



# MXA



## N9020A MXA X-Series Signal Analyzer 10 Hz to 3.6, 8.4, 13.6, or 26.5 GHz

### Data Sheet

This data sheet is a summary of the specifications and conditions for MXA signal analyzers. For the complete specifications guide, visit: [www.agilent.com/find/mxa\\_specifications](http://www.agilent.com/find/mxa_specifications)



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## Accelerate to market

Every device demands decisions that require tradeoffs in your goals—customer specs, throughput, yield. With a highly flexible signal analyzer, you can manage and minimize those tradeoffs. Agilent’s mid-performance MXA is the ultimate accelerator as your products move from design to the marketplace. It has the flexibility to quickly adapt to your evolving test requirements—today and tomorrow. Maximize your flexibility, and accelerate to market, with the Agilent MXA signal analyzer.

# Definitions and Conditions

Specifications describe the performance of parameters covered by the product warranty and apply to the full temperature range of 0 to 55 °C<sup>1</sup>, unless otherwise noted.

95th percentile values indicate the breadth of the population (approx. 2  $\sigma$ ) of performance tolerances expected to be met in 95 percent of the cases with a 95 percent confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments is observed.

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but are not covered by the product warranty.

The analyzer will meet its specifications when:

- It is within its calibration cycle
- Under auto couple control, except when Auto Sweep Time Rules = Accy
- Signal frequencies < 10 MHz, with DC coupling applied
- The analyzer has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on; if it had previously been stored at a temperature range inside the allowed storage range, but outside the allowed operating range
- The analyzer has been turned on at least 30 minutes with Auto Align set to normal, or, if Auto Align is set to off or partial, alignments must have been run recently enough to prevent an Alert message; if the Alert condition is changed from Time and Temperature to one of the disabled duration choices, the analyzer may fail to meet specifications without informing the user

For the complete specifications guide, visit:

[www.agilent.com/find/mxa\\_specifications](http://www.agilent.com/find/mxa_specifications)

1. For earlier instruments (Serial number prefix < MY/SG/US5051), the full temperature ranges from 5 to 50 °C.

# Frequency and Time Specifications

Frequency range	DC coupled	AC coupled
Option 503	10 Hz to 3.6 GHz	10 MHz to 3.6 GHz
Option 508	10 Hz to 8.4 GHz	10 MHz to 8.4 GHz
Option 513	10 Hz to 13.6 GHz	10 MHz to 13.6 GHz
Option 526	10 Hz to 26.5 GHz	10 MHz to 26.5 GHz
Band	LO multiple (N)	
0	1	10 Hz to 3.6 GHz
1	1	3.5 to 8.4 GHz
2	2	8.3 to 13.6 GHz
3	2	13.5 to 17.1 GHz
4	4	17 to 26.5 GHz
Frequency reference		
Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
Aging rate	Option PFR ± 1 x 10 <sup>-7</sup> / year ± 1.5 x 10 <sup>-7</sup> / 2 years	Standard ± 1 x 10 <sup>-6</sup> / year
Temperature stability 20 to 30 °C Full temperature range	Option PFR ± 1.5 x 10 <sup>-8</sup> ± 5 x 10 <sup>-8</sup>	Standard ± 2 x 10 <sup>-6</sup> ± 2 x 10 <sup>-6</sup>
Achievable initial calibration accuracy	Option PFR ± 4 x 10 <sup>-8</sup>	Standard ± 1.4 x 10 <sup>-6</sup>
Example frequency reference accuracy (with Option PFR) 1 year after last adjustment	= ± (1 x 1 x 10 <sup>-7</sup> + 5 x 10 <sup>-8</sup> + 4 x 10 <sup>-8</sup> ) = ± 1.9 x 10 <sup>-7</sup>	
Residual FM Option PFR Standard	≤ (0.25 Hz x N) p-p in 20 ms nominal ≤ (10 Hz x N) p-p in 20 ms nominal See band table above for N (LO multiple)	
Frequency readout accuracy (start, stop, center, marker)		
± (marker frequency x frequency reference accuracy + 0.25 % x span + 5 % x RBW + 2 Hz + 0.5 x horizontal resolution <sup>1</sup> )		
Marker frequency counter		
Accuracy	± (marker frequency x frequency reference accuracy + 0.100 Hz)	
Delta counter accuracy	± (delta frequency x frequency reference accuracy + 0.141 Hz)	
Counter resolution	0.001 Hz	
Frequency span (FFT and swept mode)		
Range	0 Hz (zero span), 10 Hz to maximum frequency of instrument	
Resolution	2 Hz	
Accuracy Swept FFT	± (0.25 % x span + horizontal resolution) ± (0.10 % x span + horizontal resolution)	

1. Horizontal resolution is span/(sweep points - 1).

Sweep time and triggering		
Range	Span = 0 Hz Span ≥ 10 Hz	1 μs to 6000 s 1 ms to 4000 s
Accuracy	Span ≥ 10 Hz, swept Span ≥ 10 Hz, FFT Span = 0 Hz	± 0.01 % nominal ± 40 % nominal ± 0.01 % nominal
Trigger	Free run, line, video, external 1, external 2, RF burst, periodic timer	
Trigger delay	Span = 0 Hz or FFT Span ≥ 10 Hz, swept Resolution	–150 to +500 ms 0 to 500 ms 0.1 μs
Time gating		
Gate methods	Gated LO; gated video; gated FFT	
Gate length range (except method = FFT)	100.0 ns to 5.0 s	
Gate delay range	0 to 100.0 s	
Gate delay jitter	33.3 ns p-p nominal	
Sweep (trace) point range		
All spans	1 to 40001	
Resolution bandwidth (RBW)		
Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8 MHz	
Bandwidth accuracy (power)	1 Hz to 750 kHz 820 kHz to 1.2 MHz (< 3.6 GHz CF) 1.3 to 2 MHz (< 3.6 GHz CF) 2.2 to 3 MHz (< 3.6 GHz CF) 4 to 8 MHz (< 3.6 GHz CF)	± 1.0 % (±0.044 dB) ± 2.0 % (±0.088 dB) ± 0.07 dB nominal ± 0.15 dB nominal ± 0.25 dB nominal
Bandwidth accuracy (–3.01 dB) RBW range	1 Hz to 1.3 MHz	± 2 % nominal
Selectivity (–60 dB/–3 dB)	4.1:1 nominal	
EMI bandwidth (CISPR compliant)	200 Hz, 9 kHz, 120 kHz, 1 MHz	(Option EMC or N6141A required)
EMI bandwidth (MIL STD 461E compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz (standard)	(Option EMC or N6141A required)
Analysis bandwidth <sup>1</sup>		
Maximum bandwidth	Option B1X Option B1A Option B85 Option B40 Option B25 (standard) Standard	160 MHz 125 MHz 85 MHz 40 MHz 25 MHz 10 MHz
Video bandwidth (VBW)		
Range	1 Hz to 3 MHz (10 % steps), 4, 5, 6, 8 MHz, and wide open (labeled 50 MHz)	
Accuracy	± 6 % nominal	
Measurement speed <sup>2</sup>		
Local measurement and display update rate	Standard 4 ms (250/s) nominal	
Remote measurement and LAN transfer rate	5 ms (200/s) nominal	
Marker peak search	1.5 ms nominal	
Center frequency tune and transfer (RF)	20 ms nominal	
Center frequency tune and transfer (μW)	47 ms nominal	
Measurement/mode switching	39 ms nominal	

1. Analysis bandwidth is the instantaneous bandwidth available around a center frequency over which the input signal can be digitized for further analysis or processing in the time, frequency, or modulation domain.

2. Sweep points = 101. Apply for instruments with S/N prefix ≥ MY/SG/US4910 or earlier instruments with Option PC2 or PC4. Otherwise, refer to the MXA specification guide.

# Amplitude Accuracy and Range Specifications

Amplitude range			
Measurement range	Displayed average noise level (DANL) to maximum safe input level		
Input attenuator range	0 to 70 dB in 2 dB steps		
Electronic attenuator (Option EA3)			
Frequency range	10 Hz to 3.6 GHz		
Attenuation range			
Electronic attenuator range	0 to 24 dB, 1 dB steps		
Full attenuation range (mechanical + electronic)	0 to 94 dB, 1 dB steps		
Maximum safe input level			
Average total power (with and without preamp)	+30 dBm (1 W)		
Peak pulse power	< 10 $\mu$ s pulse width, < 1 % duty cycle +50 dBm (100 W) and input attenuation $\geq$ 30 dB		
DC volts			
DC coupled	$\pm$ 0.2 Vdc		
AC coupled	$\pm$ 100 Vdc		
Display range			
Log scale	0.1 to 1 dB/division in 0.1 dB steps 1 to 20 dB/division in 1 dB steps (10 display divisions)		
Linear scale	10 divisions		
Scale units	dBm, dBmV, dB $\mu$ V, dBmA, dB $\mu$ A, V, W, A		
Frequency response	Specification	95th percentile ( $\approx$ 2 $\sigma$ )	
(10 dB input attenuation, 20 to 30 °C, preselector centering applied, $\sigma$ = nominal standard deviation)			
	20 Hz to 10 MHz	$\pm$ 0.6 dB	$\pm$ 0.28 dB
	10 MHz <sup>1</sup> to 3.6 GHz	$\pm$ 0.45 dB	$\pm$ 0.17 dB
	3.5 to 8.4 GHz	$\pm$ 1.5 dB	$\pm$ 0.48 dB
	8.3 to 13.6 GHz	$\pm$ 2.0 dB	$\pm$ 0.47 dB
	13.5 to 22.0 GHz	$\pm$ 2.0 dB	$\pm$ 0.52 dB
	22.0 to 26.5 GHz	$\pm$ 2.5 dB	$\pm$ 0.71 dB
Preamp on (0 dB attenuation) <sup>2</sup>	100 kHz to 3.6 GHz	$\pm$ 0.75 dB	$\pm$ 0.28 dB
	3.5 to 8.4 GHz	$\pm$ 2.0 dB	$\pm$ 0.67 dB
	8.3 to 13.6 GHz	$\pm$ 2.3 dB	$\pm$ 0.73 dB
	13.5 to 17.1 GHz	$\pm$ 2.5 dB	$\pm$ 0.97 dB
	17.0 to 22.0 GHz	$\pm$ 2.5 dB	$\pm$ 1.36 dB
	22.0 to 26.5 GHz	$\pm$ 3.5 dB	$\pm$ 1.48 dB

1. DC coupling required to meet specifications below 50 MHz. With AC coupling, specifications apply at frequencies of 50 MHz and higher. Statistical observations at 10 MHz with AC coupling show that most instruments meet the DC-coupled specifications, however, a small percentage of instruments are expected to have errors exceeding 0.5 dB at 10 MHz at the temperature extreme. The effect at 20 to 50 MHz is negligible but not warranted.
2. Apply for instruments with S/N prefix  $\geq$  MY/SG/US5051. For older instruments, refer to the MXA Specification Guide.

Input attenuation switching uncertainty		Specifications	Additional information
Attenuation > 2 dB , preamp off Relative to 10 dB (reference setting)	50 MHz (reference frequency)	± 0.20 dB	± 0.08 dB typical
	20 Hz to 3.6 GHz		± 0.3 dB nominal
	3.5 to 8.4 GHz		± 0.5 dB nominal
	8.3 to 13.6 GHz		± 0.7 dB nominal
	13.5 to 26.5 GHz		± 0.7 dB nominal
Total absolute amplitude accuracy			
(10 dB attenuation, 20 to 30 °C, 1 Hz ≤ RBW ≤ 1 MHz, input signal –10 to –50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, σ = nominal standard deviation)			
	At 50 MHz	± 0.33 dB	
	At all frequencies 20 Hz to 3.6 GHz	± (0.33 dB + frequency response) ± 0.23 dB (95th Percentile ≈ 2σ)	
Preamp on	At all frequencies	± (0.39 dB + frequency response)	
Input voltage standing wave ratio (VSWR) (≥ 10 dB input attenuation)			
	10 MHz to 3.6 GHz	< 1.2:1 nominal	
	3.6 to 8.4 GHz	< 1.5:1 nominal	
	8.4 to 13.6 GHz	< 1.6:1 nominal	
	13.6 to 26.5 GHz	< 1.9:1 nominal	
Preamp on (0 dB attenuation)	10 MHz to 3.6 GHz	< 1.7:1 nominal	
	3.6 to 8.4 GHz	< 1.8:1 nominal	
	8.4 to 13.6 GHz	< 2.0:1 nominal	
	13.6 to 26.5 GHz	< 2.0:1 nominal	
Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)			
1 Hz to 1.5 MHz RBW		± 0.05 dB	
1.6 MHz to 3 MHz RBW		± 0.10 dB	
4, 5, 6, 8 MHz RBW		± 1.0 dB	
Reference level			
Range			
Log scale		–170 to +30 dBm in 0.01 dB steps	
Linear scale		Same as Log (707 pV to 7.07 V)	
Accuracy		0 dB	
Display scale switching uncertainty			
Switching between linear and log		0 dB	
Log scale/div switching		0 dB	
Display scale fidelity			
Between –10 dBm and –80 dBm input mixer level		± 0.10 dB total	
Trace detectors			
Normal, peak, sample, negative peak, log power average, RMS average, and voltage average			
Preamplifier			
Frequency range	Option P03 Option P08 Option P13 Option P26	100 kHz to 3.6 GHz 100 kHz to 8.4 GHz 100 kHz to 13.6 GHz 100 kHz to 26.5 GHz	
Gain	100 kHz to 3.6 GHz 3.6 to 26.5 GHz	+20 dB nominal +35 dB nominal	
Noise figure	100 kHz to 3.6 GHz 3.6 to 8.4 GHz 8.4 to 13.6 GHz 13.6 to 26.5 GHz	11 dB nominal 9 dB nominal 10 dB nominal 15 dB nominal	

# Dynamic Range Specifications

1 dB gain compression (two-tone)		Total power at input mixer	
	20 to 500 MHz	0 dBm	+3 dBm nominal
	500 MHz to 3.6 GHz	3 dBm	+7 dBm nominal
	3.6 to 26.5 GHz	0 dBm	+4 dBm nominal
Preamp on (Option P03, P08, P13, P26)	10 MHz to 3.6 GHz		-10 dBm nominal
	3.6 to 26.5 GHz		
	Tone spacing 100 kHz to 20 MHz		-26 dBm nominal
	Tone spacing > 70 MHz		-16 dBm nominal
Displayed average noise level (DANL)			
(Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 1 Hz RBW, 20 to 30 °C)			
	Specification	Typical	
	10 Hz		-95 dBm nominal
	20 Hz		-105 dBm nominal
	100 Hz		-110 dBm nominal
	1 kHz		-120 dBm nominal
	9 kHz to 1 MHz		-130 dBm
	1 to 10 MHz	-150 dBm	-153 dBm
	10 MHz to 2.1 GHz	-151 dBm	-154 dBm
	2.1 to 3.6 GHz	-149 dBm	-152 dBm
	3.6 to 8.4 GHz	-149 dBm	-153 dBm
	8.4 to 13.6 GHz	-148 dBm	-151 dBm
	13.6 to 17.1 GHz	-144 dBm	-147 dBm
	17.1 to 20.0 GHz	-143 dBm	-146 dBm
	20.0 to 26.5 GHz	-136 dBm	-142 dBm
Preamp on (Option P03, P08, P13, P26)	100 kHz to 1 MHz		-149 dBm nominal
	1 to 10 MHz	-161 dBm	-163 dBm
	10 MHz to 2.1 GHz	-163 dBm	-166 dBm
	2.1 to 3.6 GHz	-162 dBm	-164 dBm
	3.6 to 8.4 GHz	-162 dBm	-166 dBm
	8.4 to 13.6 GHz	-162 dBm	-165 dBm
	13.6 to 17.1 GHz	-159 dBm	-163 dBm
	17.1 to 20.0 GHz	-157 dBm	-161 dBm
	20.0 to 26.5 GHz	-152 dBm	-157 dBm
Spurious responses			
Residual responses (Input terminated and 0 dB attenuation)	200 kHz to 8.4 GHz (swept)	-100 dBm	
	Zero span or FFT or other frequencies	-100 dBm nominal	
Image responses	10 MHz to 3.6 GHz	-80 dBc (-107 dBc typical)	
	3.6 to 13.6 GHz	-78 dBc (-88 dBc typical)	
	13.6 to 17.1 GHz	-74 dBc (-85 dBc typical)	
	17.1 to 22 GHz	-70 dBc (-82 dBc typical)	
	22 to 26.5 GHz	-68 dBc (-78 dBc typical)	
LO related spurious (f > 600 MHz from carrier)	10 MHz to 3.6 GHz	-90 dBc + 20xlogN <sup>1</sup> typical	
Other spurious f ≥ 10 MHz from carrier		-80 dBc + 20xlogN <sup>1</sup>	

1. N is the LO multiplication factor.



Second harmonic distortion (SHI)				
	Source frequency	Mixer level	Distortion	SHI
	10 MHz to 1.25 GHz	-15 dBm	-60 dBc	+45 dBm
	1.25 to 1.8 GHz	-15 dBm	-56 dBc	+41 dBm
	1.75 to 7 GHz	-15 dBm	-80 dBc	+65 dBm
	7 to 11 GHz	-15 dBm	-70 dBc	+55 dBm
	11 to 13.25 GHz	-15 dBm	-65 dBc	+50 dBm
		Preamp level	Distortion	SHI
Preamp on (Option P03, P08, P13, P26)	10 MHz to 1.8 GHz	-45 dBm	-78 dBc nominal	+33 dBm nominal
	1.8 to 13.25 GHz	-50 dBm	-60 dBc nominal	+10 dBm nominal
Third-order intermodulation distortion (TOI)				
(Two -30 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 °C, see Specifications Guide for IF prefilter bandwidths)				
		Distortion	TOI	TOI (typical)
	10 to 100 MHz	-84 dBc	+12 dBm	+17 dBm
	100 to 400 MHz	-90 dBc	+15 dBm	+20 dBm
	400 MHz to 1.7 GHz	-92 dBc	+16 dBm	+20 dBm
	1.7 to 3.6 GHz	-92 dBc	+16 dBm	+19 dBm
	3.6 to 26.5 GHz	-90 dBc	+15 dBm	+18 dBm
Preamp on (two -45 dBm tones at preamp input)	10 to 500 MHz	-98 dBc nominal		+4 dBm nominal
	500 MHz to 3.6 GHz	-100 dBc nominal		+5 dBm nominal
	3.6 to 26.5 GHz	-70 dBc nominal		-15 dBm nominal

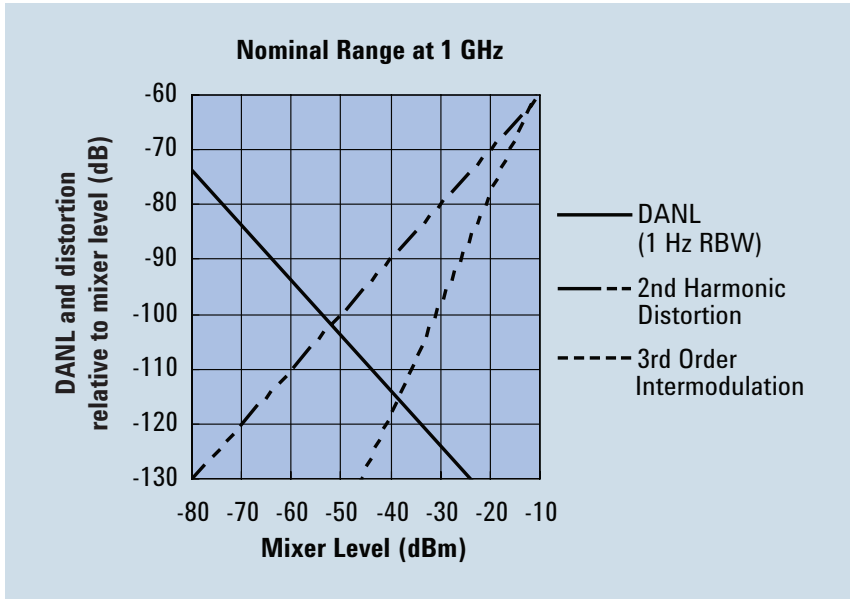


Figure 1. Nominal dynamic range – Band 0, for second and third order distortion, 20 Hz to 3.6 GHz

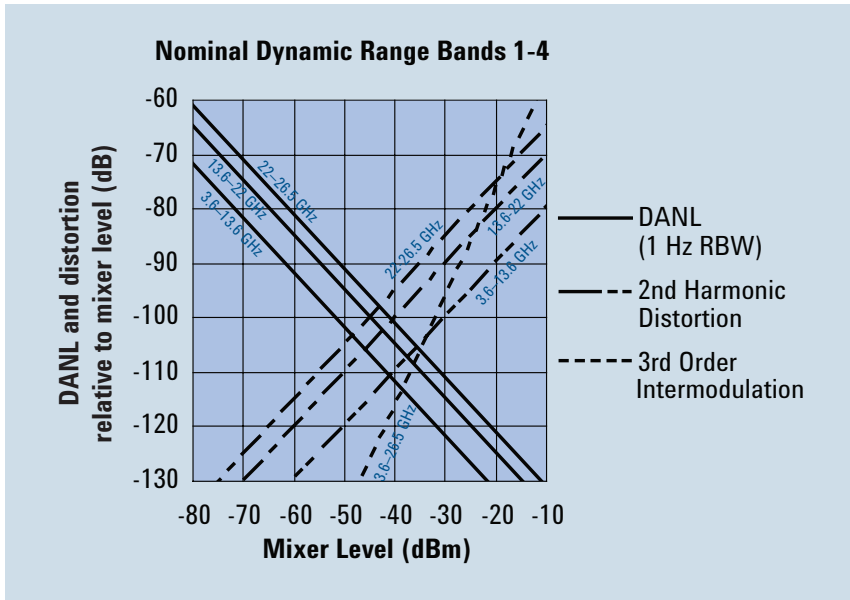


Figure 2. Nominal dynamic range – Bands 1 to 4, for second and third order distortion, 3.6 GHz to 26.5 GHz

Phase noise <sup>1</sup>	Offset	Specification	Typical
Noise sidebands (20 to 30 °C, CF = 1 GHz)	10 Hz		-80 dBc/Hz nominal
	100 Hz	-91 dBc/Hz	-100 dBc/Hz
	1 kHz		-112 dBc/Hz nominal
	10 kHz	-113 dBc/Hz	-114 dBc/Hz
	100 kHz	-116 dBc/Hz	-117 dBc/Hz
	1 MHz	-135 dBc/Hz	-136 dBc/Hz
	10 MHz		-148 dBc/Hz nominal

1. Applies for instruments with serial number prefix  $\geq$  MY/SG/US5233. Those instruments ship standard with N9020A-EP2 as the identifier. For nominal values at other center frequencies, refer to Figure 3. For earlier instruments, refer to the MXA specifications guide.

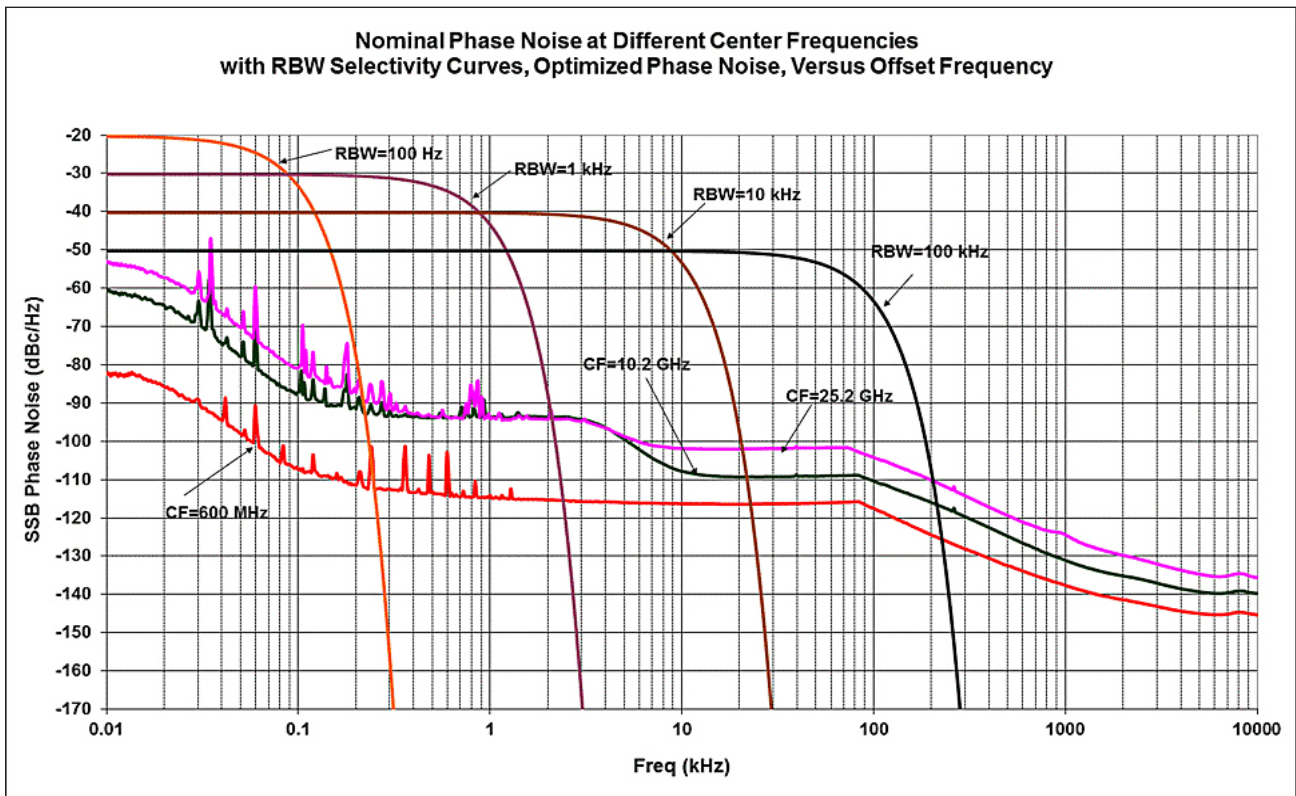


Figure 3. Nominal phase noise at different center frequencies (Applies for instruments with SN prefix  $\geq$  MY/SG/US5233; ships standard with N9020A-EP2)

# PowerSuite Measurement Specifications

Channel power		
Amplitude accuracy, W-CDMA or IS95 (20 to 30 °C, attenuation = 10 dB)	± 0.80 dB (± 0.30 dB 95th percentile)	
Occupied bandwidth		
Frequency accuracy	± [span/1000] nominal	
Adjacent channel power		
Accuracy, W-CDMA (ACLR) (at specific mixer levels and ACLR ranges)	Adjacent	Alternate
MS	± 0.14 dB	± 0.21 dB
BTS	± 0.49 dB	± 0.44 dB
Dynamic range (typical)		
Without noise correction	-73 dB	-79 dB
With noise correction	-78 dB	-82 dB
Offset channel pairs measured	1 to 6	
ACP measurement and transfer time (fast method)	14 ms nominal ( $\sigma = 0.2$ dB)	
Multiple number of carriers measured	Up to 12	
Power statistics CCDF		
Histogram resolution	0.01 dB	
Harmonic distortion		
Maximum harmonic number	10th	
Result	Fundamental power (dBm), relative harmonics power (dBc), total harmonic distortion in %	
Intermod (TOI)	Measure the third-order products and intercepts from two tones	
Burst power		
Methods	Power above threshold, power within burst width	
Results	Single burst output power, average output power, maximum power, minimum power within burst, burst width	
Spurious emission		
W-CDMA (1 to 3.6 GHz) table-driven spurious signals; search across regions		
Dynamic range	96.7 dB	(101.7 dB typical)
Absolute sensitivity	-84.4 dBm	(-89.4 dBm typical)
Spectrum emission mask (SEM)		
cdma2000® (750 kHz offset)		
Relative dynamic range (30 kHz RBW)	78.9 dB	(85.0 dB typical)
Absolute sensitivity	-99.7 dBm	(-104.7 dBm typical)
Relative accuracy	± 0.11 dB	
3GPP W-CDMA (2.515 MHz offset)		
Relative dynamic range (30 kHz RBW)	81.9 dB	(88.2 dB typical)
Absolute sensitivity	-99.7 dBm	(-104.7 dBm typical)
Relative accuracy	± 0.12 dB	

# General Specifications

## Temperature range

Operating	0 to 55 °C
Storage	–40 to 70 °C

## EMC

Complies with European EMC Directive 2004/108/EC

- IEC/EN 61326-1 or IEC/EN 61326-2-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11:2002
- ICES/NMB-001

This ISM device complies with Canadian ICES-001

Cet appareil ISM est conforme à la norme NMB-001 du Canada

## Safety

Complies with European Low Voltage Directive 2006/95EC

- IEC/EN 61010-1 3rd Edition
- Canada: CSA C22.2 No. 61010-1-12
- U.S.A.: UL 61010-1 3rd Edition

## Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u)

Acoustic noise emission

LpA < 70 dB

Operator position

Normal position

Per ISO 7779

## Environmental stress

Samples of this product have been type tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions; test methods are aligned with IEC 60068-2 and levels are similar to MILPRF-28800F Class 3.

## Power requirements

Voltage and frequency	100 to 120 V, 50/60/400 Hz 220 to 240 V, 50/60 Hz
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Power consumption	
On	465 W maximum
Standby	20 W

## Display

Resolution	1024 x 768, XGA
Size	213 mm (8.4 in.) diagonal (nominal)

## Data storage

Internal	≥ 80 GB nominal (removable solid state drive)
External	Supports USB 2.0 compatible memory devices

## Weight (without options)

Net	16 kg (35 lbs) nominal
Shipping	28 kg (62 lbs) nominal

## Dimensions

Height	177 mm (7.0 in)
Width	426 mm (16.8 in)
Length	368 mm (14.5 in)

## Warranty

The MXA signal analyzer is supplied with a standard 3-year warranty

## Calibration cycle

The recommended calibration cycle is two years; calibration services are available through Agilent service centers

# Inputs and Outputs

Front panel	
RF input Connector	Type-N female, 50 $\Omega$ nominal
Analog baseband IQ inputs (Option BBA) <sup>1</sup> Connectors (I, Q, I-Bar, Q-Bar, and Cal Out) Cal Out Signal Frequency Input impedance (4 connectors: I, Q, I-, Q-) Probes supported <sup>2</sup> Active probe Passive probe Input return loss 50 $\Omega$ impedance only selected	BNC female  AC coupled square wave Selectable between 1 kHz and 250 kHz 50 $\Omega$ , 1 M $\Omega$ (selectable, nominal) 1130A, 1131A, 1132A, 1134A 1161A –35 dB (0 to 10 MHz, nominal) –30 dB (10 to 40 MHz, nominal)
Probe power Voltage/current	+15 Vdc, $\pm 7\%$ at 150 mA max nominal –12.6 Vdc, $\pm 10\%$ at 150 mA max nominal
USB 2.0 ports Master (2 ports) Standard Connector Output current	Compatible with USB 2.0 USB Type-A female 0.5 A nominal
Rear panel	
10 MHz out Connector Output amplitude Frequency	BNC female, 50 $\Omega$ nominal $\geq 0$ dBm nominal 10 MHz $\pm$ (10 MHz x frequency reference accuracy)
Ext Ref In Connector Input amplitude range Input frequency Frequency lock range	BNC female, 50 $\Omega$ nominal –5 to 10 dBm nominal 1 to 50 MHz nominal $\pm 5 \times 10^{-6}$ of specified external reference input frequency
Trigger 1 and 2 inputs Connector Impedance Trigger level range	BNC female > 10 k $\Omega$ nominal –5 to 5 V
Trigger 1 and 2 outputs Connector Impedance Level	BNC female 50 $\Omega$ nominal 5 V TTL nominal
Monitor output Connector Format Resolution	VGA compatible, 15-pin mini D-SUB XGA (60 Hz vertical sync rates, non-interlaced) Analog RGB 1024 x 768

1. For additional specifications, please refer to the MXA specifications guide.

2. For more details, please refer to the Agilent Probe Configuration Guides, literature numbers 5968-7141EN and 5989-6162EN; probe heads are necessary to attach to your device properly and probe connectivity kits such as E2668B, E2669A, or E2675A are required.

Rear panel	
Noise source drive +28 V (pulsed) Connector	BNC female
SNS Series noise source	
Analog out Connector	BNC female (used by Option YAS)
USB 2.0 ports Master (4 ports) Standard Connector Output current Slave (1 port) Standard Connector Output current	Compatible with USB 2.0 USB Type-A female 0.5 A nominal Compatible with USB 2.0 USB Type-B female 0.5 A nominal
GPIB interface Connector GPIB codes GPIB mode	IEEE-488 bus connector SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0 Controller or device
LAN TCP/IP interface Standard Connector	1000Base-T RJ45 Ethertwist
IF output Connector Impedance	SMA female, shared by Option CR3 and CRP 50 $\Omega$ nominal
Wideband IF output, Option CR3	
Center frequency SA mode or I/Q analyzer with IF BW $\leq$ 25 MHz with Option B40 with Option B85, B1A, or B1X	322.5 MHz 250 MHz 300 MHz
Conversion gain	-1 to +4 dB (nominal) plus RF frequency response
Bandwidth Low band High band, with preselector High band, with preselector bypassed <sup>1</sup>	Up to 140 MHz (nominal) Depends on center frequency Up to 410 MHz
Programmable IF output, Option CRP	
Center frequency Range Resolution	10 to 75 MHz (user selectable) 0.5 MHz
Conversion gain	-1 to +4 dB (nominal) plus RF frequency response
Bandwidth Output at 70 MHz Low band or high band with preselector bypassed <sup>1</sup> Preselected band Lower output frequencies	100 MHz (nominal) Depends on RF center frequency Subject to folding
Residual output signals	$\leq$ -88 dBm (nominal)

1. Option MPB installed and enabled.

# I/Q Analyzer

Resolution bandwidth (spectrum measurement)				
Range				
Overall	100 mHz to 3 MHz			
Span = 1 MHz	50 Hz to 1 MHz			
Span = 10 kHz	1 Hz to 10 kHz			
Span = 100 Hz	100 mHz to 100 Hz			
Window shapes				
Flat top, Uniform, Hanning, Gaussian, Blackman, Blackman-Harris, Kaiser Bessel (K-B 70 dB, K-B 90 dB and K-B 110 dB)				
Analysis bandwidth				
Standard	10 Hz to 10 MHz			
Option B25 (standard)	10 Hz to 25 MHz			
Option B40	10 Hz to 40 MHz			
Option B85	10 Hz to 85 MHz			
Option B1A	10 Hz to 125 MHz			
Option B1X	10 Hz to 160 MHz			
IF frequency response (standard 10 MHz IF path)				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)				
Center frequency (GHz)	Span (MHz)	Preselector	Max. error	RMS (nominal)
≤ 3.6	≤ 10	n/a	± 0.40 dB	0.04 dB
3.6 < f ≤ 26.5	≤ 10	on		0.25 dB
3.6 < f ≤ 26.5	≤ 10	off <sup>1</sup>	± 0.45 dB	0.04 dB
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
≤ 3.6	≤ 10	n/a	0.4 °	0.1 °
3.6 < f ≤ 26.5	≤ 10	on	1.0 °	0.2 °
3.6 < f ≤ 26.5	≤ 10	off <sup>1</sup>	0.4 °	0.1 °
Data acquisition (10 MHz IF path)				
Time record length				
IQ analyzer	4,000,000 IQ sample pairs			
Sample rate at ADC				
Option DP2, B40 or MPB	100 MSa/s			
None of the above	90 MSa/s			
ADC resolution				
Option DP2, B40 or MPB	16 bits			
None of the above	14 bits			
Option B25 (standard) 25 MHz analysis bandwidth				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)				
Center frequency (GHz)	Span (MHz)	Preselector	Max. error	RMS (nominal)
≤ 3.6	10 to ≤ 25	n/a	± 0.45 dB	0.051 dB
3.6 < f ≤ 26.5	10 to ≤ 25	on		0.45 dB
3.6 < f ≤ 26.5	10 to ≤ 25	off <sup>1</sup>	± 0.45 dB	0.05 dB
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
0.02 ≤ f < 3.6	≤ 25	n/a	0.6 °	0.14 °
3.6 ≤ f ≤ 26.5	≤ 25	on	4.5 °	1.2 °
3.6 ≤ f ≤ 26.5	≤ 25	off <sup>1</sup>	1.9 °	0.42 °

1. Option MPB is installed and enabled.



Data acquisition (25 MHz IF path)			
Time record length (IQ pairs) IQ Analyzer	4,000,000 IQ sample pairs		
89600 software or N9064A	32-bit packing	64-bit packing	Memory
Option DP2, B40 or MPB	536 MSa	268 MSa	2 GB
None of the above	4,000,000 IQ sample pairs (independent of data packing)		
Sample rate at ADC Option DP2, B40 or MPB	100 MSa/s		
None of the above	90 MSa/s		
ADC resolution Option DP2, B40 or MPB	16 bits		
None of the above	14 bits		

## I/Q Analyzer (continued)

Option B40 (40 MHz analysis bandwidth, Option B40 is automatically included in Option B85, B1A or B1X)

Option B40 40 MHz analysis bandwidth				
IF frequency response (demodulation and FFT response relative to the center frequency, 20 to 30 °C)				
Center frequency (GHz)	Span (MHz)	Preselector		RMS (nominal)
$0.03 \leq f < 3.6$	$\leq 40$	n/a	$\pm 0.45$ dB	$\pm 0.08$ dB
$3.6 \leq f \leq 8.4$	$\leq 40$	off <sup>1</sup>	$\pm 0.35$ dB	$\pm 0.08$ dB
$8.4 < f \leq 26.5$	$\leq 40$	off <sup>1</sup>	$\pm 0.46$ dB	$\pm 0.08$ dB
IF phase linearity (deviation from mean phase linearity, nominal)				
Center frequency (GHz)	Span (MHz)	Preselector	Peak-to-peak	RMS
$0.02 \leq f < 3.6$	40	n/a	$0.2^\circ$	$0.05^\circ$
$3.6 \leq f \leq 26.5$	40	off <sup>1</sup>	$5^\circ$	$1.4^\circ$
Dynamic range (40 MHz IF path)				
SFDR (Spurious-free dynamic range)				
Signal frequency within $\pm 12$ MHz of center	-77 dBc nominal			
Signal frequency anywhere within analysis BW				
Spurious response within $\pm 18$ MHz of center	-74 dBc nominal			
Response anywhere within analysis BW	-74 dBc nominal			
Data acquisition (40 MHz IF path)				
Time record length (IQ pairs) IQ Analyzer	4,000,000 samples (I/Q pairs)			
89600 VSA software or N9064A VXA	32-bit packing	64-bit packing		
Length (IQ sample pairs)	536 MSa	268 MSa	2 GB total memory nominal	
Length (time units)			Samples/(Span x 1.28) nominal	
Sample rate At ADC	200 MSa/s			
IQ pairs			Span x 1.28 nominal	
ADC resolution	12 bits			

1. Option MPB is installed and enabled.

# I/Q Analyzer (continued)

Option B85/B1A/B1X (85/125/160 MHz analysis bandwidth)

IF frequency response					
IF frequency response (20 to 30 °C)			Relative to center frequency		
Center freq. (GHz)	Span (MHz)	Preselector		Typical	RMS (nominal)
≥ 0.15, < 3.6	≤ 85	NA	± 0.6 dB	± 0.17 dB	0.05 dB
	≤ 140	NA	± 0.6 dB	± 0.25 dB	0.05 dB
	≤ 160	NA		± 0.2 dB (nom)	0.07 dB
≥ 3.6, ≤ 8.4	≤ 85	Off <sup>1</sup>	± 0.73 dB	± 0.2 dB	0.06 dB
	≤ 140	Off <sup>1</sup>	± 0.8 dB	± 0.35 dB	0.06 dB
	≤ 160	Off <sup>1</sup>		± 0.3 dB (nom)	0.07 dB
> 8.4, ≤ 26.5	≤ 85	Off <sup>1</sup>	± 1.10 dB	± 0.50 dB	0.2 dB
	≤ 140	Off <sup>1</sup>	± 1.40 dB	± 0.76 dB	0.2 dB
	≤ 160	Off <sup>1</sup>		± 0.5 dB (nom)	0.12 dB
IF phase linearity (deviation from mean phase linearity, nominal)					
Center freq. (GHz)	Span (MHz)	Preselector		Peak-to-peak	RMS
≥ 0.03, < 3.6	≤ 85	NA		1.6°	0.54°
	≤ 140	NA		3.9°	0.85°
	≤ 160	NA		4.7°	1.23°
≥ 3.6	≤ 85	Off <sup>1</sup>		4.2°	0.93°
	≤ 160	Off <sup>1</sup>		5.3°	1.73°
EVM (EVM measurement floor)		Customized settings required, preselector bypassed (Option MPB) is installed and enabled			
Case1: 802.11ac OFDM signal, 80 MHz bandwidth, MCS8, using 89600 VSA software equalization on, pilot phase tracking post EQ on					
Carrier frequency, 5.21 GHz; input power, 0 dBm	0.23% (-52.7 dB) nominal			(EQ on preamble, pilots, and data)	
	0.35% (-49.1 dB) nominal			(EQ on preamble only)	
Case2: 802.11ac OFDM signal, 160 MHz bandwidth, MCS8, using 89600 VSA software equalization on, pilot phase tracking post EQ on					
Carrier frequency, 5.25 GHz; input power, 0 dBm	0.30% (-50.4 dB) nominal			(EQ on preamble, pilots, and data)	
	0.40% (-47.9 dB) nominal			(EQ on preamble only)	
Dynamic range					
<b>SFDR</b> (Spurious-free dynamic range)					
Signal frequency within ± 12 MHz of center	-72 dBc nominal				
Signal frequency anywhere within analysis BW					
Spurious response within ± 63 MHz of center	-71 dBc nominal				
Response anywhere within analysis BW	-69 dBc nominal				
Full scale (ADC clipping)					
Default settings, signal at CF (IF gain = Low: IF gain offset = 0 dB)					
Band 0	-8 dBm mixer level nominal				
Band 1 through 4	-7 dBm mixer level nominal				
High gain setting, signal at CF (IF gain = High)					
Band 0	-18 dBm mixer level nominal, subject to gain limitations				
Band 1 through 4	-17 dBm mixer level nominal, subject to gain limitations				
Effect of signal frequency ≠ CF	Up to ± 3 dB nominal				

1. Option MPB is installed and enabled.

Data acquisition (85/125/160 MHz IF path)			
Time record length			
IQ analyzer	4,000,000 IQ sample pairs		
89600 VSA software or N9064A VXA	Data packing		2 GB total memory
	32-bit	64-bit	
Length (IQ sample pairs)	536 MSa (2 <sup>29</sup> Sa)	268 MSa (2 <sup>28</sup> Sa)	
Length (time units)	Samples/(span x 1.28)		
Sample rate			
At ADC	400 Msa/s		
IQ pairs	Span dependent		
ADC resolution	14 bits		

## Real-Time Spectrum Analyzer (RTSA) <sup>1</sup>

Option RT1 or RT2

Real-time analysis			
Real-time analysis bandwidth			
Option RT1	Up to 160 MHz		Analysis BW option determines the max real-time bandwidth
Option RT2	Up to 160 MHz		Analysis BW option determines the max real-time bandwidth
Minimum detectable signal duration with > 60 dB StM <sup>2</sup> ratio			
Option RT1	11.42 ns		
Option RT2	5.0 ns		
Minimum signal duration with 100% probability of Frequency Mask Triggering (FMT) at full amplitude accuracy			
Option RT1	17.3 μs		Signal is at mask level
Option RT2	3.57 μs		Signal is at mask level
Minimum acquisition time	100 μs		
FFT rate	292,969/s		

1. For additional RTSA specifications, please refer to Option RT1/RT2 Chapter in the MXA Signal Analyzer specifications guide (part number: N9020-90113)

2. StM = "Signal-to-Mask"

# Related Literature

## Agilent MXA signal analyzers

*Brochure* 5989-5047EN

*Configuration Guide* 5989-4943EN

For more information or literature resources please visit the web:  
[www.agilent.com/find/mxa](http://www.agilent.com/find/mxa)



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