KEYSIGHT TECHNOLOGIES

Signal Analysis Solutions Catalog

TABLE OF CONTENTS

Bigger and Faster Technology Advances in Communications Networks

THE ONLY CONSTANT IN THE COMMUNICATIONS INDUSTRY IS CHANGE.

Communication networks are moving from voice and data communications to full-blown connected application ecosystems. Technological innovations will support the consolidation of communication systems under one 5G roof to meet end-user application needs. This includes data, voice, video, Internet of Things (IoT), and crucial communications. The 5G connected application ecosystem will provide much higher throughput, ultra-low latency, dramatically increased network capacity, reliability, and secure services.

The aerospace and defense (A / D) industry triggered many of these commercial communications technologies. The industry continues to push the boundaries of what is possible in threat detection, sophisticated military communications, and Low-Earth Orbit (LEO) satellites.

You are inventing technologies to support paradigm shifts. Your innovations will make communication networks more efficient, support broader frequency ranges, and much wider bandwidth requirements. 5G, IoT, and WLAN-enabled devices will give users widespread availability of high-speed coverage and support for data-intensive applications. Satellites and other devices will provide multiple-input and multiple-output (MIMO) functionality and greater spectral efficiency.

Your technological advances are bigger than ever and moving faster than ever — all of which pose complex test challenges.

> You are inventing technologies to support paradigm shifts.

Overcome Test Challenges with Keysight Signal Analyzers

The technology shift in communications presents unchartered territory for many RF engineers. Some of the challenges you may experience are:

- characterizing a millimeter-wave air interface
- identifying potential interference issues
- ensuring compliance with evolving standards
- learning about RF design
- capturing out-of-band emissions
- field-testing an expanding wireless ecosystem

Keysight offers signal analysis solutions to address your toughest test challenges.

N9042B UXA Signal Analyzer, Multi-touch

New to RF Design?
We'll help you get up to speed on RF test.

Stay in sync with evolving wireless standards

Achieve high-speed, multi-channel test

Acquire the performance edge in wideband, millimeter-wave measurement

Demodulate and analyze your most complex signals

Ensure EMI compliance and pre-compliance

Field test wireless networks

New to RF Design?
We'll Help You Get Up to Speed on RF Test.

RF design and test does not have to break your budget. Our entry-level signal analyzer and signal generator provide an easy-to-use, solid foundation for accurate, cost-effective testing in general-purpose applications.

N9000B CXA Signal Analyzer

TODAY'S LEADING ENTRY-LEVEL RF INSTRUMENTS FOR ESSENTIAL SIGNAL CHARACTERIZATION

- Make essential frequency and power measurements with superior level accuracy.
- Do more with PowerSuite such as adjacent channel power (ACP), complementary cumulative distribution function (CCDF), and EMC emission measurement.
- Dig deeper into your wireless devices with Pathwave X-Series measurement applications on the CXA for further digital demodulation analysis.
- Pair the N9000B CXA X-Series signal analyzer with the N5166B CXG RF vector signal generator for industrial IoT/consumer electronics characterization.

View Keysight's X-Series signal analyzers

Product	Maximum frequency	Maximum analysis bandwidth	Phase noise at 1 GHz (10 kHz offset)	DANL at 1 GHz	Third-order intermodulation distortion (TOI) at 1 GHz	
N9000B CXA signal analyzer	26.5 GHz	25 MHz	-110 dBc / Hz	-163 dBm	+17 dBm	GET A QUOTE

Product	Maximum frequency	Maximum RF bandwidth (internal / external)	Phase noise at 1 GHz (10 kHz offset)	Frequency switching	Maximum output power at 1 GHz	
N5166B CXG signal generator	6 GHz	120 MHz / 200 MHz	-119 dBc / Hz	5 ms	+18 dBm	GET A QUOTE

MEET OUR LOWEST COST RF SPECTRUM ANALYZER

Product	Maximum frequency	Maximum analysis bandwidth	Phase noise, 10 kHz offset	DANL at 1 GHz	
N9320B RF Spectrum Analyzer	3 GHz	1 MHz	-90 dBc/Hz	-148 dBm	GET A QUOTE
N9321C RF Spectrum Analyzer	4 GHz	1 MHz	-90 dBc/Hz	-152 dBm	GET A QUOTE
N9322C RF Spectrum Analyzer	7 GHz	1 MHz	-90 dBc/Hz	-152 dBm	GET A QUOTE
N9323C RF Spectrum Analyzer	13.6 GHz	1 MHz	-92 dBc/Hz	-144 dBm	GET A QUOTE
N9324C RF Spectrum Analyzer	20 GHz	1 MHz	-92 dBc/Hz	-144 dBm	GET A QUOTE

Cover a wide range of your RF test needs with our lowest-cost spectrum analyzers. Perform general-purpose spectrum analysis, signal monitoring, transmission/reflection measurements, and more.

- Simple, intuitive interface enables one-button signal measurements: CHP, OBW, ACPR, SEM, and spectrogram
- High test efficiency with optimized measurement speed and value-added features

MASTER RF SIGNAL ANALYSIS WITH FREE KEYSIGHT UNIVERSITY COURSES

Keysight University courses will advance your knowledge of precision RF measurement approaches, the latest industry standards, compliance, power, and more. You can learn basic to advanced techniques, tips, and tricks that lead to more accurate measurements and more insightful signal interpretation.

Whether you are just starting out or have decades of electronics design experience, Keysight University has a curriculum for you.

Enroll Today

Stay in Sync with Evolving Wireless Standards

SIGNAL ANALYZERS WITH PERFORMANCE AND FLEXIBILITY TO EVOLVE AS STANDARDS CHANGE

- Increase throughput and yield while minimizing costs, an essential component of base station manufacturing.
- Develop and deliver new wireless devices using best-in-class phase noise performance.
- Meet your 5G NR requirements with error vector magnitude (EVM) as low as 0.5% and real-time analysis (RTSA) bandwidth of up to 510 MHz.
- Reduce test time with enhanced frequency sweep algorithm without compromising performance.

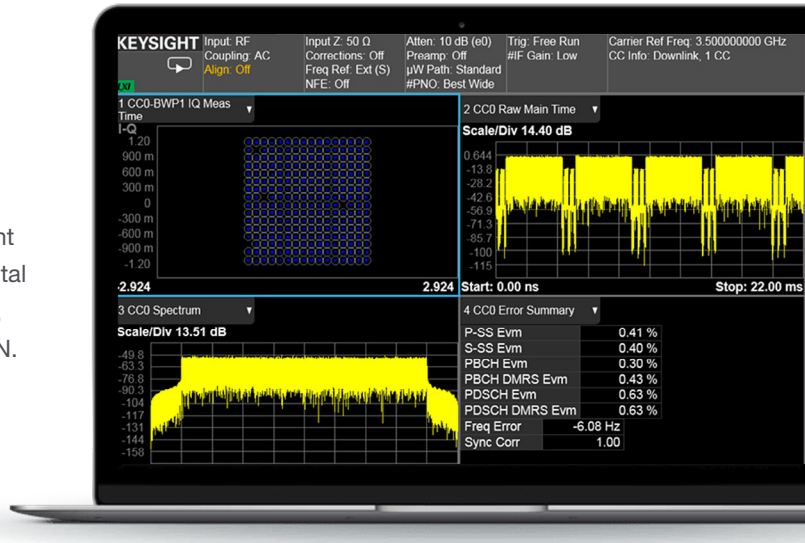
View Keysight's X-Series signal analyzers

Product	Maximum frequency	Maximum analysis bandwidth	DANL at 1 GHz	Phase noise at 1 GHz (10 kHz offset)	Maximum real-time bandwidth	
N9010B EXA X-Series signal analyzer	44 GHz Mixers to 1.1 THz	40 MHz	-170 dBm	-109 dBc / Hz	N / A	GET A QUOTE
N9020B MXA X-Series signal analyzer	50 GHz Mixers to 1.1 THz	160 MHz	-172 dBm	-114 dBc / Hz	160 MHz	GET A QUOTE
N9021B MXA X-Series signal analyzer	50 GHz Mixers to 1.1 THz	510 MHz	-172 dBm	-130 dBc / Hz	510 MHz	GET A QUOTE

N9021B MXA X-Series signal analyzer

KEYSIGHT'S PATHWAVE X-SERIES MEASUREMENT APPLICATIONS SOFTWARE HELPS YOU STAY CURRENT ON WIRELESS STANDARDS

Transform your signal analyzer with X-Series measurement applications. Address ever-changing measurement requirements with over 25 signal analysis applications for cellular communications, wireless connectivity, digital video, and general-purpose measurements. Characterize device performance from phase noise, noise figure, and pulse measurements to the latest wireless standards-compliant signals including 5G, LTE, IoT, and WLAN.



Try out the software free of charge

POPULAR SOFTWARE APPLICATIONS

Analog demodulation	Perform modulation analysis for AM, FM, PM and FM stereo signals with information bandwidth	GET A QUOTE
Noise figure	Perform noise figure and gain measurements from 10 MHz to 50 GHz	GET A QUOTE
Phase noise	Perform measurements for analyzing phase noise in frequency domain (log plot) and time domain (spot frequency)	GET A QUOTE
5G NR	Perform 5G New Radio (5G NR) transmitter downlink and uplink measurements	GET A QUOTE
Short range communications	Perform ZigBee®, Z-Wave, and LoRa CSS RF transmitter tests	GET A QUOTE
WLAN 802.11ac/ax/be	Perform spectrum and power measurements: channel power, SEM, OBW, CCDF, spurious emission, power versus time, and spectral flatness	GET A QUOTE

View all PathWave X-Series measurement applications

ACHIEVE MAXIMUM VALUE WITH GOOD, BETTER, AND BEST BUNDLES

Save time and money by taking advantage of bundle options for both signal analyzers and signal generators. Choose from signal analyzers bundles including the EXA or MXA with discounts up to 25%. Pair your savings for signal analyzers with a signal generator bundle, also offering discounts of up to 25% on the EXG or MXG.

Learn More

Achieve High-Speed, Multichannel RF Test

Drive down the size of test with multifunction testers that deliver high performance, with the scalable, high-speed PXI platform.

SPEED, SCALABILITY, AND A SMALL FOOTPRINT

- Generate and analyze multiple, synchronized RF signals.
- Accelerate your test capabilities with low latency and high throughput PCI Express® architecture.
- Perform trusted, repeatable measurements with PathWave X-Series measurement applications and PathWave vector signal analysis (VSA) software.
- Deploy a smaller footprint with no trade-off in precision when transitioning between R&D, manufacturing, and maintenance.

M9410A VXT PXIe vector transceiver

Product	Maximum frequency	Maximum analysis bandwidth	DANL at 1 GHz	Phase noise at 1 GHz (10 kHz offset)	Number of slots	
M9290A CXA-m PXIe signal analyzer	26.5 GHz	25 MHz	-163 dBm	-110 dBc / Hz	4	GET A QUOTE
M9391A PXIe vector signal analyzer	6 GHz	160 MHz	-161 dBm	-119 dBc / Hz	4	GET A QUOTE
M9393A PXIe performance vector signal analyzer	27 GHz	160 MHz, 1 GHz IF output	-168 dBm	-110 dBc / Hz	5	GET A QUOTE
M9421A VXT PXIe vector transceiver	6 GHz	160 MHz	-160 dBm	-111 dBc / Hz	4	GET A QUOTE
M9410A / M9411A VXT PXIe vector transceivers	6 GHz	1.2 GHz	-159 dBm	-129 dBc / Hz	M9410A: 2	GET A QUOTE
					M9411A: 3	GET A QUOTE
M9415A VXT PXIe vector transceiver	12 GHz	1.2 GHz	-167 dBm	-130 dBm/Hz	3	GET A QUOTE

Acquire the Performance Edge in Wideband, Millimeter-Wave Measurement

Your applications require the utmost in reliability and performance. Acquire the performance edge with Keysight's top of the line high frequency, wideband signal analyzers, and specialized software.

GET MAXIMUM PERFORMANCE FOR HIGHER FREQUENCY APPLICATIONS

- Solve your most difficult mmWave design challenges with the industry's widest analysis bandwidth, deepest dynamic range and highest unbanded, preselected frequency range.
- Characterize today's most challenging signals — fast-hopping, wideband, and transient —while using one-touch measurements for 5G, 802.11ax/ay, satellite, radar, EW, and more.
- Catch impurities early with wide spurious-free dynamic range and improved phase noise.

View Keysight's X-Series signal analyzers

Product	Maximum frequency	Maximum analysis bandwidth (internal / external)	DANL at 1 GHz	Phase noise at 1 GHz (10 kHz offset)	Maximum real-time bandwidth	
N9030B PXA X-Series signal analyzer	50 GHz Mixers to 1.1 THz	510 MHz	-174 dBm	-136 dBc / Hz	510 MHz	GET A QUOTE
N9032B PXA X-Series signal analyzer	26.5 GHz Mixers to 1.1 THz	2 GHz	-174 dBm	-136 dBc/Hz	N/A	GET A QUOTE
N9040B UXA X-Series signal analyzer	50 GHz Mixers to 1.1 THz	1 GHz	-174 dBm	-135 dBc / Hz	510 MHz	GET A QUOTE
N9041B UXA X-Series signal analyzer	110 GHz Mixers to 1.1 THz	1 GHz / 5 GHz	-174 dBm	-135 dBc / Hz	255 MHz	GET A QUOTE
N9042B UXA X-Series signal analyzer	110 GHz* Mixers to 1.1 THz	4 GHz	-174 dBm	-135 dBc / Hz	--	GET A QUOTE

* with V3050A Frequency Extender

Reach for Higher Frequencies with Cleaner Results

We offer many ways to extend the capability of your signal analyzer — see a few of them below.

FREQUENCY EXTENSIONS UP TO 110 GHZ

Mixers are commonly used to extend the frequency range of a signal analyzer. Cost-effective harmonic mixers enable fast, simple, and reliable measurements.

In order to achieve N9042B UXA data sheet specifications, use the innovative Keysight V3050A frequency extender. It combines fundamental mixing and preselection to enable more accurate measurements of wideband signals at very high frequencies.

SIMPLIFY RECEIVER CALIBRATION

At wider bandwidths and higher frequencies, imperfections in the signal path that introduce loss or other errors become increasingly evident.

The U9361 RCal replaces traditional methods that require multiple instruments to calibrate the signal path, simplifying the process and improving test accuracy by an order of magnitude.

BUILD A COMPLETE SIGNAL ANALYSIS SOLUTION

Need microwave test accessories to complete your test setup? Keysight offers the most comprehensive selection including preamplifiers, comb generators, connectors, and switches.

Learn More

V3050A Signal Analyzer Frequency Extender and U9361 RCal Receiver Calibrator

Product	Maximum frequency	Compatibility	
V3050A Frequency Extender	110 GHz	N9042B	GET A QUOTE
U9361 RCal Receiver Calibrator	110 GHz (up to 5 GHz bandwidth)	N9020B, N9021B, N9030B, N9032B, N9040B, N9041B, N9042B	GET A QUOTE
M197x Waveguide Harmonic Mixer	110 GHz	N9010B, N9020B, N9021B, N9030B, N9032B, N9040B, N9041B, N9042B	GET A QUOTE

N9042B UXA X-Series signal analyzer

REACH HIGHER FOR MILLIMETER-WAVE APPLICATIONS USING KEYSIGHT SMART MIXERS

Extend your measurement capabilities with the EXA, PXA, MXA, and UXA signal analyzers up to 110 GHz using smart mixers. Using a simple USB connection, the mixers can automatically configure the signal analyzer in use.

Learn More

DON'T SACRIFICE THE BENEFITS OF MILLIMETER-WAVE EQUIPMENT

Millimeter-wave frequency measurements require precision and care. Download the eBook to get four best practices for making measurements and maintaining your high-performance equipment.

Download eBook

Demodulate and Analyze Your Most Complex Signals

Troubleshoot your most complex signals at any point in your design. When you need to isolate the sources of unexpected interactions or verify signal problems quickly with multiple, simultaneous views, use PathWave vector signal analysis (VSA) software, a comprehensive set of tools for demodulation and vector signal analysis.

EXPLORE VIRTUALLY EVERY FACET OF A SIGNAL AND OPTIMIZE ADVANCED DESIGNS WITH PATHWAVE VSA SOFTWARE

- Make application-specific measurements, such as IoT modulation analysis, pulsed modulated radar signal analysis, multiple linear chirp FM modulated signals, and automotive radar.
- Evaluate and troubleshoot proprietary signals and modulation types to determine the root cause of signal problems with advanced troubleshooting tools.
- Verify signal problems quickly with multiple simultaneous views.
- Apply vector signal analysis across your design process. VSA is compatible with over 45 Keysight hardware platforms, including spectrum and signal analyzers, modular instruments, and oscilloscopes to give you a consistent, repeatable testing platform across teams.
- Choose the best licensing arrangement — perpetual or time-based.

PATHWAVE VSA SOFTWARE GIVES YOU ACCESS TO OVER 75 SIGNAL STANDARDS AND MODULATION TYPES.

- cellular communications
- wireless connectivity
- aerospace, defense, and satellite
- radar pulse
- custom modulation
- plus many others

Learn more

TRY OUT PATHWAVE VECTOR SIGNAL ANALYSIS (VSA) SOFTWARE

Try PathWave 89600 VSA software to make measurements with your test instrument or see recorded demo signals on your PC.

Download free software trial now

Ensure EMI Pre-Compliance and Compliance

Avoid any delays in getting a product to market by testing early for electromagnetic interference (EMI). To ensure successful final EMI compliance testing, make pre-compliance testing a part of your product development cycle.

UNCOVER EMI ISSUES EARLY IN THE DESIGN CYCLE

The Keysight PathWave EMI measurement application enables you to perform pre-compliance radiated and conducted emissions measurements with an X-Series signal analyzer. Use scan tables to set up test specifications, identify suspect signals, and more. Easily identify out-of-band device emissions.

MAKE CONDUCTED AND RADIATED EMISSIONS TESTS IN-HOUSE TO REDUCE TEST CYCLE TIMES

- Real-time scan ensures gapless signal capture while simultaneously showing in the frequency domain, time domain, and spectrogram view.
- Easily perform EMI pre-compliance and compliance tests with built-in limit lines and time domain scan.
- Meet requirements set by both commercial and military regulations — CISPR 16-1-1:2019 and MIL-STD-461G compliant.

N9048B PXE EMI receiver

Product	Maximum frequency	DANL at 1 GHz	Phase noise at 1 GHz (10 kHz offset)	Real-time bandwidth options	TDS measurement speed	
N9038B MXE EMI receiver	44 GHz Mixers to 1.1 THz	-167 dBm	-114 dBc / Hz	160 MHz	3.1 s*	GET A QUOTE
N9048B PXE EMI receiver	44 GHz Mixers to 1.1 THz	-174 dBm	-114 dBc / Hz	170, 350 MHz	500 ms 100 ms (Accelerated TDS on)*	GET A QUOTE

*Nominal speed, CISPR band C / D, 30 MHz to 1 GHz. Resolution bandwidth (RBW) = 120 kHz, measurement time = 10 ms, peak detector.

INTRODUCTION TO COMPLIANCE MEASUREMENTS

To learn more about making EMI and EMC measurements, and what requirements your devices must meet, read Keysight's application note, *Making EMI Compliance Measurements*. In this application note, you will learn the various international regulations on emissions and EMI receivers, plus what types of tests you need to perform to ensure your device meets these standards.

Download application note

Field-Test Wireless Networks

Endure your harshest working conditions with comprehensive analyzers designed for durability and frequency coverage up to 54 GHz. Easy to view, operate, and carry, Keysight's FieldFox handheld analyzers enable you to keep a versatile, accurate RF testing solution with you, wherever you go.

NEVER SACRIFICE CAPABILITY OR PORTABILITY

- Verify 5G and LTE base station coverage, beam performance, and handovers with over-the-air demodulation and phased array antenna measurements.
- Ensure wireless interference does not affect service quality by using 120 MHz of real-time analysis bandwidth and a spectrum density display to capture elusive signals.
- Detect and locate bursty, hidden, multipulse electronic warfare RF threats using real-time spectrum analysis in a variety of harsh environmental conditions.
- Monitor satellite earth station antenna sidelobe gain and optimize transmitter performance using spectrum analysis and channel power measurements.
- Bring the lab home with you by carrying an all-in-one, handheld combination analyzer that performs cable and antenna testing, vector network analysis, signal analysis, and more.

N9953B FieldFox Handheld Microwave Analyzer

FIELDFOX HANDHELD MICROWAVE ANALYZERS

Product	Max freq.	Max RT BW	DANL at 1 GHz	Total amplitude accuracy	TOI at 2.4 GHz	Phase noise at 1 GHz (10 kHz offset)	Spur-free dynamic range (at 2.4 GHz)	
N9913A	4 GHz	100 MHz	-155 dBm	±0.5 dB	+15 dBm	-110 dBc / Hz	>105 dB	GET A QUOTE
N9913B	4 GHz	120 MHz	-163 dBm	±0.2 dB	+13.5 dBm	-117 dBc / Hz	>104 dB	GET A QUOTE
N9938B	26.5 GHz	120 MHz	-163 dBm	±0.35 dB	+13.5 dBm	-117 dBc / Hz	>104 dB	GET A QUOTE
N9960A	32 GHz	10 MHz	-159 dBm	±0.9 dB	+16 dBm	-108 dBc / Hz	>104 dB	GET A QUOTE
N9952B	50 GHz	120 MHz	-163 dBm	±0.55 dB	+9.7 dBm	-114 dBc / Hz	>104 dB	GET A QUOTE
N9962B	50 GHz	120 MHz	-163 dBm	±0.55 dB	+9.7 dBm	-114 dBc / Hz	>104 dB	GET A QUOTE

View all FieldFox handheld analyzers

SOFTWARE-ENABLED, FIELD-UPGRADEABLE MEASUREMENT CAPABILITIES

- Work with over 25 measurement applications on a single user interface that provides customizable parameters for quick measurements up to 54 GHz.
- Stay current with changing measurement requirements by upgrading your handheld analyzer in the field with convenient, user-installable license keys.
- Analyze the spectrum with unprecedented amplitude accuracy and no required warm-up.
- Capture signals as short as 5.52 µs with a 100% probability of intercept.
- Analyze complex signals with PathWave vector signal analysis software.

INVESTIGATE INTERFERENCE ISSUES IN THE FIELD WITH REAL-TIME SPECTRUM ANALYZERS

Interference is everywhere — and traditional analysis is not reliable. This white paper discusses interference sources, the flaws of traditional analysis, and how real-time spectrum analysis (RTSA) improves interference detection.

Download white paper

SIX ESSENTIAL 5G FIELD TESTS USING FIELDFOX HANDHELD ANALYZERS

This eBook explains six essential 5G field tests that FieldFox handheld analyzers perform. Make your 5G transformation smooth with path loss characterization, base station coverage testing, and more.

Download eBook