Keysight MXA Signal Analyzer
Option BBA: Analog Baseband IQ Inputs

Technical Overview with Self-Guided Demonstration

KEYSIGHT TECHNOLOGIES

Introduction

The MXA signal analyzer with Option BBA from Keysight Technologies, Inc. adds analog baseband input and analysis capability to the MXA offering the best signal to noise ratio (SNR) for baseband as well as the best cost-performance in a mid-range analyzer. Option BBA contains dual 16-bit ADCs for baseband signal analysis, contributing to a superior IF flatness up to 40 MHz. With the Keysight 89601A VSA vector signal analysis software, you can expand the baseband analysis capabilities for troubleshooting and design verification of devices serving a wide range of communication applications: from popular formats like WiMAX™ and 3GPP LTE, to many proprietary format signals. Add Keysight Infiniium oscilloscope active and passive probes for easier attachment to your baseband signal when developing wireless transceivers and wireless chipsets.

Product Overview

Lay the groundwork for better signal quality at baseband

In modern “Zero-IF” direct-conversion radio transceiver designs, baseband signals are used because of easier manipulation and modulation than high frequency signals. Prior to transmission at the final RF band, modulation and up-conversion is performed on the baseband signal. However, without the guaranteed performance and behavior of these baseband signals, unexpected signal degradations can occur and must be addressed during the design and post-design validation processes. For your analog baseband development needs, utilize the MXA signal analyzer with analog baseband IQ inputs to perform comprehensive signal analysis early in your overall system design. Enhance your time to insight with Keysight 89601A VSA software for vector signal analysis and troubleshooting.

Eliminate the compromise between speed and performance at baseband

The Keysight MXA signal analyzer features state-of-the-art signal and spectrum analysis, and offers the highest mid-range analyzer performance in the industry today. Innovative breakthroughs in sweep control and processing power enable the MXA signal analyzer to achieve the industry’s fastest signal and spectrum analysis, while maintaining excellent measurement performance in areas such as amplitude accuracy and dynamic range. These same innovations are now available for analog baseband measurements.

Figure 1. MXA signal analyzer with analog baseband IQ inputs

Analog baseband analysis on your design bench

Adding analog baseband IQ inputs to the MXA signal analyzer allows engineers and technicians interested in baseband device performance to execute their signal measurement and troubleshooting. When paired with Keysight’s industry-leading 89601A VSA software, the MXA accelerates your daily tasks with excellent precision and the widest application and format coverage. You can also choose from a broad offering of X-Series advanced measurement applications, such as 802.16 OFDMA and GSM/EDGE, to evaluate your baseband signals. Furthermore, the MXA with baseband IQ inputs supports a variety of Keysight Infiniium/InfiniiMax scope probes, and provides an easy-to-use guided calibration utility and convenient internal calibrator output adjacent to the baseband IQ inputs on the front panel.

The MXA signal analyzer with Option BBA allows you to:

- Analyze any baseband signal up to 40 MHz bandwidth in wireless cellular, emerging communications, Aerospace/Defense, and many general purpose low-frequency applications

- Troubleshoot baseband signal quality issues in wireless transceiver R&D on front-end modules and IQ modems, and verify the baseband-IC and RF-IC performance in wireless chipset R&D
- Use pre-configured Infiniium/InfiniiMax active and passive probes with guided calibration for the greatest accuracy and precision when working with evaluation boards without RF connectors
- Record and replay captured baseband signals with standard 512 MSa baseband memory using Keysight 89601A VSA software

Speed your time to market with wide coverage of applications and modulation formats

There are many new technologies competing in the race to develop new, more compact and economical communication devices with higher data rates. To seize the market opportunities, baseband design engineers are pressured to shorten the development cycle, while still maintaining sufficient product quality. Because the MXA signal analyzer already offers the widest number of communication formats in the industry with its advanced measurement applications as well as the 89601A VSA software, it is now easy to measure and troubleshoot signals at both RF and baseband frequencies in a single instrument. Any unexpected signal quality degradation can be investigated at both RF and baseband merely by switching input channels on the MXA.

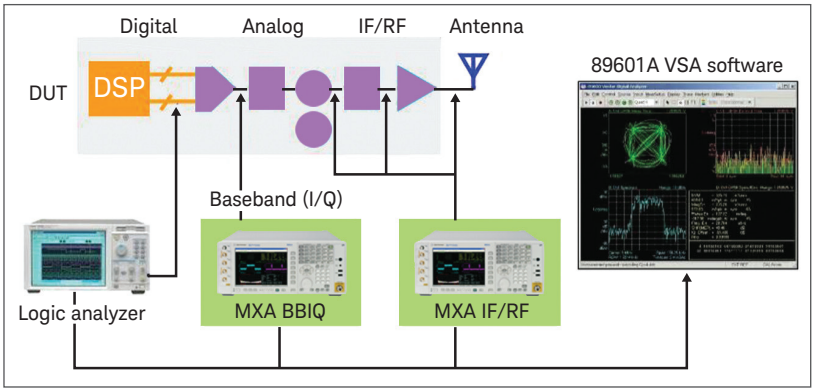

Figure 2. Simple block diagram showing signal analysis from DSP to RF antenna

Compatible applications available for MXA analog baseband IQ inputs

	Product descriptions	Ordering information
Standard	IQ Analyzer (Basic) Vector analysis in time domain and frequency domain	N9060A (Standard in MXA)
Optional measurement applications	GSM/EDGE	N9071A-2FP
	802.16 OFDMA (Mobile WiMAX)	N9075A-2FP
	cdma2000®	N9072A-2FP
	TD-SCDMA	N9079A-1FP/2FP
89601A VSA software and options	Basic VSA	89601A/AN-200 (required)
	Hardware connectivity	89601A/AN-300 (required)
	Flexible digital modulation analysis	89601A/AN-AYA
	WLAN modulation analysis	89601A/AN-B7R
	Fixed WiMAX modulation analysis	89601A/AN-B7S
	cdma2000/1xEV-DV modulation analysis	89601A/AN-B7T
	W-CDMA/HSPA modulation analysis	89601A/AN-B7U
	1xEV-DO modulation analysis	89601A/AN-B7W
	TD-SCDMA modulation analysis	89601A/AN-B7X
	Mobile WiMAX modulation analysis	89601A/AN-B7Y
	RFID modulation analysis	89601A/AN-BHC
	LTE modulation analysis	89601A/AN-BHD

Key Features

Accelerate time-to-market without compromising quality at analog baseband

Key features of MXA analog baseband IQ inputs

Option BBA: Analog baseband IQ inputs

- I, Ī, Q, Q̄ and Cal output on the MXA front panel
- I+jQ, I only, or Q only analysis
- 2-channel independent analysis using 89601A VSA's vector mode
- 50 Ω and 1 MΩ input impedance
- Single-ended and differential inputs
- Baseband bandwidth selection from 10 MHz standard, optional 25 MHz (B25) and optional 40 MHz (S40)
- Dual 16-bit ADCs across full bandwidth
- Keysight Infiniium/InfiniiMax active and passive probe connectivity
- 512 MSa standard capture depth for 89601A VSA capture/playback
- All MXA signal analyzers are upgradeable at local service centers or self-maintainers with calibration test software

Option S40: 40 MHz baseband bandwidth

- Expands baseband analysis bandwidth from standard 10 MHz to 40 MHz for single channel, 20 MHz to 80 MHz for I+jQ
- Also expands RF analysis bandwidth from 10 MHz to 25 MHz[1]

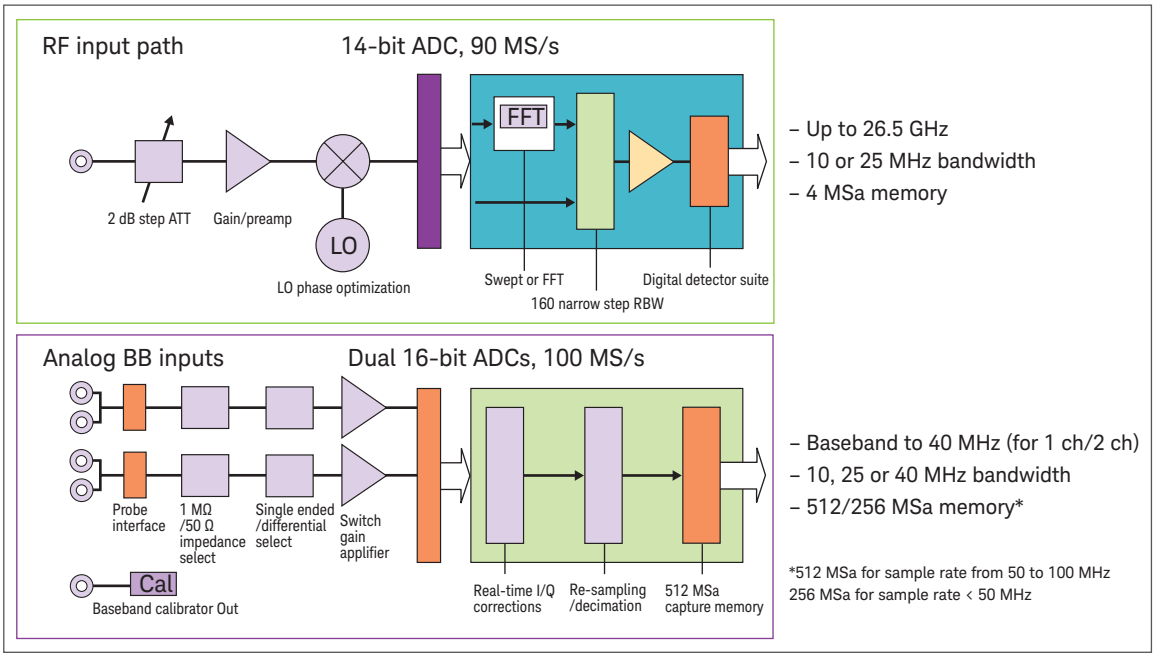

Figure 3. MXA signal analyzer block diagram (RF and analog BB)

1. If 25 MHz bandwidth is sufficient for both RF and baseband, order Option B25 (not S40) with Option BBA. Refer to the ordering information on page 14.

Easy and precise measurements with Keysight Infiniium/InfiniiMax probes

In the development process, sometimes you need to extract baseband signals from a circuit board with probes. For your convenience, the analog baseband option on the MXA signal analyzer includes a calibration utility to compensate for IQ cables and supported probes.

Supported probes

These probes are optimized for baseband analysis measurement with MXA signal analyzer Option BBA. When you perform probe calibration, the MXA stores the results for future use. The calibration is stored in non-volatile memory and can be recalled even if the instrument cycles power.

	Model number	Description
Active probe	1130A	1.5 GHz differential probe amp (No probe head)
	1131A[1]	InfiniiMax 3.5 GHz probe
	1132A[1]	InfiniiMax 5 GHz probe
	1134A[1]	InfiniiMax 7 GHz probe
Passive probe	1161A	Miniature passive probe, 10:1, 10 MΩ, 1.5 m

Probes without stored calibration

The following 115xA active probes can be used with the MXAs baseband IQ inputs using the same probe calibration utility software. However, the probe calibration is not stored in the MXA, so it's lost if power is cycled. Use of the E2655B deskew and calibration kit including calibration fixture is required because of the different physical configuration of the probes. (The physical connections are different mechanically, not electrically.)

	Model number	Description
Active probe	1153A	200 MHz differential probe
	1156A	Active probe, 1.5 GHz
	1157A	Active probe, 2.5 GHz
	1158A	Active probe, 4 GHz

For more information: **www.keysight.com/find/probes**

1. Probe heads are necessary to attach to your device properly. Probe connectivity kits such as E2668A, E2669A or E2675A are needed. For more details, please refer to the Keysight probe configuration guide, 5968-7141EN and 5989-6162EN.

Self-Guided Demonstrations

Demonstration 1: Calibrating for analog baseband measurements

Getting started

This section will guide you through some typical measurements for the MXA signal analyzer with analog baseband IQ inputs. Keystrokes surrounded by [] indicate front panel keys, while keystrokes surrounded by {} indicate soft keys located in the right edge of the display. If a keystroke describes status (such as *on* or *off*), it is the status that results from pressing the key.

If you would like to perform a self-guided demonstration with your device or signal generator, refer to the test signal information provided for each demonstration example. Then, start the MXA signal analyzer with the keystroke *[Mode]* to select the mode menu, and then prepare the MXA signal analyzer with the appropriate settings. In the initial setup, press *[Input]* and *{I/Q}* to switch input from RF input to baseband IQ inputs.

If you encounter any issues during setup, use *[Mode Preset]* or *[Meas Setup] {Meas Preset}* to return to a known state.

When you change the cable connections with different probes, it is highly recommended to perform an I/Q cable calibration first for the accurate baseband measurements prior to calibrating the probes connected.

The basic steps for cable and probe calibration are:

1. Start an I/Q cable calibration with short BNC cable.
2. Perform an isolation calibration with the probes before connecting to the test fixture.
3. Connect the I probe first and then the Q probe in turn to the test fixture (which is connected to the Cal Out).

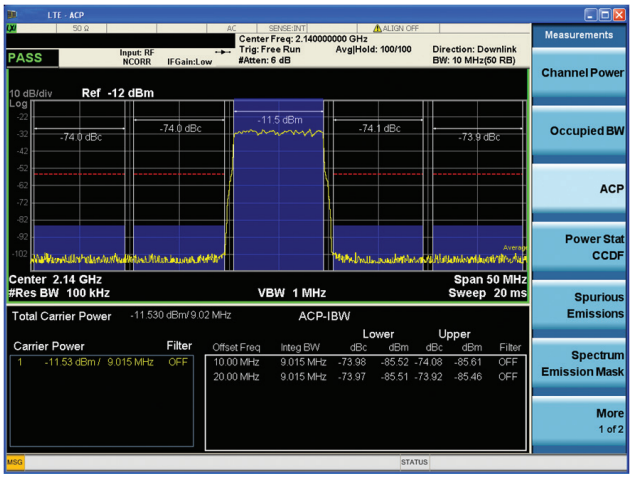

Figure 4. Cable calibration for baseband IQ inputs

Quick navigation:

To calibrate cables for analog baseband I/Q inputs: [Input], {I/Q}, {I/Q Cable Calibrate...}.

Demonstration 2: Measurement in IQ analyzer mode

Intermodulation with 2-tone signal at analog baseband

Test signal: 2-tone signal at ±500 kHz of baseband I and Q

IQ analyzer (N9060A) is a standard feature for all MXA signal analyzers and provides two measurements: complex spectrum and IQ waveform. Complex spectrum shows sampled complex data in the frequency domain. By using powerful marker functions available on the MXA signal analyzer, you can easily make channel power, intermodulation distortion, and spurious signal measurements. With up to 12 normal and delta markers on screen, plus additional sophisticated capabilities such as noise marker and band/interval markers, you can expand your analysis and troubleshooting capabilities to fully-characterize baseband signals.

In other optional application modes like GSM/EDGE, IEEE 802.16 OFDMA, TD-SCDMA, cdma2000, and 802.16 OFDMA (WiMAX/WiBro), you can simply switch input menu from RF to I/Q for analog baseband signal analysis. Any FFT-based in-channel analysis can be made and you can compare the result with the RF signal to figure out any EVM difference between analog baseband and RF signals.

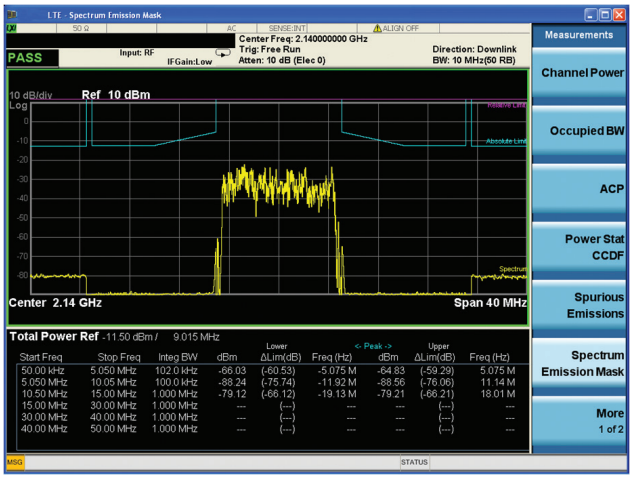

Figure 5. Intermodulation in IQ Analyzer (Basic) mode with 2-tone signal at analog baseband

Quick navigation:

To see the signal in the frequency domain with complex data: *[Mode] {IQ Analyzer(Basic)}*, *[Meas] {Complex Spectrum}*, *[Span] 8 {MHz}*, *[BW] {Res BW} 10 {kHz}*.

To put markers on a spectrum trace: *[Marker] {Select Marker}* 1 *[Peak Search]*, *{Select Marker}* 2 *{Delta} {Relative To}* 1 and *{Select Marker}* 3 *{Delta} {Relative To}* 1.

Demonstration 3: Measurement using 89601A VSA for 2 channel analysis

2-channel independent vector analysis in time domain

Test signal:
Channel 1: Reference signal generated by a signal generator
Channel 2: DUT signal at lower power (To check the timing, the 10 MHz reference clock is connected from the signal generator to MXA.)

The 89601A VSA software runs inside the MXA signal analyzer for vector signal analysis of either an RF input or analog baseband IQ inputs. If independent analysis of 2 channels is required for signals below 40 MHz, the 89601A VSA software gives you the frequency and time domain characteristics of the signal under test.

The 2-channel independent analysis can be used for cross channel measurement, cross correlations, and timing adjustment with Main Time trace. Many trace selections are available, including spectrogram to monitor the signal transitions and hopping.

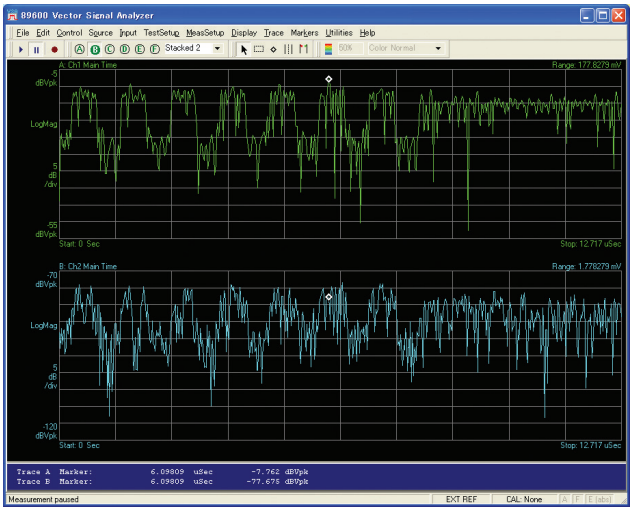

Figure 6. 2-channel independent vector analysis with 89601A VSA software

Quick navigation:

To see the 2-channel signals in time domain using the 89601A VSA software: *[Mode] {89601A VSA}*.

To switch the input channel from 1 channel (RF) to 2 channels with baseband IQ inputs: select 89601A menu; *Input* > *Channels* > *2 Channels*

Note: There is another input selection for I+jQ here. This selects I+jQ complex data analysis for various 89601A VSA application options. Please refer to the table on page 3 to find which application options are supported by the MXA signal analyzer's analog baseband IQ inputs.

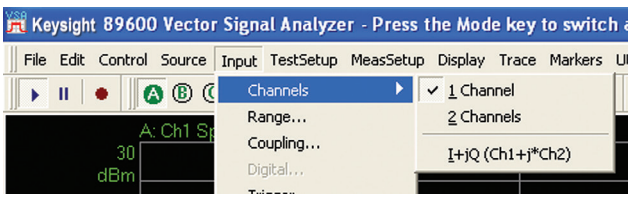

Figure 7. Input channel selection menu in 89601A VSA software

Specifications

MXA analog BBIQ key specifications (N9020A/AK-BBA)

For more detailed specification information, refer to the MXA Specifications Guide, N9020-90075.

	Specifications	Supplemental information
Frequency range		
(I only, Q only)	DC to 40 MHz	Tuning range
(I+jQ)	–40 MHz to 40 MHz	Baseband range
Frequency span		
(I only, Q only)		
Standard base instrument	10 Hz to 10 MHz	
Option B25	10 Hz to 25 MHz	
Option S40	10 Hz to 40 MHz	
(I+jQ)		
Standard base instrument	10 Hz to 20 MHz	
Option B25	10 Hz to 50 MHz	
Option S40	10 Hz to 80 MHz	
(2-channel with 89601A VSA software)		
Standard base instrument	10 Hz to 10 MHz per channel	
Option B25	10 Hz to 25 MHz per channel	Zoom, complex data
	10 Hz to 20 MHz per channel	Baseband
Option S40	10 Hz to 40 MHz per channel	Zoom, complex data
	10 Hz to 20 MHz per channel	Baseband
Frequency resolution	1 Hz	
Input ranges		Full-scale peak voltage
50 Ω input impedance	1 V peak	10 dBm
	0.5 V peak	4 dBm
	0.250 V peak	–2 dBm
	0.125 V peak	–8 dBm
Maximum common mode input range		
50 Ω impedance	–3 V to +3 V	±6.75 V (Keysight 1130A probe)
1 MΩ impedance	–3 V to +3 V	±30 V (Keysight 1161A probe)
Maximum safe input voltage	±4 V (DC + AC)	
Absolute amplitude accuracy		
All ranges, 250 kHz reference frequency		±0.07 dB (nominal)
Amplitude linearity		
Amplitude linearity		
0 to –45 dB relative to full scale		±0.10 dB (nominal)
More than 45 dB below full scale		±0.20 dB (nominal)
Frequency response		
Relative to 250 kHz, 50/1 MΩ		
0 to 40 MHz		±0.25 dB (nominal)
Phase noise		
1 MHz to 40 MHz		
Offset 1 kHz		–132 dBc/Hz (nominal)
Offset 10 kHz		–136 dBc/Hz (nominal)
Offset 100 kHz		–142 dBc/Hz (nominal)
Offset > 100 kHz		–142 dBc/Hz (nominal)
Channel match, Amplitude match, 50/1 MΩ, Single-ended input mode selected		
0 to 10 MHz		±0.04 dB (95th percentile)
> 10 MHz to 25 MHz		±0.06 dB (95th percentile)
> 25 MHz to 40 MHz		±0.10 dB (95th percentile)
Phase match, 50/1 MΩ, Single-ended input mode selected		
0 to 10 MHz		±0.08 degree (95th percentile)
> 10 MHz to 25 MHz		±0.18 degree (95th percentile)
> 25 MHz to 40 MHz		±0.32 degree (95th percentile)

MXA analog BBIQ key specifications (N9020A/AK-BBA) (continued)

Specifications	Supplemental information
Crosstalk	
50 Ω and 1 MΩ inputs	< –70 dB (nominal)
Common mode rejection (50 Ω input)	
0 Hz to 40 MHz	< –50 dB (nominal)
Signal to noise ratio	
50 Ω input impedance selected, 1 V scale	147 dBfs/Hz (nominal)
Displayed average noise level	Voltage averaging applied
Input terminated in 50 Ω, 50 Ω impedance	No DC offset applied
Single-ended, 1 kHz RBW, normalized to 1 Hz	Averaged noise level over the stated frequency range
> 2 to 40 MHz	
1 V peak	–137 dBm (32 nV/rtHz)
0.5 V peak	–142 dBm (18 nV/rtHz)
0.250 V peak	–146 dBm (11 nV/rtHz)
0.125 V peak	–149 dBm (8 nV/rtHz)
Displayed average noise level	Voltage averaging applied
Input terminated in 1 Ω, 1 Ω impedance	No DC offset applied
Single-ended, 1 kHz RBW, normalized to 1 Hz	Averaged noise level over the stated frequency range
> 2 to 40 MHz	
1 V peak	–136 dBm (35 nV/rtHz)
0.5 V peak	–140 dBm (22 nV/rtHz)
0.250 V peak	–143 dBm (16 nV/rtHz)
0.125 V peak	–146 dBm (11 nV/rtHz)
Residual responses	
0 Hz to 40 MHz	–90 dBm (nominal)
Spurious responses	
f > 1 kHz from carrier	–70 dBc (nominal)
Second harmonic distortion	–70 dBc (nominal)
Third order intermodulation distortion	–70 dBc (nominal)
Residual DC (IQ) offset	
After auto-zero	–54 dBfs (nominal)

Application specifications

Specifications	Supplemental information
Residual EVM: X-Series measurement applications	
N9071A-2FP GSM/EDGE	
EDGE EVM floor	±0.5% (nominal)
PFER phase error, rms, floor	±0.3 degree (nominal)
N9072A cdma2000	
Composite EVM floor	±1.5% (nominal)
Composite Rho floor	0.99978 (nominal)
N9075A 802.16 OFDMA (Mobile WiMAX)	
RCE floor (10 MHz bandwidth)	–48 dB (nominal)
N9079A TD-SCDMA	
Composite EVM floor	±1.5% (nominal)
Residual EVM: 89601A VSA software	
89601A/AN Option BHD: 3GPP LTE	
10 MHz bandwidth	DL: ≤ –48 dB (0.4%) (nominal) UL: ≤ –46 dB (0.5%) (nominal)
89601A/AN Option B7U: 3GPP W-CDMA	
5 MHz bandwidth	≤ 1.5% EVM (nominal)
89601A/AN Option B7Y: 802.16 OFDMA	
10 MHz bandwidth	≤ –48 dB RCE

BBIQ measurement specifications

	Specifications	Supplemental information
Complex spectrum		
Resolution bandwidth ranges Overall (Manual):	 100 mHz to 3 MHz	
Pre-FFT filter Type Bandwith (I+jQ)	 Flat Top, Gaussian Auto, Manual 1 Hz to 20 MHz 1 Hz to 50 MHz 1 Hz to 80 MHz	 Standard instrument Option B25 Option S40
FFT window	Flat Top, Uniform, Hanning, Hamming, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70 dB, K-B 90 dB and K-B 110 dB)	
Averaging Average number Average mode Average type	 1 to 20,001 Exponential, Repeat Power Avg (RMS), Log Power Avg (Video), Voltage Avg, Maximum, Minimum	
IQ waveform		
Information bandwidth	10 Hz to 20 MHz 10 Hz to 50 MHz 10 Hz to 80 MHz	Standard instrument Option B25 Option S40
Averaging Average number Average mode Average type	 1 to 20,001 Exponential, Repeat Power Avg (RMS), Log Power Avg (Video), Voltage Avg,	
Displays	RF Envelope, I/Q Waveform	
Trigger		
Source	Freerun, External 1, External 2	
General trigger setup	Trigger level, Trigger slope, Trigger delay, Auto trigger, Trigger holdoff	
Trigger slope	Positive, Negative	
Trigger delay Range (External - 1/2) Range (Baseband IQ trigger)	On, Off –150 msec to 500 msec –2.5 sec to 10.0 sec	
Auto trigger Time interval range	On, Off	 1 msec to 100 sec (nominal)
Trigger holdoff Time interval range Resolution	On, Off 0 to 500 msec 100 msec	
Baseband I/Q trigger source	I/Q Mag, I (Demodulated), Q (Demodulated), Input I, Input Q, and Aux Channel Center Frequency	
Baseband IQ trigger setup	Trigger level, Trigger slope, and Trigger delay	
Aux channel I/Q mag trigger setup	Trigger level, Trigger slope, Trigger delay, Trigger center frequency, and Trigger BW	

BBIQ general specifications

	Specifications	Supplemental information
Baseband IQ inputs		
Connectors I, Q, $\bar{I}$, $\bar{Q}$, and Cal out	BNC female	
Cal Out Signal Frequency	 AC coupled square wave Selectable between 1 kHz and 250 Khz	
Input impedance (4 connectors: I, $\bar{I}$, Q, $\bar{Q}$)		50 Ω, 1 MΩ (nominal, selectable)
Probes supported[1] Active probe Passive probe	 1130A, 1131A, 1132A, 1134A 1161A	 Keysight InfiniiMax Series
Input return loss 50 Ω impedance selected		–35 dB (0 to 10 MHz, nominal) –30 dB (10 to 40 MHz, nominal)
Input capacitance 1 MΩ input impedance		 12 pF (nominal)
Capture depth	512 MSa 256 MSa	Sampling rate 50 MHz to 100 MHz Sampling rate < 50 MHz
Capture record length Sample rate 100 MS/s Sample rate 50 MS/s Sample rate 25 MS/s Sample rate 12.5 MS/s	 5 sec 5 sec 10 sec 20 sec	 80 MHz bandwidth with I+jQ, 40 MHz bandwidth with I+jQ, 20 MHz bandwidth with I+jQ, 10 MHz bandwidth with I+jQ,

1. For more details, please refer to the Keysight probe configuration guides, 5968-7141EN and 5989-6162EN.
Probe heads are necessary to attach to your device properly. Probe connectivity kits such as E2668B, E2669A. or E2675A are needed.

Ordering Information

For further information, refer to the MXA Configuration Guide, 5989-4943EN.

Model number	Details	Notes
N9020A	MXA signal analyzer	Requires options for frequency range: 503, 508, 513, or 526
N9020A-BBA	Analog baseband IQ inputs	Standard 10 MHz baseband and RF bandwidth
N9020A-B25	Baseband and RF bandwidth, 25 MHz	Expanded baseband and RF bandwidth to 25 MHz
N9020A-S40	Baseband bandwidth 40 MHz, RF bandwidth 25 MHz	Requires Option BBA Expanded baseband bandwidth to 40 MHz, RF bandwidth to 25 MHz
N9020AK-BBA	Upgrade analog baseband IQ inputs	
N9020AK-S40	Upgrade MXA baseband bandwidth from 10 to 40 MHz	Requires Option BBA
N9020AK-SU1	Upgrade MXA baseband bandwidth from 25 to 40 MHz	Requires Option BBA
N9071A-2FP	GSM/EDGE measurement application	
N9072A-2FP	cdma2000 measurement application	
N9075A-2FP	802.16 OFDMA measurement application	
N9079A-1FP/2FP	TD-SCDMA measurement application	
89601A/AN	Vector signal analysis (VSA) software	
89601A/AN-200	Basic VSA	
89601A/AN-300	Hardware connectivity	
89601A/AN-AYA	Flexible digital modulation analysis	Requires Options 200 and 300
89601A/AN-B7R	WLAN modulation analysis	Requires Options 200 and 300
89601A/AN-B7S	Fixed WiMAX modulation analysis	Requires Options 200 and 300
89601A/AN-B7T	cdma2000/1xEV-DV modulation analysis	Requires Options 200 and 300
89601A/AN-B7U	W-CDMA/HSPA modulation analysis	Requires Options 200 and 300
89601A/AN-B7W	1xEV-DO modulation analysis	Requires Options 200 and 300
89601A/AN-B7X	TD-SCDMA modulation analysis	Requires Options 200 and 300
89601A/AN-B7Y	Mobile WiMAX modulation analysis	Requires Options 200 and 300
89601A/AN-BHC	RFID modulation analysis	Requires Options 200 and 300
89601A/AN-BHD	LTE modulation analysis	Requires Options 200 and 300

Literature Resources

Keysight MXA signal analyzer

MXA Signal Analyzer, Brochure, 5989-5047EN, Keysight Technologies, 2014

MXA Signal Analyzer, Data Sheet, 5989-4942EN, Keysight Technologies, 2014

MXA Signal Analyzer, Configuration Guide, 5989-4943EN, Keysight Technologies, 2014

MXA Signal Analyzer Option BBA, Technical Overview, 5989-6538EN, Keysight Technologies, 2014

Keysight 89601A VSA software

89600 VSA Software, Technical Overview, 5989-1679EN, Keysight Technologies, 2014

89600 VSA Software Hardware Measurement Platforms, Data Sheet, 5989-1753EN, Keysight Technologies, 2014

Keysight oscilloscope probes

Infiniium Series Oscilloscope Probes, Accessories, and Options, Selection Guide and Data Sheet, 5968-7141EN, Keysight Technologies, 2014

Oscilloscope Probes and Accessories, Selection Guide, 5989-6162EN, Keysight Technologies, 2014

Probes and Accessories for Oscilloscopes, Configuration Flyer, 5989-8433EN, Keysight Technologies, 2014

Keysight X-Series signal analyzers

X-Series Signal Analyzer (MXA/EXA), Demonstration Guide, 5989-6126EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) W-CDMA, HSDPA/HSUPA Technical Overview, 5989-5352EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) 802.16 OFDMA Technical Overview, 5989-5353EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) Phase Noise Technical Overview, 5989-5354EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) GSM/EDGE Technical Overview, 5989-6532EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) cdma2000, 1xEV-DO, Technical Overview, 5989-6533EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) TD-SCDMA Technical Overview, 5989-6534EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) Analog Demodulation Technical Overview, 5989-6535EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) LTE Technical Overview, 5989-6537EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) Remote Language Compatibility, Technical Overview, 5989-6539EN, Keysight Technologies, 2014

X-Series Signal Analyzers (MXA/EXA) Noise Figure Technical Overview, 5989-6536EN, Keysight Technologies, 2014

Using X-Series Signal Analyzers (MXA/EXA) for Measuring and Troubleshooting Digitally Modulated Signals, Application Note, 5989-4944EN, Keysight Technologies, 2014

Using X-Series Signal Analyzers (MXA/EXA) Preselector Tuning for Amplitude Accuracy in Microwave Spectrum Analysis, Application Note, 5989-4946EN, Keysight Technologies, 2014

Maximizing Measurement Speed with X-Series Signal Analyzers (MXA/EXA), Application Note, 5989-4947EN, Keysight Technologies, 2014

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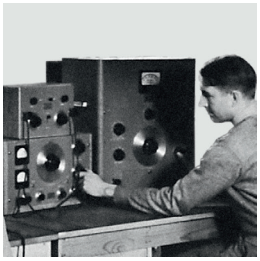

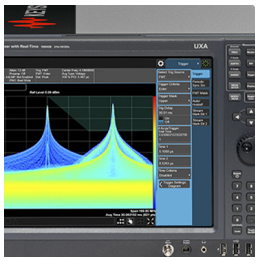

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