

PRELIMINARY

Agilent Technologies

N9010A EXA Signal Analyzer

Data Sheet

Frequency and Time Specifications

Frequency range	DC Coupled	AC Coupled
Option 503	9 kHz to 3.6 GHz	10 MHz to 3.6 GHz
Option 507	9 kHz to 7.0 GHz	10 MHz to 7.0 GHz
Option 513	9 kHz to 13.6 GHz	10 MHz to 13.6 GHz
Option 526	9 kHz to 26.5 GHz	10 MHz to 26.5 GHz

Band	LO Multiple (N)	
0	1	9 kHz to 3.6 GHz
1	1	3.5 to 7.0 GHz
2	2	6.9 to 13.6 GHz
3	2	13.5 to 17.1 GHz
4	4	17 to 26.5 GHz

Frequency reference		
Accuracy	\pm [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
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
Temperature stability 20 to 30 °C 5 to 50 °C	Option PFR $\pm 1.5 \times 10^{-8}$ $\pm 5 \times 10^{-8}$	Standard $\pm 2 \times 10^{-6}$ $\pm 2 \times 10^{-6}$
Achievable initial calibration accuracy	Option PFR $\pm 4 \times 10^{-8}$	Standard $\pm 1.4 \times 10^{-6}$
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	$= (0.25 \text{ Hz} \times N) \text{ p-p in 20 ms nominal}$ $= (10 \text{ Hz} \times N) \text{ p-p in 20 ms nominal}$ See band table above for N (LO Multiple)	

Frequency readout accuracy (start, stop, center, marker)
\pm (marker frequency x frequency reference accuracy + 0.25% x span + 5% x RBW + 2 Hz + 0.5 x horizontal resolution)

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

Marker frequency counter	
Accuracy	\pm (marker frequency x frequency reference accuracy + 0.100 Hz)
Delta counter accuracy	\pm (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	±(0.25% x span + horizontal resolution)	
FFT	±(0.10% x span + horizontal resolution)	

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 1 µs 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 20001
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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)
RBW range	820 kHz to 1.2 MHz (< 3.6 GHz CF)	±2.0% (±0.088 dB)
	1.3 to 2.0 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)	1 Hz to 1.3 MHz	±2% nominal
RBW range		
Selectivity (-60 dB/-3 dB)	4.1:1 nominal	

Analysis bandwidth²

Maximum bandwidth	10 MHz, Standard
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²

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.

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

Local measurement and display update rate	Sweep points = 1001	11 ms (90/s) nominal
Remote measurement and LAN transfer rate	Sweep points = 1001	4 ms (250/s) nominal
Marker peak search	5 ms nominal	
Center frequency tune and transfer (RF)	51 ms nominal	
Center frequency tune and transfer (µW)	86 ms nominal	

Measurement/mode switching	75 ms nominal
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Amplitude Accuracy and Range Specifications

Amplitude range

Measurement range	Displayed average noise level (DANL) to +23 dBm
Input attenuator range (9 kHz to 26.5 GHz) standard	0 to 60 dB in 10 dB steps
Option FSA	0 to 60 dB in 2 dB steps

Electronic attenuator (Option EA3)

Frequency range	9 kHz to 3.6 GHz
Attenuation range	
Electronic attenuator range	0 to 24 dB, 1 dB steps
Full attenuation range (mechanical + electronic)	0 to 84 dB, 1 dB steps

Maximum safe input level

Average total power	+30 dBm (1 W)
Preamp (Option P03)	+25 dBm
Peak pulse power	<10 μ s pulse width, <1% duty cycle +50 dBm (100 W) and input attenuation =30 dB
DC volts	
DC coupled	\pm 0.2 Vdc
AC coupled	\pm 70 Vdc

Display range

Log scale	1 to 1 dB/division in 0.1 dB steps 0.1 to 20 dB/division in 1 dB steps (10 display divisions)
Linear scale	10 divisions
Scale units	dBm, dBmV, dB μ V, dBmA, dB μ A, V, W, A

Frequency response (10 dB input attenuation, 20 to 30 °C, preselector centering applied, s = nominal standard deviation)

	Specification	95th Percentile (\sim 2 s)
9 kHz to 10 MHz	\pm 0.8 dB	\pm 0.28 dB
10 MHz to 3.6 GHz	\pm 0.5 dB	\pm 0.17 dB
3.5 to 7.0 GHz	\pm 2.0 dB	
6.9 to 13.6 GHz	\pm 2.5 dB	
13.5 to 22.0 GHz	\pm 3.0 dB	
22.0 to 26.5 GHz	\pm 3.2 dB	
Preamp on (Option P03) attenuation 0 dB	100 kHz to 3.6 GHz	\pm 0.75 dB
		\pm 0.28 dB

Input attenuation switching uncertainty

50 MHz (reference frequency)		
attenuation > 0 dB	\pm 0.20 dB	\pm 0.08 dB typical
attenuation = 0 dB	\pm 0.25 dB	\pm 0.1 dB typical
9 kHz to 3.6 GHz		\pm 0.3 dB nominal
3.5 to 7.0 GHz		\pm 0.5 dB nominal
6.9 to 13.6 GHz		\pm 0.7 dB nominal
13.5 to 26.5 GHz		\pm 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, s = nominal standard deviation)

At 50 MHz	\pm 0.40 dB
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	At all frequencies	$\pm(0.40 \text{ dB} + \text{frequency response})$
	9 kHz to 3.6 GHz	$\pm 0.40 \text{ dB}$ (95th Percentile ~ 2 s)
Preamp on (Option P03)	100 kHz to 3.6 GHz	$\pm (0.39 \text{ dB} + \text{frequency response})$

Input voltage standing wave ratio (VSWR) (=10 dB input attenuation)

	10 MHz to 3.6 GHz	< 1.2:1 nominal
	3.6 to 7.0 GHz	< 1.5:1 nominal
	7.0 to 13.6 GHz	< 1.6:1 nominal
	13.6 to 26.5 GHz	< 1.9:1 nominal
Preamp on (Option P03) (0 dB attenuation)	10 MHz to 3.6 GHz	< 1.7:1 nominal

Resolution bandwidth switching uncertainty (referenced to 30 kHz RBW)

1 Hz to 1.5 MHz RBW	$\pm 0.07 \text{ dB}$
1.6 MHz to 3 MHz RBW	$\pm 0.10 \text{ dB}$
4, 5, 6, 8 MHz RBW	$\pm 1.0 \text{ dB}$

Reference level

Range	
Log scale	-170 to +23 dBm in 0.01 dB steps
Linear scale	Same as Log (707 pV to 3.16 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	$\pm 0.15 \text{ dB total}$
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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
Gain	100 kHz to 3.6 GHz	+20 dB nominal
Noise figure	100 kHz to 3.6 GHz	11 dB nominal

Dynamic Range Specifications

1 dB gain compression (two-tone)

		Total power at input mixer
20 to 500 MHz		0 dBm nominal
500 MHz to 3.6 GHz		+3 dBm nominal

	3.6 to 26.5 GHz	0 dBm nominal	
Preamp on (Option P03)	10 MHz to 3.6 GHz		-10 dBm nominal

Displayed average noise level (DANL)

(Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 20 to 30 °C)

		Specification	Typical
Preamp off	1 to 10 MHz	-145 dBm	-149 dBm
	10 MHz to 2.1 GHz	-146 dBm	-150 dBm
	2.1 to 3.6 GHz	-144 dBm	-148 dBm
	3.6 to 7.0 GHz	-144 dBm	-149 dBm
	7.0 to 13.6 GHz	-143 dBm	-147 dBm
	13.6 to 17.1 GHz	-137 dBm	-143 dBm
	17.1 to 20.0 GHz	-137 dBm	-142 dBm
Preamp on (Option P03)	10 MHz to 2.1 GHz	-160 dBm	-162 dBm
	2.1 to 3.6 GHz	-159 dBm	-160 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 typical
Other spurious		
First RF Order		
f = 10 MHz from carrier	-70 dBc	
Higher RF Order		
f = 10 MHz from carrier	-80 dBc	

Second harmonic distortion (SHI)

	Mixer level	SHI (Nominal)
10 MHz to 1.8 GHz	-15 dBm	+45 dBm
1.8 to 7.0 GHz	-15 dBm	+65 dBm
7.0 to 11.0 GHz	-15 dBm	+55 dBm
11.0 to 13.25 GHz	-15 dBm	+50 dBm

Third-order intermodulation distortion (TOI) (two -30 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 degC, see Specifications Guide for IF prefilter bandwidths)

	Distortion	TOI	Typical
100 to 400 MHz	-82 dBc	+11 dBm	+15 dBm
400 MHz to 1.7 GHz	-94 dBc	+12 dBm	+16 dBm
1.7 to 3.6 GHz	-86 dBc	+13 dBm	+16 dBm
3.6 to 7.0 GHz	-84 dBc	+12 dBm	+15 dBm
7.0 to 13.6 GHz	-84 dBc	+12 dBm	+15 dBm
13.6 to 26.5 GHz	-78 dBc	+9 dBm	+14 dBm
Preamp on (Option P03)	10 to 500 MHz	+4 dBm nominal	
(two -45 dBm tones at preamp input)	500 MHz to 3.6 GHz	+5 dBm nominal	

Phase noise³

Noise sidebands (20 to 30 °C, CF = 1 GHz)	Offset	Specification	Typical
	100 Hz	-84 dBc/Hz	-88 dBc/Hz
	1 kHz		-97 dBc/Hz nominal
	10 kHz	-99 dBc/Hz	-103 dBc/Hz
	100 kHz	-111 dBc/Hz	-114 dBc/Hz
	1 MHz	-130 dBc/Hz	-134 dBc/Hz
	10 MHz		-143 dBc/Hz nominal

³ For nominal values, refer to Figure 3.

Power Suite Measurement Specifications

Channel power

Amplitude accuracy, W-CDMA or IS95 (20 to 30 °C, attenuation = 10 dB)	±0.94 dB (±0.40 dB 95th percentile)
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Occupied bandwidth

Frequency accuracy	± [span/1000] nominal
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Adjacent channel power

Accuracy, W-CDMA (ACLR) (at specific mixer levels and ACLR ranges)	Adjacent	Alternate
MS	±0.22 dB	±0.34 dB
BTS	±1.07 dB	±1.00 dB
Dynamic range (typical)		
Without noise correction	-68 dB	-74 dB
With noise correction	-73 dB	-76 dB
Offset channel pairs measured	1 to 6	
ACP speed (fast method). Data measurement and transfer time	14 ms nominal (s = 0.2 dB)	
Multiple number of carriers measured	Up to 12	

Power statistics CCDF

Histogram resolution	0.01 dB
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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	91.9 dB (97.1 dB typical)
Absolute sensitivity	-79.4 dBm (-85.4 dBm typical)

Spectrum emission mask (SEM)

cdma2000 [®] (750 kHz offset)	
Relative dynamic range (30 kHz RBW)	74.0 dB (81.0 dB typical)
Absolute sensitivity	-94.7 dBm (-100.7 dBm typical)
Relative accuracy	±0.11 dB
3GPP W-CDMA (2.515 MHz offset)	
Relative dynamic range (30 kHz RBW)	76.5 dB (83.9 dB typical)
Absolute sensitivity	-94.7 dBm (-100.7 dBm typical)
Relative accuracy	±0.12 dB

General Specifications

Temperature range

Operating	5 to +50 °C
Storage	-40 to +65 °C

EMC

Complies with European EMC Directive 89/336/EEC, amended by 93/68/EEC

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

Safety

Complies with European Low Voltage Directive 73/23/EEC, amended by 93/68/EEC

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1
- USA: UL 61010-1

Audio noise

Acoustic noise emission	Geraeuschemission
LpA <70 dB	LpA <70 dB
Operator position	Am Arbeitsplatz
Normal position	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

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 MIL-PRF-28800F Class 3.

Power requirements

Voltage and frequency (nominal)	100/120 V, 50/60 Hz 220/240 V, 50/60 Hz
Power consumption	
On	< 260 watts
Standby	< 20 watts

Data storage

Internal	40 GB nominal
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 EXA signal analyzer is supplied with a one-year warranty.

Calibration cycle

The recommended calibration cycle is one year. Calibration services are available through Agilent service centers.

Input and Outputs

Front panel

RF input	
Connector	Type-N female, 50 Ω 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	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 \pm (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	10 MHz
Frequency lock range	$\pm 5 \times 10^{-6}$ of specified external reference input frequency
Trigger 1 and trigger 2 inputs	
Connector	BNC female
Impedance	>10 k Ω nominal
Trigger level range	-5 to +5 V
Trigger 1 and trigger 2 outputs	
Connector	BNC female
Impedance	50 Ω nominal
Level	5 V TTL nominal

Rear panel (continued)

Sync (reserved for future use)	
Connector	BNC female
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) (reserved for future use)	
Connector	BNC female
SNS series noise source (reserved for future use)	
Digital bus (reserved for future use)	
Connector	MDR-80
Analog out (reserved for future use)	
Connector	BNC female
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
GPIO interface	
Connector	IEEE-488 bus connector
GPIO codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
LAN TCP/IP interface	
Standard	100BaseT
Connector	RJ45 Ethertwist

EXA Signal Analyzer Ordering Information

Hardware

N9010A	EXA signal analyzer
N9010A-503	Frequency range, 9 kHz to 3.6 GHz
N9010A-507	Frequency range, 9 kHz to 7.0 GHz
N9010A-513	Frequency range, 9 kHz to 13.6 GHz
N9010A-526	Frequency range, 9 kHz to 26.5 GHz
N9010A –FSA	Fine step attenuator
N9010A-PFR	Precision frequency reference
N9010A-EA3	Electronic attenuator, 3.6 GHz
N9010A-P03	Preamplifier, 3.6 GHz

Applications

N9068A	Phase noise measurement application
N9071A	GSM/EDGE measurement application
N9073A-1FP	W-CDMA measurement application
N9073A-2FP	HSDPA/HSUPA measurement application
N9075A	802.16 OFDMA measurement application
89601A	Vector signal analysis software

Accessories

N9010A-CPU	Instrument security, additional CPU/HDD
N9010A-MSE	Mouse
N9010A-KYB	Keyboard
N9010A-EFM	USB flash drive, 512 MB
N9010A-DVR	USB DVD-ROM/CD-R/RW drive
N9010A-CPU	Instrument security, additional CPU/HDD
N9010A-MLP	Minimum loss pad, 50 to 75 ?
N9010A-PRC	Portable configuration
N9010AK-CVR	Front panel cover
N9010A-1CP	Rack mount and handle kit
N9010A-1CM	Rack mount kit
N9010A-1CN	Front handle kit
N9010A-1CR	Rack slide kit
N9010A-HTC	Hard transit case

Warranty and service

Standard warranty is one year.

R-51B-001-3C	1 year return-to-Agilent warranty extended to 3 years
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Calibration⁴

R-50C-011-3	Inclusive calibration plan, 3 year coverage
R-50C-013-3	Inclusive calibration plan and cal data, 3 year coverage

⁴ Options not available in all countries