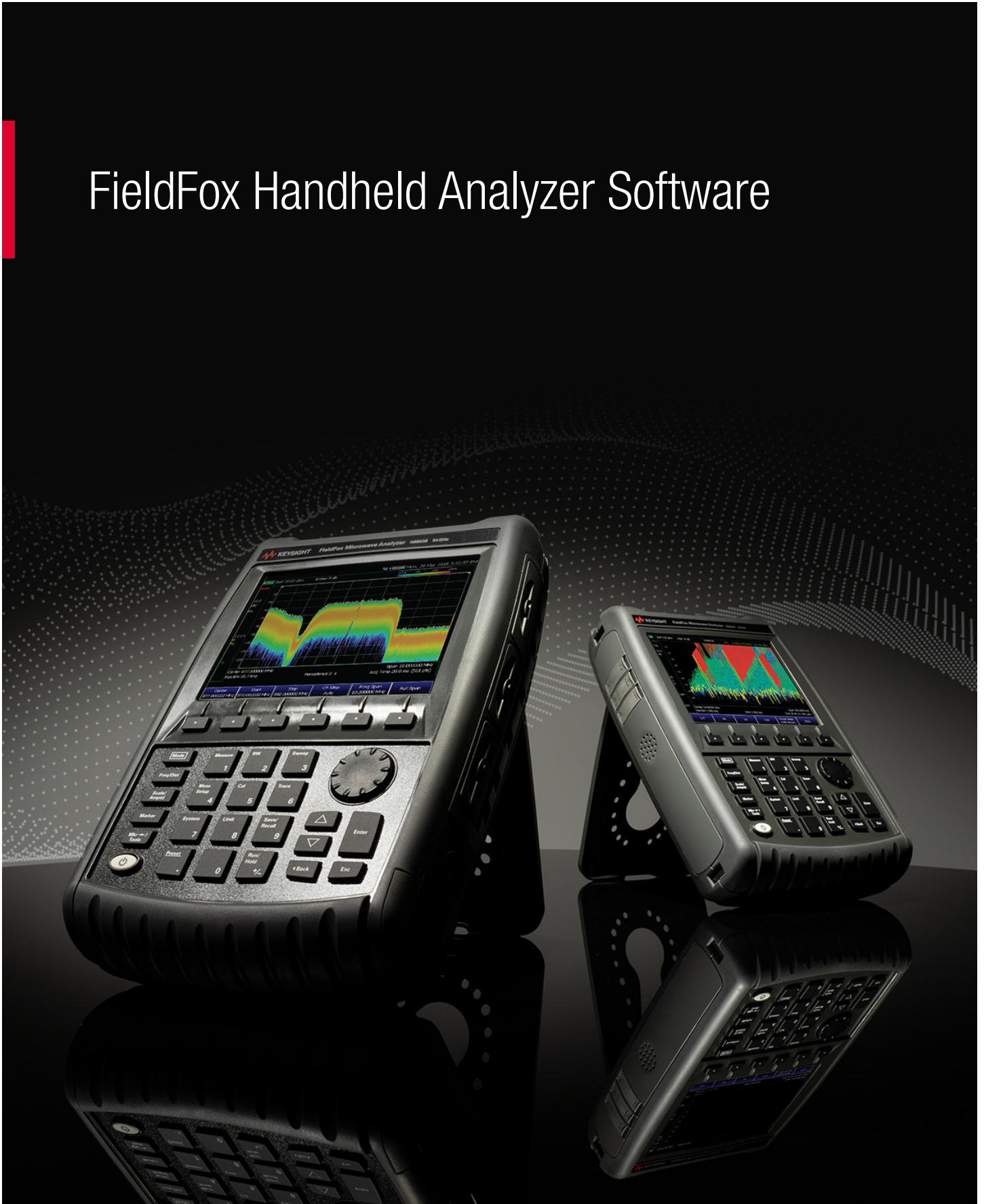


FieldFox Handheld Analyzer Software



An All-In-One Analyzer for Field System Installation, Verification, and Maintenance

As high-frequency technologies develop and extend beyond the lab, the need for portable, high-performance test gear increases. FieldFox handheld analyzers are able to withstand the toughest RF and microwave measurement environments regardless of test site location. Install, verify, and maintain systems in the field using one unit that supports over 25 measurement capabilities.

FieldFox's software options provide the same precision and accuracy as the Keysight equipment on your lab bench. You can customize your configuration at initial purchase or upgrade later with license keys that you can quickly and easily install in the field. There is no need to send the unit back to upgrade it.



FieldFox Family Overview

FieldFox offers two series in the product family that differ in frequency range and bandwidth. The A-Series models have frequency coverage from 100 kHz to 50 GHz with 10 MHz of bandwidth, while the B-Series models have frequency coverage from 9 kHz to 54 GHz and up to 120 MHz of bandwidth. To see a side-by-side comparison of the A-Series versus B-Series specifications, please see the flyer [FieldFox Microwave Analyzers: B-Series vs. A-Series Specifications](#).

FieldFox has three base configurations to choose from – vector network analyzer (VNA), cable and antenna tester (CAT), and signal analyzer (SA). You can also configure your unit as a combination analyzer that supports all of the base functions and more. Figure 1 shows a visual representation of the FieldFox family of instruments.

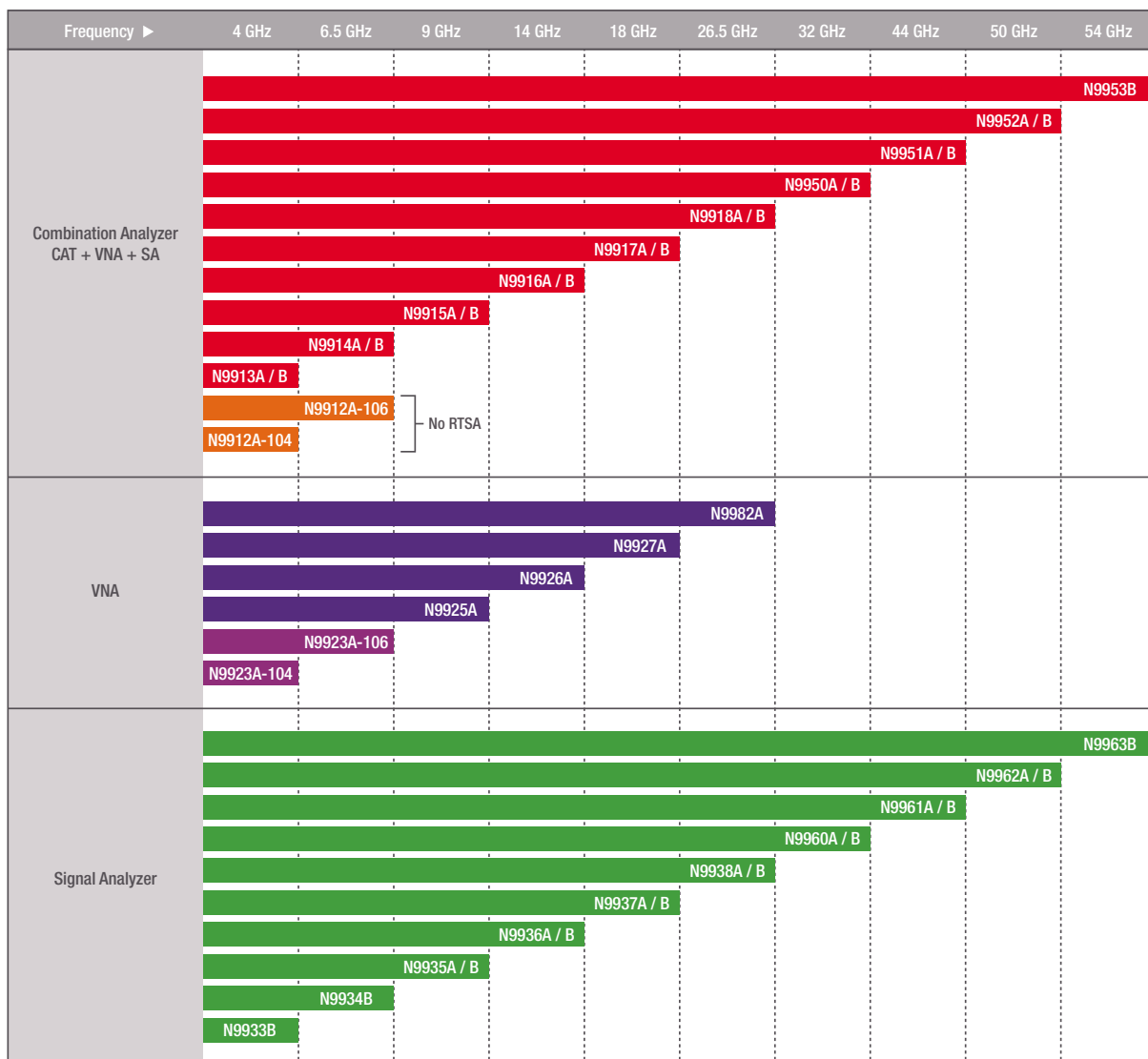


Figure 1. A visual representation of the FieldFox family, base configurations, and frequency coverage

FieldFox Measurement Options and Compatible Instruments

Once you choose your base model, customize FieldFox with the measurement options that meet your needs. The tables below list several FieldFox software option bundles that appear by application. The tables also indicate the instruments that support each option.

Cellular communications								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
233	Spectrum analyzer	✓	✓	✓	—	—	Base model	Base model
235	Pre-amplifier	✓	✓	✓	—	—	✓	✓
236	Interference analyzer and spectrogram	✓	✓	✓	—	—	✓	✓
307	GPS receiver	External	✓	✓	External	✓	✓	✓
312	Channel scanner	✓	✓	✓	—	—	✓	✓
350	Real-time spectrum analyzer (RTSA)	—	✓	✓	—	—	✓	✓
352	Indoor and outdoor mapping	—	✓	✓	—	—	✓	✓
358	Electromagnetic field (EMF) measurements	—	✓	✓	—	—	✓	✓
370	Over-the-air (OTA) LTE FDD	—	✓	✓	—	—	✓	✓
371	Over-the-air (OTA) LTE TDD	—	✓	✓	—	—	✓	✓
377	Over-the-air (OTA) 5G TF	—	✓	✓	—	—	✓	✓
378	Over-the-air (OTA) 5G NR	—	—	✓	—	—	—	✓
B04	Analysis bandwidth, 40 MHz	—	—	✓	—	—	—	✓
B10	Analysis bandwidth, 120 MHz	—	—	✓	—	—	—	✓

Satellite and radar communications								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
010	VNA time domain	✓	✓	✓	✓	✓	—	—
112	QuickCal	✓	✓ (N991xA only)	✓	✓	✓	—	—
209	Extended range transmission analysis (ERTA)	—	✓	✓	—	—	✓	✓
210	VNA transmission/reflection	✓	✓	✓	Base model	Base model	—	—
211	VNA full 2-port S-parameters	—	✓	✓	✓	✓	—	—

Satellite and radar communications (continued)								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
215	TDR cable measurements	—	✓	✓	—	✓	—	—
233	Spectrum analyzer	✓	✓	✓	—	—	Base model	Base model
235	Pre-amplifier	✓	✓	✓	—	—	✓	✓
302	USB power sensor support	✓	✓	✓	✓	✓	✓	✓
305	Cable and antenna analyzer	Base model	Base model	Base model	✓	✓	—	—1
307	GPS receiver	External	✓	✓	External	✓	✓	✓
310	Built-in power meter	✓	✓	✓	—	✓	✓	✓
320	Reflection meas. (RL, VSWR and scalar meas.)	—2	—2	—2	—2	—2	✓	✓
350	Real-time spectrum analyzer (RTSA)	—	✓	✓	—	—	✓	✓
351	I/Q analyzer (IQA)	—	✓	✓	—	—	✓	✓
352	Indoor and outdoor mapping	—	✓	✓	—	—	✓	✓
356	Noise figure (NF)	—	✓	✓	—	—	✓	✓
B10	Analysis bandwidth, 120 MHz	—	—	✓	—	—	—	✓

Automotive (RF/MW) testing								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
210	VNA transmission/reflection	✓	✓	✓	Base model	Base model	—	—
211	VNA full 2-port S-parameters	—	✓	✓	✓	✓	—	—
233	Spectrum analyzer	✓	✓	✓	—	—	Base model	Base model
235	Pre-amplifier	✓	✓	✓	—	—	✓	✓
236	Interference analyzer and spectrogram	✓	✓	✓	—	—	✓	✓
302	USB power sensor support	✓	✓	✓	✓	✓	✓	✓
307	GPS receiver	External	✓	✓	External	✓	✓	✓
312	Channel scanner	✓	✓	✓	—	—	✓	✓
330	Pulse measurement with USB peak power sensor	✓	✓	✓	✓	✓	✓	✓
350	Real-time spectrum analyzer (RTSA)	—	✓	✓	—	—	✓	✓
352	Indoor and outdoor mapping	—	✓	✓	—	—	✓	✓
355	Analog demodulation	—	✓	✓	—	—	✓	✓
361	Electromagnetic interference (EMI) measurements	—	—	✓	—	—	—	✓
370	Over-the-air (OTA) LTE FDD	—	✓	✓	—	—	✓	✓
371	Over-the-air (OTA) LTE TDD	—	✓	✓	—	—	✓	✓
378	Over-the-air (OTA) 5G NR	—	—	✓	—	—	—	✓
B10	Analysis bandwidth, 120 MHz	—	—	✓	—	—	—	✓

General purpose / education								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
112	QuickCal	✓	✓ (N991xA only)	✓	✓	✓	—	—
208	USB power sensor measurement versus frequency	✓	✓	✓	✓	✓	✓	✓
210	VNA transmission/reflection	✓	✓	✓	Base model	Base model	—	—
211	VNA full 2-port S-parameters	—	✓	✓	✓	✓	—	—
215	TDR cable measurements	—	✓	✓	—	✓	—	—
233	Spectrum analyzer	✓	✓	✓	—	—	Base model	Base model
236	Interference analyzer and spectrogram	✓	✓	✓	—	—	✓	✓
302	USB power sensor support	✓	✓	✓	✓	✓	✓	✓
305	Cable and antenna analyzer	Base model	Base model	Base model	✓	✓	—	—1
330	Pulse measurement with USB peak power sensor	✓	✓	✓	✓	✓	✓	✓
350	Real-time spectrum analyzer (RTSA)	—	✓	✓	—	—	✓	✓
351	I/Q analyzer (IQA)	—	✓	✓	—	—	✓	✓
355	Analog demodulation	—	✓	✓	—	—	✓	✓
356	Noise figure (NF)	—	✓	✓	—	—	✓	✓

Additional options								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
208	USB power sensor measurement versus frequency	✓	✓	✓	✓	✓	✓	✓
220	Tracking generator	—	—3	—3	—	—	✓	✓
238	Spectrum analyzer time gating	—	✓	✓	—	—	✓	✓
310	Built-in power meter	✓	✓	✓	—	✓	✓	✓
353	IQ streaming	—	✓	✓	—	—	✓	✓

Utilities								
Option number	Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
		N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
030	Remote control capability	✓	✓	✓	✓	✓	✓	✓
307	GPS receiver	External	✓	✓	External	✓	✓	✓
309	DC bias variable-voltage source	—	✓	✓	✓	✓	✓	✓
352	Indoor and outdoor mapping	—	✓	✓	—	—	✓	✓
360	Phased array antenna support	—	✓ (N995xA only)	✓	—	—	✓ (N996xA only)	✓
—	SCPI support	✓	✓	✓	✓	✓	✓	✓
—	OML mixer support	—	✓ (N9916 to 52A only)	✓ (N9916 to 53B only)	—	—	✓ (N9936 to 62A only)	✓ (N9936 to 62A only)
—	Datalink	✓	✓	✓	✓	✓	✓	✓

Description	Combination analyzers			Vector network analyzers (VNA)		Spectrum analyzers	
	N9912A	N9913/4/5/6/7/8A N9950/51/52A	N9913/14/15/16/ 17/18B N9950/51/52/53B	N9923A	N9925/26/27/28A	N9935/36/37/38A N9960/61/62A	N9933/34/35/36/ 37/38B N9960/61/62/63B
Materials Measurement Suite (N1500A)	✓	✓	✓	✓	✓	—	—
PathWave Vector Signal Analysis (VSA 89600)	—	✓	✓	—	—	✓	✓
Signal Surveyor (N6820ES)	—	✓	✓	—	—	✓	✓
PathWave BenchVue FieldFox Handheld Analyzer Control & Automation App (BV0010B)	✓	✓	✓ (N9917B only)	✓	✓	✓	—
PathWave BenchVue Network and Spectrum Analyzer Control & Automation App (BV9001B)	—	—	✓ (N9917B only)	—	—	—	—
WaveJudge Wireless Analyzer Toolset (SJ001A)	—	—	✓	—	—	—	✓

- Option 305 is not available on the N993x/6xB. A subset of CAT measurements, return loss, and VSWR, is available as Option 320.
- Option 320 is not applicable to models N991xA/B, N995xA/B, or N992xA. These models include reflection measurements of return loss and VSWR. There is no need for an Option 320 on these analyzers.
- On the N991xA/B or N995xA/B model analyzers, order Options 233 and 210 to obtain a tracking generator with the spectrum analyzer. There is no Option 220 on these analyzers. Option 233 provides the spectrum analyzer capability and Option 210 offers the “tracking” capability.

FieldFox Measurement Options Overview

You need to perform routine maintenance, occasional troubleshooting, and repair of your networks in the toughest working environments. FieldFox software options enable you to keep mission-critical systems operating smoothly. Several options and utilities are described below.

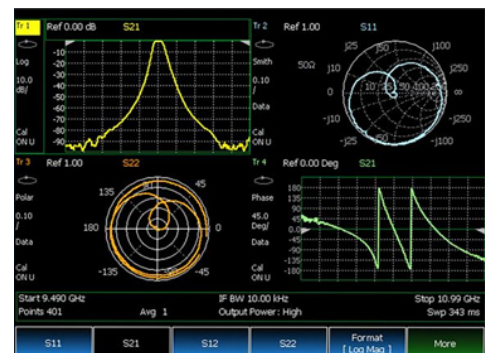
030 – Remote control capability with iOS or Android devices

- Monitor and control FieldFox remotely using your iOS or Android device.
- Press any key and turn the knob of the unit from your iOS/Android device using an emulated FieldFox front panel.
- Access technical documents such as data sheets instantly.



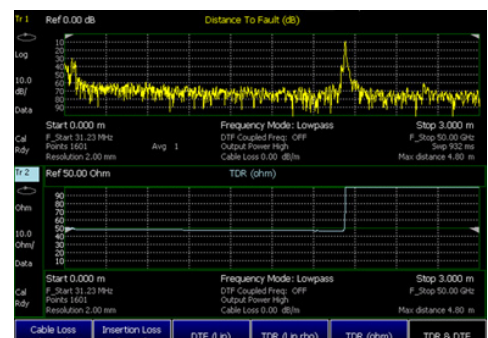
211 – Vector network analyzer (VNA) two-port S-parameters

- Measure all four S-parameters, magnitude, and phase characteristics of your component without having to disconnect the DUT, turn it around, and reconnect it to the analyzer.
- Get the best measurement accuracy possible with full, two-port calibration.
- Measure high rejection, narrowband devices such as cavity filters with 117 dB of dynamic range.
- Measure non-insertable devices accurately and easily with two-port error correction.
- Use Keysight's microwave expertise to deliver field measurements consistent with benchtop VNAs.



215 – Time-domain reflectometry (TDR) cable measurements

- Measure impedance changes along the cable and identify specific faults.
- Characterize the type of fault, including inductive or capacitive discontinuities.
- Measure distance-to-fault (DTF) and TDR in a single sweep.



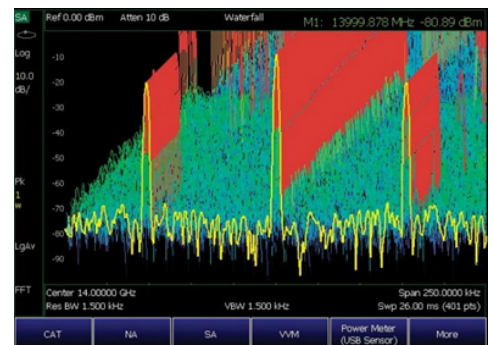
233 – Spectrum analyzer

- Monitor for unexpected signals and perform signal surveillance of dynamic spectral environments.
- Detect a low-level signal under strong signal conditions or close-in small interference signals with superior dynamic range (TOI +15 dBm, DANL -148 dBm/Hz with preamp off), close-in phase noise (-117 dBc/Hz at 10 kHz offset for a 1 GHz carrier), and fast sweep time.
- Simplify power measurements for a variety of radio standards with full power suites.
- Enable lab-grade measurement accuracy with no warm-up time.



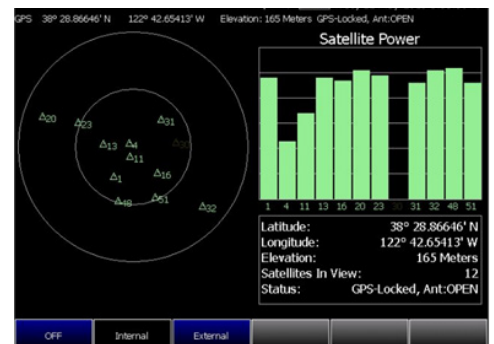
236 – Interference analyzer

- Identify interfering signals quickly and maintain quality of service (QoS) of your network.
- Detect intermittent signals or monitor signals over a period of time with spectrogram and waterfall displays.
- Record signal traces into internal memory or external flash memory devices for offline processing.



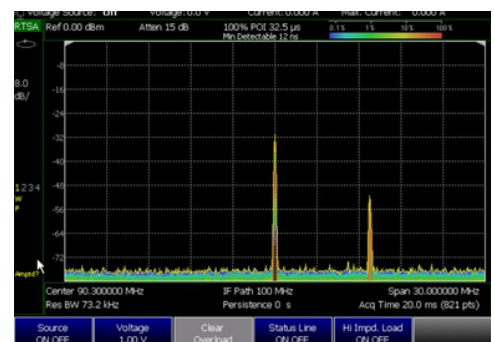
307 – Global navigation satellite system (GNSS) / global positioning system (GPS) receiver

- Collect geo-location tags and match them to measurements.
- Display and save the geodata – time, latitude, longitude, and elevation – in data files.



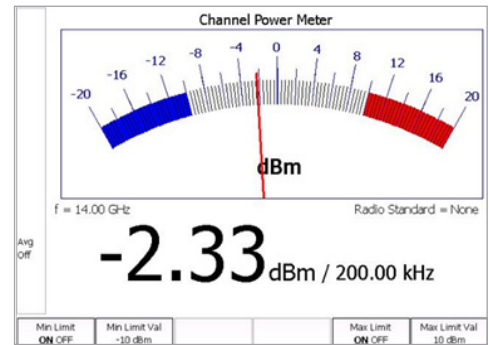
309 – DC bias variable voltage source

- Provide DC power to amplifiers under test and bias tower mounted amplifiers (TMA) when you need to sweep through the TMA to reach the antenna. Bias tees are available separately.



310 – Built-in power meter

- Make accurate, user-definable channel power measurements such as transmitter output power with no additional external hardware.
- View measurements easily by emulating the power meter user interface with analog and digital displays.



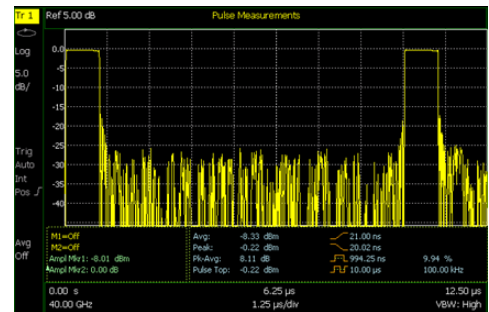
312 – Channel scanner

- Make up to 20 channel power measurements simultaneously and verify wireless network coverage, path loss, and potential interference issues.
- Measure primary carriers and their intermodulated products.
- Customize frequency and bandwidth settings for each channel.
- Use time interval logging and geotagging to export files to Google Earth for network coverage analysis.
- Record and play back the data with datalogging.



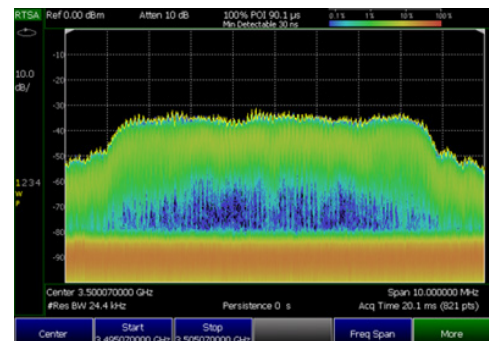
330 – Pulse measurements

- Characterize pulsed RF signals efficiently and obtain important key performance indicators (KPIs) by using Keysight's USB peak power sensors.
- Measure peak power, average power, and peak-to-average ratio.
- Check radar signal quality in the field with a lightweight, portable unit.



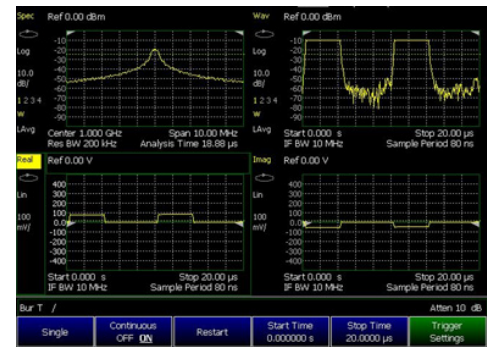
350 – Real-time spectrum analyzer (RTSA)

- Acquire gap-free signal data with real-time bandwidth up to 120 MHz.
- Detect signals as short as 5.52 µs with 100% probability of intercept (POI) and full amplitude accuracy.
- Visualize a low-level signal in the presence of a high-power transmitter using the spectrum density view.
- Find an elusive signal quickly using FieldFox's recording and playback to analyze saved data offline.



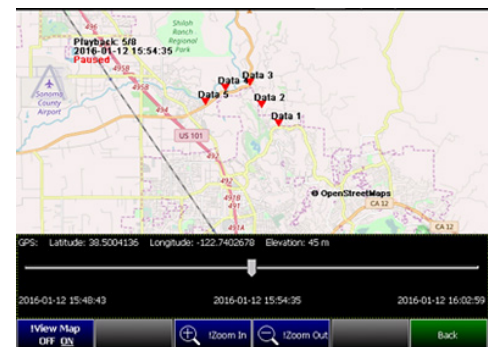
351 – I/Q analyzer

- Verify final signal chain integration.
- Troubleshoot signal quality degradation.
- Customize the display with up to four simultaneous and multi-domain measurement views.
- Enhance performance with features such as amplitude and intermediate frequency (IF) alignment before capture.
- Provide gapless in-phase and quadrature (IQ) data to external application software to perform spectrum monitoring, demodulation, and decoding.



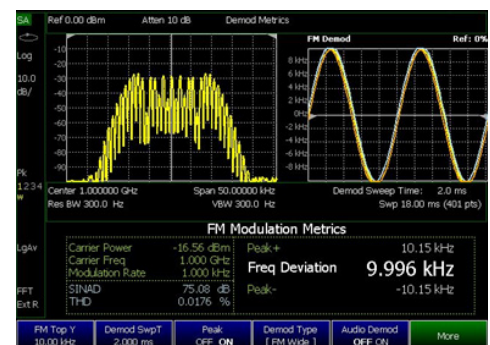
352 – Indoor and outdoor mapping

- Import and display maps from OpenStreetMap (OSM) for data collection and mapping.
- Save maps to internal memory, SD card, or USB port.
- Use the FieldFox Map Support Tool to download OSM maps or use a direct wired local area network (LAN) connection.



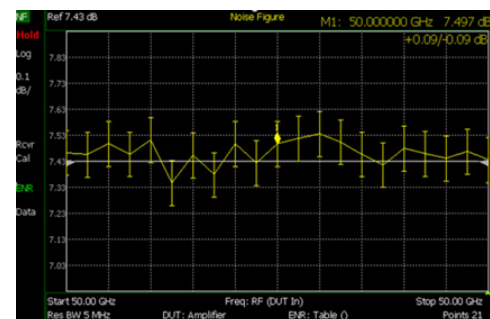
355 – AM/FM analog demodulation

- Characterize AM/FM radio transmitters.
- Tune to a signal and listen to the audio tones with the built-in speakers or a headphone.
- Measure AM/FM metrics such as carrier power, modulation rate, signal-to-noise and distortion (SINAD) with a full selection of post-demodulation filters.



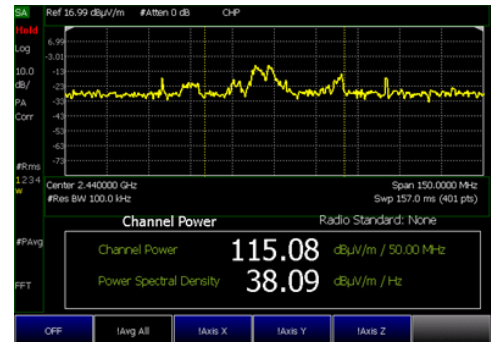
356 – Noise figure (NF)

- Quantify the signal-to-noise ratio (SNR) degradation caused by components in the link.
- Use the industry-proven Y-factor technique to accurately verify and characterize device noise figures.
- Receive real-time measurement integrity feedback on measurement data that includes built-in uncertainty calculator error bars.
- Optimize gain to avoid compression and measurement time to achieve jitter goal.
- Define loss compensation for dB lost before and after device under test (DUT).



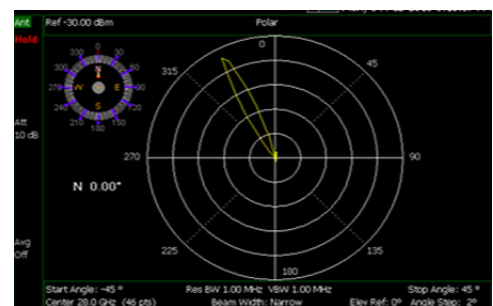
358 – Electromagnetic field measurements (EMF)

- Evaluate total (RF) exposure in any given RF and microwave environment.
- Verify compliance to exposure levels set by government and regulatory agencies.
- Measure the total field strength across the frequency band of interest.
- Connect to AGOS Advanced Technologies' Triaxial Isotropic Antenna, model SDIA-6000, for measurements.
- Record, recall, and playback data with geo-location information for post-processing analysis.



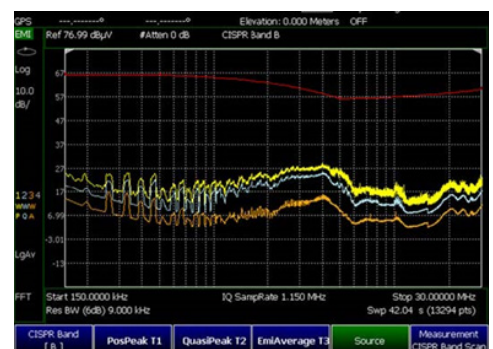
360 – Phased array antenna support¹

- Support a 64-element, single polarization phased array antenna with coverage from 27.5 to 30 GHz.
- Understand g-Node-B (gNB) beam characteristics by measuring signal power level across azimuth and elevation from base stations.
- Reduce measurement complexity with an integrated RF probe and phased array solution to capture energy radiated from the gNB.
- Simulate 5G user equipment (UE) and antenna performance.
- Verify phased array performance with boresight, polar antenna pattern with compass, and heat map (azimuth versus elevation) displays.



361 – Electromagnetic interference (EMI) measurements

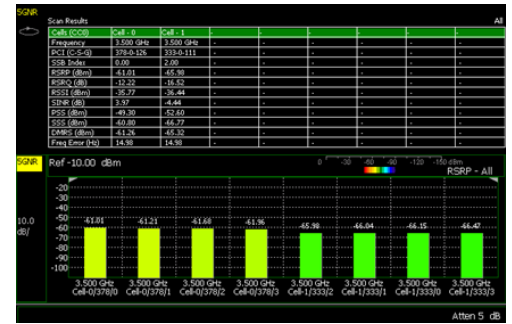
- Evaluate pre-compliance limits prior to formal compliance tests.
- Identify issues such as noise floor rise and interference that other equipment generates.
- Perform equipment or network regulatory audits against various limits, such as CISPR 16-1-1.
- Troubleshoot circuit boards.
- Test potential system level performance impact due to EMI degradation.



1. Purchase a supported phased array antenna directly from Anokiwave, or from Keysight as product number 85571A-028. Please [contact us](#) to understand delivery lead time.

378 – 5G NR over-the-air (OTA) measurements

- Characterize air interface path loss and beam coverage.
- Verify the quality of the network and beam performance.
- Measure and decode primary synchronization signal (PSS), secondary synchronization signal (SSS), beam indexes, cell ID, and various signal quality metrics.
- Identify frequency drifting, isolate power issues, investigate performance problems, and verify Inter-RAT handovers.
- Analyze 5G NR frequency range 1 (FR1) and frequency range 2 (FR2) up to millimeter-wave (mmWave) without requiring an external mixer.



Conclusion

FieldFox's software options enable a customized solution to meet your measurement needs wherever you go. Configure your unit at purchase or upgrade later as your needs change. With over 25 different measurement options and frequency coverage up to 54 GHz, FieldFox is the most well-equipped tool to keep your network up and running in the field.

Learn More

To learn more about the various options you see in this brochure, download our Technical Overviews.

- [A-Series Technical Overview](#)
- [B-Series Technical Overview](#)
- [FieldFox 5G gNB Field Test Solution Technical Overview](#)
- [5G mmWave Air Interface Characterization with Phased Array Antenna Technical Overview](#)

To understand the different ways that you can customize FieldFox to meet your needs, download our Configuration Guides.

- [A-Series Configuration Guide](#)
- [B-Series Configuration Guide](#)

