# FieldFox Handheld Analyzers

4/6.5/9, 10/14/18/26.5/32/44/50/54 GHz (B and C models)

## Introduction

This configuration guide describes configurations, options, and accessories for the FieldFox B-Series and new C-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 B/C-Series Family and Options" shows a comparison of the functions available in the FieldFox B- and C-Series family of analyzers. The table on page 4 titled "FieldFox N9912C and Options" details the unique configurations available for the N9912C.FieldFox RF analyzer that offer greater flexibility,

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



## KEYSIGHT

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# FieldFox B/C-Series Family and Options

| Option | Description | Combination analyzers N9913/4/5/6/7/8B, N9913/4/5C N9950/1/2/3B | Signal analyzers N9933/4/5/6/7/8B, N9933/4/5C N9960/1/2/3B |
|---|---|---|---|
| **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 | ✓ | — |
| 320 | Reflection meas. (RL, VSWR and scalar meas.) | — [3] | ✓, not available on C model |
| **Spectrum analysis** | | | |
| 209 | Extended Range Transmission Analysis (ERTA) | ✓ | ✓ |
| 220 | Tracking generator | ✓[4] | ✓ |
| 233 | Spectrum analyzer | ✓ | Base model [1] |
| 235 | Pre-amplifier | ✓ | ✓ |
| 236 | Interference analyzer and spectrogram | ✓ | ✓ |
| 238 | Spectrum analyzer time gating | ✓ | ✓ |
| 312 | Channel scanner | ✓ | ✓ |
| 350 | Real-Time Spectrum Analyzer (RTSA) | ✓ | ✓ |
| 351 | I/Q Analyzer (IQA) | ✓ | ✓ |
| 352 | Indoor and outdoor mapping | ✓ | ✓ |
| 353 | IQ streaming | ✓ | ✓ |
| 355 | Analog demodulation | ✓ | ✓ |
| 356 | Noise Figure (NF) | ✓ | ✓ |
| 357 | Pulse generator | ✓ | ✓ |
| 358 | EMF measurements | ✓ | ✓ |
| 360 | Phased array antenna support | ✓ | ✓ |
| 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 | ✓ | ✓ |
| B04 | Analysis bandwidth, 40 MHz [5] | ✓ | ✓ |
| B10 | Analysis bandwidth, 120 MHz [5] | ✓ | ✓ |
| **Power measurements** | | | |
| 208 | USB power sensor meas. versus frequency | ✓ | ✓ |
| 302 | USB power sensor support | ✓ | ✓ |
| 310 | Built-in power meter | ✓ | ✓ |
| 330 | Pulse meas. with USB peak power sensor | ✓ | ✓ |
| **System features** | | | |
| 030 | Remote control capability | ✓ | ✓ |
| 307 | GPS receiver | ✓ | ✓ |
| 309 | DC bias variable-voltage source | ✓ | ✓ |
| — | Frequency extender support [6] | ✓ | ✓ |
| **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 | ✓ | ✓ |

1. Base model functionality listed is the primary function of that instrument. For example, on the N991xB,C/5xB combo analyzers, cable and antenna analyzer is the standard function included with every N991xB,C/5xB.
2. Cable and antenna analyzer is not available on the N993xB,C/6xB. A subset of measurements, return loss and VSWR, is available as Option 320.
3. Option 320 is not applicable to N991xB,C/5xB. The N991xB,C/5xB includes reflection measurements of return loss and VSWR as standard functions.
4. On the N991xB,C/5xB analyzers, order Options 233 and 210 to obtain a tracking generator with the spectrum analyzer. There is no Option 220 on the N991xB,C/5xB analyzers. Option 233 provides the spectrum analyzer capability and Option 210 the "tracking" capability.
5. 10 MHz standard.

6. Models N9913/33B,C, N9914/34B,C and N9915/35B,C do not support frequency extenders. This is because the mixers' starting LO frequency is higher than 10 GHz and the FieldFox Port 1 provides the LO to the mixer. For a list of supported VDI frequency extenders, see Accessories pages 19-20.

# FieldFox N9912C and Options

| Base unit | FieldFox RF analyzer | |
|---|---|---|
| **Instrument functions (must pick one from CA, NA and SA, only can pick one from each group CA, NA and SA)** | | |
| CA4 | Cable and antenna analyzer 4 GHz | |
| CA6 | Cable and antenna analyzer 6.5 GHz | Frequency can be upgraded via N9912CU |
| CAX | Cable and antenna analyzer 10 GHz | Frequency can be upgraded via N9912CU |
| NA4 | Vector network analyzer 4 GHz | Full 2 port VNA |
| NA6 | Vector network analyzer 6.5 GHz | Frequency can be upgraded via N9912CU |
| NAX | Vector network analyzer 10 GHz | Frequency can be upgraded via N9912CU |
| SA4 | Spectrum analyzer 4 GHz | |
| SA6 | Spectrum analyzer 6.5 GHz | Frequency can be upgraded via N9912CU |
| SAX | Spectrum analyzer 10 GHz | Frequency can be upgraded via N9912CU |
| **Measurement options** | | |
| 010 | VNA time domain | Requires network analyzer (NA) |
| 030 | Remote control capability | Requires an iOS or an Android device |
| 208 | USB power sensor meas. versus frequency | Require option 302 |
| 215 | TDR cable measurements | Requires an CA option |
| 220 | Tracking generator | Requires spectrum analyzer unless VNA option is ordered |
| 235 | Pre-amplifier | Require spectrum analyzer |
| 236 | Interference analyzer and spectrogram | Require spectrum analyzer |
| 238 | Spectrum analyzer time gating | Require spectrum analyzer |
| 302 | USB power sensor support | Need to order USB power sensor. See FAQ A |
| 307 | GPS receiver | Need to order GPA antenna, N9910X-825. See FAQ C |
| 308 | Vector voltmeter | Require VNA option |
| 309 | DC bias variable-voltage source | Recommend N9910X-713 cable. See FAQ D |
| 310 | Built-in power meter | No power meter required |
| 312 | Channel scanner | Require spectrum analyzer |
| 330 | Pulse meas. with USB peak power sensor | Require option 302 |
| 350 | Real-Time Spectrum Analyzer (RTSA) | Require spectrum analyzer |
| 352 | Indoor and outdoor mapping | Require channel scanner at one from option 312, 370, 371, 378 and GPS option 307 |
| 355 | Analog demodulation | Require spectrum analyzer |
| 358 | EMF measurements | Require spectrum analyzer and 85572A Tri-axial antenna |
| 361 | EMI measurements | Require Spectrum analyzer |
| 366 | Interference finder (manual mode) | Require Spectrum analyzer, GPS option 307, and 85574A Handheld direction antenna |
| 370 | Over-the-Air (OTA) LTE FDD | Require Spectrum analyzer and GPS option 307 |
| 371 | Over-the-Air (OTA) LTE TDD | Require Spectrum analyzer and GPS option 307 |
| 378 | Over-the-Air (OTA) 5G NR | Require Spectrum analyzer and GPS option 307 |
| B04 | Analysis bandwidth, 40 MHz | Require Spectrum analyzer |
| **Windows PC software** | | |
| 89601C | PathWave VSA (89600 VSA) software | Require spectrum analyzer |
| SJ002A | WaveJudge Wireless Analyzer Toolset | Require spectrum analyzer |
| S9910A | Keysight Spectrum Management (KSMS) | Require spectrum analyzer |

# FieldFox RF and Microwave (Combination) Analyzers

## Analyzer models

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

| Model | Description | CAT and VNA frequency | SA frequency [1] | Test port connectors |
|---|---|---|---|---|
| N9913B | 4 GHz FieldFox RF analyzer | 30 kHz to 4 GHz | 9 kHz to 4 GHz | Type-N (f) |
| N9914B | 6.5 GHz FieldFox RF analyzer | 30 kHz to 6.5 GHz | 9 kHz to 6.5 GHz | Type-N (f) |
| N9915B | 9 GHz FieldFox microwave analyzer | 30 kHz to 9 GHz | 9 kHz to 9 GHz | Type-N (f) |
| N9916B | 14 GHz FieldFox microwave analyzer | 30 kHz to 14 GHz | 9 kHz to 14 GHz | Type-N (f) |
| N9917B | 18 GHz FieldFox microwave analyzer | 30 kHz to 18 GHz | 9 kHz to 18 GHz | Type-N (f) |
| N9918B | 26.5 GHz FieldFox microwave analyzer | 30 kHz to 26.5 GHz | 9 kHz to 26.5 GHz | 3.5 mm (m) |
| N9950B | 32 GHz FieldFox microwave analyzer | 300 kHz to 32 GHz | 9 kHz to 32 GHz | 2.4 mm (m) |
| N9951B | 44 GHz FieldFox microwave analyzer | 300 kHz to 44 GHz | 9 kHz to 44 GHz | 2.4 mm (m) |
| N9952B | 50 GHz FieldFox microwave analyzer | 300 kHz to 50 GHz | 9 kHz to 50 GHz | 2.4 mm (m) |
| N9953B | 54 GHz FieldFox microwave analyzer | 300 kHz to 54 GHz | 9 kHz to 54 GHz | 1.8 mm (m) |
| N9913C | 4 GHz FieldFox RF analyzer | 3 kHz to 4 GHz | 3 kHz to 4 GHz | Type-N (f) |
| N9914C | 6.5 GHz FieldFox RF analyzer | 3 kHz to 6.5 GHz | 3 kHz to 6.5 GHz | Type-N (f) |
| N9915C | 10 GHz FieldFox RF analyzer | 3 kHz to 10 GHz | 3 kHz to 10 GHz | Type-N (f) |
| N9912C | FieldFox RF analyzer | 3 kHz to 4/6.5/10 GHz [2] | 3 kHz to 4/6.5/10 GHz [2] | Type-N (f) |

## Analyzer options [3]

### Step 2. Select optional measurement capabilities.

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

| Option | Description | Prerequisite options/notes |
|---|---|---|
| **CAT/vector network analysis** | | |
| 010 | VNA time domain | Requires 210, recommend 211. See 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. |
| 350 | Real-Time Spectrum Analyzer (RTSA) | Requires 233, Recommend 235. See FAQ # 11 |
| 351 | I/Q Analyzer (IQA) | Requires 233 |

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1. Useable to 5 kHz for N991x/5xB.
2. The maximum frequency of the N9912C is defined by option selected and may be upgradable via license keys. Refer to page 4 for more details.
3. This table is applicable for N991xB/C and N995xB excluding N9912C.

| Option | Description | Prerequisite options/notes |
|---|---|---|
| 352 | Indoor and outdoor mapping | Requires 233, 307, and at least one of 312, 360, 370, 371, 377 or 378. See FAQ #15 |
| 353 | IQ streaming | Requires 233 and 351 |
| 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 |
| 360 | Phased array antenna support | Requires 233. Also requires phased array antenna. N995x/6xB models are required. See FAQ #14 |
| 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. |
| 377 | Over-the-Air (OTA) 5G TF | Requires 233 and 307. Recommend 235. See FAQ #14 N995xB models are required. 5G TF is pre-5G standard. Not available on C models |
| 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 |
| 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 bias variable-voltage source | Recommend N9910X-713 cable. See FAQ D |
| — | Frequency extender support | Requires 233. Optional 350, 351, 360, 370, 371, 377, 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 |

1. 10 MHz standard.
2. List of compatible sensors available from www.keysight.com/find/fieldfoxsupport.

# FieldFox RF and Microwave (Combination) Analyzer FAQs[1]

| Question | Answer |
|---|---|
| 1. What is included with a base N991x/5xB 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/5xB 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:<br>• TG CW mode (source CW frequency can be set independent of SA frequency) - included<br>• TG CW coupled mode (source CW frequency is auto coupled to SA's center frequency) - included<br>• TG tracking mode (traditional TG operation, swept SA coupled to swept source) - (requires Option 210) |
| 3. What is included with N991x/5xB Option 236? | Interference analyzer and spectrogram, trace playback and recording |
| 4. What is included with N991x/5xB 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/5xB 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/5xB 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/5xB 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/5xB 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:<br>• FieldFox combination analyzers: N9913/14/15/16/17/18/50/51/52/53B, N9913/14/15C<br>• FieldFox signal analyzers: N9933/34/35/36/37/38/60/61/62/63B, N9933/34/35C |
| | The two FieldFox units used in ERTA do not have to be the same model. |
| | ERTA requires the following options on Combo FieldFox models (N9913/14/15/16/17/18/50/51/52/53B and C model):<br>• Option 210, VNA transmission/reflection<br>• Option 233, spectrum analyzer |
| | ERTA requires the following options on SA FieldFox models (N9933/34/35/36/37/38/60/61/62/63B and C models)<br>• 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. |

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1. Some of the options may not be applicable to N9912C. Refer to the table on page 4 for more details.

| Question | Answer |
|---|---|
| | With either the Combo or SA FieldFox units, the following options are highly recommended:<br>• Option 235, preamplifier – this option increases the measurement dynamic range by increasing the received signal power<br>• 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. Alternately, 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 becomes available when Option 355 is purchased. AM/FM metrics provides the user with RF spectrum view, demodulated baseband signal waveform, carrier power, frequency deviation, SINAD and more. |
| 11. What is included with Option 350? | Real-Time Spectrum Analyzer (RTSA) or Option 350 provides real-time measurements on a 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 needs to be purchased. |
| | RTSA mode (Option 350) does include Trace Recording and Playback by default in RTSA mode. |
| | Purchasing RTSA mode (Option 350) does not enable Trace Recording and Playback in SA mode (Option 233). |

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

| Question | Answer |
|---|---|
| 13. What are the requirements for Noise Figure (NF) Option 356? | Requires spectrum analyzer mode (Option 233 on combination models), internal preamplifier (Option 235) and DC bias variable voltage source (Option 309) as well as CPU2 processor. An external noise source is also required and FieldFox supports Keysight noise source models 346A/B/C/K40/K01. Also recommended to improve accuracy is an external preamplifier Keysight models U7227A/C/F or U7228A/C/F. Requires accessory item N9910X-713 BNC to SMB cable for DC bias variable voltage source to noise source connection. |
| 14. What is required for phased array antenna support (Option 360) and 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 internal preamplifier (Option 235). N995x/6xB 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 (360), and OTA LTE FDD/TDD (370/371), OTA 5G TF (377), OTA 5G NR (378). Mapping is currently not available in SA or RTSA modes. Outdoor mapping requires the availability of GPS (Option 307). Maps can be saved to the FieldFox internal memory, SD card or USB drive. Using a direct wired LAN connection, FieldFox will automatically access OpenStreetMap (OSM) once location coordinates (latitude and longitude) and zoom levels have been entered the Map Explorer menu. If using the l FieldFox Map Support Tool, OSM map files can be downloaded to a .zip file and imported to FieldFox internal memory. If the FieldFox GPS receiver is enabled and OSM maps have been previously saved to FieldFox with those GPS coordinates, FieldFox can automatically load the corresponding map to match the current GPS coordinates. |
| 16. What is required for EMF measurements (Option 358)? | Requires triaxial antenna. 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 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 (N6820ES-USD). Requires Surveyor 4D software version 4.3 or later (May 2019). Frequencies above 26.5 GHz will require N995x/6xB models. |

| Question | Answer |
|---|---|
| 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 internal preamplifier (Option 235). FR2 frequencies above 26.5 GHz will require N995x/6xB. Additionally, although these OML external mixer products are no longer available for sale, the following information serves primarily as a reference for existing customers who own them. |

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

| Question | Answer |
|---|---|
| 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** | **N9917B, N9937B, N9938B (typ-N); N9918B, N9938B/Opt 100 (3.5 mm), N9950B, N9960B, N9951B, N9961B, N9952B, N9962B (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.
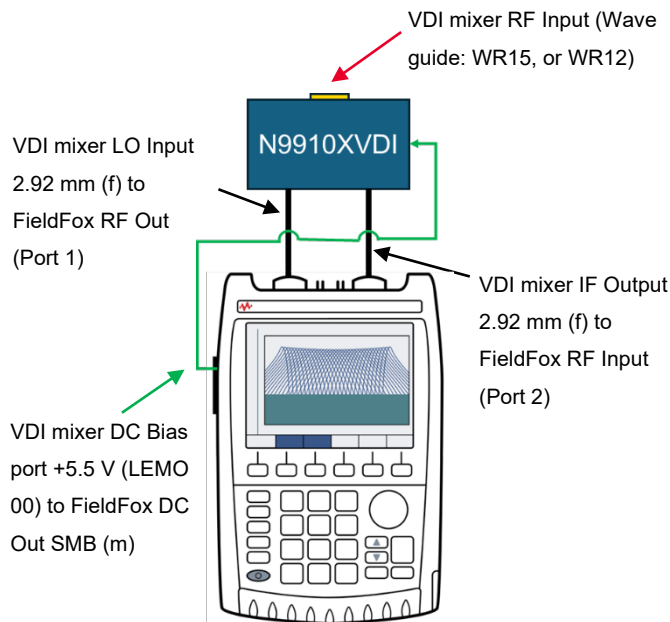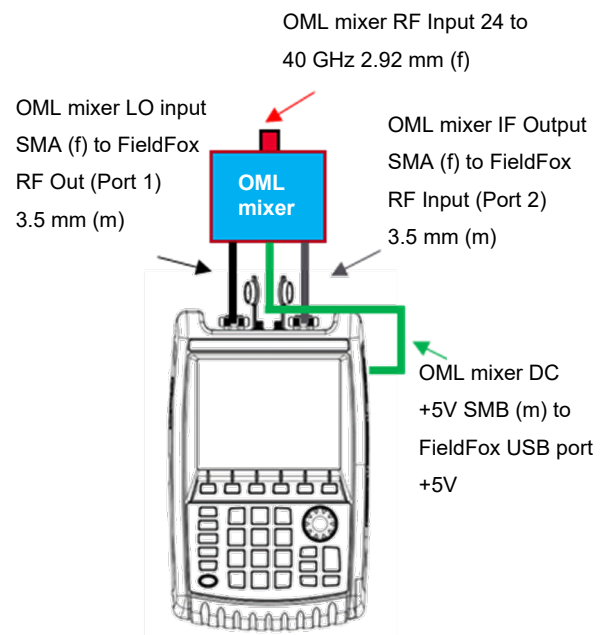


**Figure 1a** VDI PSAX frequency extender diagram



**Figure 1b** OML frequency extender diagram (For information only, not available for sale)

# ERTA System Typical Configuration[1]

| Item | Description/Options | Quantity |
|---|---|---|
| FieldFox | Combo analyzer: Required Options 210, 233. Recommended: 235, 307<br>SA analyzer: Required: Option 220. Recommended: 235, 307. Not available for N99xxC. | 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.
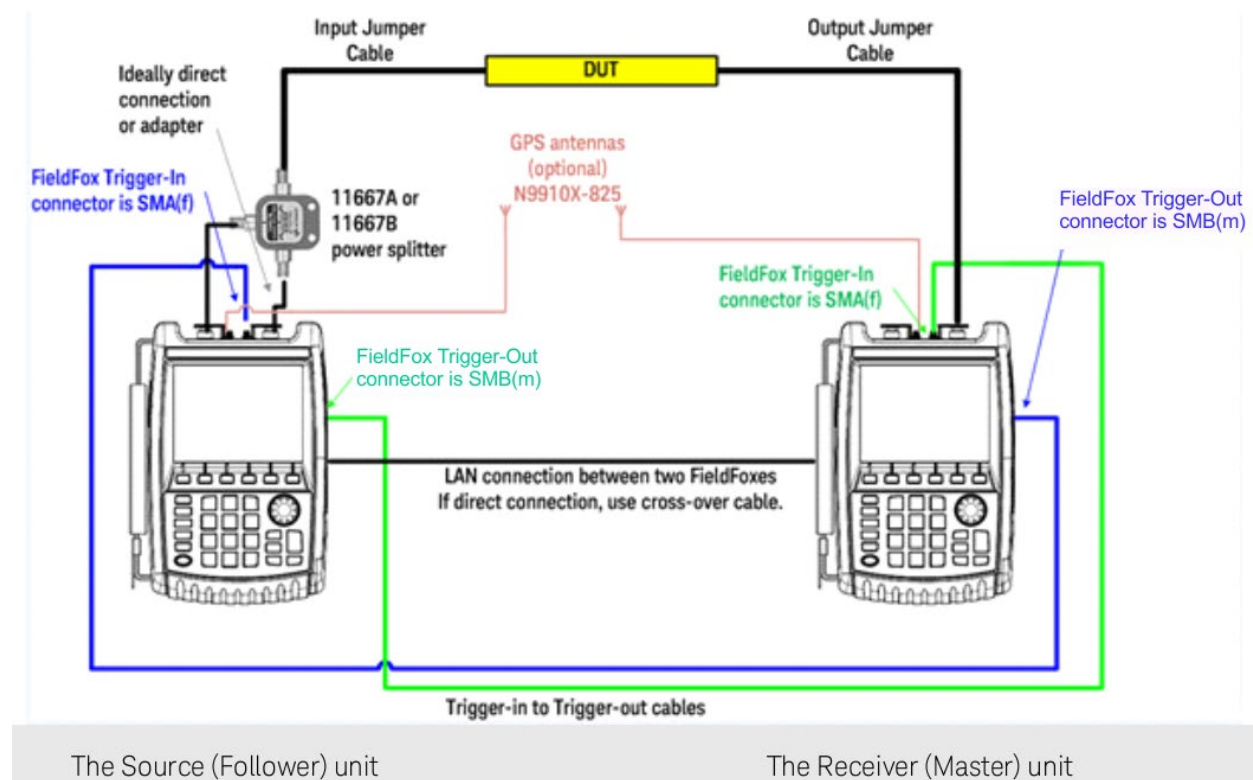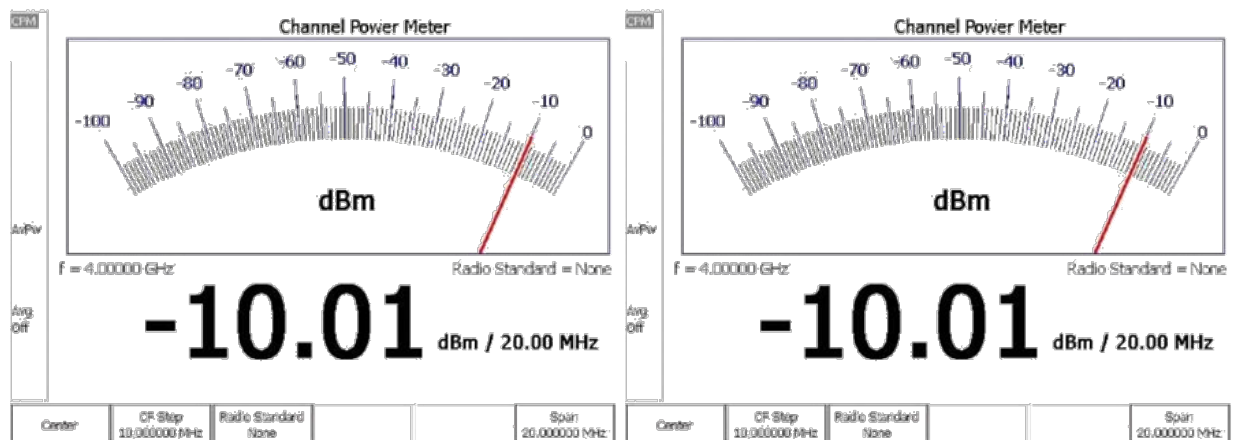


**Figure 2.** ERTA system diagram

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1. Not applicable to N9912C.

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

| Question | Answer |
|---|---|
| C. What do I need to get GPS information? | 1. The recommended GPS solution is to order:<br>　◦ Option 307 - built-in GPS receiver<br>　◦ A GPS antenna such as N9910X-825<br>　◦ Other GPS antennas can also be used<br>　◦ The GPS connector on the instrument is SMA (f)<br>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, DC 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 the Reference/ Trigger In and Reference / Trigger Out? | The connector for the Ref/Trig In is SMA (f). Recommend ordering N9910X Option 712 Trig/Ref in SMA (m) to BNC (f) cable. The connector for the Ref/Trig Out is SMB (m). Recommend ordering N9910X Option 713 bias-tee power cable SMB (f) to BNC (m). |
| 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.<br>2. Not supplied by user, but necessary for operation of Option 030 are:<br>　◦ 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<br>　◦ 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 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<br>Analog gauge display and digital display, dBm and watts<br>Relative/absolute measurements, dB or %, minimum and maximum limits<br>Trace graph for pulse profiling with gating<br>Rise time, fall time, pulse width, pulse period, pulse repetition frequency |
| I. 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-frequenc**y 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 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 |
|---|---|---|---|
| N9933B | 4 GHz FieldFox signal analyzer | 9 kHz to 4 GHz | Type-N (f) |
| N9934B | 6.5 GHz FieldFox signal analyzer | 9 kHz to 6.5 GHz | Type-N (f) |
| N9935B | 9 GHz FieldFox signal analyzer | 9 kHz to 9 GHz | Type-N (f) |
| N9936B | 14 GHz FieldFox signal analyzer | 9 kHz to 14 GHz | Type-N (f) |
| N9937B | 18 GHz FieldFox signal analyzer | 9 kHz to 18 GHz | Type-N (f) |
| N9938B | 26.5 GHz FieldFox signal analyzer | 9 kHz to 26.5 GHz | Type-N (f) [2] |
| N9960B | 32 GHz FieldFox signal analyzer | 9 kHz to 32 GHz | 2.4 mm (m) |
| N9961B | 44 GHz FieldFox signal analyzer | 9 kHz to 44 GHz | 2.4 mm (m) |
| N9962B | 50 GHz FieldFox signal analyzer | 9 kHz to 50 GHz | 2.4 mm (m) |
| N9963B | 54 GHz FieldFox signal analyzer | 9 kHz to 54 GHz | 1.8 mm (m) |
| N9933C | 4 GHz FieldFox signal analyzer | 3 kHz to 4 GHz | Type-N (f) |
| N9934C | 6.5 GHz FieldFox signal analyzer | 3 kHz to 6.5 GHz | Type-N (f) |
| N9935C | 10 GHz FieldFox signal analyzer | 3 kHz to 10 GHz | Type-N (f) |

1. Useable to 5 kHz for N993x/6xB.
2. Order Option 100 for 3.5 mm (m) test port connectors. With N9938B-100, the spectrum analyzer is built with 3.5 mm test port connectors instead of the standard Type-N (f). Option 100 is a prerequisite for Option 320 for N9938B.

# 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 N9938B. Option 100 is only available at time of purchase. It is not available as an upgrade. It is a prerequisite for Option 320 for N9938B. |
| 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. |
| 320 | Reflection measurements (Return Loss, VSWR and Scalar) | 320 requires 220 on all models. On N9938B, 320 also requires 100. |
| 350 | Real-Time Spectrum Analyzer (RTSA) | Recommend 235. See FAQ # 11 |
| 351 | I/Q Analyzer (IQA) | — |
| 352 | Indoor and outdoor mapping | Requires 307, and at least one of 312, 360, 370, 371, 377 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 |
| 360 | Phased array antenna support | Requires phased array antenna. Not applicable to N991x/3x (x≤5). N991x/3xB (x>5) models require an external mixer. See FAQ #14. No external mixer required for N995x/6xB models. |
| 361 | EMI measurements | — |
| 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. |
| 377 | Over-the-Air (OTA) 5G TF | Requires 307, recommend 235. N991x/3xB (x> 5) models require an external mixer. See FAQ #14. No external mixer required for N995x/6xB models. |
| 378 | Over-the-Air (OTA) 5G NR | Requires B10 and 307. Recommend 235. N993xB (x>5) models require external mixer for FR2 frequencies above 26.5 GHz. See FAQ #18. No external mixer required for N996xB models. |
| 390 | Directional finding – TDOA node support | |
| 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 |
| 320 | Reflection measurements (Return Loss, VSWR and Scalar) | Requires 220 on all models. On N9938B specifically, also requires 100. |
| **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 bias variable-voltage source | Recommend N9910X-713 cable, See FAQ D |
| — | Frequency extender support | Optional 350, 351, 360, 370, 371, 377, 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 |

**KEYSIGHT**

# FieldFox 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 320? | Return loss and VSWR |
| | Normalization using data/memory |
| 4. What is the difference between Option 320 and the CAT mode on the combo base model? | Option 320 on the N993x/6xB SA offers RL and VSWR. CAT mode on the N991x/5x combo analyzers offer RL and VSWR, DTF, insertion loss, and various calibration capabilities such as OSL. |
| 5. What is included with Option 355? | FieldFox analog demodulation has two parts: (1) Tune and listen, and (2) AM/FM metrics. Tune and listen are available as a standard feature on all N993x/6x FieldFox spectrum analyzers. AM/FM metrics becomes available when Option 355 is purchased. AM/FM metrics provides the user with RF spectrum view, demodulated baseband signal waveform, carrier power, frequency deviation, SINAD and more. |
| Additional FAQs | **FAQs on pages 6 through 11 apply to all microwave FieldFox models.** |

# Upgrades

## FieldFox RF and microwave (combination) analyzer upgrades

**N9913/14/15/16/17/18BU, N9913/14/15CU, N9950/51/52/53BU**

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 bias variable-voltage source | License key | Recommend N9910X-713 cable |
| 310 | Built-in power meter | License key | None |
| 312 | Channel scanner | License key | Requires 233 |
| 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, 377 or 378. |
| 353 | IQ streaming | License key | Requires 233 and 351 |

| Option | Description | Upgrade contents | Additional requirements |
|---|---|---|---|
| 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. Not applicable to N991x (x≤5). External mixer required for N991xB (x>5) but not for N995xB. See FAQ #14 |
| 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 |
| 377 | Over-the-Air (OTA) 5G TF [3] | License key | Requires 233 and 307, recommend 235, not on C model |
| 378 | Over-the-Air (OTA) 5G NR | License key | Requires 233, B10, and 307, recommend 235; N991x/3xB models require external mixer for FR2 frequencies above 26.5 GHz. 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 [4] | License key | Requires 233. Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software |
| B10 | Analysis bandwidth, 120 MHz [4] | License key | Requires 233. Recommend 350, 351, 378 or PathWave VSA (formerly 89600 VSA) software |
| S70 | OTA 5G NR and LTE FDD/TDD cellular measurements, node-locked 12-month subscription [5] | License key | Requires 233, B10, 235, and 307 |

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. Requires external mixer for N991xB (x>5) models. See FAQ #14. No external mixer required for N995xB.
4. 10 MHz standard.
5. If the 12-month subscription is expiring and needs to be extended, re-order Option BU-S70 for another period of 12 months.

# FieldFox signal analyzer upgrades

## N9933/34/35/36/37/38BU, N9933/34/35CU, N9960/61/62/63BU

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 |
| 208 | USB power sensor measurements versus frequency | License key | Requires 302 |
| 209 | Extended Range Transmission Analysis (ERTA) | License key | Requires 220 [1], recommend 307 |
| 220 | Full-band tracking generator | License key | None |
| 235 | Preamplifier | License key | None |
| 236 | Interference analyzer and spectrogram | License key | None |
| 238 | Spectrum analyzer time gating | License key | None |
| 302 | External USB power sensor support | License key | None |
| 307 | GPS receiver | License key | None |
| 309 | DC bias variable-voltage source | License key | Recommend N9910X-713 cable |
| 310 | Built-in power meter | License key | None |
| 312 | Channel scanner | License key | None |
| 320 | Reflection measurements (Return Loss, VSWR and Scalar) | License key [2] | Option 220 for all models / Option 100 and 220 for N9938B |
| 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, 377 or 378. |

| Option | Description | Upgrade contents | Additional requirements |
|---|---|---|---|
| 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 phased array antenna. Not applicable to N993x (x≤5). External mixer required for N993xB (x>5) but not for N996xB. 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 |
| 377 | Over-the-Air (OTA) 5G TF [4] | License key | Requires 307, recommend 235 |
| 378 | Over-the-Air (OTA) 5G NR | License key | Requires B10 and 307, recommend 235. N993xB models require external mixer for FR2 frequencies above 26.5 GHz. See FAQ #18 |
| 390 | Directional finding – TDOA node support | License key | |
| 391 | Directional finding – Angle of arrival | License key | |
| B04 | Analysis bandwidth, 40 MHz [5] | License key | Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software |
| B10 | Analysis bandwidth, 120 MHz [5] | License key | Recommend 350, 351 or PathWave VSA (formerly 89600 VSA) software |
| S70 | OTA 5G NR and LTE FDD/TDD cellular measurements, node-locked 12-month subscription [6] | License key | Requires B10, 235, and 307 |

1. For N9938B, Option 320 is only available as a software upgrade if the spectrum analyzer is already equipped with Option 100, which is 3.5 connectors on the test port. 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.
4. Requires external mixer for N993xB (x>5) models. See FAQ #14. No external mixer required for N996xB.
5. 10 MHz standard.
6. If the 12-month subscription is expiring and needs to be extended, re-order Option BU-S70 for another period of 12 months.

# FieldFox N9912C upgrades

## N9912CU

| Option | Description | Upgrade contents | Additional requirements |
|---|---|---|---|
| CA4 | Cable and antenna analyzer 4 GHz | License key | |
| CA6 | Cable and antenna analyzer 6.5 GHz | License key | |
| CAX | Cable and antenna analyzer 10 GHz | License key | |
| C46 | Cable and antenna analyzer upgrade from 4 to 6.5 GHz | License key | Requires CA4 |
| C4X | Cable and antenna analyzer upgrade from 4 to 10 GHz | License key | Requires CA4 |
| C6X | Cable and antenna analyzer upgrade from 6 to 10 GHz | License key | Requires CA6 |
| | | | |
| NA4 | Vector network analyzer 4 GHz | License key | |
| NA6 | Vector network analyzer 6.5 GHz | License key | |
| NAX | Vector network analyzer 10 GHz | License key | |
| N46 | Vector network analyzer upgrade from 4 to 6.5GHz | License key | Requires NA4 |
| N4X | Vector network analyzer upgrade from 4 to 10 GHz | License key | Requires NA4 |
| N6X | Vector network analyzer upgrade from 6 to 10 GHz | License key | Requires NA6 |
| | | | |
| SA4 | Spectrum analyzer 4 GHz | License key | |
| SA6 | Spectrum analyzer 6.5 GHz | License key | |
| SAX | Spectrum analyzer 10 GHz | License key | |
| S46 | Spectrum analyzer upgrade from 4 to 6.5 GHz | License key | Requires SA4 |
| S4X | Spectrum analyzer upgrade from 4 to 10 GHz | License key | Requires SA4 |
| S6X | Spectrum analyzer upgrade from 6 to 10 GHz | License key | Requires SA6 |
| | | | |
| 010 | VNA time domain | License key | Requires NA4, NA6, or NAX |
| 030 | Remote control capability | License key | Requires an iOS or Android device |
| 208 | USB power sensor meas. versus frequency | License key | Requires 302. See FAQ I |
| 215 | TDR cable measurements | License key | Requires CA4, CA6, or CAX |
| 220 | Tracking generator | License key | Requires SA4, SA6, or SAX |
| 235 | Pre-amplifier | License key | Requires SA4, SA6, or SAX |
| 236 | Interference analyzer and spectrogram | License key | Requires SA4, SA6, or SAX |
| 238 | Spectrum analyzer time gating | License key | Requires SA4, SA6, or SAX |
| 302 | USB power sensor support | License key | Need to order USB power sensor. See FAQ A |
| 307 | GPS receiver | License key | Need to order GPS antenna, N9910X-825. See FAQ C |
| 308 | Vector voltmeter | License key | Requires NA4, NA6, or NAX |
| 309 | DC bias variable-voltage source | License key | Recommend N9910X-713 cable. See FAQ D |
| 310 | Built-in power meter | License key | No power sensor required. See FAQ B |
| 312 | Channel scanner | License key | Requires SA4, SA6, or SAX |
| 330 | Pulse meas. with USB peak power sensor | License key | Requires 302 and USB peak power sensor; See FAQ G and FAQ H |
| 350 | Real-Time Spectrum Analyzer (RTSA) | License key | Requires SA4, SA6, or SAX. Recommend 235. See FAQ #11 |
| 352 | Indoor and outdoor mapping | License key | Requires SA4, SA6, or SAX, and 307 and at least one of 312, 370, 371, or 378. See FAQ #15 |
| 355 | Analog demodulation | License key | Requires SA4, SA6, or SAX |
| 358 | EMF measurements | License key | Requires SA4, SA6, or SAX. Also requires triaxial antenna. See FAQ #16 |
| 361 | EMI measurements | License key | Requires SA4, SA6, or SAX |
| 366 | Interference finder (manual mode) | License key | Requires SA4, SA6, or SAX and 307. Also requires 85574A Handheld direction antenna |
| 370 | Over-the-Air (OTA) LTE FDD | License key | Requires SA4, SA6, or SAX, and 307. Recommend 235 |
| 371 | Over-the-Air (OTA) LTE TDD | License key | Requires SA4, SA6, or SAX, and 307. Recommend 235 |
| 378 | Over-the-Air (OTA) 5G NR | License key | Requires SA4, SA6, or SAX, and B04 and 307. Recommend 235 |
| B04 | Analysis bandwidth, 40 MHz [5] | License key | Requires SA4, SA6, or SAX. Recommend 350, 351, or PathWave VSA (formerly, 89600 VSA) software |

# Documentation

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

| Option | Description | Notes |
|---|---|---|
| N99xxB-ABA | Printed User's Guide in English | |

The latest User's Guide (manual) for FieldFox including the N99xxC is available online from: www.keysight.com/find/fieldfoxsupport.

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

# Calibration Kits

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

| Model | Description | Connector | Frequency range | Components |
|---|---|---|---|---|
| **7-16** | | | | |
| N9910X-802 | 3-in-1 OSL Cal kit | 7/16 (m) | DC to 4 GHz | Open, short, load (all male) |
| N9910X-803 | 3-in-1 OSL Cal kit | 7/16 (f) | DC to 4 GHz | Open, short, load (all female) |
| 85038A | Standard cal kit | 7/16 | DC to 7.5 GHz | Open, short, load (both female and male) |
| **Type-N, 50 Ω** | | | | |
| N9910X-800 [1] | 3-in-1 OSL cal kit | Type-N (m) | DC to 6 GHz | Open, short, load (all male) |
| N9910X-801 | 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 |

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

| | | | | |
|---|---|---|---|---|
| **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-028 [1] | 5G Phased Array Antenna 28 GHz |
| 85572A-006 | Triaxial Isotropic Antenna 400 MHz to 6 GHz |
| 85572A-007 | Triaxial Isotropic Antenna 30 MHz to 6 GHz |
| 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 | N9918B or N9938B with option 100 (RF ports: 3.5 mm (m)) |
| N9910XVDI-102 | Male-type-N to male-SMA, Qty 2 of 1250-1636 | N9917B/N9937B/N9938B (RF ports: Typ-N (f)) |
| N9910XVDI-103 | Female-2.4 mm to male-SMA, Qty 2 of 11901-60004 | N9950B/N9960B/N9951B/N9961B/N9952B/N9962B (RF ports: 2.4 mm (m)) |
| 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), recommended for N995xA and N996xA analyzers |
| 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<br>Type-N (m) to Type-N (m) cable, 3.28 ft | | N9910X-881<br>Hard transit case | |
| N9910X-708<br>3.5 mm (m) to 3.5 mm (f) cable, 3.28 ft | | N9910X-812<br>Type-N (m) to Type-N (m) cable, 12 ft | |
| N9910X-820<br>Antenna, directional | | N9910X-816<br>Type-N (m) to Type-N (f) cable, 3.28 ft | |
| N9910XA-823<br>Antenna, cellular narrowband | | N9910X-821<br>Antenna, telescopic whip™ | |
| N9910X-822<br>Antenna, directional | | N9910X-848<br>Coaxial adapter, Type-N(f) to 3.5 mm (f) | |
| N9910X-825<br>Antenna, GPS, active | | N9910X-875<br>DC car charger and adapter | |
| N9910X-876<br>Extra high-capacity battery | | N9910X-873<br>AD/DC adapter | |
| N9910X-872<br>External battery charger | | N9910X-874<br>External bias-tee | |
| N4690B [1]<br>2-port ECal, Type-N, 18 GHz | | 85054D<br>Economy cal kit, Type-N, 18 GHz | |

1. Discontinued

| Description | Accessory | Description | Accessory |
|---|---|---|---|
| N9910X-800<br>3-in-1 OSL cal kit, Type-N (m),<br>6 GHz | | N9910X-801<br>3-in-1 OSL cal kit, Type-N (f),<br>6 GHz | |
| N9910X-811<br>Type-N (m) to<br>Type-N (f) cable, 5 ft | | 85520A<br>4-in-1 OSLT cal kit, 3.5 mm<br>(m), 26.5 GHz | |
| 85514A<br>4-in-1 OSLT cal kit, Type-N (m),<br>9 GHz | | 85521A<br>4-in-1 OSLT cal kit, 3.5 mm<br>(f), 26.5 GHz | |
| 85515A<br>4-in-1 OSLT cal kit, Type-N (f),<br>9 GHz | | 85518A<br>4-in-1 OSLT cal kit, Type-N<br>(m), 18 GHz | |
| 85519A<br>4-in-1 OSLT cal kit, Type-N (f),<br>18 GHz | | 85572A<br>Triaxial Isotropic Antenna<br>(Option 85572A-006:400<br>MHz to 6 GHz; Option<br>85572A-007: 30 MHz to 6<br>GHz) | |
| N9911X-211/212/213/214<br>WR-90 economical cal kit | | 85571A-028 [1]<br>5G Phase Array Atnenna<br>28 GHz | |
| N4691B [2]<br>2-port ECal, 3.5 mm,<br>26.5 GHz | | N4692A [2]<br>2.92 mm, 2-port ECal,<br>40 GHz | |

1. Not currently RoHS compliant
2. Discontinued

| Description | Accessory | Description | Accessory |
| --- | --- | --- | --- |
| N4693A [1]<br>2.4 mm 2-port ECal, 50 GHz | | N4691D<br>3.5 mm, 2-port ECal, 26.5 GHz | |
| N4692D<br>2.92 mm, 2-port ECal, 40 GHz | | N4693D<br>2.4 mm, 2-port ECal, 50 GHz | |
| N4694D<br>1.85 mm, 2-port ECal, 67 GHz | | X11644A<br>WR-90 standard cal kit | |
| 85033D/E<br>3.5 mm cal kit, 9 GHz | | 85052D<br>3.5 mm cal kit, 26.5 GHz | |
| 85056D<br>2.4 mm cal kit, 50 GHz | | N9910X-888<br>Hands free harness (for FieldFox N99xxB/C models only) | |
| N9910X-895<br>Magnetic mount base for antenna | | 85574A<br>Handheld direction finding antenna, 20 MHz (optional 9 kHz) to 8.5 GHz | |

1. Discontinued

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

# Confidently Covered by Keysight Services

Prevent delays caused by technical questions and reduce system downtime due to instrument maintenance and repairs with Keysight Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, software support, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for instruments, software, and solutions. KeysightCare covers an extensive group of instruments, application software, and solutions and ensures optimal uptime, faster response, faster access to experts, and faster resolution.

## Keysight Services

| Offering | Benefits |
|---|---|
| KeysightCare  ![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 test system up-time by securing technical support, repair, and calibration services with committed response and turnaround times. 1-year KeysightCare Assured is included in every new instrument purchase. 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\*** | **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 |

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

**KEYSIGHT**