Agilent
N8201A Performance Downconverter Synthetic Instrument Module 3 Hz to 26.5 GHz

Data Sheet

The Agilent Technologies N8201A performance downconverter synthetic instrument module down converts a microwave signal to an IF signal providing IF output frequencies of 7.5, 21.4, and 321.4 MHz to offer three different signal bandwidth capabilities. External mixing can be utilized to downconvert microwave signals up to 110 GHz. The N8201A is based upon the industry's most accurate spectrum analyzer, the PSA Series spectrum analyzer.

Agilent's synthetic instrument family offers the highest-performing RF/MW LAN-based modular instrumentation and the smallest footprint for automated test systems (ATSs); providing the maximum flexibility and minimizing the cost of an ATS over its lifetime.

- LXI Class-A compliant
- Microwave performance similar to the E4440A PSA Series high-performance spectrum analyzer
- Coherent LO input/output port allowing a common LO signal to drive multiple downconverters
- 200 MHz wide modulation bandwidth with pre-selector off

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Definitions and Conditions

Specifications (spec): Specifications describe the performance of parameters covered by the product warranty and apply over 0 to 55 °C temperature range unless otherwise noted.

Typical (typ): 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 of 20 to 30 °C. Typical performance does not include measurement uncertainty.

Nominal (nom): Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty. Nominal values represent the value of a parameter that is most likely to occur; they represent the expected mean or average.

The N8201A performance downconverter will meet its specifications when:

- Stored a minimum of two hours within the operating temperature range and turned on for at least 30 minutes with Auto Align On selected.
- The instrument is within its one-year calibration cycle.
- Align All Now has been performed within the past 24 hours or when the temperature changes 3 °C.
- Front panel 1st LO OUT connector terminated in 50 Ω.
- DC coupling applied if RF frequency is < 20 MHz.
- Front panel 1st and 2nd LO jumpers must be installed.

Frequency

Frequency range[1]

DC coupled	3 Hz to 26.5 GHz
AC coupled	20 MHz to 26.5 GHz

Internal mixing bands preamp off

Internal mixing band	Specification	Harmonic mixing mode (N)[2]
0	3 Hz to 3.045 GHz (DC coupled)	1–
0	20 MHz to 3.045 GHz (AC coupled)	1–
1	3.045 to 6.6 GHz	1–
2	6.6 to 13.2 GHz	2–
3	13.2 to 19.2 GHz	4–
4	19.2 to 26.5 GHz	4–

Internal mixing bands preamp on (Option 1DS)

Internal mixing band	Specification	Harmonic mixing mode (N)[2]
0	100 kHz to 3.045 GHz (DC coupled)	1–
0	20 MHz to 3.045 GHz (AC coupled)	1–

Internal mixing bands preamp on (Option 110)

Internal mixing band	Specification	Harmonic mixing mode (N)[2]
0	10 MHz to 3.045 GHz (DC coupled)	1–
0	20 MHz to 3.045 GHz (AC coupled)	1–
1	3.045 to 6.6 GHz	1–
2	6.6 to 13.2 GHz	2–
3	13.2 to 19.2 GHz	4–
4	19.2 to 26.5 GHz	4–

Internal mixing bands preselector bypassed (Option 123)

Internal mixing band	Specification	Harmonic mixing mode (N)[2]
1	3.055 to 6.6 GHz	1–
2	6.6 to 13.2 GHz	2–
3	13.2 to 19.2 GHz	4–
4	19.2 to 26.5 GHz	4–

Frequency range for external mixing (Option AYZ)

Band	Harmonic mixing mode (N)[1]	
	Preselected	Preselector bypassed
K (18.0 to 26.5 GHz)	N/A	6–
A (26.5 to 40.0 GHz)	8+	8–
Q (33.0 to 50.0 GHz)	10+	10–
U (40.0 to 60.0 GHz)	10+	10–
V (50.0 to 75.0 GHz)	14+	14–
E (60.0 to 90.0 GHz)	N/A	16–
W (75.0 to 110.0 GHz)	N/A	18–
F (90.0 to 140.0 GHz)	N/A	22–
D (110.0 to 170.0 GHz)	N/A	26–
G (140.0 to 220.0 GHz)	N/A	32–
Y (170.0 to 260.0 GHz)	N/A	38–
J (220.0 to 325.0 GHz)	N/A	48–

1. Up to 325 GHz down conversion capability with external mixers.
2. N is the harmonic mixing mode. All mixing modes are negative (as indicated by the '–'), where the desired first LO harmonic is higher than the tuned frequency by the first IF (3.9214 GHz for the 3 Hz to 3.0 GHz band, 321.4 MHz for all other bands).

Frequency reference (internal)

Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy[1]]	
Temperature stability	20 to 30 °C 0 to 55 °C	$\pm 1 \times 10^{-8}$ $\pm 5 \times 10^{-8}$
Aging rate	$\pm 1 \times 10^{-7}$/year[2] $\pm 5 \times 10^{-10}$/day (nominal)	
Settability	$\pm 2 \times 10^{-9}$	
Warm-up and retrace[3]	300 s after turn on 900 s after turn on	$\pm 1 \times 10^{-7}$ of final frequency (nominal) $\pm 5 \times 10^{-8}$ of final frequency (nominal)
Achievable initial calibration accuracy[4]	$\pm 7 \times 10^{-8}$	

Frequency accuracy

±(Input RF frequency x frequency reference accuracy)

IF output bandwidth (nominal)

IF output	3 dB bandwidth	Center frequency
7.5 MHz	9.25 MHz	7.5 MHz
21.4 MHz	11 MHz	21.4 MHz
321.4 MHz		
50 MHz to 3.045 GHz	100 MHz[5]	300 MHz
3.045 to 26.5 GHz	40 to 80 MHz[6]	321.4 MHz
Preselector bypassed (Option 123)		
3.055 to 26.5 GHz	240 MHz	321.4 MHz
External mixing	240 MHz	321.4 MHz

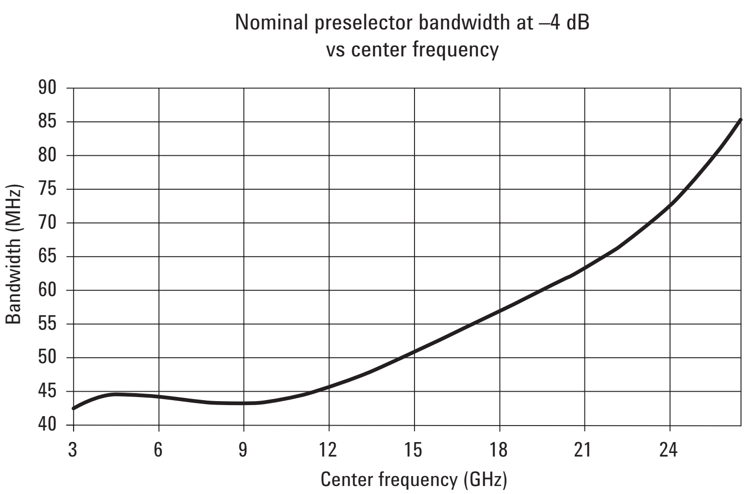


Figure 1. Nominal preselector bandwidth at –4 dB vs center frequency

1. Calibration accuracy depends on how accurately the frequency standard was adjusted to 10 MHz. If the calibration procedure is followed, the calibration accuracy is given by the specification "Achievable initial calibration accuracy."
2. For periods of one year or more.
3. Applies only when power is disconnected from instrument. Does not apply when instrument is in standby mode.
4. The achievable calibration accuracy at the beginning of the calibration cycle includes these effects:
   a) The temperature difference between the calibration environment and the use environment
   b) The orientation relative to the gravitation field changing between the calibration environment and the use environment
   c) Retrace effects in both the calibration environment and the use environment due to unplugging the instrument
   d) Settability
5. The IF bandwidth is 60 MHz if used at a center frequency of 321.4 MHz.
6. See figure above for nominal 4 dB IF bandwidth of preselector.

Stability phase noise (center frequency = 1 GHz[1], best case optimization[2])

Offset	20 to 30 °C	0 to 55 °C	Typical	Nominal
100 Hz	–91 dBc/Hz	–90 dBc/Hz	–96 dBc/Hz	
1 kHz	–103 dBc/Hz	–100 dBc/Hz	–108 dBc/Hz	
10 kHz	–116 dBc/Hz	–115 dBc/Hz	–118 dBc/Hz	
30 kHz	–116 dBc/Hz	–115 dBc/Hz	–118 dBc/Hz	
100 kHz	–122 dBc/Hz	–121 dBc/Hz	–124 dBc/Hz	
1 MHz	–145 dBc/Hz	–144 dBc/Hz	–147 dBc/Hz	–148 dBc/Hz
6 MHz	–154 dBc/Hz	–154 dBc/Hz	–156 dBc/Hz	–156.5 dBc/Hz
10 MHz	–156 dBc/Hz	–156 dBc/Hz	–157.5 dBc/Hz	–158 dBc/Hz

Nominal phase noise of different LO optimizations

Trace A: Optimize £(f) for f < 50 kHz; Dual loop wideband
Trace B: Optimize £(f) for f > 50 kHz; Dual loop narrowband
Trace C: Optimize LO for fast tuning; Single loop wideband

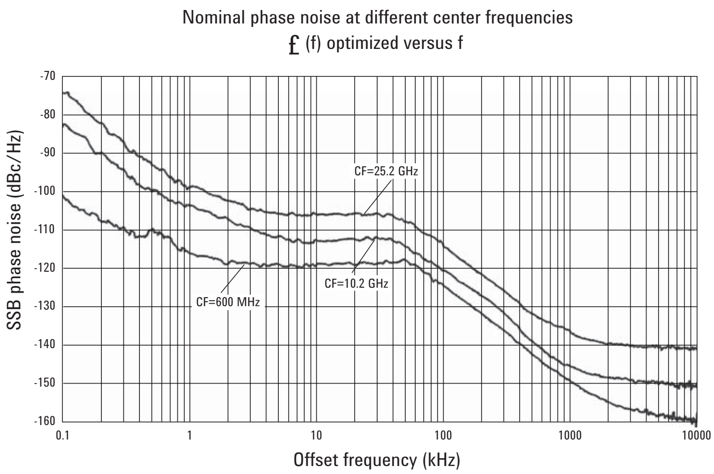


Figure 2. Nominal phase noise at diffferent center frequencies

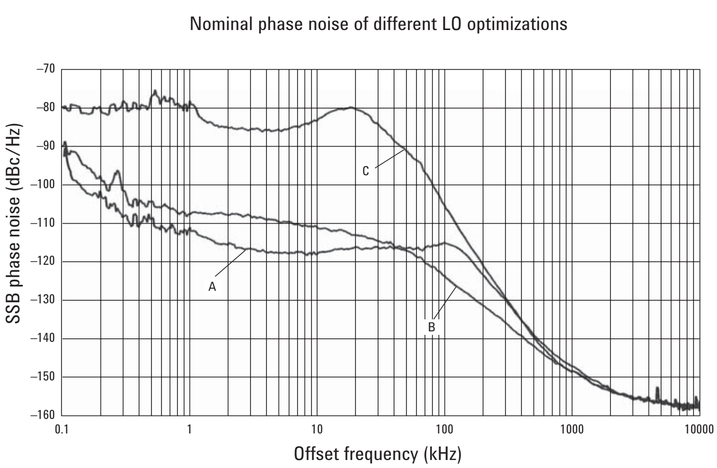


Figure 3. Nominal phase noise at diffferent LO center frequencies

1. Nominal changes of phase noise sidebands with other center frequencies are shown by some examples in the graphs that follow. To predict the phase noise for other center frequencies, note that phase noise at offsets above approximately 1 kHz increases nominally as 20 x log N, where N is the harmonic mixer mode. For offsets below 1 kHz, and center frequencies above 1 GHz, the phase noise increases nominally as 20 log CF, where CF is the center frequency in GHz.
2. Noise sidebands for offsets of 30 kHz and below are shown for phase noise optimization set to optimize £(f) for f < 50 kHz; for offsets of 100 kHz and above, the optimization is set for f > 50 kHz.

Amplitude

Maximum safe input level

Preamp off	+30 dBm (1W)
Preamp on (Option 1DS)	+30 dBm (1W)
Preamp on (Option 110)	+25 dBm (1W)
Microwave preselector bypass (Option 123)	+10 dBm (1W)[1]
Peak pulse power < 10 μs pulse width, < 1% duty cycle and input attenuation ≥ 30 dB	+50 dBm (100 W)
DC volts: DC coupled < ±0.2 Vdc AC coupled ±100 Vdc	

Input attenuator range

0 to 70 dB in 2 dB steps

Input attenuation switching uncertainty (nominal)

Frequency	0 to 40 dB attenuation range	0 to 70 dB attenuation range
DC to 6.5 GHz	±0.3 dB	±0.4 dB
6.5 to 13 GHz	±0.4 dB	±0.5 dB
13 to 19 GHz	±0.6 dB	±0.7 dB
19 to 26.5 GHz	±0.7 dB	±0.9 dB

1. Adding 20 dB of input attenuation will increase the maximum input power to +30 dBm.

Gain compression[1]

1 dB gain compression point (two-tone)[2]

RF input frequency	Maximum power at mixer[3]	Nominal power at mixer
Preamp off		
20 to 200 MHz	0 dBm	+3 dBm
200 MHz to 3.0 GHz	+3 dBm	+7 dBm
3.0 to 6.6 GHz	+3 dBm	+4 dBm
6.6 to 26.5 GHz	–2 dBm	0 dBm
Preselector bypassed (Option 123)		
3.045 to 26.5 GHz		+8 dBm
Preamp on (Option 1DS)		Nominal power at preamp
10 to 200 MHz		–30 dBm
200 MHz to 3 GHz		–25 dBm
Preamp on (Option 110)		
10 to 200 MHz		–24 dBm
200 MHz to 3 GHz		–20 dBm
3.0 to 6.6 GHz		–23 dBm
6.6 to 26.5 GHz		–27 dBm

Gain compression (two-tone) (typical)[2]

RF input frequency	Mixer level[3]	Compression
20 to 200 MHz	0 dBm	< 0.5 dB
200 MHz to 6.6 GHz	+3 dBm	< 0.5 dB
6.6 to 26.5 GHz	–2 dBm	< 0.4 dB

Noise figure

(Input terminated, 0 dB input attenuation)

Frequency	Noise figure	Noise figure (typical)	Input referred noise density[4] (typical)
Preamp off (Option 110 not installed)			
10 to 100 kHz	38 dB	34 dB	–139 (dBm/Hz)
100 kHz to 1 MHz	30 dB	26 dB	–147 (dBm/Hz)
1 to 10 MHz	25 dB	22 dB	–151 (dBm/Hz)
10 MHz to 1.2 GHz	22 dB	20 dB	–153 (dBm/Hz)
1.2 to 2.1 GHz	23 dB	21 dB	–152 (dBm/Hz)
2.1 to 6.6 GHz	24 dB	22 dB	–151 (dBm/Hz)
6.6 to 13.2 GHz	26 dB	21 dB	–152 (dBm/Hz)
13.2 to 20 GHz	29 dB	26 dB	–147 (dBm/Hz)
20 to 26.5 GHz	33 dB	30 dB	–143 (dBm/Hz)

1. Gain compression is described by a level/compression pair where for every mixer level there is a different amount of compression. The first table labeled "1 dB compression point" indicates the signal level where you will see 1 dB of compression, where as the second table indicates the amount of compression to expect at a given signal level.
2. Large signals, even at frequencies not within the IF bandwidth, can cause in-band signals to be compressed because of two-tone gain compression. This specification tells how large an interfering signal must be in order to cause a 1 dB change in an in-band signal.
3. Mixer power level (dBm) = input power (dBm) – input attenuation (dB).
4. Input referred noise density (dBm/Hz) = thermal noise at +55 °C (dBm) + noise figure of the downconverter (dB). The noise measured at the IF output's of the downconverter will be higher due to the Conversion gain, the measurable noise density is not diminished due to this gain.

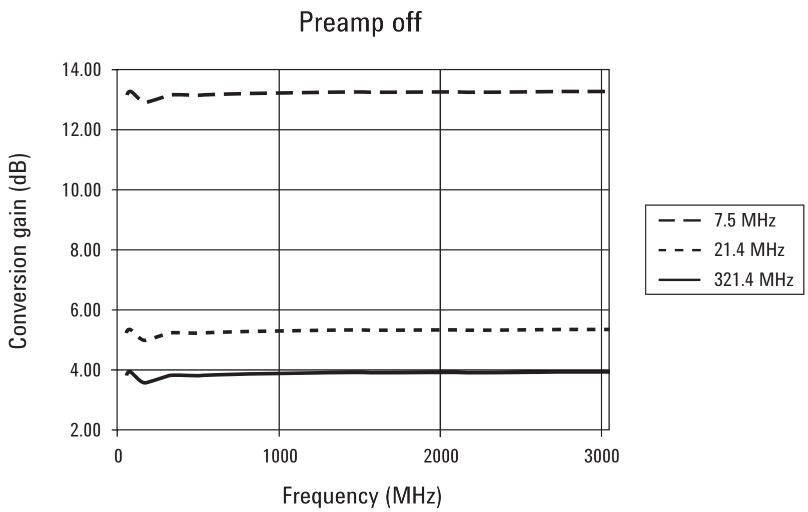
Noise figure (continued)

Frequency	Noise figure	Noise figure (typical)	Input referred noise density[1] (typical)
Preamp off (Option 110 installed)			
10 to 100 kHz	38 dB	34 dB	–139 (dBm/Hz)
100 kHz to 1 MHz	30 dB	26 dB	–147 (dBm/Hz)
1 to 10 MHz	25 dB	22 dB	–151 (dBm/Hz)
10 MHz to 1.2 GHz	23 dB	20 dB	–153 (dBm/Hz)
1.2 to 2.1 GHz	24 dB	21 dB	–152 (dBm/Hz)
2.1 to 6.6 GHz	25 dB	22 dB	–151 (dBm/Hz)
6.6 to 13.2 GHz	27 dB	25 dB	–146 (dBm/Hz)
13.2 to 16 GHz	30 dB	28 dB	–143 (dBm/Hz
16 to 19 GHz	30 dB	27 dB	–144 (dBm/Hz)
19 to 26.5 GHz	34 dB	31 dB	–140 (dBm/Hz)
Preamp on (Option 1DS)			
100 to 500 kHz	18 dB	13 dB	–160 (dBm/Hz)
500 kHz to 1 MHz	15 dB	10 dB	–163 (dBm/Hz)
1 to 10 MHz	12 dB	7 dB	–166 (dBm/Hz)
10 to 500 MHz	7 dB	5 dB	–168 (dBm/Hz)
500 MHz to 1.1 GHz	8 dB	6 dB	–167 (dBm/Hz)
1.1 to 2.1 GHz	9 dB	7 dB	–166 (dBm/Hz)
2.1 to 3.0 GHz	10 dB	9 dB	–164 (dBm/Hz)
Preamp on (Option 110)			
10 to 50 MHz	28 dB	21 dB	–152 (dBm/Hz)
50 to 500 MHz	23 dB	11 dB	–162 (dBm/Hz)
500 MHz to 3 GHz	10 dB	7 dB	–166 (dBm/Hz)
3 to 6.6 GHz	11 dB	9 dB	–164 (dBm/Hz)
6.6 to 13.2 GHz	13 dB	10 dB	–163 (dBm/Hz)
13.2 to 16 GHz	14 dB	10 dB	–163 (dBm/Hz)
16 to 19 GHz	16 dB	11 dB	–162 (dBm/Hz)
19 to 26.5 GHz	19 dB	14 dB	–159 (dBm/Hz)
Preselector bypassed (Option123) (Option 110 not installed)			
> 3.05 to 6.6 GHz	25 dB	22 dB	–151 (dBm/Hz)
6.6 to 13.2 GHz	33 dB	29 dB	–144 (dBm/Hz)
13.2 to 19.2 GHz	38 dB	35 dB	–138 (dBm/Hz)
19.2 to 26.5 GHz	44 dB	41 dB	–132 (dBm/Hz)
Preselector bypassed (Option123) (Option 110 installed)			
> 3.05 to 6.6 GHz	28 dB	24 dB	–149 (dBm/Hz)
6.6 to 13.2 GHz	36 dB	33 dB	–140 (dBm/Hz)
13.2 to 16 GHz	40 dB	36 dB	–137 (dBm/Hz)
16 to 19.2 GHz	40 dB	37 dB	–136 (dBm/Hz)
19.2 to 26.5 GHz	47 dB	46 dB	–127 (dBm/Hz)
Preselector bypassed (Option 123) Preamp on (Option 110)			
> 3.05 to 6.6 GHz	16 dB	13 dB	–160 (dBm/Hz)
6.6 to 13.2 GHz	25 dB	22 dB	–151 (dBm/Hz)
13.2 to 16 GHz	29 dB	28 dB	–145 (dBm/Hz)
16 to 19.2 GHz	33 dB	32 dB	–141 (dBm/Hz)
19.2 to 26.5 GHz	40 dB	38 dB	–135 (dBm/Hz)

1. Input referred noise density (dBm/Hz) = thermal noise at +55 °C (dBm) + noise figure of the downconverter (dB). The noise measured at the IF output's of the downconverter will be higher due to the Conversion gain, the measurable noise density is not diminished due to this gain.

Conversion gain

The nominal downconverter conversion gain versus frequency for the 7.5 MHz, 21.4 MHz, and 321.4 MHz IF outputs is shown in the following graphs. All curves have 0 dB input attenuation.



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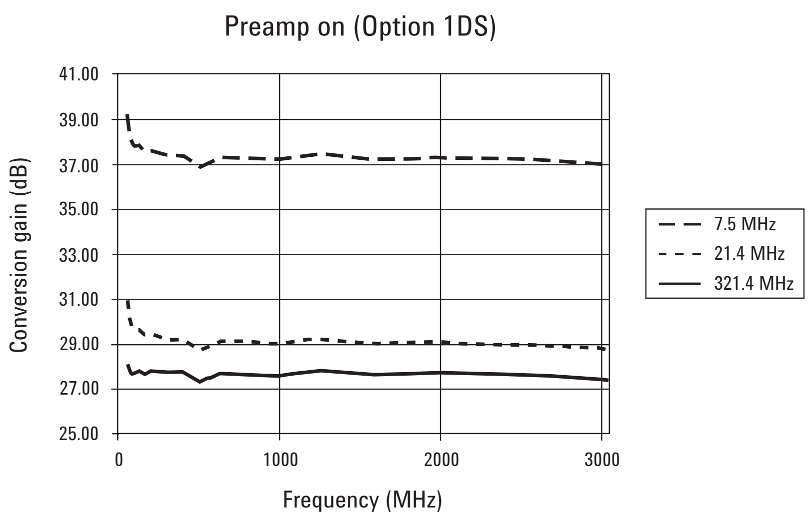
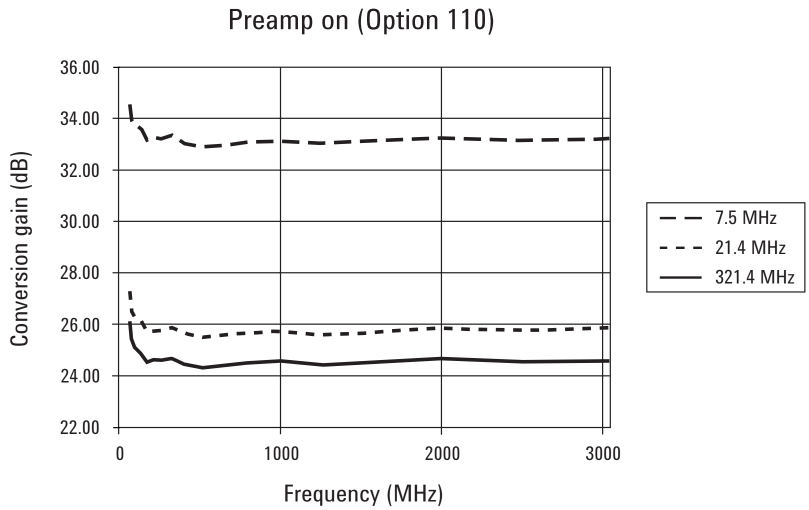


(4b)

Figure 4. Conversion gain curves (nominal)



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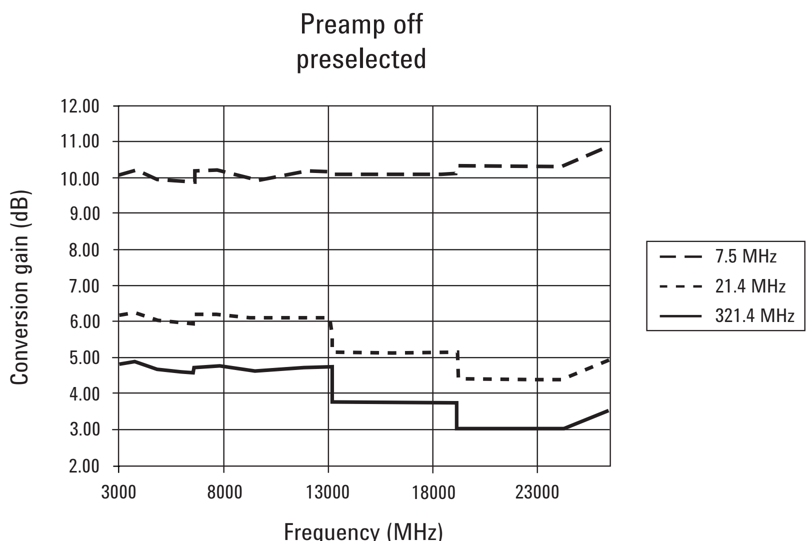

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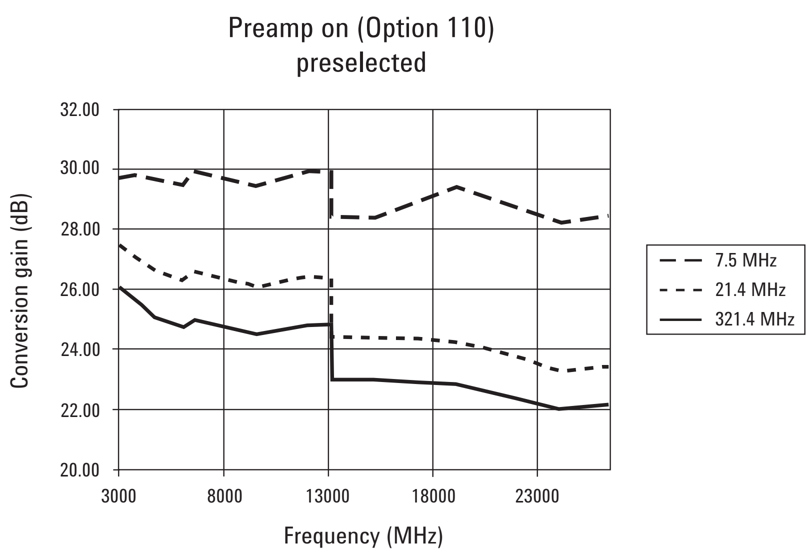

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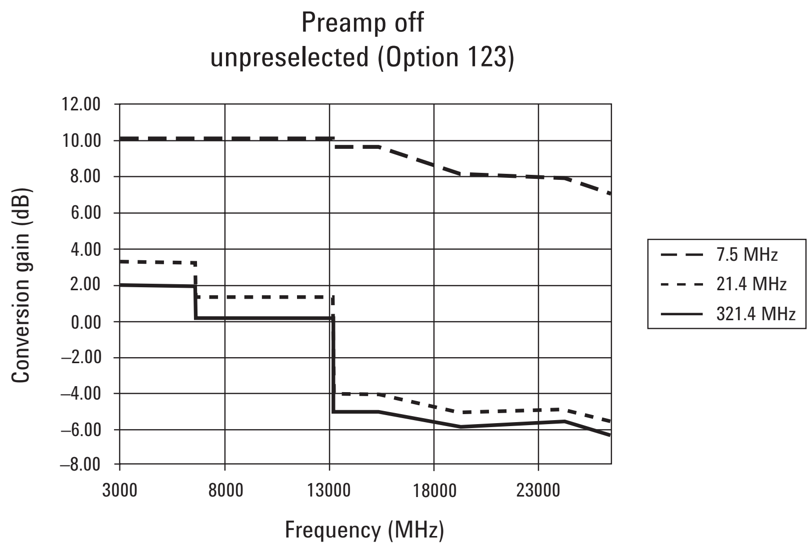
Figure 4, continued. Conversion gain curves (nominal)



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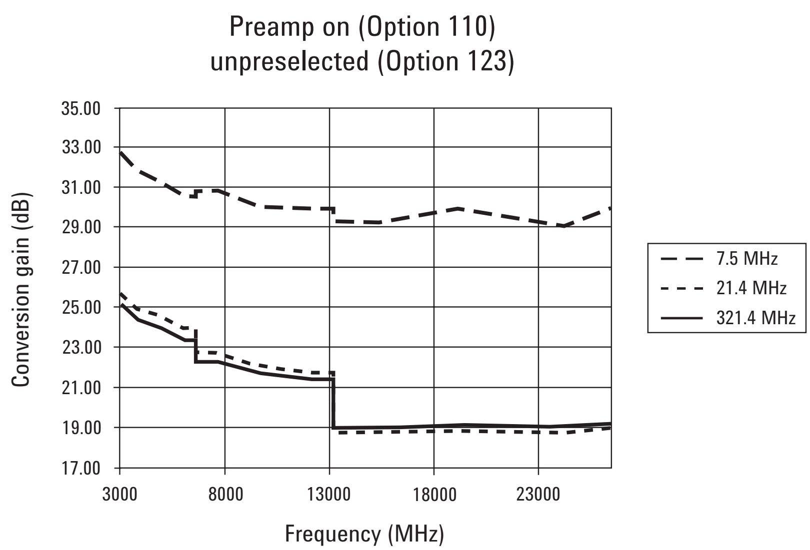


(4g)

Figure 4, continued. Conversion gain curves (nominal)

RF input VSWR at tuned frequency (nominal)

Condition	VSWR
10 dB attenuation, 50 MHz	< 1.07:1
≥ 8 dB input attenuation	
50 MHz to 3 GHz	< 1.2:1
3 to 18 GHz	< 1.6:1
18 to 26.5 GHz	< 1.9:1
2 to 6 dB input attenuation	
50 MHz to 3 GHz	< 1.6:1
3 to 26.5 GHz	< 1.9:1
0 dB input attenuation	
50 MHz to 3 GHz	< 1.9:1
3 to 26.5 GHz	< 1.9:1
Preamp on (Option 1DS)	
< 10 dB input attenuation	
50 MHz to 3 GHz	< 1.5:1
≥ 10 dB input attenuation	
50 MHz to 3 GHz	< 1.2:1
Preamp on (Option 110)	
< 10 dB input attenuation	
200 MHz to 6.6 GHz	< 1.5:1
6.6 to 26.5 GHz	< 1.9:1
≥ 10 dB input attenuation	
200 MHz to 6.6 GHz	< 1.4:1
6.6 to 13.2 GHz	< 1.7:1
13.2 to 19.2 GHz	< 1.5:1
19.2 to 26.5 GHz	< 1.8:1
Internal 50 MHz calibrator is on	Open input
Alignments running	Open input

Spurious responses

General spurious responses

(Mixer level[1] = –40 dBm, N = LO mixing harmonic)	
f < 10 MHz from carrier	(–73 + 20 log N) dBc
f ≥ 10 MHz from carrier	(–80 + 20 log N) dBc
	(–90 + 20 log N) dBc typical

Second harmonic distortion (SHI)

Frequency	Mixer level[1]	Distortion	SHI
Preamp off			
30 to 460 MHz –40 dBm	–82 dBc	+42 dBm	
460 MHz to 1.18 GHz	–40 dBm	–92 dBc	+52 dBm
1.18 to 1.5 GHz–40 dBm	–82 dBc	+42 dBm	
1.5 to 2.0 GHz –10 dBm	–90 dBc	+80 dBm	
2.0 to 13.25 GHz	–10 dBm	–100 dBc	+90 dBm
Preselector bypassed (Option 123)			
10 MHz to 25 GHz	–40 dBm	–70 dBc (nominal)	+30 dBm (nominal)
Preamp on (Option 1DS)	Preamp level[2]		
10 MHz to 1.5 GHz	–45 dBm	–60 dBc (nominal)	+15 dBm (nominal)
Preamp on (Option 110)			
10 MHz to 13.25 GHz	–45 dBm	–55 dBc (nominal)	+10 dBm (nominal)

1. Mixer level (dBm) = input power (dBm) – input attenuation (dB).
2. Preamp level (dBm) = input power (dBm) – input attenuation (dB).

Third-order intermodulation distortion (TOI) (nominal)

Frequency	Distortion	TOI[1]
Preamp off, preselected	Two –30 dBm tones	
10 MHz to 3 GHz	–92 dBc	+16 dBm
3 to 26.5 GHz	–100 dBc	+20 dBm
Preamp on (Option 1DS)	Two – 45 dBm tones	
10 MHz to 3 GHz	–76 dBc	–7 dBm
Preamp on (Option 110)	Two – 45 dBm tones	
10 MHz to 26.5 GHz	–74 dBc	–8 dBm
Preselector bypassed (Option 123)	Two –30 dBm tones	
3.05 to 26.5 GHz	–100 dBc	+20 dBm

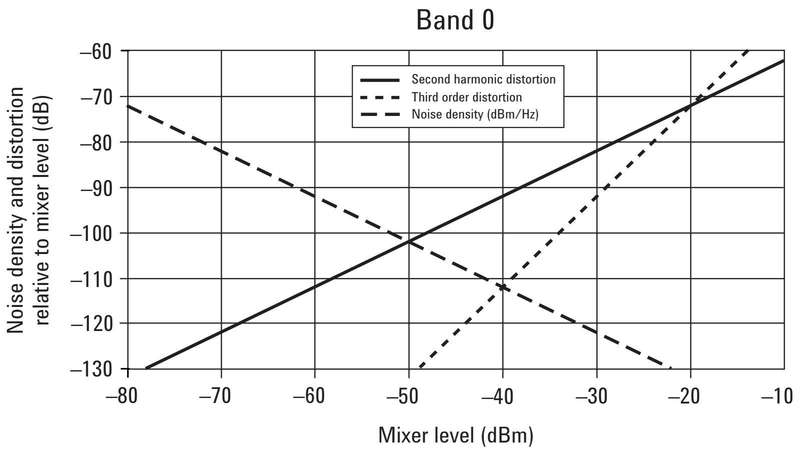
Other Input Related Spurious

Frequency	Mixer level[2]	Distortion
Images, multiples and out-of-band responses 10 MHz to 26.5 GHz	–10 dBm	–80 dBc

Residual responses (nominal)
(Input terminated and 0 dB attenuation)

	Input referred level (dBm)[3]		
Frequency Range	**321.4 MHz IF out**	**21.4 MHz IF out**	**7.5 MHz IF out**
50 MHz to 26.5 GHz	–75	–100	–100
50 MHz to 26.5 GHz Preamp on (Option 1DS or 110)	–90	–100	–100
3.045 to 26.5 GHz Preselector bypassed (Option 123)	–65	–95	–90

1. TOI = third order intercept. TOI = mixer tone level (dBm) - distortion (dBc) / 2, where distortion is the relative level of the distortion tones.
2. Mixer level (dBm) = input power (dBm) – input attenuation (dB).
3. Input referred level (dBm) = residual level at IF output (dBm) – conversion gain of downconverter (dB). This is the signal level which would be required at the input of the downconverter to create a signal at the IF output equal to the residual level.



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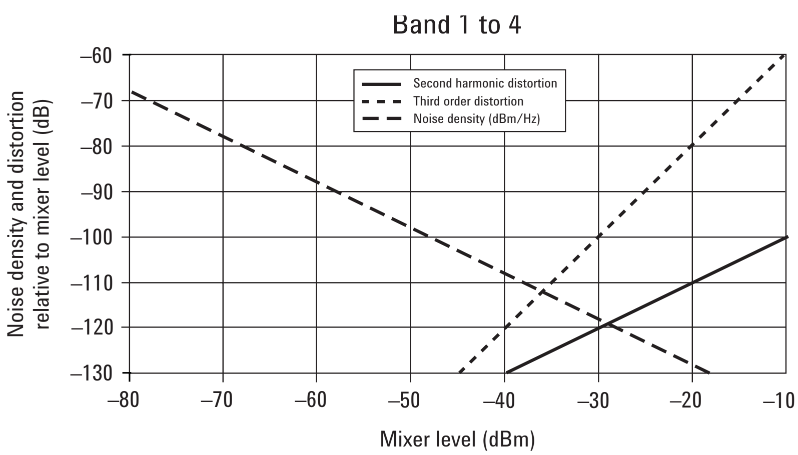

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Figure 5. Nominal dynamic range

Preamplifier specifications

Option 1DS

Frequency range	100 kHz to 3 GHz
Gain	+28 dB (nominal)
Noise figure	
10 MHz to 1.5 GHz	6 dB (nominal)
1.5 to 3.0 MHz	7 dB (nominal)

Option 110

Frequency range	10 MHz to 26.5 GHz
Gain	+27 dB (nominal)
Noise figure	
10 to 30 MHz	12.5 dB (nominal)
30 MHz to 3 GHz	7.8 dB (nominal)
3 to 26.5 GHz	10.3 dB (nominal)

Hardware settling time (nominal)[1]

Affected hardware	Nominal settling time
Input attenuator	65 ms
Preamp (Option 110 or 1DS)	85 ms
Microwave preselector (Option 123)	25 ms
AC/DC coupling	90 ms

Tuning	Frequency range[2]	Average	Maximum
	3 Hz to 3.05 GHz	175 ms	260 ms
	Tuning crosses 3.05 GHz	200 ms	280 ms
	3.05 to 26.5 GHz	240 ms	320 ms

Regulatory Compliance

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

1. Hardware settling time is the time required for the IVI-COM driver command to return.
2. This is the frequency range containing both the initial and final RF input tuning frequencies. Example, if the previous RF input frequency is 1 GHz and the final frequency is 3 GHz, then the nominal settling time will be 175 ms.

General Specifications

AC power

Power requirements	100 to 120 V 50/60/400 Hz
	220 to 240 V 50/60 Hz
Power consumption	< 260 watts, no options, < 450 watts, all options Standby < 20 watts (typical)

Environmental

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.

Operating temperature range	0 to 55 °C
Storage temperature range	–40 to 70 °C
Humidity	Type tested: 0 to 95% at 40 °C
Altitude	Type tested: 0m to 4600 m above mean sea level (15,000 ft)
Acoustic emissions	Type tested: L_{NPE} < 55 dB(A) at 25 °C tested according to ISO 7779

Shock and vibration

Operating random	Type tested: 5 to 500 Hz, 0.21 g_{rms}, close in phase noise may be significantly degraded due to microphonics.
Survival random vibration	Type tested: 5 to 500 Hz, 2.09 g_{rms}
Survival swept sine vibration	Type tested: 5 to 500 Hz, 0.5 g_{peak}
Transportation shock	Type tested: 50 G peak trapezoidal; 337 in/sec ΔV

Data storage

2 MB (nominal)

Weight

Net weight	19.0 kg (42 lbs) (nominal)
Shipping weight	25.9 kg (57 lbs) (nominal)

Dimensions

4U, 1/2 rack width LXI module

Height	17.7 cm (7.0 in)
Width	21.2 cm (8.375 in)
Length	65.0 cm (25.6 in)

Recommended calibration cycle

The recommended calibration cycle is 12 months. Calibration services are available through Agilent service centers.

Security

All user data is stored in volatile memory. For additional information on instrument security issues, visit:
www.agilent.com/find/security

ISO compliance

This modular instrument is manufactured in an ISO-9001 registered facility in concurrence with Agilent Technologies, Inc. commitment to quality.

Warranty

This Agilent Technologies product is warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that are defective.

Input/Output Descriptions

Front panel connectors

RF input	
Connector type	3.5 mm male precision connector
Impedance	50 Ω (nominal) (see RF input VSWR)
First LO emission level[1]	Band 0: < –120 dBm
	Bands ≥ 1: < –100 dBm
Reference 1-30 MHz	
Connector type	SMB male
Impedance	50 Ω (nominal)
Input amplitude range	–5 to +10 dBm (nominal)
Input frequency	1 to 30 MHz (nominal), selectable to 1 Hz resolution
Lock range	±5 x 10^{-6} of selected external reference input frequency
Reference 10 MHz out (switched)	
Connector type	SMB male
Impedance	50 Ω (nominal)
Output amplitude	≥ 0 dBm (nominal)
Frequency	10 MHz ± (10 MHz x frequency reference accuracy)
Trigger in	
Connector type	SMB male
Impedance	4 kΩ (nominal)
Trigger level range	LVTTL
Trigger out	
Connector type	SMB male
External trigger input impedance	50 Ω (nominal)
Level	5V TTL
Low level	100 mV (nominal) (high impedance load)
High level	4.9 V (nominal) (high impedance load)
	2.4 V (nominal) (50 Ω load)
321.4 MHz IF output	
Connector type	SMB male
Impedance	50 Ω (nominal)
21.4 MHz IF output	
Connector type SMB male	
Impedance	50 Ω (nominal)
7.5 MHz IF output	
Connector type	SMB male
Impedance	50 Ω (nominal)
Ext mixer pre-sel out	
Connector	SMB male
Load impedance (DC coupled)	110 Ω (nominal)
Range	0 to 10 V (nominal)
Sensitivity:	
External mixer	1.5 V/GHz of tuned LO frequency (nominal)
Ext mixer IF in	
Connector	SMA female
Impedance	50 Ω (nominal)
Center frequency	321.4 MHz
3 dB bandwidth	60 MHz (nominal)
Maximum safe input level	+10 dBm
Absolute amplitude accuracy	20 to 30 °C 0 to 55 °C
	±1.2 dB ±2.5 dB
VSWR	< 1.5:1 (nominal)
1 dB gain compression	0 dBm (nominal)

1. With 10 dB attenuation.

Front panel connectors (continued)

Ext mixer IF in (continued)		
Mixer bias current		
Range	±10 mA	
Resolution	0.01 mA	
Accuracy	±0.02 mA (nominal)	
Output impedance	477 Ω (nominal)	
Mixer bias voltage		
Range	±3.7 V (measured in an open circuit)	
Ext mixer 1st LO out		
Connector	SMA female	
Impedance	50 Ω (nominal)	
Frequency range	3.05 to 6.89 GHz	
VSWR	< 2.0:1 (nominal)	
Power output	20 to 30 °C	0 to 55 °C
3.05 to 6.0 GHz	+14.5 to +18.5 dBm	+14.5 to +19.0 dBm
6.0 to 6.89 GHz	+13.5 to +18.5 dBm	+13.5 to +19.0 dBm
Coherent carriers 3.6 GHz 2nd LO out		
Connector type	SMA female	
Impedance	50 Ω (nominal)	
Power output	+3 dBm	
Frequency	3.6 GHz	
Coherent carriers 3 to 7 GHz 1st LO in		
Connector type	SMA female	
Impedance	50 Ω (nominal)	
Input power	+15 dBm	
Coherent carriers 3.6 GHz 2nd LO in		
Connector type	SMA female	
Impedance	50 O (nominal)	
Input power	+3 dBm	
Coherent carriers 3 to 7 GHz 1st LO out		
Connector type	SMA female	
Impedance	50 O (nominal)	
Power output	+15 dBm	
Frequency	3.05 to 6.89 GHz	
VGA out		
Connector	VGA compatible, 15-pin mini D-SUB	
Format	VGA (31.5 kHz horizontal, 60 Hz vertical sync rates, non-interlaced) Analog RGB	
Resolution	640 x 480	
Noise source +28 V (pulsed) (Option 219)		
Connector	BNC female	
Output voltage	On 28.0 +/- 0.1 V (60 mA maximum)	
	Off < 1 V	
IF log video (Option V7L)		
321.4 MHz in		
Connector	SMB male	
Impedance	50 Ω (nominal)	
Video out		
Connector	SMB male	
Impedance	50 Ω (nominal)	
Maximum input power	+10 dBm	

Rear panel connectors

LXI trigger bus in	
Connector type	25-pin subminiature female connector
LXI trigger bus out	
Connector type	25-pin subminiature female connector
LAN (10/100Base-T)	
Connector type	RJ45

Ordering Information and Options

Model/option	Description
N8201A	Performance downconverter 3 Hz to 26.5 GHz
N8201A-526	Frequency range from 3 Hz to 26.5 GHz
N8201A-AYZ	External mixing capability
N8201A-B7J[1]	Digital demodulation hardware (Required for Agilent 89601A VSA software.)
N8201A-123	Microwave pre-selector bypass
N8201A-1DS	Built-in preamplifier; 100 kHz to 3 GHz
N8201A-110	Built-in preamplifier; 10 MHz to 26.5 GHz
N8201A-219[1]	Noise figure measurement personality
N8201A-226[1]	Phase noise measurement personality
N8201A-V7L[1]	Log video output on front panel
N8201A-H02	Adds internal digitizer and SCPI capability

Glossary

AC	Alternating current
DC	Direct current
k	Kilo, or 1000
LAN	Local Area Network
ms	Milliseconds
s	Seconds
SHI	Second harmonic distortion
SMB	Sub-miniature bayonet
TOI	Third-order intermodulation distortion
LXI	LAN eXtensions for Instrumentation

1. Requires Option H02.

References

Web resources

For additional information on synthetic instruments, visit:
www.agilent.com/find/synthetic

For additional information on instrument security issues, visit:
www.agilent.com/find/security

For information about renting, leasing, or financing Agilent's latest technology, visit:
www.agilent.com/find/buy/alternatives

For additional accessory information, visit:
www.agilent.com/find/accessories

For additional information about Agilent PSA Series spectrum analyzers, visit:
www.agilent.com/find/psa

Related literature

Synthetic instruments

N8201A Performance Downconverter Synthetic Instrument Module, 3 Hz to 26.5 GHz, Data Sheet
Literature number 5989-5720EN

N8201A Option 219 Performance Downconverter Synthetic Instrument Module 3 Hz to 26.5 GHz, Technical Overview and Self-Guided Tour for the Noise Figure Measurement Personality
Literature number 5989-6747EN

N8201A Option 226 Performance Downconverter Synthetic Instrument Module 3 Hz to 26.5 GHz, Technical Overview and Self-Guided Tour for the Phase Noise Measurement Personality
Literature number 5989-6748EN

N8201A Option V7L Performance Downconverter Synthetic Instrument Module 3 Hz to 26.5 GHz, Technical Overview and Self-Guided Tour for the Fast Rise Time Video Output
Literature number 5989-6749EN

N8211A Performance Analog Upconverter Synthetic Instrument Module, 250 kHz to 20/40 GHz, Data Sheet
Literature number 5989-2592EN

N8212A Performance Vector Upconverter Synthetic Instrument Module, 250 kHz to 20 GHz, Data Sheet
Literature number 5989-2593EN

N8221A IF Digitizer Synthetic Instrument Module, 30 MS/s, Data Sheet
Literature number 5989-2594EN

N8241A Arbitrary Waveform Generator Synthetic Instrument Module, 15-Bit, 1.25 GS/s or 625 MS/s, Technical Overview
Literature number 5989-2595EN

N8242A Arbitrary Waveform Generator Synthetic Instrument Module, 10-Bit, 1.25 GS/s or 625 MS/s, Technical Overview
Literature number 5989-5010EN

N8201A-H02 Compact Performance Spectrum Analyzer for ATE Applications,
Literature number 5989-5721EN

Spectrum analyzer literature

PSA Series High-Performance Spectrum Analyzer, Brochure
Literature number 5980-1283E

Agilent PSA Series Spectrum Analyzers, Data Sheet
Literature number 5980-1284E

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LXI

www.lxistandard.org

LXI is the LAN-based successor to GPIB, providing faster, more efficient connectivity. Agilent is a founding member of the LXI consortium.

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