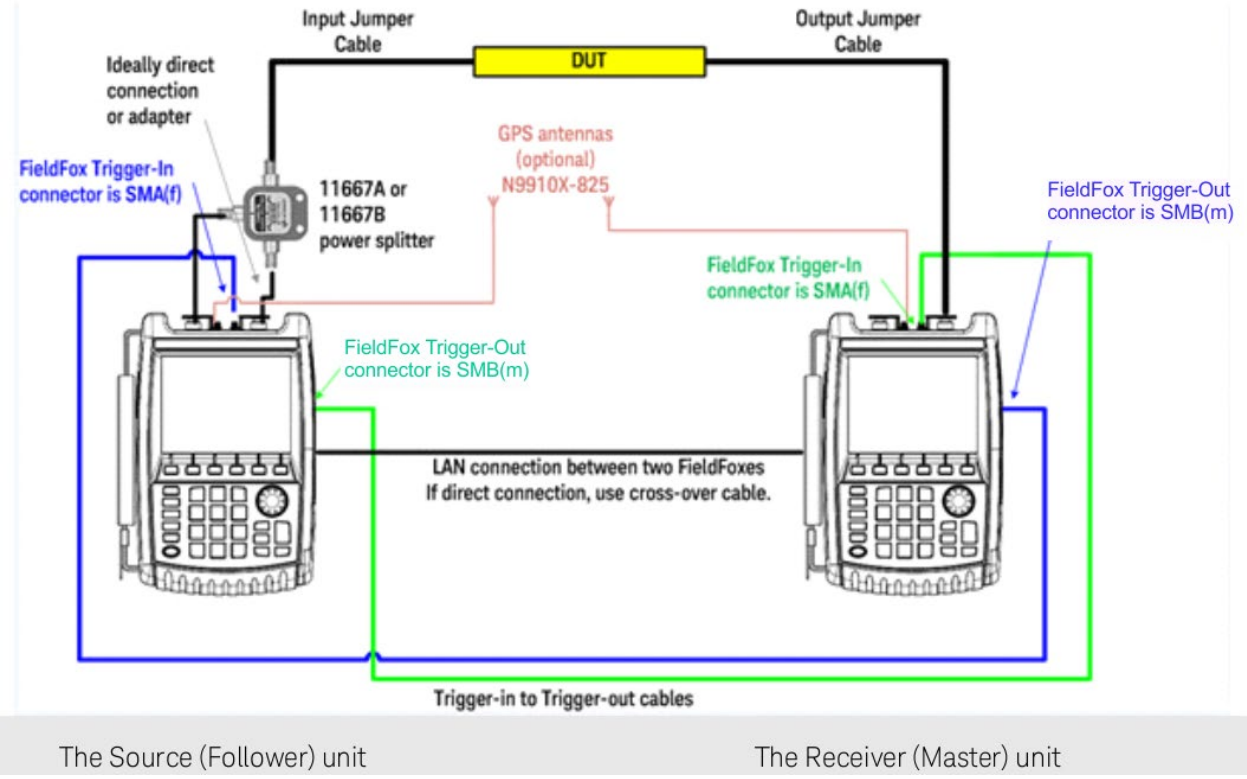
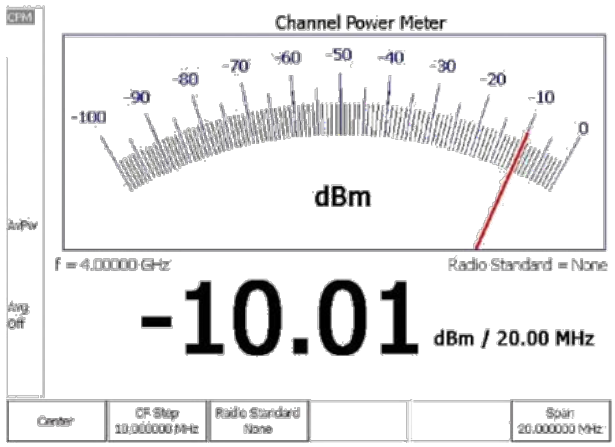


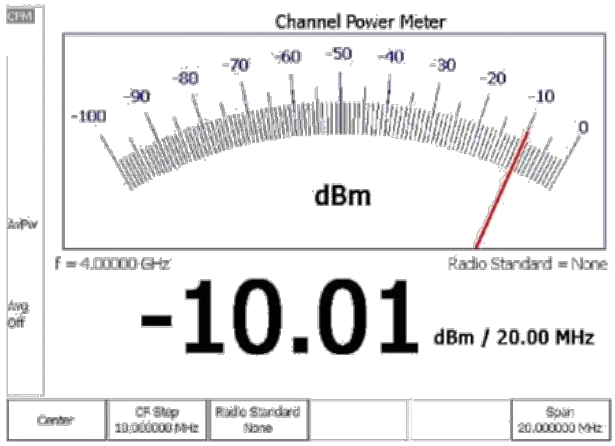
Figure 2. ERTA system diagram

FAQs – Applicable to All FieldFox D-Series RF and Microwave Analyzers

Question	Answer		
A. 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.		
B. 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 120 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





C. 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.
D. What is the connector for Option 309, DCPS output?	The DC output has a SMB (m) connector. Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m).
E. What are the connectors for Reference Out, Trigger Out, and Trigger In?	The connector for Trig In is SMA (f). Recommend ordering N9910X Option 712 Trig/Ref in SMA (m) to BNC (f) cable. The connectors for the Ref Out and Trig Out are SMB (m). Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m).
F. What is Option 030 remote control capability?	1. Option 030 provides a license for FieldFox to allow remote control via an iOS or Android 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, or Android device with Android OS 9.0 or higher, with free FieldFox app ○ A WiFi or 3G/4G network connection between FieldFox and iOS device or Android device
G. 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 or page 20 of this document 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. Option 330 or pulse measurement requires Option 302 and Keysight USB power sensor
H. 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

Question	Answer
	Trace graph for pulse profiling with gating
	Rise time, fall time, pulse width, pulse period, pulse repetition frequency
I. What is required by Option 208? And what can I do 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.
J. What are the new user interface connectors in the D-Series FieldFox compared to its predecessors?	1. SFP+ (Small Form-factor Pluggable Plus), quantity 2: Enable data transfer rates of up to 10 GbE. 2. USB 3.0/DP Out: Also connects to USB earphone. 3. Trig In:4. Ref Out: Separated from Trig In. For frequency reference output. 5. Trig Out: Separated from Ref Out.
H. How do I connect an earphone to the D-Series Field Fox?	The D-Series FieldFox eliminate the legacy 3.5 mm earphone jack. Instead, the audio output is from the "USB 3.0/DP Out" connector on the instrument's right-side panel. Insert your earphone jack into the USB 3.0/DP Out (If the earphone is with 3.5 mm miniature audio jack, then a USB type C to 3.5 mm earphone adapter is required).

FieldFox D-Series RF and Microwave Signal Analyzers

Analyzer Models

Step 1. Select The Model that Provides the Desired Frequency Range

Model	Description	Frequency Range [1]	Test Port Connectors
N9936D	14 GHz FieldFox signal analyzer	9 kHz to 14 GHz	Type-N (f)
N9937D	18 GHz FieldFox signal analyzer	9 kHz to 18 GHz	Type-N (f)
N9938D	26.5 GHz FieldFox signal analyzer	9 kHz to 26.5 GHz	Type-N (f) [2]
N9960D	32 GHz FieldFox signal analyzer	9 kHz to 32 GHz	2.4 mm (m)
N9961D	44 GHz FieldFox signal analyzer	9 kHz to 44 GHz	2.4 mm (m)
N9962D	50 GHz FieldFox signal analyzer	9 kHz to 50 GHz	2.4 mm (m)
N9963D	54 GHz FieldFox signal analyzer	9 kHz to 54 GHz	1.85 mm (m)

1. Useable to 5 kHz for N993x/6xD.
2. Order Option 100 for 3.5 mm (m) test port connectors. With N9938D-100, the spectrum analyzer is built with 3.5 mm test port connectors instead of the standard Type-N (f).

Analyzer Options

Step 2. Select Optional Measurement Capabilities

You can also add any of these options as a software upgrade in the future.

Option	Description	Prerequisite Options/Notes
Spectrum Analysis		
100	3.5 mm (m) connectors	Only available on N9938D and at time of purchase. No upgrade available.
209	Extended Range Transmission Analysis (ERTA)	Requires 220. Recommend 307. Requires two FieldFox units. See FAQ # 9. See page 9 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	Require the corresponding option to support a specific app. For example, to support EMF in channel scanner requires 358; to support indoor and outdoor mapping requires 352
350	Real-Time Spectrum Analyzer (RTSA)	Recommend 235. See FAQ # 11
351	I/Q Analyzer (IQA)	—
352	Indoor and outdoor mapping	Requires 307, and at least one of 312, 360, 370, 371, or 378. See FAQ #15
353	IQ streaming	Requires 351
355	Analog demodulation	—
356	Noise Figure (NF)	Requires 235, 309 and accessory item N9910X-713 BNC to SMB cable. See FAQ #13 for external preamplifier and noise source requirements.
357	Pulse generator	
358	EMF measurements	Requires triaxial isotropic antenna. See FAQ #16
361	EMI measurements	—
360	Phase array antenna support	See FAQ #14. Only available on N995xD/6xD.
366	Interference finder (manual mode)	Requires 307, and 85574A Handheld direction antenna
370/371	Over-the-Air (OTA) LTE FDD/TDD	Requires 307, recommend 235.
378	Over-the-Air (OTA) 5G NR	Requires B10 and 307. Recommend 235. For NR2, no external mixer required for N996xD
390	Directional finding – TDOA node support	
391	Directional finding – Angle of Arrival (AoA)	
B04	Analysis bandwidth, 40 MHz [1]	Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software
B10	Analysis bandwidth, 120 MHz [1]	Recommend 350, 351, 378 or PathWave VSA (formerly 89600 VSA) software
Power Measurements		
208	USB power sensor meas. versus frequency	Requires 302. See FAQ I
302	USB power sensor support	Need to order USB power sensor [2]. See FAQ A
310	Built-in power meter	No power sensor required. See FAQ B
330	Pulse meas. with USB peak power sensor	Requires 302 and USB peak power sensor. See FAQ G and FAQ H
System Features		
030	Remote control capability	Requires an iOS device or an Android device
307	GPS receiver	Need to order GPS antenna, N9910X-825. See FAQ C
309	DC Power Supply (DCPS)	Recommend N9910X-713 cable, See FAQ D
—	Frequency extender support	Optional 350, 351, 360, 370, 371, 378, PathWave VSA software. See Accessories, pages 19-20
Windows Based Software		
89601C	PathWave VSA (89600 VSA) software	—
N6820ES	Surveyor 4D software	Requires 235 and 307, see page 7, FAQ #17
SJ002A	WaveJudge Wireless Analyzer Toolset	
S9910A	Keysight spectrum management software (KSMS)	Requires 235 and 307
S9911A	Directional Finding - TDOA	Requires S9910A
S9912A	Directional Finding - AoA	Requires S9910A

1. 10 MHz standard.
2. List of compatible sensors available from www.keysight.com/find/fieldfoxsupport or the list on page 20 of this document.

FieldFox D-Series Signal Analyzer FAQs

Question	Answer
1. What is included with the basic signal 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 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 N993x/6x FieldFox spectrum analyzers. AM/FM metrics become available when Option 355 is purchased. AM/FM metrics provide the user with RF spectrum view, demodulated baseband signal waveform, carrier power, frequency deviation, SINAD and more.
Additional FAQs	**FAQs on pages 6 through 11 apply to all microwave FieldFox models.**

Upgrades

Fieldfox RF and Microwave (Combination) Analyzer Upgrades

N9916/17/18/50/51/52/53DU

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

Option	Description	Upgrade Contents	Additional Requirements
010	VNA time domain analysis	License key	Requires 210, recommend 211
030	Remote control capability	License key	Requires an iOS device or an Android device
208	USB power sensor measurements versus frequency	License key	Requires 302
209	Extended Range Transmission Analysis (ERTA)	License key	Requires 233 and 210 [1], recommend 307
210	VNA transmission and reflection	License key	None
211	VNA full 2-port S-parameters	License key	Requires 210
212	Mixed-mode S-parameters	License key	Requires 210 and 211
215	TDR cable measurements	License key	None
233	Spectrum analyzer	License key	None
235	Preamplifier	License key	Requires 233
236	Interference analyzer and spectrogram	License key	Requires 233
238	Spectrum analyzer time gating	License key	Requires 233
302	External USB power sensor support	License key	None
307	GPS receiver	License key	None
308	Vector voltmeter	License key	Requires 210 and 211 for full VVM functionality
309	DC power supply (DCPS)	License key	Recommend N9910X-713 cable
310	Built-in power meter	License key	None
312	Channel scanner	License key	Requires 233. Requires 233. Require the corresponding option to support a specific app. For example, to support EMF in channel scanner requires 358; to support indoor and outdoor mapping requires 352
330	Pulse measurements	License key	Requires 302 and USB peak power sensor
350	Real-Time Spectrum Analyzer (RTSA)	License key	Requires 233, recommend 235
351	I/Q Analyzer (IQA)	License key	Requires 233
352	Indoor and outdoor mapping	License key	Requires 233, 307, and at least one of 312, 360, 370, 371, or 378
353	IQ streaming	License key	Requires 233, 351
355	Analog demodulation	License key	Requires 233
356	Noise Figure (NF)	License key [2]	Requires 233, 235, 309 and accessory cable N9910X-713
357	Pulse generator	License key	Requires 233
358	EMF measurements	License key	Requires 233. Also requires triaxial isotropic antenna. See FAQ #16
360	Phased array antenna support	License key	Requires 233. Also requires phased array antenna. Requires N995xD. See FAQ #14

Option	Description	Upgrade Contents	Additional Requirements
361	EMI measurements	License key	Requires 233
366	Interference finder (manual mode)	License key	Requires 233, 307. Also requires 85574A Handheld direction antenna
370	Over-the-Air (OTA) LTE FDD	License key	Requires 233 and 307, recommend 235
371	Over-the-Air (OTA) LTE TDD	License key	Requires 233 and 307, recommend 235
378	Over-the-Air (OTA) 5G NR	License key	Requires 233, B10, and 307, recommend 235; See FAQ #18
390	Directional finding – TDOA node support	License key	Requires 233
391	Directional finding – Angle of arrival (AoA)	License key	Requires 233
B04	Analysis bandwidth, 40 MHz [3]	License key	Requires 233. Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software
B10	Analysis bandwidth, 120 MHz [3]	License key	Requires 233. Recommend 350, 351, 378 or PathWave VSA (formerly 89600 VSA) software

1. Option 209 is a system based on two FieldFox units. See FAQ #9, for a detailed description of the system requirements.
2. See FAQ #13 for external preamplifier and noise source requirements.
3. 10 MHz standard.

FieldFox Signal Analyzer Upgrades

N9936/37/38/60/61/62/63DU

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

Option	Description	Upgrade Contents	Additional Requirements
030	Remote control capability	License key	Requires an iOS device or an Android device
100	3.5 mm connectors	Not applicable	Not applicable; only available when purchased with the N9938D
208	USB power sensor measurements versus frequency	License key	Requires 302
209	Extended Range Transmission Analysis (ERTA)	License key	Requires 220, 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 Power Supply (DCPS)	License key	Recommend N9910X-713 cable
310	Built-in power meter	License key	None
312	Channel scanner	License key	Require the corresponding option to support a specific app. For example, to support EMF in channel scanner requires 358; to support indoor and outdoor mapping requires 352
330	Pulse measurements	License key	Requires 302 and 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	Requires 307, and at least one of 312, 360, 370, 371, or 378.
353	IQ streaming	License key	Requires 351
355	Analog demodulation	License key	None
356	Noise Figure (NF)	License key [3]	Requires 235, 309 and accessory cable N9910X-713
357	Pulse generator	License key	None
358	EMF measurements	License key	Requires triaxial isotropic antenna. See FAQ #16
360	Phased array antenna support	License key	Requires 233. Also requires phased array antenna. Requires N996xD. See FAQ #14
361	EMI measurements	License key	None
366	Interference finder (manual mode)	License key	Requires 307. Also requires 85574A Handheld direction antenna
370	Over-the-Air (OTA) LTE FDD	License key	Requires 307, recommend 235
371	Over-the-Air (OTA) LTE TDD	License key	Requires 307, recommend 235
378	Over-the-Air (OTA) 5G NR	License key	Requires B10 and 307, recommend 235. See FAQ #18
390	Directional finding – TDOA node support	License key	
391	Directional finding – Angle of arrival (AoA)	License key	

Option	Description	Upgrade Contents	Additional Requirements
B04	Analysis bandwidth, 40 MHz [4]	License key	Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software
B10	Analysis bandwidth, 120 MHz [4]	License key	Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software

1. For N9938D, Option 100 must have been ordered at the time of original purchase. It cannot be added later.
2. Option 209 is a system based on two FieldFox units. See FAQ #9, for a detailed description of the system requirements.
3. See FAQ #13 for external preamplifier and noise source requirements.
5. 10 MHz standard.

Documentation

The latest User's Guide (manual) for FieldFox including the N99xxD is available online from: http://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. The component column 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 [1]	3-in-1 OSL Cal kit	7/16 (m)	DC to 4 GHz	Open, short, load (all male)
N9910X-803 [1]	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 (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
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

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.

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[2]	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[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[2]	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 (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[2]	ECal	2.4 mm	10 MHz to 50 GHz	Connectors configurable
1.85 mm				
85058E	Economy cal kit	1.85 mm	DC to 67 GHz	Open, short, fixed load (female and male)
N4694A[2]	ECal	1.85 mm	10 MHz to 67 GHz	Connectors configurable
N4694D	ECal	1.85 mm	10 MHz to 67 GHz or DC to 67 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

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

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 ft	0.914 m
N9910X-810	Type-N (m)	Type-N (m)	8 GHz	5 ft	1.5 m
N9910X-811	Type-N (m)	Type-N (f)	8 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

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

Noise Sources

346A/B/C/CK01/CK40	Noise source family	www.keysight.com/find/346noisesources
U1832A	USB smart noise source, 10 MHz to 18 GHz, 5 dB ENR nominal	www.keysight.com/us/en/product/U1832A/
U1832B	USB smart noise source, 10 MHz to 26.5 GHz, 5 dB ENR nominal	www.keysight.com/us/en/product/U1832B/
U1832C	USB smart noise source, 500 MHz to 50 GHz, 5 dB ENR nominal	www.keysight.com/us/en/product/U1832C/
U1833A	USB smart noise source, 10 MHz to 18 GHz, 15 dB ENR nominal	www.keysight.com/us/en/product/U1833A/
U1833B	USB smart noise source, 10 MHz to 26.5 GHz, 15 dB ENR nominal	www.keysight.com/us/en/product/U1833B/
U1833C	USB smart noise source, 500 MHz to 50 GHz, 15 dB ENR nominal	www.keysight.com/us/en/product/U1833C/
U1833D	USB smart noise source, 500 MHz to 60 GHz, 10 dB ENR nominal	www.keysight.com/us/en/product/U1833D/

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)
N9910XA-823 [1]	Antenna, cellular narrowband, 824 to 869 MHz, Type-N (f)
N9910XA-824 [1]	Antenna, cellular narrowband, PCS 1850 to 1990 MHz, Type-N (f)
N9910X-825	Antenna, GPS, active, SMA (m)
85571A [1]	5G phased array antenna
85571A-028 [1]	5G Phased Array Antenna 28 GHz
85572A	EMF Triaxial antenna
85572A-006	Triaxial Isotropic Antenna 400 MHz to 6 GHz
85572A-007	Triaxial Isotropic Antenna 30 MHz to 6 GHz
85573A	Automatic DF Antenna and accessories
85573A-108	20 MHz to 8 GHz DF AoA antenna (including cable assembly)
85574A	Handheld direction antenna and accessories
85574A-100	20 MHz to 8.5GHz direction antenna with digital compass
85574A-209	Frequency extension for 85574A option 100 - 9 kHz to 20 MHz

1. Currently not RoHS compliant.

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-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, 10 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

Keysight N9910XVDI (or VDI PSAX) Frequency Extender Modules

The VDI PSAX frequency extenders, covering WR15 (50 to 75 GHz) or WR12 (60 GHz to 90 GHz), can be purchased either from Keysight as N9910XVDI (with an option for different millimeter-wave frequency range, shown below) or directly through Virginia Diodes, Inc (VDI). If purchased directly from VDI, contact VDI (www.vadiodes.com/en/products/portable-spectrum-analyzer-extenders-psax) or contact a Keysight representative for assistance.

FieldFox operating modes that support frequency extenders include: Spectrum analyzer, real-time spectrum analyzer, I/Q analyzer, and PathWave vector signal analysis software (formerly 89600 VSA).

Keysight Model/Option	Keysight Item Description	VDI Model/Option	Frequency Range
N9910XVDI	VDI frequency extenders for FieldFox	-	-
N9910XVDI-W15	WR15 frequency extender, 50 to 75 GHz	WR15PSAX	50 to 75 GHz
N9910XVDI-W12	WR12 frequency extender, 60 to 90 GHz	WR12PSAX	60 to 90 GHz

VDI Frequency Extender Module Adapter Kits

VDI PSAX frequency extender module adapter kits simplify the connection to FieldFox units with RF ports of Type-N, 3.5 mm, or 2.4 mm. Be sure to select the correct adapters for the VDI PSAX frequency extender based on the FieldFox model and its specific RF port type.

Option Number	Description	Fit to FieldFox Models
N9910XVDI-101	Male-SMA to female-SMA male, Qty 2 of 1250-3851	N9918D or N9938D with Option 100 (RF ports: 3.5 mm (m))
N9910XVDI-102	Male-type-N to male-SMA, Qty 2 of 1250-1636	N9917D/N9937D/N9938D (RF ports: Typ-N (f))
N9910XVDI-104	Female-SMA to male-SMA adapter, right angle, for connecting GPS antenna or Trigg/Ref input	All FieldFox models
Other VDI PSAX-Related Accessories		**Notes**
N9910XVDI-100	DC power cable replacement	Every VDI PSAX module shipped with a DC power cable as standard. This option is for replacement only.

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), used for connecting with 3.5 mm, 2.4 mm, or 1.85 mm connectors
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-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-886	Torque wrench, 17 mm, 90 N-cm (8 in-lb)
N9910X-895	Magnetic mount base for antenna

1. Also recommend ordering N9910X-713 Bias-Tee Power Cable, SMB(f) to BNC(m), 3.28 ft., to connect to the FieldFox DC source.

Keysight Power Sensors Supported with FieldFox (Options 208, 302, or 330)

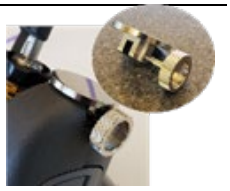
Model Number	USB or LAN	Sensor Type	Frequency and Power Range
U2000A	USB	Average	10 MHz to 18 GHz, -60 dBm to +20 dBm
U2000B	USB	Average	10 MHz to 18 GHz, -30 dBm to +44 dBm
U2000H	USB	Average	10 MHz to 18 GHz, -50 dBm to +30 dBm
U2001A	USB	Average	10 MHz to 6 GHz, -60 dBm to +25 dBm
U2001B	USB	Average	10 MHz to 6 GHz, -30 dBm to +44 dBm
U2001H	USB	Average	10 MHz to 6 GHz, -50 dBm to +30 dBm
U2002A	USB	Average	50 MHz to 24 GHz, -60 dBm to +20 dBm
U2002H	USB	Average	50 MHz to 24 GHz, -50 dBm to +30 dBm
U2004A	USB	Average	9 kHz to 6 GHz, -60 dBm to +20 dBm
U2021XA	USB	Average and peak	50 MHz to 18 GHz, -30 dBm to +20 dBm
U2022XA	USB	Average and peak	50 MHz to 40 GHz, -30 dBm to +20 dBm
U2041XA	USB	Average	10 MHz to 6 GHz, -70 dBm to +26 dBm
U2042XA	USB	Average and peak	10 MHz to 6 GHz, -70 dBm to +26 dBm
U2043XA	USB	Average	10 MHz to 18 GHz, -70 dBm to +26 dBm
U2044XA	USB	Average and peak	10 MHz to 18 GHz, -70 dBm to +26 dBm
U2051XA	USB	Average	10 MHz to 6 GHz, -70 dBm to +26 dBm
U2052XA	USB	Average	10 MHz to 18 GHz, -70 dBm to +26 dBm
U2053XA	USB	Average	10 MHz to 33 GHz, -70 dBm to +26 dBm
U2054XA	USB	Average	10 MHz to 40 GHz, -70 dBm to +20 dBm
U2055XA	USB	Average	10 MHz to 50/53 GHz, -70 dBm to +20 dBm
U2056XA	USB	Average	10 MHz to 54 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz)
U2057XA	USB	Average	10 MHz to 67 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz), to +10 dBm (≤67 GHz)
U2062XA	USB	Average and peak	10 MHz to 18 GHz, -70 dBm to +26 dBm
U2063XA	USB	Average and peak	10 MHz to 33 GHz, -70 dBm to +26 dBm
U2064XA	USB	Average and peak	10 MHz to 40 GHz, -70 dBm to +20 dBm
U2065XA	USB	Average and peak	10 MHz to 50/53 GHz, -70 dBm to +20 dBm
U2066XA	USB	Average and peak	10 MHz to 54 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz)
U2067XA	USB	Average and peak	10 MHz to 67 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz), to +10 dBm (≤67 GHz)
U8481A	USB	Average	10 MHz to 18 GHz, -35 dBm to +20 dBm
U8485A	USB	Average	10 MHz to 33 GHz, -35 dBm to +20 dBm
U8487A	USB	Average	10 MHz to 50 GHz, -35 dBm to +20 dBm
U8488A	USB	Average	10 MHz to 67 GHz, -35 dBm to +20 dBm
U8489A	USB	Average	DC to 120 GHz, -35 dBm to +20 dBm
L2051XA	LAN	Average	10 MHz to 6 GHz, -70dBm to +26 dBm
L2052XA	LAN	Average	10 MHz to 18 GHz, -70dBm to +26 dBm
L2053XA	LAN	Average	10 MHz to 33 GHz, -70dBm to +26 dBm
L2054XA	LAN	Average	10 MHz to 40 GHz, -70dBm to +20 dBm
L2055XA	LAN	Average	10 MHz to 50/53 GHz, -70dBm to +20 dBm
L2056XA	LAN	Average	10 MHz to 54 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz)
L2057XA	LAN	Average	10 MHz to 67 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz), to +10 dBm (≤67 GHz)
L2061XA	LAN	Average and peak	10 MHz to 6 GHz, -70dBm to +26 dBm
L2062XA	LAN	Average and peak	10 MHz to 18 GHz, -70dBm to +26 dBm
L2063XA	LAN	Average and peak	10 MHz to 33 GHz, -70dBm to +26 dBm
L2064XA	LAN	Average and peak	10 MHz to 40 GHz, -70dBm to +20 dBm
L2065XA	LAN	Average and peak	10 MHz to 50/53 GHz, -70dBm to +20 dBm
L2065XT	LAN	Average and peak	10 MHz to 53 GHz, -70dBm to +20 dBm
L2066XA	LAN	Average and peak	10 MHz to 54 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz)
L2067XA	LAN	Average and peak	10 MHz to 67 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz), to +10 dBm (≤67 GHz)
L2065XT	LAN	Thermal Vacuum Compliance	10 MHz to 53 GHz, -70 dBm to +20 dBm
L2066XT	LAN	Thermal Vacuum Compliance	10 MHz to 54 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz)
L2067XT	LAN	Thermal Vacuum Compliance	10 MHz to 67 GHz, -70 dBm to +20 dBm (≤50 GHz), to +15 dBm (≤54 GHz), to +10 dBm (≤67 GHz)
U2049XA	LAN	Average and peak	10 MHz to 33 GHz, -70dBm to +20 dBm

Description	Accessory	Description	Accessory
N9910X-701 Type-N (m) to Type-N (m) cable, 3.28 ft		N9910X-881 Hard transit case	
N9910X-708 3.5 mm (m) to 3.5 mm (f) cable, 3.28 ft		N9910X-812 Type-N (m) to Type-N (m) cable, 12 ft	
N9910X-820 Antenna, directional		N9910X-816 Type-N (m) to Type-N (f) cable, 3.28 ft	
N9910XA-823 Antenna, cellular narrowband		N9910X-821 Antenna, telescopic whip™	
N9910X-822 Antenna, directional		N9910X-848 Coaxial adapter, Type-N(f) to 3.5 mm (f)	
N9910X-825 Antenna, GPS, active		N9910X-875 DC car charger and adapter	
N9910X-876 Extra high-capacity battery		N9910X-873 AD/DC adapter	
N9910X-872 External battery charger		N9910X-874 External bias-tee	
N4690B [1] 2-port ECal, Type-N, 18 GHz		85054D Economy cal kit, Type-N, 18 GHz	

1. Discontinued

Description	Accessory	Description	Accessory
N9910X-800 3-in-1 OSL cal kit, Type-N (m), 6 GHz		N9910X-801 3-in-1 OSL cal kit, Type-N (f), 6 GHz	
N9910X-811 Type-N (m) to Type-N (f) cable, 5 ft		85520A 4-in-1 OSLT cal kit, 3.5 mm (m), 26.5 GHz	
85514A 4-in-1 OSLT cal kit, Type-N (m), 9 GHz		85521A 4-in-1 OSLT cal kit, 3.5 mm (f), 26.5 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		85572A Triaxial Isotropic Antenna (Option 85572A-006:400 MHz to 6 GHz; Option 85572A-007: 30 MHz to 6 GHz)	
N9911X-211/212/213/214 WR-90 economical cal kit		N4691B [2] 2-port ECal, 3.5 mm, 26.5 GHz	
N4692A [2] 2.92 mm, 2-port ECal, 40 GHz		N4693A [2] 2.4 mm 2-port ECal, 50 GHz	

1. Not currently RoHS compliant
2. Discontinued

Description	Accessory	Description	Accessory
N4691D 3.5 mm, 2-port ECal, 26.5 GHz		N4692D 2.92 mm, 2-port ECal, 40 GHz	
N4693D 2.4 mm, 2-port ECal, 50 GHz		N4694D 1.85 mm, 2-port ECal, 67 GHz	
85033D/E 3.5 mm cal kit, 9 GHz		85052D 3.5 mm cal kit, 26.5 GHz	
85056D 2.4 mm cal kit, 50 GHz		X11644A WR-90 standard cal kit	
N9910X-895 Magnetic mount base for antenna		85571A-028[1] 5G Phase Array Antenna 28 GHz (Not supported by N991xD/3xD)	
85573A Automatic direction-finding (DF) Antenna and Accessories 20 MHz – 8 GHz		85574A Handheld direction-finding antenna, 20 MHz (optional 9 kHz) to 8.5 GHz	

Note: While some items in this table might undergo changes in appearance without notifications, their technical performance remains unchanged.

[1] Not currently RoHS compliant

Keysight Support Services

Accelerate your learning curve, enhance your test uptime, and confidently guarantee your instrument accuracy with Keysight Support Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for an extensive group of instruments, software, and solutions to ensure optimal uptime, with fast response times and resolution. Explore the services that are right for you.

Keysight Services

Offering	Benefits
KeysightCare 	KeysightCare provides elevated support for Keysight instruments and software, with access to technical support experts who respond within a specified time and ensure committed repair and calibration turnaround times (TAT). KeysightCare offers multiple service agreement tiers, including KeysightCare Assured, Enhanced, and Application Software Support. See the KeysightCare data sheet for details.
KeysightCare Assured	KeysightCare Assured goes beyond basic warranty with repair services that include committed TAT and unlimited access to technical experts.
KeysightCare Enhanced	KeysightCare Enhanced includes all the benefits of KeysightCare Assured plus Keysight's accurate and reliable Calibration Services, accelerated, and committed TAT, and technical response.
Keysight Support Portal & Knowledge Center	All KeysightCare tiers include access to the Keysight Support Portal where you can manage support and service resources related to your assets such as service requests, and status, or browse the Knowledge Center.
Education Services	Build confidence and gain new skills to make accurate measurements, with flexible Education Services developed by Keysight experts. Including Start-up Assistance.
Alternative Acquisition Options	
KeysightAccess	Reduce budget challenges with a leased-based subscription service, that offers low monthly payments, enabling you to get the instruments, software, and technical support you want for your test needs.

Recommended Services

Maximize your instrument uptime and confidently make accurate measurements by securing technical support, repair, and calibration services with committed response and turnaround times. High-performance instruments include 1 year of KeysightCare Assured. Obtain multi-year KeysightCare upfront to eliminate the need for lengthy and tedious paperwork and yearly requests for maintenance budget. Plus, you benefit from secured service for 2, 3, or 5 years.

Service	Function
KeysightCare Enhanced [1]	**Includes Tech Support, Warranty and Calibration**
R-55B-001-1	KeysightCare Enhanced – Upgrade 1 year
R-55B-001-2	KeysightCare Enhanced – Extend to 2 years
R-55B-001-3	KeysightCare Enhanced – Extend to 3 years (Recommended)
R-55B-001-5	KeysightCare Enhanced – Extend to 5 years (Recommended)
KeysightCare Assured	**Includes Tech Support and Warranty**
R-55A-001-2	KeysightCare Assured – Extend to 2 years
R-55A-001-3	KeysightCare Assured – Extend to 3 years
R-55A-001-5	KeysightCare Assured – Extend to 5 years
Start-Up Assistance	
PS-S40-01	Included – instrument fundamentals and operations starter
PS-S40-04	Recommended – instrument fundamentals and operations starter
PS-S40-02	Optional, technology & measurement science standard learning

1. Available in select countries. For details, please view the datasheet. R-55B-001-2/3/5 must be ordered with R-55B-001-1.

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