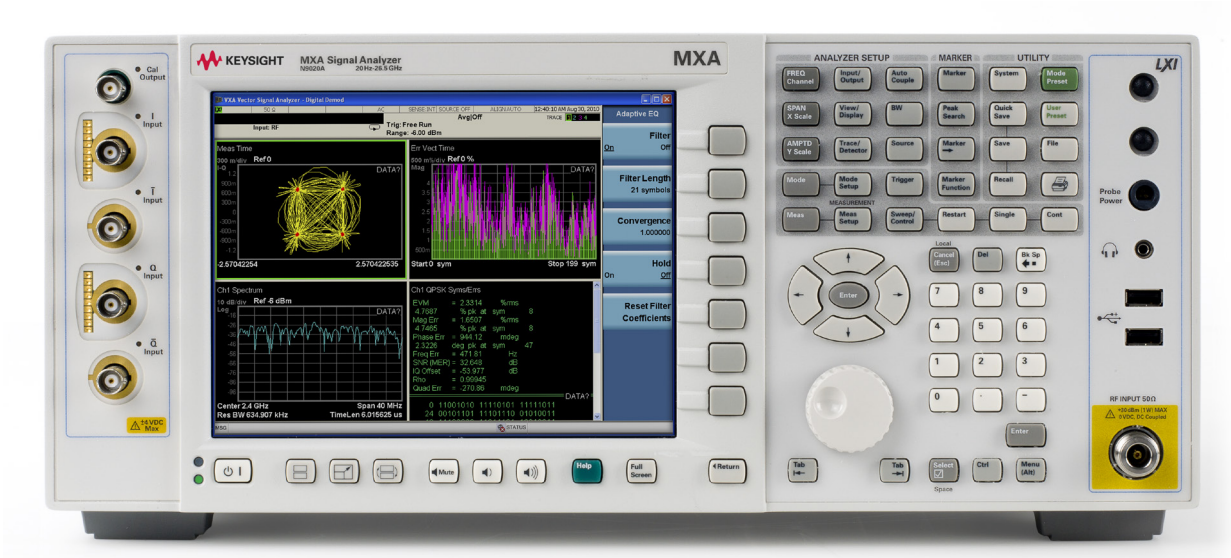
Keysight N9020A MXA
X-Series Signal Analyzer
10 Hz to 3.6, 8.4, 13.6, or 26.5 GHz

Data Sheet



KEYSIGHT TECHNOLOGIES

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This data sheet is a summary of the specifications and conditions for MXA signal analyzers. For the complete specifications guide, visit: www.keysight.com/find/mxa_specifications

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. Keysight Technologies Inc.'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 Keysight 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[1], unless otherwise noted.

95th percentile values indicate the breadth of the population (approx. 2 σ) 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.keysight.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] [1]		
Aging rate	Option PFR $\pm 1 \times 10^{-7}$ / year $\pm 1.5 \times 10^{-7}$ / 2 years	Standard $\pm 1 \times 10^{-6}$ / year	w/ J7023A AFR $\pm 1 \times 10^{-9}$ / year
Temperature stability 20 to 30 °C Full temperature range	Option PFR $\pm 1.5 \times 10^{-8}$ $\pm 5 \times 10^{-8}$	Standard $\pm 2 \times 10^{-6}$ $\pm 2 \times 10^{-6}$	w/ J7023A AFR $\pm 5 \times 10^{-10}$
Achievable initial calibration accuracy	Option PFR $\pm 4 \times 10^{-8}$	Standard $\pm 1.4 \times 10^{-6}$	w/ J7023A AFR $\pm 5 \times 10^{-11}$
Example frequency reference accuracy (with Option PFR) 1 year after last adjustment	$= \pm (1 \times 1 \times 10^{-7} + 5 \times 10^{-8} + 4 \times 10^{-8})$ $= \pm 1.9 \times 10^{-7}$		
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 [2])

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. *When used with external frequency reference 1 pulse-per-second (PPS), such as the J7203A atomic frequency reference (AFR), the reference tracking accuracy needs to be taken into account for calculation of the overall frequency accuracy. Refer to the MXA signal analyzer specifications guide (part number: N9020-90113) for more details.*
2. *Horizontal resolution is span/(sweep points – 1).*

Sweep time and triggering		
Range	Span = 0 Hz	1 µs to 6000 s
	Span ≥ 10 Hz	1 ms to 4000 s
Accuracy	Span ≥ 10 Hz, swept	± 0.01 % nominal
	Span ≥ 10 Hz, FFT	± 40 % nominal
	Span = 0 Hz	± 0.01 % nominal
Trigger	Free run, line, video, external 1, external 2, RF burst, periodic timer	
Trigger delay	Span = 0 Hz or FFT	–150 to +500 ms
	Span ≥ 10 Hz, swept	0 to 500 ms
	Resolution	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	± 1.0 % (±0.044 dB)
	820 kHz to 1.2 MHz (< 3.6 GHz CF)	± 2.0 % (±0.088 dB)
	1.3 to 2 MHz (< 3.6 GHz CF)	± 0.07 dB nominal
	2.2 to 3 MHz (< 3.6 GHz CF)	± 0.15 dB nominal
	4 to 8 MHz (< 3.6 GHz CF)	± 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 [1]		
Maximum bandwidth	Option B1X	160 MHz
	Option B1A	125 MHz
	Option B85	85 MHz
	Option B40	40 MHz
	Option B25 (standard)	25 MHz
	Standard	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 [2]	Standard
Local measurement and display update rate	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 µs pulse width, < 1 % duty cycle +50 dBm (100 W) and input attenuation ≥ 30 dB
DC volts	
DC coupled	± 0.2 Vdc
AC coupled	± 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, dBµV, dBmA, dBµA, V, W, A

Frequency response		Specification	95th percentile (≈ 2σ)
(10 dB input attenuation, 20 to 30 °C, preselector centering applied, σ = nominal standard deviation)			
	20 Hz to 10 MHz	± 0.6 dB	± 0.28 dB
	10 MHz [1] to 3.6 GHz	± 0.45 dB	± 0.17 dB
	3.5 to 8.4 GHz	± 1.5 dB	± 0.48 dB
	8.3 to 13.6 GHz	± 2.0 dB	± 0.47 dB
	13.5 to 22.0 GHz	± 2.0 dB	± 0.52 dB
	22.0 to 26.5 GHz	± 2.5 dB	± 0.71 dB
Preamp on (0 dB attenuation) [2]	100 kHz to 3.6 GHz	± 0.75 dB	± 0.28 dB
	3.5 to 8.4 GHz	± 2.0 dB	± 0.67 dB
	8.3 to 13.6 GHz	± 2.3 dB	± 0.73 dB
	13.5 to 17.1 GHz	± 2.5 dB	± 0.97 dB
	17.0 to 22.0 GHz	± 2.5 dB	± 1.36 dB
	22.0 to 26.5 GHz	± 3.5 dB	± 1.48 dB

Input attenuation switching uncertainty		Specifications	Additional information
Attenuation > 2 dB, preamp off	50 MHz (reference frequency)	± 0.20 dB	± 0.08 dB typical
Relative to 10 dB	20 Hz to 3.6 GHz		± 0.3 dB nominal
(reference setting)	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

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 ≥ MY/SG/US5051. For older instruments, refer to the MXA Specification Guide.*

Total absolute amplitude accuracy		Specifications
(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	± (0.33 dB + frequency response)
	20 Hz to 3.6 GHz	± 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	100 kHz to 3.6 GHz
	Option P08	100 kHz to 8.4 GHz
	Option P13	100 kHz to 13.6 GHz
	Option P26	100 kHz to 26.5 GHz
Gain	100 kHz to 3.6 GHz	+20 dB nominal
	3.6 to 26.5 GHz	+35 dB nominal
Noise figure	100 kHz to 3.6 GHz	11 dB nominal
	3.6 to 8.4 GHz	9 dB nominal
	8.4 to 13.6 GHz	10 dB nominal
	13.6 to 26.5 GHz	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

DANL with Noise Floor Extension (Option NFE) on	Improvement @ 95th percentile	
Frequency band	Preamp Off	Preamp On
Band 0, f > 20 MHz	9 dB	10 dB
Band 1	8 dB	9 dB
Band 2	10 dB	10 dB
Band 3	9 dB	10 dB
Band 4	9 dB	9 dB

Example of effective DANL @ 20 to 30 °C		
Frequency	Preamp Off	Preamp On
Mid-Band 0 (1.8 GHz)	–159 dBm	–170 dBm
Mid-Band 1 (5.9 GHz)	–157 dBm	–169 dBm
Mid-Band 2 (10.95 GHz)	–157 dBm	–168 dBm
Mid-Band 3 (15.3 GHz)	–151 dBm	–165 dBm
Mid-Band 4 (21.75 GHz)	–146 dBm	–159 dBm

Spurious responses		
Residual responses (Input terminated and 0 dB attenuation)	200 kHz to 8.4 GHz (swept) Zero span or FFT or other frequencies	–100 dBm –100 dBm nominal
Image responses	10 MHz to 3.6 GHz 3.6 to 13.6 GHz 13.6 to 17.1 GHz 17.1 to 22 GHz 22 to 26.5 GHz	–80 dBc (–107 dBc typical) –78 dBc (–88 dBc typical) –74 dBc (–85 dBc typical) –70 dBc (–82 dBc typical) –68 dBc (–78 dBc typical)
LO related spurious (f > 600 MHz from carrier)	10 MHz to 3.6 GHz	–90 dBc + 20xlogN [1] typical
Other spurious f ≥ 10 MHz from carrier	–80 dBc + 20xlogN [1]	

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

1. N is the LO multiplication factor.

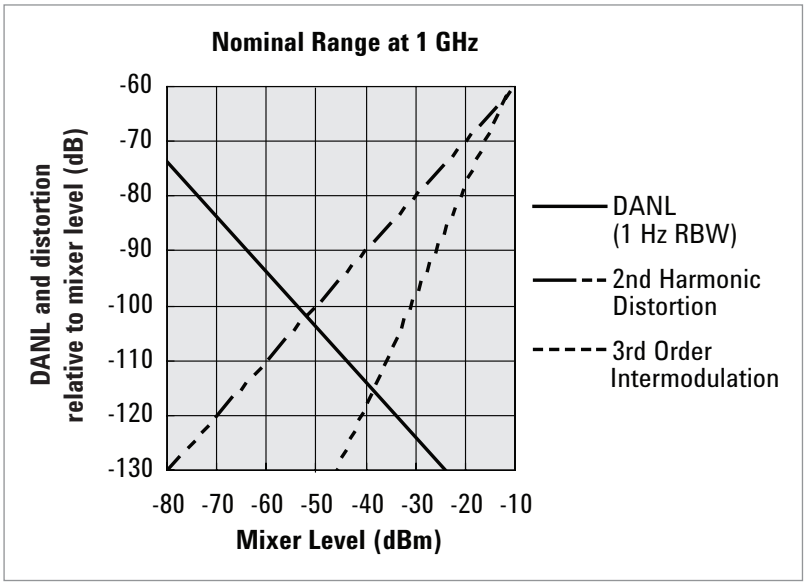

Figure 1. Nominal dynamic range – Band 0, for second and third order distortion, 20 Hz to 3.6 GHz

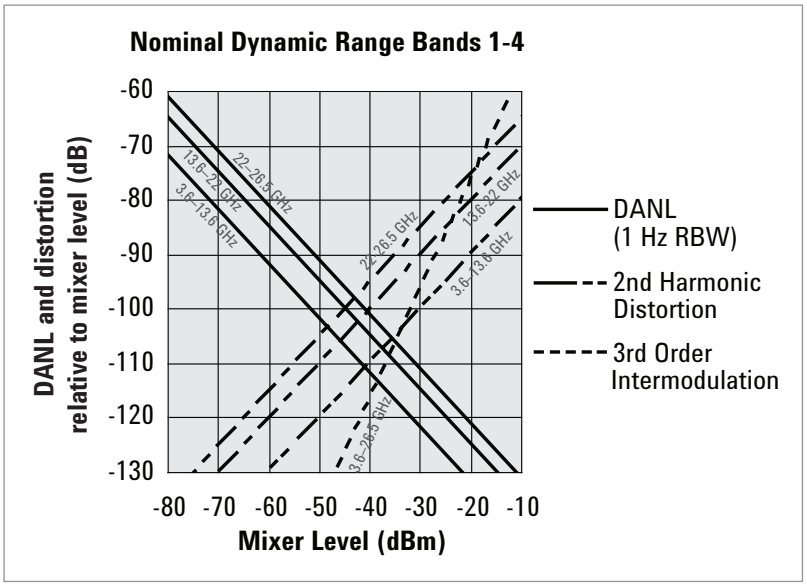

Figure 2. Nominal dynamic range – Bands 1 to 4, for second and third order distortion, 3.6 GHz to 26.5 GHz

Phase noise [1]	Offset	Specification	Typical
Noise sidebands	10 Hz		–80 dBc/Hz nominal
(20 to 30 °C, CF = 1 GHz)	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 ≥ 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.

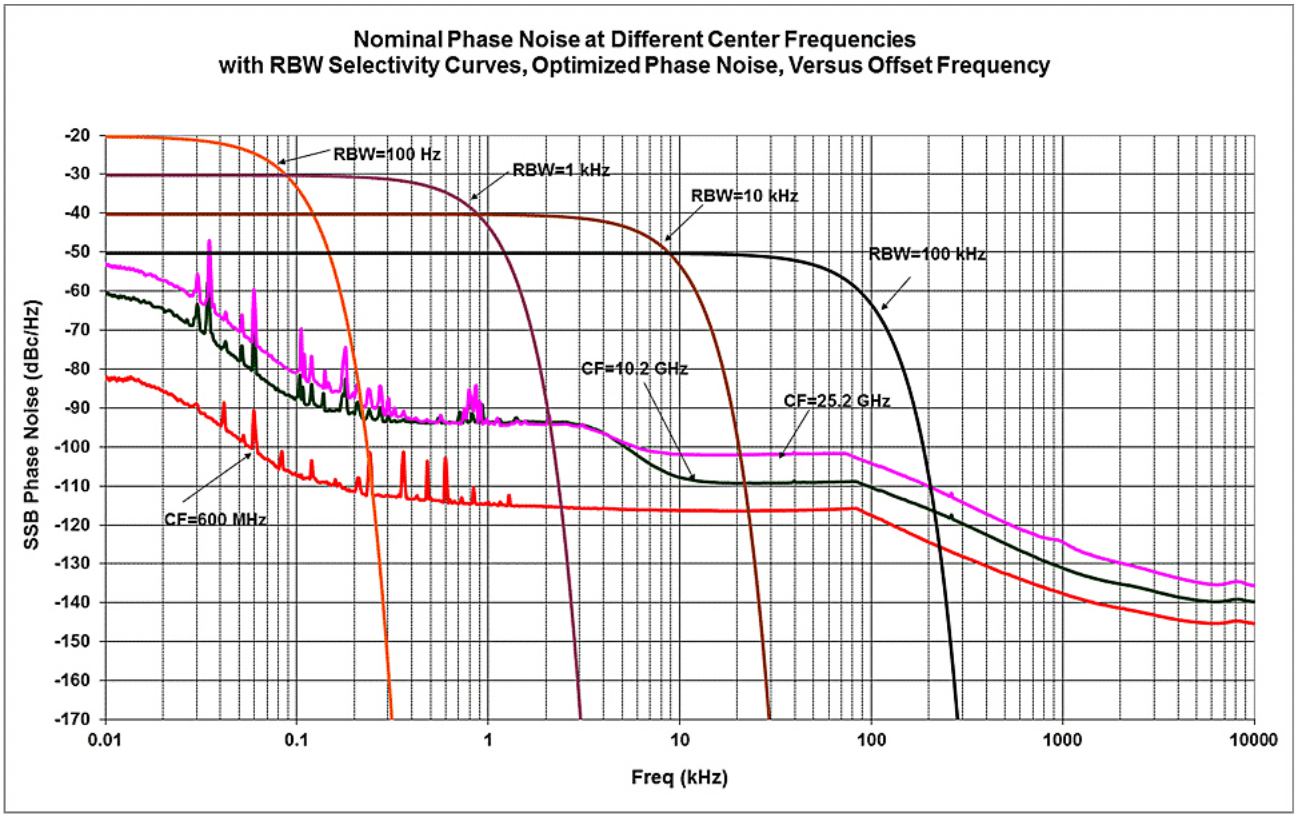

Figure 3. Nominal phase noise at different center frequencies (Applies for instruments with SN prefix ≥ MY/SG/US5233; ships standard with N9020A-EP2)

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	Adjacent	Alternate
Accuracy, W-CDMA (ACLR) (at specific mixer levels and ACLR ranges)		
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 (σ = 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 Keysight 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
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 Keysight service centers

Inputs and Outputs

Front panel	
RF input	
Connector	Type-N female, 50 Ω nominal
External Mixing (Option EXM)	
Connection port	
Connector	SMA, female
Impedance	50 Ω nominal
Functions	Triplexed for LO output, IF input, and mixer bias
Mixer bias range	± 10 mA in 10 µA step
IF input center frequency	
Narrowband IF path	322.5 MHz
40 MHz BW IF path	250.0 MHz
85, 125, or 160 MHz BW IF path	300 MHz
LO output frequency range	3.75 to 14.0 GHz
Analog baseband IQ inputs (Option BBA) [1]	
Connectors (I, Q, I-Bar, Q-Bar, and Cal Out)	BNC female
Cal Out	
Signal	AC coupled square wave
Frequency	Selectable between 1 kHz and 250 kHz
Input impedance (4 connectors: I, Q, I-, Q-)	50 Ω, 1 MΩ (selectable, nominal)
Probes supported [2]	
Active probe	1130A, 1131A, 1132A, 1134A
Passive probe	1161A
Input return loss	
50 Ω impedance only selected	–35 dB (0 to 10 MHz, nominal) –30 dB (10 to 40 MHz. nominal)
Probe power	
Voltage/current	+15 Vdc, ±7 % at 150 mA max nominal –12.6 Vdc, ±10 % at 150 mA max nominal
USB 2.0 ports	
Master (2 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal

Rear panel	
10 MHz out	
Connector	BNC female, 50 Ω nominal
Output amplitude	≥ 0 dBm nominal
Frequency	10 MHz ± (10 MHz x frequency reference accuracy)
Ext Ref In	
Connector	BNC female, 50 Ω nominal
Input amplitude range	–5 to 10 dBm nominal
Input frequency	1 to 50 MHz nominal
Frequency lock range	± 5 x 10^{-6} of specified external reference input frequency
Trigger 1 and 2 inputs	
Connector	BNC female
Impedance	> 10 kΩ nominal
Trigger level range	–5 to 5 V

1. *For additional specifications, please refer to the MXA specifications guide.*
2. *For more details, please refer to the Keysight 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	
Trigger 1 and 2 outputs	
Connector	BNC female
Impedance	50 Ω nominal
Level	5 V TTL nominal
Monitor output	
Connector	VGA compatible, 15-pin mini D-SUB
Format	XGA (60 Hz vertical sync rates, non-interlaced) Analog RGB
Resolution	1024 x 768
Noise source drive +28 V (pulsed)	
Connector	BNC female
SNS Series noise source	
Analog out	
Connector	BNC female (used with N9063A analog demod app and Option YAS)
USB 2.0 ports	
Master (4 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal
Slave (1 port)	
Standard	Compatible with USB 2.0
Connector	USB Type-B female
Output current	0.5 A nominal
GPIB interface	
Connector	IEEE-488 bus connector
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
GPIB mode	Controller or device
LAN TCP/IP interface	
Standard	1000Base-T
Connector	RJ45 Ethertwist
IF output	
Connector	SMA female, shared by Option CR3 and CRP
Impedance	50 Ω nominal

Wideband IF output, Option CR3	
Center frequency	
SA mode or I/Q analyzer with IF BW ≤ 25 MHz	322.5 MHz
with Option B40	250 MHz
with Option B85, B1A, or B1X	300 MHz
Conversion gain	–1 to +4 dB (nominal) plus RF frequency response
Bandwidth	
Low band	Up to 140 MHz (nominal)
High band, with preselector	Depends on center frequency
High band, with preselector bypassed [1]	Up to 410 MHz

Programmable IF output, Option CRP	
Center frequency	
Range	10 to 75 MHz (user selectable)
Resolution	0.5 MHz
Conversion gain	–1 to +4 dB (nominal) plus RF frequency response
Bandwidth	
Output at 70 MHz	100 MHz (nominal)
Low band or high band with preselector bypassed [1]	Depends on RF center frequency
Preselected band	
Lower output frequencies	Subject to folding
Residual output signals	≤ –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 [1]	± 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 [1]	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 [1]	± 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 [1]	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	**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 ≤ f < 3.6	≤ 40	n/a	± 0.45 dB	± 0.08 dB
3.6 ≤ f ≤ 8.4	≤ 40	off [1]	± 0.35 dB	± 0.08 dB
8.4 < f ≤ 26.5	≤ 40	off [1]	± 0.46 dB	± 0.08 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	40	n/a	0.2 °	0.05 °
3.6 ≤ f ≤ 26.5	40	off [1]	5 °	1.4 °

Dynamic range (40 MHz IF path)	
SFDR (Spurious-free dynamic range)	
Signal frequency within ± 12 MHz of center	–77 dBc nominal
Signal frequency anywhere within analysis BW	
Spurious response within ± 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	**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 [1]	± 0.73 dB	± 0.2 dB	0.06 dB
	≤ 140	Off [1]	± 0.8 dB	± 0.35 dB	0.06 dB
	≤ 160	Off [1]		± 0.3 dB (nom)	0.07 dB
> 8.4, ≤ 26.5	≤ 85	Off [1]	± 1.10 dB	± 0.50 dB	0.2 dB
	≤ 140	Off [1]	± 1.40 dB	± 0.76 dB	0.2 dB
	≤ 160	Off [1]		± 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 [1]		4.2°	0.93°
	≤ 160	Off [1]		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	
SFDR (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	Data packing		
	32-bit	64-bit	
Length (IQ sample pairs)	536 MSa (2^{29} Sa)	268 MSa (2^{28} Sa)	2 GB total memory
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) [1]

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 [2] 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

Keysight MXA signal analyzers

Publication title	Publication type	Publication number
MXA X-Series Signal Analyzer N9020A	Brochure	5989-5047EN
MXA X-Series Signal Analyzer N9020A	Configuration Guide	5989-4943EN

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