N9021B MXA Signal Analyzer

10 Hz – 50 GHz

Introduction

This step-by-step process will help you to configure the N9021B MXA signal analyzer, that provides you with up to 510 MHz analysis bandwidth, and up to 50 GHz frequency range.

Refer to the following option list, and tailor the performance and features of the N9021B MXA signal analyzer to meet your requirements

For more information

For a summary of specifications, you may refer to the *N9021B MXA Signal Analyzer* - Data Sheet (3119-1123EN).

A full set of specifications are available in the *N9021B MXA Signal Analyzer Specification Guide* (N9021-90001)

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Included in Base Product

Standard options and accessories come with the MXA base model at no additional charge and do not need to be ordered.

They include:

- Spectrum analyzer measurement application
- Hex-core, high-performance processor, 32 GB RAM, with flash calibration file memory
- Frequency reference
- Mechanical attenuator
- Digital processor with 4 GB capture memory
- Fast sweep capability
- Microsoft Windows 10 operating system
- Multi-language user interface
- Benchtop configuration
- User guides
- Receiver calibrator (RCal) control license
- Power cord

Configure Your N9021B MXA Signal Analyzer

Step 1. Choose maximum frequency range (required option)

Description	Option number	Additional information
Frequency range, 10 Hz – 8.4 GHz	N9021B-508	With Type-N (F) input connector
Frequency range, 10 Hz – 13.6 GHz	N9021B-513	With Type-N (F) input connector
Frequency range, 10 Hz – 26.5 GHz	N9021B-526	With Type-N (F) input connector, 3.5 mm connector optional (opt. C35)
Frequency range, 10 Hz – 32 GHz	N9021B-532	With 2.4 mm (M) input connector
Frequency range, 10 Hz – 44 GHz	N9021B-544	With 2.4 mm (M) input connector
Frequency range, 10 Hz – 50 GHz	N9021B-550	With 2.4 mm (M) input connector

Step 2. Add a preamplifier

Description	Option number	Additional information
Preamplifier, 100 kHz – 8.4 GHz	N9021B-P08	Compatible with option 508 only
Preamplifier, 100 kHz – 13.6 GHz	N9021B-P13	Compatible with option 513 only
Preamplifier, 100 kHz – 26.5 GHz	N9021B-P26	Compatible with option 526 only
Preamplifier, 100 kHz – 32 GHz	N9021B-P32	Compatible with option 532 only
Preamplifier, 100 kHz – 44 GHz	N9021B-P44	Compatible with option 544 only
Preamplifier, 100 kHz – 50 GHz	N9021B-P50	Compatible with option 550 only

Step 3. Choose frequency reference

Description	Option number	Additional information
Frequency reference	Standard	Aging rate: $\pm 1 \times 10^{-6}$/year
Precision frequency reference	N9021B-PFR	Reduces frequency drift for more accurate measurement
		Aging rate: $\pm 1 \times 10^{-7}$/year

Step 4. Choose an attenuator

Description	Option number	Additional information
Mechanical attenuator	Standard	2 dB steps, 0 to 70 dB
Electronic attenuator up to 3.6 GHz	N9021B-EA3	In addition to the mechanical attenuator, 1 dB steps, 0 to 24 dB

Step 5. Choose analysis bandwidth

Description	Option number	Additional information
255 MHz analysis bandwidth	N9021B-B2X	Option MPB required for measurement > 3.6 GHz; also enables fast sweep capability licensed as N9021B-FS1 and N9021B-FS2
510 MHz analysis bandwidth	N9021B-B5X	Option MPB required for measurement > 3.6 GHz; also enables fast sweep capability licensed as N9021B-FS1 and N9021B-FS2
Microwave pre-selector bypass	N9021B-MPB	Required for wideband analysis with option B2X, B5X at frequency > 3.6 GHz; also enables fast sweep capability licensed as N9021B-FS1 and N9021B-FS2

Step 6. Choose performance options

Description	Option number	Additional information
Digital processor with 2 GB capture memory	Standard	Standard when B2X or B5X is installed. Licensed as N9021B-DP2
Digital processor with 4 GB capture memory	Standard	Standard when B2X or B5X is installed. Licensed as N9021B-DP4
Fast sweep capability	Standard	Improves sweep speed at swept mode; licensed as N9021B-FS1 and FS2
Enhanced phase noise	Standard	Licensed as N9021B-EP1
Noise floor extension	N9021B-NF2	Improves analyzer's DANL performance
External mixing	N9021B-EXM	Connects with Keysight and 3rd party mixers to extend frequency coverage up to 1.1 THz
Fast power, up to maximum available analysis bandwidth	N90EMFP2B	Accelerate power measurements such as ACPR; requires option B2X or B5X

Step 7. Add real-time spectrum analysis

Description	Option number	Additional information
Real-time analysis to maximum available BW, basic detection	N9021RT1B	Includes frequency mask trigger (FMT) and time qualified trigger; min.17.3 µs signal duration for 100% POI; requires B2X or B5X which determines max. real-time BW
Real-time analysis to maximum available BW, optimum detection	N9021RT2B	Includes frequency mask trigger (FMT) and time qualified trigger; mini. 3.57 µs signal duration for 100% POI; requires B2X or B5X which determines max. real-time BW; node-locked license only
Frequency mask trigger, basic detection	N9021FT1B	Enables frequency mask triggering with 89600 VSA software to detect signals as short as 15 µs duration; included in N9021RT1B; requires bandwidth option B2X or B5X
Frequency mask trigger, optimum detection	N9021FT2B	Enables frequency mask triggering with 89600 VSA software to detect signals as short as 3.6 µs duration; included in N9021RT2B; requires bandwidth option B2X or B5X; node-locked license only
Duplex IF RTSA	N90EMDUAB	Enables control of 2 × 255 MHz DIF for optimized frequency and time domain analysis in RTSA mode; requires option B5X and N9021RT1B or N9021RT2B

Step 8. Add instrument features

Description	Option number	Additional information
Basic EMC features	N90EMEMCB	CISPR-compliant detectors, -6 dB RBW, and band-presets
Time domain scan	N90EMTDSB	Improves scan speed for EMC pre-compliance tests; requires N6141EM0E EMC emission measurement application, and option DP2/DP4, or B2X/B5X
Enhanced display package	N90EMEDPB	Includes spectrogram, trace zoom, and zone span
Resolution bandwidth extended	N9021B-RBE	Extends the maximum RBW in spectrum analyzer mode and Zero Span; requires option B2X, or B5X
External source control	N9021B-ESC	Controls Keysight EXG, MXG and PSG signal generators' supports external mixing; includes 3 BNC cables and 1 cross-over LAN cable

Step 9. Add security features

Description	Option number	Additional information
Additional removable solid-state drive (SSD)	N9021B-SS2	Provides a fully-imaged, removable SSD in addition to the one installed in instruments, with Windows 10 operating system
Exclude launch program	N9021B-SF1	Prevents the launching of Windows programs from the instrument application
Prohibit saving results	N9021B-SF2	Prevents instrument application from saving/recalling of measurement results or user configurations to/from instrument's storage

Step 10. Add input/output utilities

Description	Option number	Additional information
APC 3.5 mm input connector	N9021B-C35	Compatible with option 526 only
Second IF output	N9021B-CR3	Wideband IF out; center frequency depends on IF path; output on Aux IF connector at rear panel
Arbitrary IF output	N9021B-CRP	IF out 10 to 75 MHz (in 500 kHz steps); output on Aux IF connector at rear panel
Y-axis video out	N9021B-YAS	Screen video (0-1 V open circuit) on rear panel analog out

Step 11. Choose measurement applications and license type

Note: Keysight offers flexible license types and terms for the measurement applications, refer to page 12 of *X-Series Measurement Applications - Brochure* (5989-8019EN).

Description	Model number	Additional information
General purpose		
Spectrum analyzer and IQ analyzer	Standard	Traditional spectrum analysis plus many new and enhanced functions
PowerSuite	N90EMPSMB	One-button power measurements such as channel power, OBW, ACPR, TOI, SEM, etc.
Vector modulation analysis - Digital demodulation	E9054EM0E	Performs on-button flexible modulation analysis with FSK, PSK, QAM, MSK, ASK, APSK, VSB etc. and popular format preset
Vector modulation analysis- Custom OFDM	E9054EM1E	Performs on-button custom OFDM modulation analysis measurement with user-defined settings or recalling 89600 VSA or Signal Studio output file
Power amplifier measurement	E9055EM0E	Characterizes power amplifier with pre-distortion in RF and millimeter wave
Channel quality	E9056EM0E	Performs repeatable channel response measurements as group delay and other characteristics with multi-tone signals for wideband component testing
Analog demodulation	E9063EM0E	One-button measurement for AM/FM/PM demodulation with metrics, tune and listen, and AF spectrum; supports audio output (output voltage proportional to frequency deviation). FM Stereo and RDS are included
Pulse analysis	E9067EM0E	Characterize pulsed RF signals in the time domain, with phase, frequency and statistical analysis of large pulse sets; enables fixed and variable length gated acquisition for capturing pulses of varying pulse width and PRI (requires 4 GB capture memory Option DP4)
Phase noise	E9068EM0E	Adds one-button measurements for analyzing phase noise in frequency domain (log plot) and time domain (spot frequency), supports external mixing
Noise figure	E9069EM0E	Adds one-button measurements for noise figure, gain, and related metrics; requires preamplifier to meet specifications; Works with Keysight U1831C USB noise source, N400xA series smart noise sources, and 346 series noise sources; Supports U7227 USB external preamplifiers

Description	Model number	Additional information
EMI emissions	E6141EM0E	Performs pre-compliance conducted and radiated emission measurements
Remote language compatibility	E9061EM0E	Adds capability to emulate HP/Agilent 8566/68 and 856xE/EC spectrum analyzers
SCPI command language compatibility	E9062EM0E	Adds capability to emulate the R&S FSP/FSU/FSE/FSL/FSV/FSW spectrum analyzers or ESU EMI receiver
MATLAB software	N6171A	
Cellular communications		
5G NR (New Radio)	E9085EM0E	Standard-based, one-button 5G NR downlink and uplink measurements
LTE/LTE-Advanced FDD	E9080EM0E	Standard-based, one-button LTE/LTE-Advanced FDD measurements
NB-IoT and eMTC FDD	E9080EM3E	Standard-based, one-button NB-IoT and eMTC measurements
LTE V2X	E9080EM4E	Standard-based, one-button LTE-V2X transmitter measurements
LTE/LTE-Advanced TDD	E9082EM0E	Standard-based, one-button LTE/LTE-Advanced TDD measurements
GSM/EDGE/Evo	E9071EM0E	Standard-based, one-button GSM/EDGE/Evo measurement application
W-CDMA/HSPA+	E9073EM0E	Standard-based, one-button W-CDMA, HSPA, HSPA+ measurements
cdma2000 remote control-only	E9072EM0E	cdma2000 measurement application, access from SCPI commands only
1xEV-DO remote control-only	E9076EM0E	1xEV-DO measurement application, access from SCPI commands only
TD-SCDMA remote control-only	E9079EM0E	TD-SCDMA measurement application, access from SCPI commands only
Multi-standard radio	E9083EM0E	Standard-based, one-button MSR measurement application on any combination of LTE-FDD, LTE-TDD, W-CDMA/HSPA/HSPA+, GSM/EDGE/EDGE Evo, cdma2000, 1xEV-Do and TD-SCDMA signals

Description	Model number	Additional information
Wireless connectivity		
WLAN 802.11a/b/g/j/p/n	E9077EM0E	Standard-based, one-button 802.11a/b/g/j/p/n/af/ah measurement
WLAN 802.11ac/ax	E9077EM1E	Standard-based, one-button 802.11ac/ax measurement
WLAN 802.11be	E9077EM2E	Standard-based, one-button 802.11be measurement
Bluetooth®	E9081EM0E	Standard-based, one-button Bluetooth (BR/EDR, Low energy 4.0/4/2 and Bluetooth 5/5.1) measurements
Short-range communications & IoT	E9084EM0E	Standard-based, one-button 802.15 for Zigbee measurement, HRP UWB measurement; G.9959 for Z-Wave measurement; and LoRa CSS measurement

Step 12. Choose 89600 VSA software licenses

Description	Model number	Additional information
Basic vector signal analysis and hardware connectivity	89601200C (required core option)	Provides the tools and user interface that including time and frequency domain measurement, hardware connectivity, recordings, and playback
		Channel quality modulation analysis
General purpose		
Digital demodulation analysis	89601AYAC	Analysis of >40 modulation formats, including custom APSK and presets for communication formats like GSM/EDGE, ZigBee FSK, Bluetooth®, APCO25 and SOQPSK
		Proprietary and pre-standard, customized IQ constellation signals
		TEDS modulation analysis
		Channel response measurements such as phase/magnitude response and multi-tone group delay
		Flex Frame modulation analysis
Custom OFDM modulation analysis	89601BHFC	Proprietary and pre-standard OFDM formats
PowerSuite measurement	89601PSMC	PowerSuite measurement for ACP and EVM
Cellular communication		
5GNR modulation analysis	89601BHNC	5G NR modulation analysis
LTE/LTE-A FDD modulation analysis	89601BHGC	LTE FDD modulation analysis
		LTE-Advanced FDD modulation analysis
LTE/LTE-A TDD modulation analysis	89601BHHC	LTE TDD modulation analysis
		LTE-Advanced TDD modulation analysis
3G modulation analysis bundle	89601B7NC	W-CDMA/HSPA+ modulation analysis
		TD-SCDMA/HSPA modulation analysis
		cdma2000 modulation analysis
		1xEV-DO and 1xEV-DV modulation analysis
Channel sounding signal analysis	89601CSDC	Performs channel sounding measurement

Description	Model number	Additional information
Wireless connectivity		
Wireless connectivity modulation analysis	89601B7RC	WLAN 802.11a/b/g/j/p modulation analysis
		WiMax™ modulation analysis
High throughput WLAN modulation analysis	89601BHXC	WLAN 802.11n/ac modulation analysis
		WLAN 802.11ax modulation analysis
		WLAN 802.11be modulation analysis
IoT modulation analysis	89601BHTC	NB-IoT modulation analysis
		RFID modulation analysis
		HRP UWB (IEEE 802.15.4/4z) modulation analysis
Radar analysis		
Pulse analysis	89601BHQC	Pulsed modulated radar signal analysis
		Advanced pulse signal analysis
		Frequency hopping signal analysis
FMCW radar analysis	89601BHPC	For multi-chirp linear FM modulated signals or automotive radar
Other standard formats		
DOCSIS modulation analysis	89601BHMC	DOCSIS3.1 downstream and upstream modulation analysis

Step 13. Choose accessories

Description	Option number	Additional information
Power cord	Standard	Dependent upon the region of use
Adapter	11901B	2.4 mm female to APC-3.5 female adapter
Rack mount	1CM113A	Adds rack mount flanges to the MXA
Front handles	1CN103A	Adds front handles to the MXA
Rack mount with handles	1CP105A	Adds rack mount flanges and handles to the MXA
Rack slide	1CR014A	Adds a non-tilting rack slide to the MXA
USB DVD-ROM/CD-R/RW drive	1DVR001A	Enhances the usability of the Windows OS
Mouse, USB interface	1MSE001A	Enhances the usability of the 89600 VSA software

Description	Option number	Additional information
US 65-key USB keyboard	1KB001A	Smaller keyboard; enhances usability of the 89600 VSA software
Minimum loss pad, 50 to 75 Ω	MLP001A	50 Ω type-N male to 75 Ω BNC female adapter
		Frequency range: 9 MHz to 2 GHz
		Input/output return loss: 20 and 11 dB
		Insertion loss: 5.7 dB
Front panel cover	CV1117A	Protective cover for front panel
Receiver calibration (RCal) module	U9361C/F/G/M	Enables magnitude and complex corrections; see U9361C/F/G/M configuration guide (3120-1408EN) for details
V-band waveguide harmonic mixer, 50 to 75 GHz	M1970V-001	Requires Option EXM; USB mixer with smart features
Extended V-band waveguide harmonic mixer, 50 to 80 GHz	M1970V-002	Requires Option EXM; USB mixer with smart features
E-band waveguide harmonic mixer, 60 to 90 GHz	M1970E	Requires Option EXM; USB mixer with smart features
W-band waveguide harmonic mixer, 75 to 110 GHz	M1970W	Requires Option EXM; USB mixer with smart features
E-band waveguide harmonic mixer, 60 to 90 GHz	M1971E-001	Requires Option EXM; USB mixer with smart features and 3 signal paths
E-band waveguide harmonic mixer, 55 to 90 GHz	M1971E-003	Requires Option EXM; USB mixer with smart features and 3 signal paths
V-band waveguide harmonic mixer, 50 to 75 GHz	M1971V	Requires Option EXM; USB mixer with smart features and 3 signal paths
W-band waveguide harmonic mixer, 75 to 110 GHz	M1971W	Requires Option EXM; USB mixer with smart features and 3 signal paths
26 to 40 GHz waveguide harmonic mixer	11970A	Requires Option EXM and N9029BE13 diplexer
33 to 50 GHz waveguide harmonic mixer	11970Q	Requires Option EXM and N9029BE13 diplexer
40 to 60 GHz waveguide harmonic mixer	11970U	Requires Option EXM and N9029BE13 diplexer
50 to 75 GHz waveguide harmonic mixer	11970V	Requires Option EXM and N9029BE13 diplexer
75 to 110 GHz waveguide harmonic mixer	11970W	Requires Option EXM and N9029BE13 diplexer
LO/IF diplexer	N9029BE13	Ordering convenience; required for 11970 Series external mixers

Description	Option number	Additional information
50 to 75 GHz frequency extension module	N9029BV-W15	VDI signal analyzer frequency extension module; requires Option EXM
60 to 90 GHz frequency extension module	N9029BV-W12	VDI signal analyzer frequency extension module; requires Option EXM
75 to 110 GHz frequency extension module	N9029BV-W10	VDI signal analyzer frequency extension module; requires Option EXM
90 to 140 GHz frequency extension module	N9029BV-W08	VDI signal analyzer frequency extension module; requires Option EXM
110 to 170 GHz frequency extension module	N9029BV-W06	VDI signal analyzer frequency extension module; requires Option EXM
140 to 220 GHz frequency extension module	N9029BV-W05	VDI signal analyzer frequency extension module; requires Option EXM
170-260 GHz frequency extension module	N9029BV-W04	VDI signal analyzer frequency extension module; requires Option EXM
220 to 330 GHz frequency extension module	N9029BV-W03	VDI signal analyzer frequency extension module; requires Option EXM
260 to 400 GHz frequency extension module	N9029BV-W2B	VDI signal analyzer frequency extension module; requires Option EXM
330 to 500 GHz frequency extension module	N9029BV-W02	VDI signal analyzer frequency extension module; requires Option EXM
550 to 750 GHz frequency extension module	N9029BV-W1B	VDI signal analyzer frequency extension module; requires Option EXM
750 to 1100 GHz frequency extension module	N9029BV-W01	VDI signal analyzer frequency extension module; requires Option EXM
USB external preamplifier, 10 MHz to 4 GHz	U7227A	
USB external preamplifier, 0.1 to 26.5 GHz	U7227C	
USB external preamplifier, 2 to 50 GHz	U7227A	
Near-field probes	N9311X-100	Includes 4 magnetic field probes, up to 3 GHz

For more information on accessories, please go to: www.keysight.com/find/accessories

Step 14. Add calibration, technical training and support

Description	Option number	Additional information
Commercial calibration certificate with test data	N9021B-UK6	Calibration certificate only available at time of instrument purchase; only provides measurement results
Keysight Calibration + Uncertainties + Guardbanding	N9021B-AMG	Provides ISO 17025A accredited calibration from factory
ANSI Z540-1-1994 Calibration	N9021B-A6J	Provides ANSI Z540 compliant calibration from factory
Calibration Assurance Plan, Return-to-Keysight, 3 years	R-50C-011-3	Keysight tests your instrument against its original specifications and automatically makes adjustments if outside of specified parameters; pre- and post-adjustment measurement data reports also provided
Calibration Assurance Plan, Return-to-Keysight, 5 years	R-50C-011-5	
Calibration Assurance Plan, Return-to-Keysight, 7 years	R-50C-011-7	
Calibration Assurance Plan, Return-to-Keysight, 10 years	R-50C-011-10	
Service: Remote scheduled productivity assistance	PS-S10-100	Hourly phone-in technical support service designed to help you understand and operate your equipment through convenient phone and Web access
Service: 1-day start-up assistance	PS-S20-01	Training on how to operate your instrument effectively (recommended)
Service: Productivity assistance	PS-S20-100	Daily instrument and application consulting using your equipment and device under test
Service: custom engineering service	PS-X10-100	Application-specific technical assistance

Other calibration options may be available; for more information on calibration go to:
www.keysight.com/find/calibration

Instrument Upgrades

The majority of N9021B upgrade kit are fast license-key upgrades for performance options that do not require additional hardware:

1. Place an order for the upgrade with Keysight and request to receive the option upgrade entitlement certificate and a one-time software upgrade license through email
2. Redeem the certificate through the web by following the instructions on the certificate
3. Install the license file and latest software in the MXA
4. Begin using the new capability

Upgrade for analysis bandwidth from 255 MHz to 510 MHz requires both license certificate and hardware installations at Keysight service centers.

Description	Option number	Requirements	Additional information
Increase frequency from 32 to 44 GHz, includes 44 GHz preamplifier and calibration	N9021BU-F15	Option 532	Calibration needs be implemented at Keysight service center
Increase frequency from 32 to 50 GHz, includes 50 GHz preamplifier and calibration	N9021BU-F20	Option 532	
Increase frequency from 44 to 50 GHz, includes 50 GHz preamplifier and calibration	N9021BU-F21	Option 544	
Preamplifier, 32 GHz	N9021BU-P32	Option 532	Compatible with option 532 only
Preamplifier, 44 GHz	N9021BU-P44	Option 544	Compatible with option 544 only
Preamplifier, 50 GHz	N9021BU-P50	Option 550	Compatible with option 550 only
Analysis bandwidth upgrade, from 255 MHz to 510 MHz	N9021BU-BUM	Option B2X	Upgrade needs be implemented at Keysight service center

Description	Option number	Requirements	Additional information
		Option MPB	
Connects with Keysight and 3rd party mixers to extend frequency coverage up to 1.1 THz	N9021BU-EXM		Refer to "*Step 12*." on page 7 for more info
Electronic attenuator up to 3.6 GHz, in addition to the mechanical attenuator	N9021BU-EA3		Achieves 1 dB steps, 0 to 24 dB
Noise floor extension	N9021BU-NF2		Improves analyzer's DANL performance
Precision frequency reference	N9021BU-PFR		
Provides a fully imaged, removable SSD in addition to the one installed in instruments, with Windows 10 operating system	N9021BU-SS1		
Prevents the launching of Windows programs from the instrument application	N9021BU-SF1		
Prevents instrument application from saving/recalling of measurement results or user configurations to/from instrument's storage	N9021BU-SF2		
Wideband IF out; center frequency depends on IF path; output on Aux IF connector at rear panel	N9021BU-CR3		
IF out 10 to 75 MHz (in 500 kHz steps); output on Aux IF connector at rear panel	N9021BU-CRP		
Screen video (0-1 V open circuit) on rear panel analog out	N9021BU-YAS		
Extends the maximum RBW in Zero Span; requires option B2X, or B5X	N9021BU-RBE		
Controls Keysight EXG, MXG and PSG signal generators' supports external mixing; includes 3 BNC cables and 1 cross-over LAN cable	N9021BU-ESC		

Related Literatures

N9021B MXA Signal Analyzer - Data Sheet, 3119-1123EN

PathWave X-Series Measurement Application, Brochure, 5989-8019EN

PathWave Vector Signal Analysis (89600 VSA), Brochure, 5990-6553EN

Web Sources

Visit our Signal Source Analyzer Web site for additional product information and literature:

www.keysight.com/find/E5055A

www.keysight.com/find/ssa

Phase noise measurements: www.keysight.com/find/phasenoise

RF and microwave accessories: www.keysight.com/find/mta