M9393A PXIe Performance Vector Signal Analyzer

9 kHz to 8.4, 14, 18 or 27 GHz

Data Sheet

Challenge the Boundaries of Test

Agilent Modular Products

Anticipate ___Accelerate ___Achieve

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OVERVIEW

Acquire the performance edge in PXI

Whether your system supports a leading-edge design or a legacy platform, change is certain. Modular solutions are highly adaptable, and Agilent is taking flexibility farther with the M9393A PXIe performance vector signal analyzer. The M9393A is the realization of our microwave measurement expertise in modular form. It integrates core signal-analysis capabilities with hardware speed and accuracy, enabling you to tailor your solution to fit specific needs – today and tomorrow. Deploy the M9393A and acquire the performance edge in PXI.

Validate the true performance of your device

The M9393A meets stringent system requirements with microwave performance previously unseen in modular. Quickly test to tighter tolerances with best-in-class switching speed and amplitude accuracy.

Get consistent, accurate results faster with optimized software elements

The M9393A leverages Agilent's trusted measurement science, providing proven, familiar software applications that minimize development time and reduce risk.

X-Series measurement applications: Verify signal compliance with standards-based measurements for LTE, WLAN and more, while simplifying software migration through deep programmatic compatibility with Agilent benchtop signal analyzers.

89600 VSA software: Characterize signals across the entire frequency range with new high-speed stepped spectrum capability along with existing software support for > 75 signal formats and multi-channel analysis.

Ensure success at microwave frequencies today and tomorrow

Easily adapt to changing test needs with license key upgradable options and hardware designed for extensibility. Rely on unmatched supportability based on Agilent's N7800A calibration and adjustment software for TME self-maintainers and Agilent's standard 3-year warranty.

Applications

- Aerospace and defense manufacturing and depot test
- Wireless device design validation and manufacturing

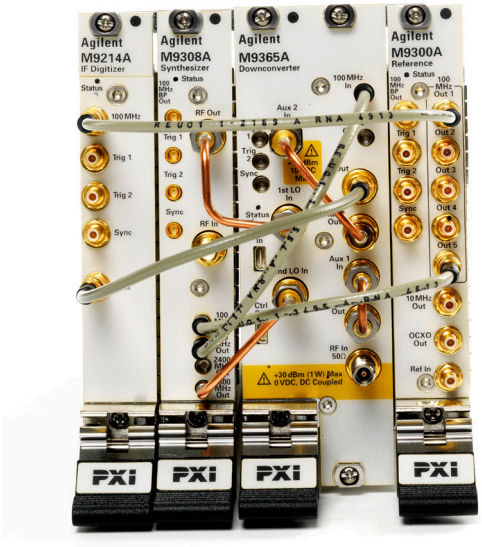


Figure 1. M9393A PXIe performance vector signal analyzer with four modules consisting of the M9300A frequency reference, M9308A synthesizer, the M9365A downconverter and the M9214A digitizer.

Product description

The M9393A PXI performance VSA is a modular vector signal analyzer for frequencies from 9 kHz to 8.4, 14, 18 or 27 GHz. A typical PXI VSA configuration includes four individual PXI modules — M9300A frequency reference, M9308A synthesizer, M9365A downconverter and the M9214A digitizer.

For more information on product options and configurations, see the Configuration Guide, literature number 5991-4580EN.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Definitions for specifications

Temperatures referred to in this document are defined as follows:

- Full temperature range = Individual module temperature of 15 to 75 °C, as reported by the module, and environment temperature of 0 to 55 °C.
- Controlled temperature range = Individual module temperature of 36 to 50 °C, as reported by the module, and environment temperature of 20 to 30 °C.

Specifications describe the warranted performance of calibrated instruments. Data represented in this document are specifications unless otherwise noted under the following conditions.

- Calibrated instruments have been stored for a minimum of 2 hours within the full temperature range
- 30 minute warm-up time
- Calibration cycle maintained
- When used with Agilent M9300A frequency reference and Agilent interconnect cables

Characteristics *describe product performance that is useful in the application of the product, but that is not covered by the product warranty. Characteristics are often referred to as Typical or Nominal values and are italicized.*

- ***Typical*** describes characteristic performance, which 80% of instruments will meet when operated within the controlled temperature range.
- ***Nominal*** describes representative performance that is useful in the application of the product when operated within the controlled temperature range.
- ***95th percentile*** values indicate the breadth of the population (approx. 2σ) 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.

Recommended best practices in use

- Use slot blockers and EMC filler panels in empty module slots to ensure proper operating temperatures. Agilent chassis and slot blockers optimize module temperature performance and reliability of test.
- At environment temperatures above 45 °C, chassis fan should be set to high.

Conversion type definitions

Conversion types	Frequency range
Auto	9 kHz to 8.4, 14, 18 or 27 GHz
Double conversion	9 kHz to 3.6 GHz
Single high	3.6 GHz to 8.4, 14, 18 or 27 GHz
Single low	3.6 GHz to 8.4, 14, 18 or 27 GHz

Additional information

- Mixer level offset modifies the receiver gain prior to the first mixer of the receiver. A negative setting improves distortion (i.e., TOI) at the cost of noise performance (i.e., DANL). A positive setting improves noise performance at the cost of distortion.
- The PeakToAverage property is used with expected RF Power property to optimize level settings in the Downconverter. Set this to the ratio, in dB, of the peak power to the average power. The Downconverter uses this value to optimize mixer level, IF gain, and ADC clip level.
- IF Level Offset (dB). Additional adjustment of IF power level. Positive values reduce noise. Negative values reduce distortion.
- Digitizer Level Offset (dB). Additional adjustment of Downconverter IF power to the digitizer. Positive values increase power to the digitizer. Negative values decrease power to the digitizer.
- All graphs contain measured data from one unit and are representative of product performance within the controlled temperature range unless otherwise noted.
- Default conditions apply, unless otherwise noted.
- The specifications contained in this document are subject to change.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

BLOCK DIAGRAM

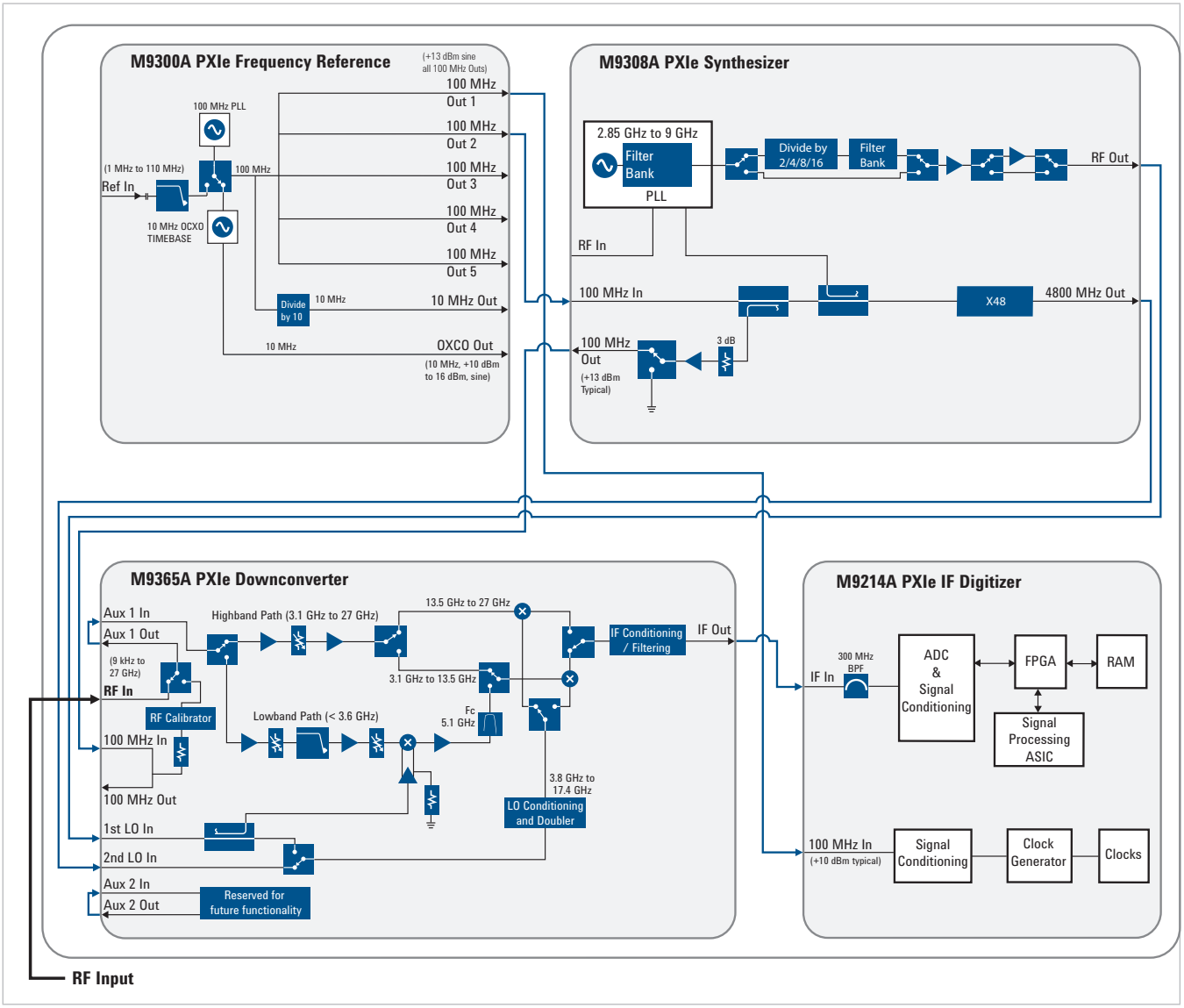


Figure 2. M9393A PXIe vector signal analyzer block diagram with four modules consisting of the M9308A synthesizer, M9365A downconverter, M9214A digitizer and the optional M9300A frequency reference.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

FREQUENCY

Frequency range and resolution	
Option F08	9 kHz to 8.4 GHz
Option F14	9 kHz to 14 GHz
Option F18	9 kHz to 18 GHz
Option F27	9 kHz to 27 GHz
Tuning resolution	0.01 Hz

Analysis bandwidth [1]		
Maximum bandwidth	Option B04 (standard)	40 MHz
	Option B10	100 MHz
	Option B16	160 MHz

IF frequency [2]		Final IF	First IF (< 3.6 GHz)
	40 MHz IF path	240 MHz	5040 MHz
	100/160 MHz IF path	300 MHz	5100 MHz
	40 MHz alternate IF path [3]	326 MHz	5126 MHz

Band	Harmonic mixing mode	LO multiple (N) [4]	Frequency
Band 0	1	1	9 kHz to 3.6 GHz
Band 1	1	1	3.6 to 8.4 GHz
Band 2	1	2	8.4 to 13.6 GHz
Band 3	2	2	13.6 to 17.1 GHz
Band 4	2	4	17.1 to 27 GHz

Frequency switching speed [5, 6]			
List mode switching speed [7]	Band	Standard, nominal	Option UNZ, nominal
Baseband frequency offset change [9]	n/a	*5 ms*	*10 µs*
Arbitrary frequency change within:	0: < 3.6 GHz 1: 3.6 to 8.4 GHz 2: 8.4 to 13.6 GHz 3: 13.6 to 17.1 GHz 4: 17.1 to 27 GHz	*5 ms*	*175 µs* *135 µs* *135 µs* *155 µs* *145 µs*
Non-list mode switching speed [8]		Standard, nominal	Option UNZ, nominal
Baseband frequency offset change [9]		*5 ms*	*250 µs*
Arbitrary frequency change		*5 ms*	*1 ms*

1. *Instantaneous bandwidth (1 dB 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. *Double conversion below 3.6 GHz, single conversion above 3.6 GHz.*
3. *Only used for some frequencies below 3.6 GHz for best performance as determined by the instrument software.*
4. *N is the LO multiplication factor.*
5. *When used with the M9018A PXIe chassis (2-link configuration: 1 x 8 [factory default]) and M9037A PXIe embedded controller.*
6. *Settled to within 2 kHz or 1 ppm, whichever is greater of final value. Does not include data acquisition or processing time. Amplitude settled to within 0.1 dB. Channel filter set to none.*
7. *Time from trigger input to frequency and amplitude settled. Minimum IQ sample rate ≥ 6 MHz. Minimum spectrum acquisition ≥ 4.8 MHz. Minimum power acquisition channel filter bandwidth ≥ 4.8 MHz. For frequency changes crossing 3.6 GHz with option UNZ, switching time is 2 ms. For frequency changes crossing any other bands with option UNZ, switching time is < 300 µs.*
8. *Mean time from IVI command to carrier frequency settled to within 2 kHz or 1 ppm, whichever is greater. Amplitude settled within 0.1 dB. Simultaneous carrier frequency and amplitude switching. For frequency changes crossing 3.6 GHz with option UNZ, switching time is 2 ms.*
9. *Baseband offset can be adjusted ± from carrier frequency within limits determined by RF analysis bandwidth and IF filter bandwidth. Synthesizer frequency and amplitude are not changing. Baseband offset settled to within 2 kHz.*

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

FREQUENCY (CONT'D)

Resolution bandwidth (RBW)		
Minimum RBW	1 Hz	
Maximum RBW (ENBW) [10]	IF dither OFF	IF dither ON
Flat top (160 MHz IF)	31.25 MHz	27.3 MHz
Flat top (40 MHz IF)	7.8 MHz	3.9 MHz
Gaussian top (160 MHz)	19.4 MHz	16.99 MHz
Gaussian top (40 MHz)	4.8 MHz	2.4 MHz

Video bandwidth (VBW)	
Range	1 Hz to maximum RBW and wide open to 50 MHz
Accuracy	VBW is implemented by averaging to achieve a similar variance reduction effect for the same VBW value.

Frequency span	
Range	Single FFT: 800 Hz to 160 MHz Stepped: 800 Hz to 27 GHz
Resolution	2 Hz

10. IF Dither ON only available with 89600 VSA software, option SSA.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

FREQUENCY (CONT'D)

Frequency reference (M9300A PXIe frequency reference module)	
Reference outputs	
100 MHz Out (Out 1 through Out 5)	
Amplitude	≥ 10 dBm *13 dBm, typical*
Connectors	5 SMB snap-on
Impedance	*50 Ω, nominal*
10 MHz Out	
Amplitude	*9.5 dBm, nominal*
Connectors	1 SMB snap-on
Impedance	50 Ω, nominal
OCXO Out	
Amplitude	*11.5 dBm, nominal*
Connectors	1 SMB snap-on
Impedance	*50 Ω, nominal*
Frequency accuracy	
Same as accuracy of internal time base or external reference input	
Internal timebase	
Accuracy	± [(time since last adjustment x aging rate) ± temperature effects ± calibration accuracy]
Frequency stability Aging rate	
Daily	*< ±0.5 ppb/day, after 72 hours of warm-up*
Yearly	*< ±0.1 ppm/year, after 72 hours of warm-up*
Total 10 years	*< ±0.6 ppm/10yrs, after 72 hours of warm-up*
Achievable initial calibration accuracy (at time of shipment)	$\pm 5 \times 10^{-8}$
Temperature effects	
20 to 30 °C	*< ±10 ppb*
Full temperature range	*< ±50 ppb*
Warm up	
5 minutes over +20 to +30 °C, with respect to 1 hour	*< ±0.1 ppm*
15 minutes over +20 to +30 °C, with respect to 1 hour	*< ±0.01 ppm*
External reference input	
Frequency	1 to 110 MHz, sine wave
Lock range	*±1 ppm, nominal*
Amplitude	*0 to 10 dBm, nominal*
Connector	1 SMB snap-on
Impedance	*50 Ω, nominal*

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

AMPLITUDE

Input level	
Max safe average total power	+35 dBm
Max DC voltage	±10 Vdc
Max RF input (specified performance)	+30 dBm

Expected input level setting	Pre-amplifier OFF
Range	–170 to +30 dBm
Resolution	0.1 dB

Electronic attenuator	
Frequency range	9 kHz to 27 GHz
Attenuation range	0 to 42 dB
Step size	0.25 dB

Absolute amplitude accuracy [11]

Frequency [12]	Pre-amp OFF [13]			Pre-amp ON [14]		
	Specification	95th percentile	Typical	Specification	95th percentile	Typical
100 kHz to 1 MHz	±1.53 dB	*±0.97 dB*	*±0.71 dB*	±1.76 dB	*±1.01 dB*	*±0.71 dB*
1 MHz to 20 MHz	±1.19 dB	*±0.69 dB*	*±0.49 dB*	±1.56 dB	*±0.89 dB*	*±0.61 dB*
20 MHz to 100 MHz	±0.57 dB	*±0.29 dB*	*±0.17 dB*	±0.68 dB	*±0.39 dB*	*±0.24 dB*
100 MHz to 3.6 GHz	±0.54 dB	*±0.25 dB*	*±0.13 dB*	±0.72 dB	*±0.37 dB*	*±0.26 dB*
3.6 GHz to 8 GHz	±0.59 dB	*±0.29 dB*	*±0.16 dB*	±0.83 dB	*±0.39 dB*	*±0.26 dB*
8 GHz to 14 GHz	±0.72 dB	*±0.37 dB*	*±0.23 dB*	±0.98 dB	*±0.47 dB*	*±0.32 dB*
14 GHz to 18 GHz	±0.8 dB	*±0.47 dB*	*±0.35 dB*	±1.06 dB	*±0.6 dB*	*±0.47 dB*
18 GHz to 26.5 GHz	±1.4 dB	*±0.53 dB*	*±0.37 dB*	±2.1 dB	*±1.08 dB*	*±0.92 dB*
26.5 GHz to 27 GHz	±2.37 dB	*±0.57 dB*	*±0.4 dB*	±2.67 dB	*±0.67 dB*	*±0.48 dB*

Frequency [12]	Pre-amp bypass [15]		
	Specification	95th percentile	Typical
100 kHz to 1 MHz	±1.2 dB	*±0.75 dB*	*±0.53 dB*
1 MHz to 20 MHz	±1.12 dB	*±0.65 dB*	*±0.46 dB*
20 MHz to 100 MHz	±0.67 dB	*±0.35 dB*	*±0.21 dB*
100 MHz to 3.6 GHz	±0.69 dB	*±0.36 dB*	*±0.23 dB*

11. Measured using a well matched input signal (8490D-020) attenuator. Module temperature within ± 3 °C of field alignment.

12. Frequency is exclusive on the start frequency and inclusive on the stop frequency.

13. Expected input level set to 6 dBm below 3.6 GHz. Expected input level set to -5 dBm above 3.6 GHz. Peak to average 0 dBm.

14. Expected input level set to -3 dBm. Peak to average 0 dBm.

15. Expected input level set to -5 dBm. Peak to average 0 dBm.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

AMPLITUDE (CONT'D)

Amplitude repeatability and linearity				
	Pre-amp OFF, typical		Pre-amp ON, typical	
Repeatability [16]	*±0.025 dB*		*±0.055 dB*	
Linearity [17]	ADC Dither High		ADC Dither Low	
Power range	Specification	Typical	Specification	Typical
> –35 dB	0.08 dB	*0.03 dB*	0.08 dB	*0.03 dB*
≤ –35 dB	0.1 dB	*0.04 dB*	0.21 dB	*0.1 dB*

IF flatness, typical [18, 19]	Across any 20 MHz in 40 MHz path	Across any 20 MHz in 160 MHz path	40 MHz	100 MHz	160 MHz
≤ 13.6 GHz	*± 0.08 dB*	*± 0.137 dB*	*± 0.156 dB*	*± 0.214 dB*	*± 0.34 dB*
> 13.6 GHz	*± 0.115 dB*	*± 0.144 dB*	*± 0.169 dB*	*± 0.312 dB*	*± 0.473 dB*

IF phase linearity, typical [18, 19]	Across any 20 MHz in 40 MHz path	Across any 20 MHz in 160 MHz path	40 MHz	100 MHz	160 MHz
≤ 13.6 GHz	*± 0.68 °*	*± 1.28 °*	*± 0.81 °*	*± 1.34 °*	*± 1.56 °*
> 13.6 GHz	*± 1.46 °*	*± 1.54 °*	*± 1.69 °*	*± 2.56 °*	*± 3.59 °*

IF bandwidth filter switching uncertainty [20]			
	Specification	Typical	Nominal
	±0.3 dB	*±0.14 dB*	*±0.1 dB*

Expected input level switching uncertainty [21]						
	Pre-amp OFF [22]				Pre-amp ON [23]	
	≤ –5 dBm		> –5 dBm		≤ –3 dBm	
	Specification	Typical	Specification	Typical	Specification	Typical
> 100 kHz to 1 MHz	±0.14 dB	*±0.03 dB*	±1.53 dB	*±0.6 dB*	±0.48 dB	*±0.18 dB*
> 1 to 20 MHz	±0.18 dB	*±0.04 dB*	±1.56 dB	*±0.64 dB*	±0.48 dB	*±0.18 dB*
> 20 to 100 MHz	±0.15 dB	*±0.04 dB*	±0.56 dB	*±0.24 dB*	±0.39 dB	*±0.15 dB*
> 100 MHz to 3.6 GHz	±0.16 dB	*±0.04 dB*	±0.53 dB	*±0.24 dB*	±0.44 dB	*±0.18 dB*
> 3.6 to 8 GHz	±0.18 dB	*±0.05 dB*	±0.39 dB	*±0.15 dB*	±0.34 dB	*±0.12 dB*
> 8 to 17 GHz	±0.16 dB	*±0.05 dB*	±0.71 dB	*±0.19 dB*	±0.53 dB	*±0.17 dB*
> 17 to 24 GHz	±0.19 dB	*±0.05 dB*	±2.38 dB	*±0.39 dB*	±0.78 dB	*±0.17 dB*
> 24 to 27 GHz	±0.18 dB	*±0.06 dB*	±1.39 dB	*±0.31 dB*	±0.55 dB	*±0.16 dB*

16. Input level –11 dBm, LO nulling run at ~1 GHz, 150 ms allowed for amplitude settling, measurement made at 1 kHz from center of IF.

17. Input level 20 dB above the noise floor and ADC dither on, no change in hardware settings, below expected input level.

18. Deviation from the mean error of the entire bandwidth, all conversion types.

19. Expected input level = 0 dBm, Mixer level offset = 0.

20. Amplitude error relative to the reference IF bandwidth filter of 40 MHz.

21. Measured using a well matched input signal (8490D-020) attenuator. Peak to average = 0 dBm

22. Measurement referenced to Expected input level setting of -5 dBm

23. Measurement referenced to Expected input level setting of -3 dBm

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

AMPLITUDE (CONT'D)

Amplitude switching speed [24]			
Option UNZ, nominal			
List mode switching speed	9 kHz to 3.6 GHz	3.6 to 6 GHz	6 to 27 GHz
From lower to higher power [25]	*90 µs*	*180 µs*	*50 µs*
From higher to lower power [25]	*90 µs*	*50 µs*	*50 µs*
Pre-amp OFF to pre-amp ON	*245 µs*	*190 µs*	*190 µs*
Pre-amp ON to pre-amp OFF	*160 µs*	*220 µs*	*90 µs*
Non-list mode switching speed	*1 ms*		
Standard, nominal	*5 ms*		

Input voltage standing wave ratio (VSWR)		
	Pre-amp OFF, nominal	Pre-amp ON, nominal
10 MHz to ≤ 50 MHz	*< 1.38 : 1*	*< 2.57 : 1*
> 50 MHz to ≤ 3 GHz	*< 1.21 : 1*	*< 1.9 : 1*
> 3 GHz to ≤ 3.6 GHz	*< 1.12 : 1*	*< 1.61: 1*
> 3.6 GHz to ≤ 12 GHz	*< 1.49 : 1*	*< 1.4 : 1*
> 12 GHz to ≤ 20 GHz	*< 1.99 : 1*	*< 1.99 : 1*
> 20 GHz to ≤ 23 GHz	*< 1.36 : 1*	*< 1.36 : 1*
> 23 GHz to ≤ 27 GHz	*< 1.81 : 1*	*< 1.82 : 1*

Trace detectors	
With IVI driver	Normal
With 89600 VSA software	Normal, Max, Sample, Average, Min

Preamplifier	
Frequency range	
Option F08	9 kHz to 8.4 GHz
Option F14	9 kHz to 14 GHz
Option F18	9 kHz to 18 GHz
Option F27	9 kHz to 27 GHz
Gain [26]	Typical
< 3.6 GHz	*+15.5 dB*
3.6 to < 15 GHz	*+25.0 dB*
15 to < 25 GHz	*+22.0 dB*
25 to 27 GHz	*+19.0 dB*

24. When using M9018A PXIe chassis (2-link configuration: 1x8 [factory default]) and M9037A PXIe embedded controller. Amplitude settled to within 0.1 dB. Does not include data acquisition or processing time.

25. No pre-amplifier switching.

26. Gain is normalized to pre-amplifier OFF state.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

DYNAMIC RANGE SPECIFICATIONS

Displayed average noise level (DANL) [27]					
		Specification		Typical	
		Noise corrections OFF	Noise corrections ON	Noise corrections OFF	Noise corrections ON
Pre-amp OFF	*9 to 50 kHz*	–120 dBm/Hz	–125 dBm/Hz	*–129 dBm/Hz*	*–135 dBm/Hz*
	50 kHz to 51 MHz	–143 dBm/Hz	–147 dBm/Hz	*–147 dBm/Hz*	*–154 dBm/Hz*
	51 to 900 MHz	–147 dBm/Hz	–158 dBm/Hz	*–150 dBm/Hz*	*–161 dBm/Hz*
	900 MHz to 2.6 GHz	–145 dBm/Hz	–156 dBm/Hz	*–148 dBm/Hz*	*–158 dBm/Hz*
	2.6 to 3.6 GHz	–143 dBm/Hz	–154 dBm/Hz	*–146 dBm/Hz*	*–157 dBm/Hz*
	3.6 to 7.4 GHz	–146 dBm/Hz	–157 dBm/Hz	*–149 dBm/Hz*	*–160 dBm/Hz*
	7.4 to 10 GHz	–144 dBm/Hz	–155 dBm/Hz	*–148 dBm/Hz*	*–158 dBm/Hz*
	10 to 13.6 GHz	–142 dBm/Hz	–152 dBm/Hz	*–145 dBm/Hz*	*–156 dBm/Hz*
	13.6 to 17 GHz	–136 dBm/Hz	–147 dBm/Hz	*–141 dBm/Hz*	*–151 dBm/Hz*
	17 to 21 GHz	–133 dBm/Hz	–144 dBm/Hz	*–136 dBm/Hz*	*–147 dBm/Hz*
	21 to 22 GHz	–131 dBm/Hz	–142 dBm/Hz	*–135 dBm/Hz*	*–145 dBm/Hz*
	22 to 26 GHz	–124 dBm/Hz	–134 dBm/Hz	*–128 dBm/Hz*	*–138 dBm/Hz*
	26 to 27 GHz	–117 dBm/Hz	–127 dBm/Hz	*–122 dBm/Hz*	*–133 dBm/Hz*
Pre-amp ON	*9 to 50 kHz*	–120 dBm/Hz	–126 dBm/Hz	*–131 dBm/Hz*	*–134 dBm/Hz*
	50 kHz to 51 MHz	–135 dBm/Hz	–147 dBm/Hz	*–142 dBm/Hz*	*–152 dBm/Hz*
	51 to 2.8 GHz	–154 dBm/Hz	–165 dBm/Hz	*–158 dBm/Hz*	*–168 dBm/Hz*
	2.8 to 3.6 GHz	–153 dBm/Hz	–164 dBm/Hz	*–157 dBm/Hz*	*–168 dBm/Hz*
	3.6 to 9 GHz	–152 dBm/Hz	–163 dBm/Hz	*–156 dBm/Hz*	*–166 dBm/Hz*
	9 to 16.2 GHz	–150 dBm/Hz	–160 dBm/Hz	*–154 dBm/Hz*	*–164 dBm/Hz*
	16.2 to 21 GHz	–147 dBm/Hz	–157 dBm/Hz	*–152 dBm/Hz*	*–163 dBm/Hz*
	21 to 23.9 GHz	–143 dBm/Hz	–153 dBm/Hz	*–149 dBm/Hz*	*–159 dBm/Hz*
	23.9 to 25.9 GHz	–139 dBm/Hz	–150 dBm/Hz	*–145 dBm/Hz*	*–155 dBm/Hz*
	25.9 to 27 GHz	–136 dBm/Hz	–147 dBm/Hz	*–141 dBm/Hz*	*–152 dBm/Hz*
For nominal, see figure 4.					

Gain compression (0.1 dB two-tone), nominal [28]		
Frequency	Pre–amp OFF	Pre–amp ON
< 3.6 GHz	*0 dBm*	*–15 dB*
3.6 to 5 GHz	*–5 dBm*	*–28 dB*
5 to 17 GHz	*–3 dBm*	*–27 dB*
17 to 27 GHz	+1 *dBm*	*–21 dB*

27. Expected input level = -60 dBm, Mixer level offset = 0 dBm, Noise Correction ON uses 100 averages, Conversion = auto, PeakToAverage = 0 dB.

28. Large signals can cause the analyzer to incorrectly measure on-screen signals because of two-tone gain compression. This specification tells how large an8interfering signal must be in order to cause a 0.1 dB change in a low power signal. Tone spacing = 100 kHz, measuring a -30 dBm signal for the low power tone. Expected input level = 0 dBm, Mixer level offset = 0 dB.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

DYNAMIC RANGE SPECIFICATIONS (CONT'D)

Third order intermodulation distortion (TOI)				
	Frequency	Specification	Typical	Nominal
Pre-amp OFF [29]	10 to 600 MHz	+26 dBm	*+29 dBm*	*+31 dBm*
	600 MHz to 3.6 GHz	+26 dBm	*+31 dBm*	*+33.5 dBm*
	3.6 to 13.6 GHz	+26 dBm	*+29 dBm*	*+30 dBm*
	13.6 to 16.5 GHz	+24 dBm	*+28.5 dBm*	*+29.5 dBm*
	16.5 to 18 GHz	+21 dBm	*+25 dBm*	*+28.5 dBm*
	18 to 27 GHz	+24 dBm	*+29 dBm*	*+31 dBm*
Pre-amp ON [30]	10 to 600 MHz	+3 dBm	*+8.5 dBm*	*+12.5 dBm*
	600 MHz to 3.6 GHz	+4 dBm	*+10 dBm*	*+13 dBm*
	3.6 to 13.6 GHz	–1.5 dBm	*+3.5 dBm*	*+4.5 dBm*
	13.6 to 16.5 GHz	–4.5 dBm	*+2 dBm*	*+4 dBm*
	16.5 to 18 GHz	–9 dBm	*–3 dBm*	*+1 dBm*
	18 to 24 GHz	–7 dBm	*0 dBm*	*+3 dBm*
	24 to 27 GHz	–1 dBm	*+5 dBm*	*+7.5 dBm*

Second harmonic distortion (SHI)			
	Frequency	Typical	Nominal
Pre-amp OFF [31]	10 to 300 MHz	*+56 dBm*	*+60 dBm*
	300 MHz to 1.8 GHz	*+60 dBm*	*+62 dBm*
	1.8 to 5.2 GHz	*+41 dBm*	*+44 dBm*
	5.2 to 10 GHz	*+32 dBm*	*+36 dBm*
	10 to 13.5 GHz	*+21 dBm*	*+25 dBm*
Pre-amp ON [32]	10 MHz to 1.5 GHz	*+33 dBm*	*+35 dBm*
	1.8 to 4 GHz	*+16 dBm*	*+22 dBm*
	4 to 10 GHz	*0 dBm*	*+3 dBm*
	10 to 13.5 GHz	*–10 dBm*	*–5 dBm*

29. Tone separation = 100 kHz, Expected input level = 3 dBm, Mixer offset level = 0 dB, PeakToAverage = 6 dB, Conversion type Auto

30. Tone separation = 100 kHz, Expected input level = –22 dBm, Mixer offset level = 0 dB, PeakToAverage = 6 dB, Conversion type Auto

31. Expected input level = 0 dBm

32. Expected input level = -30 dBm

DYNAMIC RANGE SPECIFICATIONS (CONT'D)

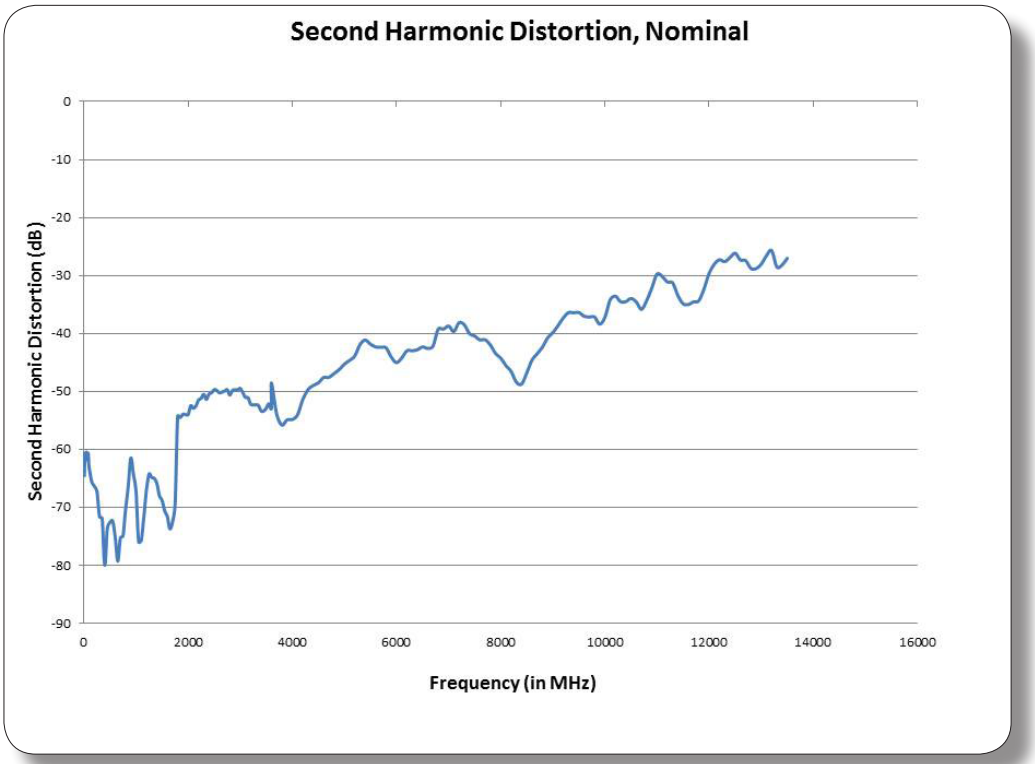


Figure 3. Nominal second harmonic distortion, expected input level = 0 dBm.

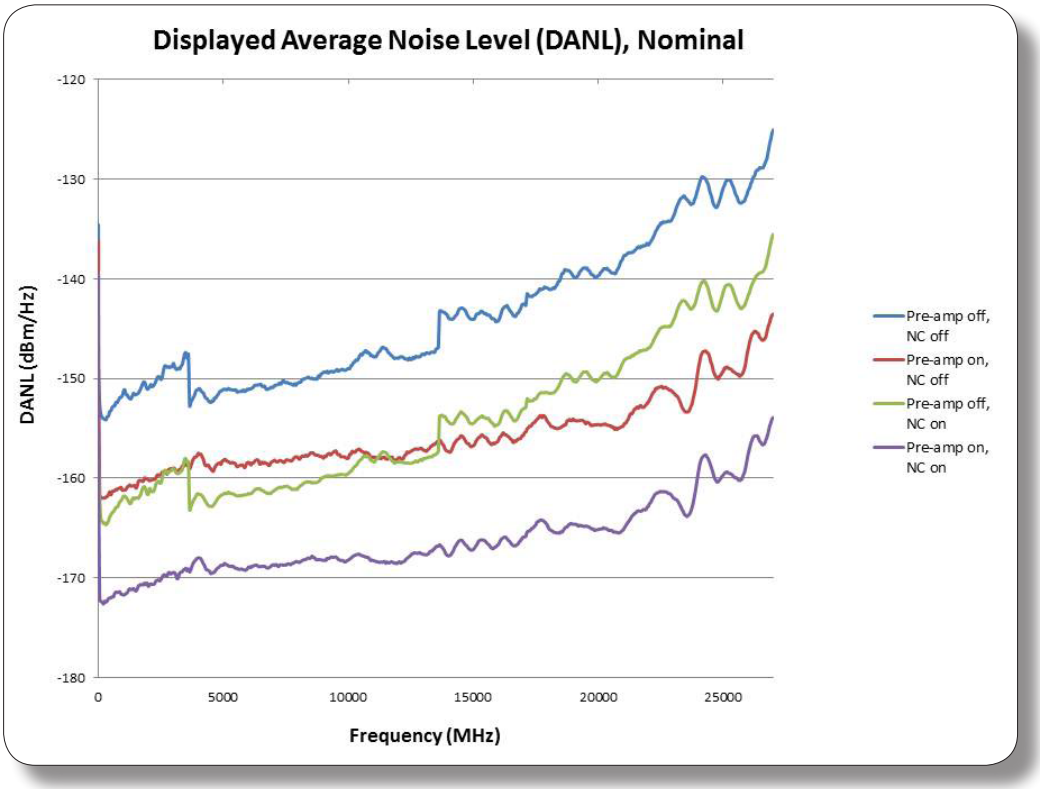


Figure 4. Nominal displayed average noise level. Expected input level = -60 dBm, Mixer level offset = 0 dBm, Noise correction (NC) ON uses 100 averages.

DYNAMIC RANGE SPECIFICATIONS (CONT'D)

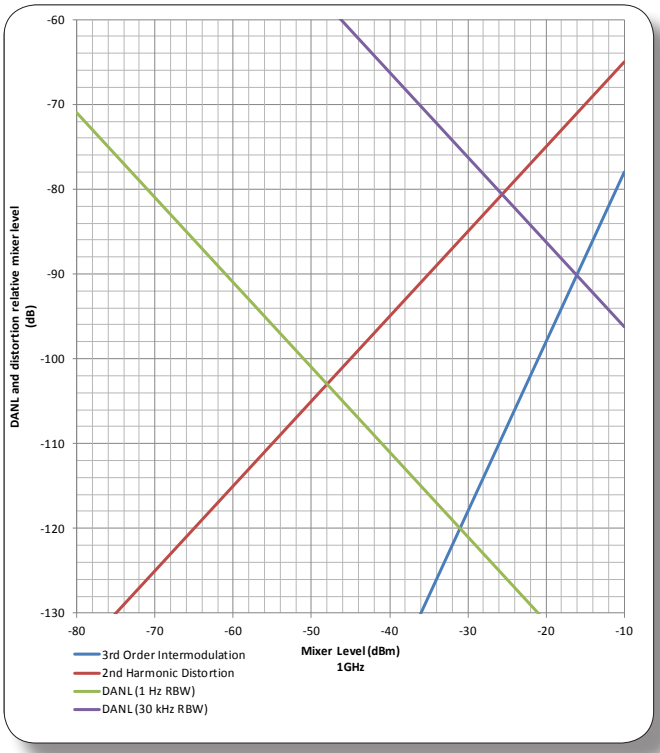


Figure 5. Dynamic range at 1 GHz.

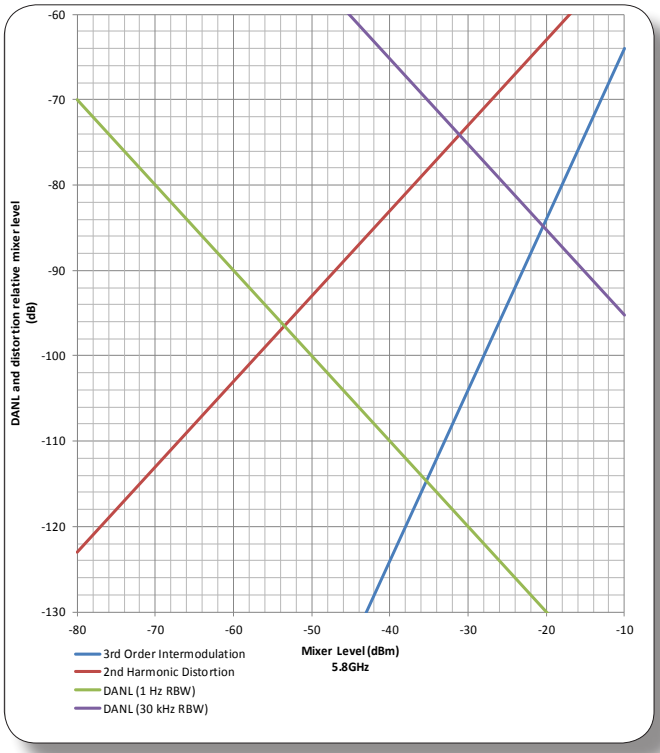


Figure 6. Dynamic range at 5.8 GHz.

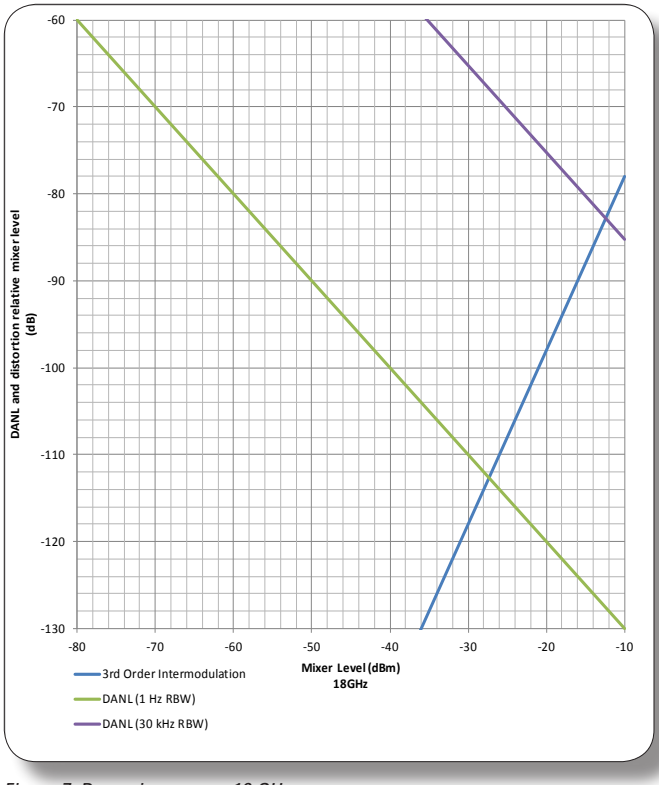


Figure 7. Dynamic range at 18 GHz.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

SPECTRAL PURITY

Phase noise [33]				
Center frequency	Offset	Specification, noise corrections OFF	Typical, noise corrections OFF	Typical, noise corrections ON
1 GHz	100 Hz		*–88 dBc/Hz*	
	1 kHz		*–105 dBc/Hz*	
	10 kHz	–107 dBc/Hz	*–110 dBc/Hz*	
	100 kHz		*–107 dBc/Hz*	
	300 kHz		*–118 dBc/Hz*	
	1 MHz	–131 dBc/Hz	*–134 dBc/Hz*	*–134 dBc/Hz*
	3 MHz		*–139 dBc/Hz*	*–141 dBc/Hz*
	10 MHz		*–141 dBc/Hz*	*–144 dBc/Hz*

33. Expected input level = 0 dBm, Mixer level offset = 0 dB, Pre-amp = OFF, Noise correction ON results use a counted average of 100, PeakToAverage = 5

Figure 8. Nominal phase noise 1 to 26.5 GHz. Expected input level = 0 dBm, Mixer level offset = 0 dB, Pre-amp = OFF, Noise correction ON results use a counted average of 100, PeakToAverage = 5

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

SPECTRAL PURITY (CONT'D)

Residuals, images & spurious responses *Substantial reduction of internally generated spurs and residuals will be seen with 89600 VSA software, option SSA, IF dither enabled.*			
Non-input related spurs [34]	Frequency	Specification	Typical
IF bandwidth filter = 40 MHz	0.1 to 150 MHz	–96 dBm	*–103 dBm*
	150 MHz to 1.6 GHz	–99 dBm	*–106 dBm*
	1.6 to 1.8 GHz	–97 dBm	*–104 dBm*
	1.8 to 2.5 GHz	–83 dBm	*–91 dBm*
	2.5 to 3.1 GHz	–97 dBm	*–104 dBm*
	3.1 to 3.6 GHz	–93 dBm	*–101 dBm*
	3.6 to 13 GHz	–95 dBm	*–102 dBm*
IF bandwidth filter = 100/160 MHz	0.1 to 550 MHz	–99 dBm	*–106 dBm*
	550 to 910 MHz	–66 dBm	*–74 dBm*
	910 MHz to 1.7 GHz	–93 dBm	*–102 dBm*
	1.7 to 2.5 GHz	–76 dBm	*–84 dBm*
	2.5 to 3.6 GHz	–81 dBm	*–89 dBm*
	3.6 to 13 GHz	–96 dBm	*–102 dBm*
IF bandwidth filter = 40/100/160 MHz	> 13 GHz	*–100 dBm, nominal*	

LO related spurs [35]	Offset			
	200 Hz - 1 kHz	1 - 10 kHz	10 - 100 kHz	100 kHz - 10 MHz
100 kHz to 3.6 GHz	–67 dBc	–66 dBc	–67 dBc	–65 dBc
3.6 to 8.5 GHz	–62 dBc	–63 dBc	–68 dBc	–64 dBc
8.5 to 13.6 GHz	–57 dBc	–59 dBc	–64 dBc	–63 dBc
13.6 to 17.1 GHz	–55 dBc	–57 dBc	–62 dBc	–61 dBc
17.1 to 27 GHz	–52 dBc	–52 dBc	–58 dBc	–48 dBc
Frac-N-Spur [36]	*< –50 dBc + 20log(N), nominal*			

First and higher order spurious responses [37]	Frequency	Specification	Nominal
IF BW filter = 40 MHz	100 kHz to 3.6 GHz	–63 dBc	*–74 dBc*
	3.6 to 8.4 GHz	–72 dBc	*–84 dBc*
	8.4 to 17 GHz	–88 dBc	*–96 dBc*
	17 to 27 GHz	–89 dBc	*–97 dBc*
IF BW filter = 100/160 MHz	100 kHz to 3.6 GHz	–63 dBc	*–78 dBc*
	3.6 to 8.4 GHz	–75 dBc	*–86 dBc*
	8.4 to 17 GHz	–86 dBc	*–96 dBc*
	17 to 27 GHz	–98 dBc	*–108 dBc*

34. Expected input level: -50 dBm, mixer level offset: 0 dBm, pre-amp OFF, noise correction OFF. Enabling pre-amp and/or noise correction will yield a nominal 10 dB improvement.

35. Input level = -10 dBm, Expected input level = 0 dBm, Mixer level offset = 0 dBm, Averages = 50

36. N is the LO multiplication factor. See LO multiplier table for the N value versus frequency range.

37. Input level = 0 dBm, Expected input level = 0 dBm, Mixer level offset = 0 dBm, Noise correction ON, Averages = 10

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

SPECTRAL PURITY (CONT'D)

Residuals, images & spurious responses (cont'd)			
IF rejection, nominal [38]			
Frequency	40 MHz IF path	40 MHz alternate IF path	100/160 MHz IF path
< 3.6 GHz			
Final IF	*–80 dBc*	*–85 dBc*	*–82 dBc*
First IF	*–64 dBc*	*–80 dBc*	*–71 dBc*
3.6 to 13.6 GHz	*–78 dBc*	*–83 dBc*	*–78 dBc*
13.6 to 20 GHz	*–70 dBc*	*–81 dBc*	*–70 dBc*
20 to 27 GHz	*–53 dBc*	*–80 dBc*	*–55 dBc*
Image responses [39]		Specification	Typical
≤ 3.6 GHz	$f_{IMAGE} = (f_C \pm 2 * f_{FINAL\ IF})$	–63 dBc	*–72 dBc*
	$f_{IMAGE} = (f_C \pm 2 * f_{FIRST\ IF})$	–77 dBc	*–85 dBc*
> 3.6 GHz (digital image rejection ON)	$f_{IMAGE} = (f_C \pm 2 * f_{FINAL\ IF})$	*Images are nominally below the noise floor*	
Line related spurious responses			
	–60 dBc, nominal		
Spurious free dynamic range (SFDR)			
	–72 dBc, nominal		
LO emission [40]	Pre-amp OFF, nominal		Pre-amp ON, nominal
≤ 100 MHz	*–69 dBm*		*–82 dBm*
> 100 MHz	*–80 dBm*		

38. Suppression of signal at IF frequencies when turned at least 2x IF filter bandwidth away.

39. Expected input level = -10 dBm, Mixer level offset = 0 dB, Peak to average = 0 dB, f_C = analyzer center frequency, f_{IMAGE} = input frequency that is an image to analyzer center frequency, $f_{FINAL\ IF}$= 240, 300, 326 MHz, $f_{FIRST\ IF}$= 5040, 5100, 5126 MHz.

40. Expected input level = -50 dBm, RF attenuation = 0 dB. LO emissions refers to the LO power leaking out at the RF input port.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

TIME AND ACQUISITION

Maximum capture memory	Non-list mode	List mode
Option M01	128 MSample (512 MB)	128 MSample (512 MB)
Option M05	512 MSample (2 GB)	512 MSample (2 GB)
Option M10	1 GSample (4 GB) [41]	512 MSample (2 GB) to ~ 1 GSample (3.999 GB) [41]
Segments		
Minimum length	32 bytes	
Maximum length	Full capture memory [42]	
Maximum sample rate	Specification	
Option B04 / 40 MHz	50 MS/s complex, 100 MS/s real	
Option B10 / 100 MHz	125 MS/s complex, 250 MS/s real	
Option B16 / 160 MHz	200 MS/s complex, 400 MS/s real	
List mode		
Maximum number of segments	3201	
Trigger sources	External, magnitude, wideband magnitude, wideband burst, software, immediate	
Trigger modes	Per acquisition	
Triggering		
Delay range [43]	–0.1 to +1 s	
Delay resolution	1 sample	
Delay accuracy	2 ns	
Holdoff range	0 to 1 s	
Holdoff resolution	10 ns	
Acquisition minimum size	2 samples	
Acquisition maximum size	1 GSamples	

41. The maximum size for a single list point capture is limited to 512 MSamples (2 GB). However, with option M10, total capture of up to 3.999 GB is available across all list mode captures.

42. The user can allocate memory for one or more acquisitions. Each acquisition takes up the memory that needs to be a power of 2. Minimum is 32 bytes.

43. Negative trigger delay limited to capture size.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

MEASUREMENT SPEED

IQ data capture [44]	Nominal	
Large block (50 MSamples)	*1.2 s*	Transferred in 10 kSa blocks
Small block (100 captures, 100 ksamples each)	*252 ms*	Transferred in 10 kSa blocks
Adjust level, freq (10 ksamples)	*1.6 ms*	Transferred in 10 kSa blocks

Power measurements [45]			
Channel power settings & filter bandwidth	Acquisition Time	Averages	Nominal
3.84 MHz	400 µs	None	*1.7 ms*
		10	*8.6 ms*
	100 µs	None	*1.2 ms*
		10	*3.8 ms*
	50 µs	None	*1.1 ms*
		10	*3.3 ms*
30 kHz	100 µs	None	*3.9 ms*
		10	*30.7 ms*

44. Capture block, transfer to host memory, 160 MHz BW, excludes frequency transitions below 400 MHz, with M9037A PXIe embedded controller (2-link configuration: 1 x 8 [factory default]).

45. Transfer to host memory, 160 MHz IF bandwidth filter, excludes frequency transitions below 400 MHz, with M9037A PXIe embedded controller (2-link configuration: 1 x 8 [factory default]).

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

FORMAT SPECIFIC MEASUREMENT DATA

16QAM [46]			
EVM	Fc	Unequalized, nominal	Equalized, nominal
RRC Alpha = 0.2, 50 MSymbols/s	1.8 GHz	*0.39%*	*0.21%*
	5.95 GHz	*0.41%*	*0.20%*
RRC Alpha = 0.35, 50 MSymbols/s	5.95 GHz	*0.39%*	*0.19%*

CDMA2000 [47]		
	Parameters	Nominal
Pilot EVM	Fc = 0.9, 1.9 GHz	*0.37%*

GSM [47]		
	Parameters	Nominal
Global phase error	Fc = 0.9, 1.8, 1.9 GHz	*0.18 °*
ORFS dynamic range (noise corrections OFF)	200 kHz offset	*–36 dBc*
	250 kHz offset	*–41.5 dBc*
	400 kHz offset	*–68 dBc*
	600 kHz offset	*–75 dBc*
	800 kHz offset	*–77.5 dBc*
	1200 kHz offset	*–81.5 dBc*
	1800 kHz offset	*–79.5 dBc*

EDGE [47]		
	Parameters	Nominal
Residual EVM	Fc = 0.9, 1.8, 1.9, 2.0, 2.1, 2.2 GHz	*0.25%*
ORFS dynamic range (noise corrections OFF)	200 kHz offset	*–36.5 dBc*
	250 kHz offset	*–42 dBc*
	400 kHz offset	*–67 dBc*
	600 kHz offset	*–73.5 dBc*
	800 kHz offset	*–76.5 dBc*
	1200 kHz offset	*–81 dBc*
	1800 kHz offset	*–78.5 dBc*

W-CDMA [47]			
	Parameters		Nominal
Residual EVM	Fc = 0.9, 1.8, 1.9, 2.0, 2.1 GHz		*0.50%*
ACLR dynamic range (channel bandwidth = 5 MHz, Fc = 2 GHz)		Noise corrections OFF	Noise corrections ON
	Adjacent	*–73 dB*	*–75 dB*
	Alternate	*–75 dB*	*–79 dB*
W-CDMA channel power accuracy			*± 0.5 dB*

46. Input signal (total power) 0 dBm, range set to just above overload, conversion mode: Auto, Mixer level offset and IF level offset optimized for EVM performance.

47. Expected input level 0 dBm, input signal (total power) 0 dBm, Mixer level offset 0 dB, conversion mode: Auto, PeakToAverage set per signal peak to average.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

FORMAT SPECIFIC MEASUREMENT (CONT'D)

802.11g [48]	Parameters	Nominal
EVM	2.4 GHz, 20 MHz BW	*–50.5 dB*

802.11a [48]	Parameters	Nominal
EVM	5.8 GHz, 20 MHz BW	*–50 dB*

802.11n [48]	Parameters	Nominal
	5.8 GHz, 40 MHz BW	*–50.5 dB*

802.11ac [48]	Parameters		80 MHz, nominal	160 MHz, nominal
EVM	5.8 GHz, 256 QAM	Preamble only	*–48.5 dB*	*–46 dB*
		Preamble, pilots and data	*–51.5 dB*	*–49.5 dB*
SEM	5.8 GHz, 80 MHz BW	See figure 9		

802.11a/g [48]	Parameters	
SEM	2.4 GHz, 20 MHz BW	See figure 10
	5.5 GHz, 20 MHz BW	See figure 11

802.11e [48]	Parameters	Nominal
OFDMA WiMAX™ EVM	Fc = 2.5, 3.5, & 5.8 GHz	*–48 dB*

LTE FDD [48]		Nominal		
E–TM 3.1		5 MHz	10 MHz	20 MHz
EVM	Fc < 3.6 GHz	*–47.5 dB*	*–48.5 dB*	*–48 dB*
	Fc ≥ 3.6 GHz	*–49 dB*	*–51.5 dB*	*–50.5 dB*
	Channel BW = 5 MHz, Fc = 2 GHz	Noise corrections OFF	Noise corrections ON	
ACLR	Adjacent	*–68.5 dB*	*–71 dB*	
	Alternate	*–71 dB*	*–77.5 dB*	

48. Expected input level 0 dBm, input signal (total power) 0 dBm, Mixer level offset 0 dB, conversion mode: Auto, PeakToAverage set per signal peak to average.

FORMAT SPECIFIC MEASUREMENT (CONT'D)

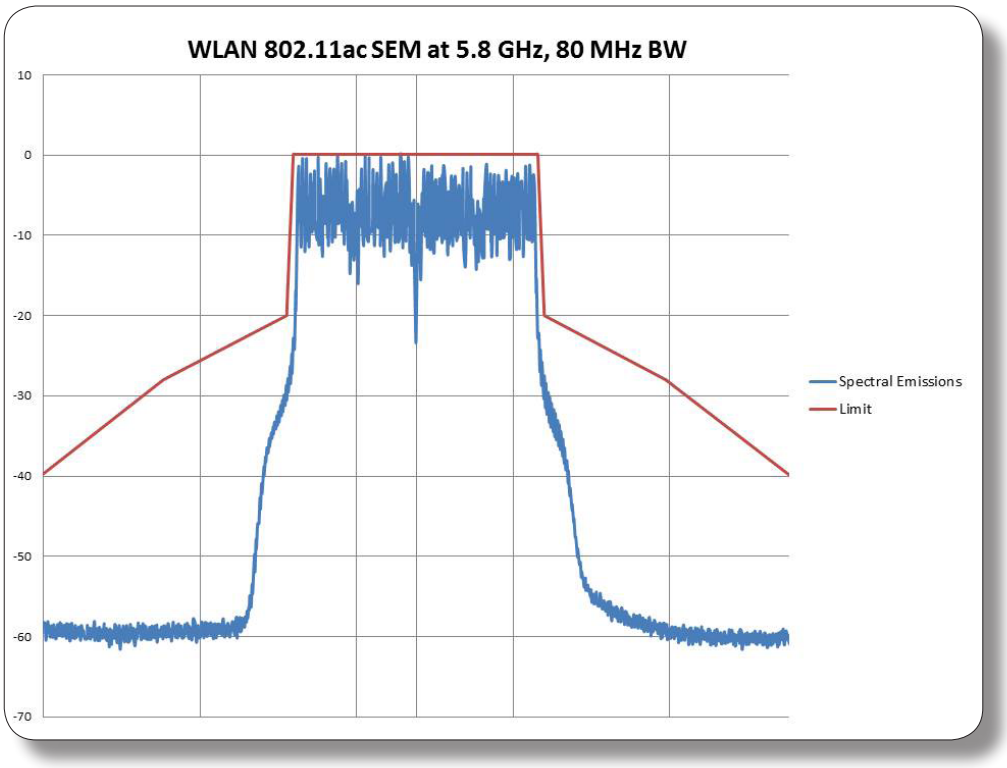


Figure 9. WLAN 802.11ac SEM at 5.8 GHz, 80 MHz bandwidth.

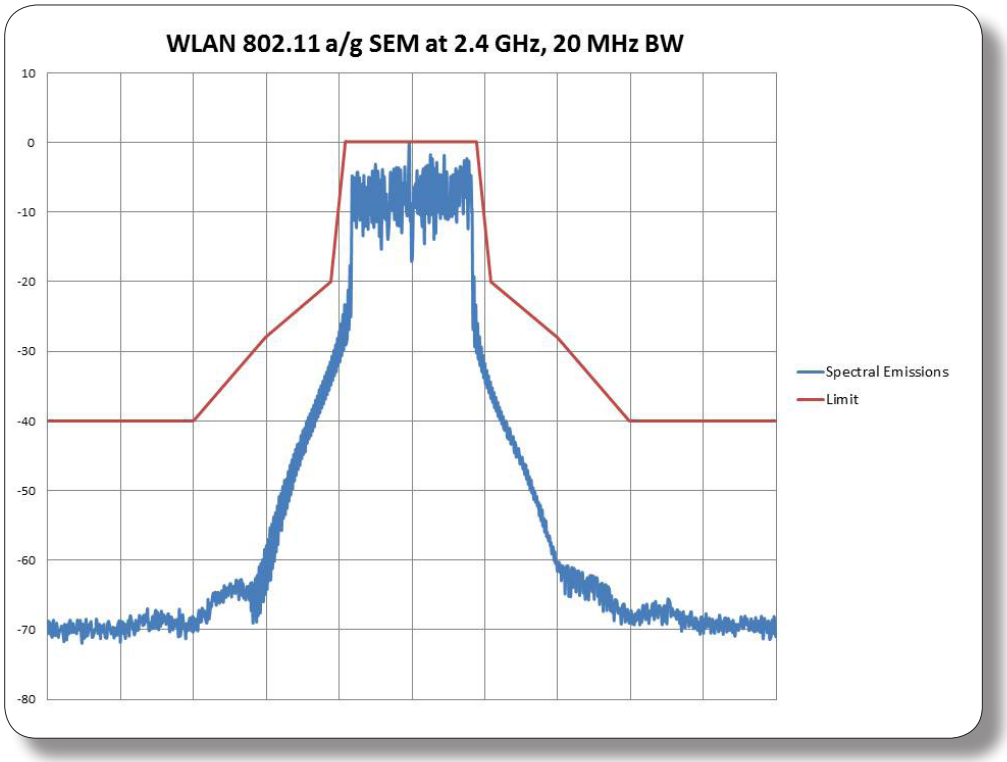


Figure 10. WLAN 802.11 a/g SEM at 2.4 GHz, 20 MHz bandwidth.

FORMAT SPECIFIC MEASUREMENT (CONT'D)

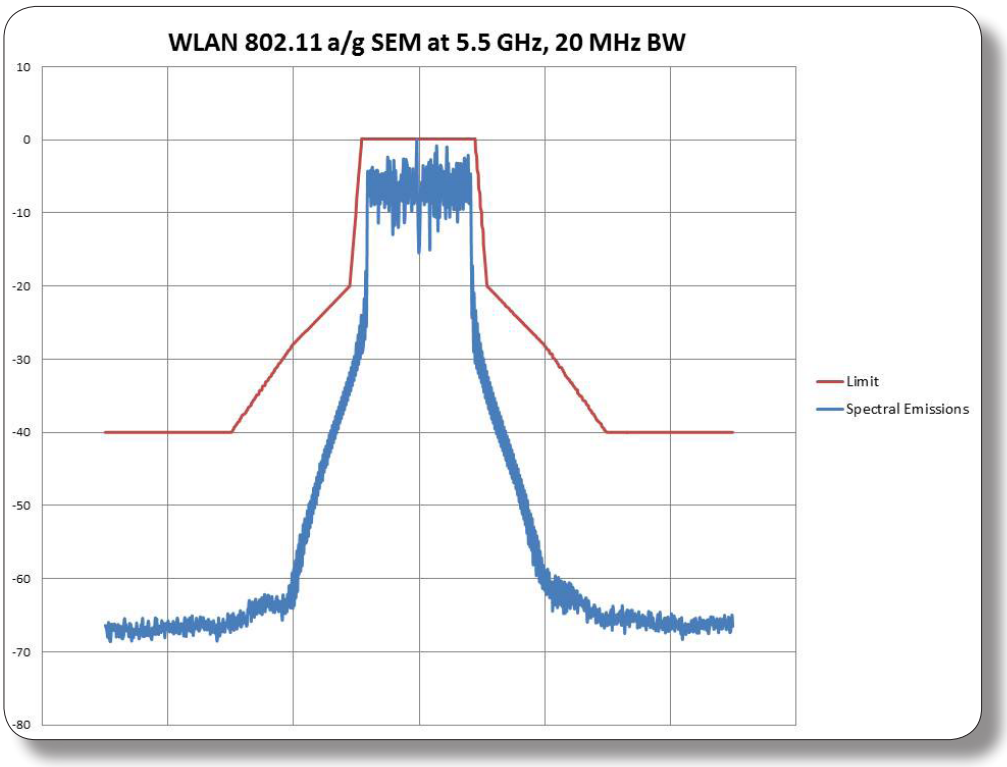


Figure 11. WLAN 802.11 a/g SEM at 5.5 GHz, 20 MHz bandwidth.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Environmental and physical specifications				
Temperature	Operating		Individual module temp 25 to 75 °C as reported by the module and environment temp of 0 to 55 °C	
	Non-operating (storage)		Environment temp of –40 to +70 °C	
Humidity [49]			Type tested at 95%, +40 °C (non-condensing)	
Shock/vibration [49]	Operating random vibration Survival random vibration Functional shock Bench handling		Type tested at 5 to 500 Hz, 0.21 g rms Type tested at 5 to 500 Hz, 2.09 g rms Type tested at half-sine, 30 g, 11 ms Type tested per MIL-PRF-28800F	
Altitude			Up to 15,000 feet (4,572 meters) [50]	
Connectors	RF In		APC 3.5 mm (f)	
EMC			Complies with European EMC Directive 2004/108/EC • IEC/EN 61326-2-1 • CISPR Pub 11 Group 1, class A • AS/NZS CISPR 11 • ICES/NMB-001 This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.	
Warm-up time			30 minutes	
Size	M9300A M9308A M9365A M9214A		1 PXIe slot 1 PXIe slot 2 PXIe slots 1 PXIe slot	
Dimensions	Module	Length	Width	Height
	M9300A	210 mm	22 mm	130 mm
	M9308A	210 mm	22 mm	130 mm
	M9365A	210 mm	44 mm	130 mm
	M9214A	210 mm	22 mm	130 mm
Weight	M9300A M9308A M9365A M9214A		0.55 kg (1.21 lbs) 0.59 kg (1.31 lbs) 1.05 kg (2.31 lbs) 0.36 kg (0.79 lbs)	
Power drawn from chassis	M9300A M9308A M9365A M9214A		≤ 18 W ≤ 37 W ≤ 50 W ≤ 35 W	

49. 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.

50. At 15,000 feet, the maximum environmental temperature is de-rated to 52 °C.

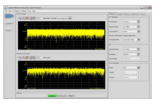
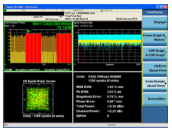
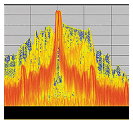
TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

System requirements	
Operating system	Windows 7 (32 & 64 bit)
Processor speed	1.5 GHz dual core (x86 or x64) minimum, 2.4 GHz recommended No support for Itanium64
Available memory	4 GB minimum 8 GB recommended
Available disk space [51]	1.5 GB available hard disk space includes: 1 GB for Microsoft .NET framework 4.0 [52] 100 MB for Agilent IO libraries suite
Video	Support for DirectX 9 graphics with 128 MB graphics recommended (SuperVGA supported)
Browser	Microsoft Internet Explorer 7.0 or greater

51. For a list of computers compatible with Agilent Technologies PXIe M9018A chassis, refer to Tested Computer Technical Note (literature no. 5990-7632EN).

52. .NET framework runtime components are installed by default with Windows Windows 7. Therefore, you may not need this amount of available disk space.

SOFTWARE

Instrument connection software			
	Agilent IO library	The IO library suite offers a single entry point for connection to the most common instruments including AXIe, PXI, GPIB, USB, Ethernet/LAN, RS-232, and VXI test instruments from Agilent and other vendors. It automatically discovers interfaces, chassis, and instruments. The graphical user interface allows you to search for, verify, and update IVI instrument and soft front panel drivers for modular and traditional instruments. The IO suite safely installs in side-by-side mode with NI I/O software.	Free software download at www.agilent.com/find/iosuite
Module setup and usage			
	Agilent soft front panel	The PXI module includes a soft front panel (SFP), a software-based graphical user interface (GUI) which enables the instrument's capabilities from your PC.	Included on CD-ROM shipped with module or online
Module management			
Agilent connection expert		Connection expert is the graphical user interface included in the IO libraries suite that allows you to search for, verify and update IVI instrument and soft front panel drivers for modular and traditional instruments	Free software download at www.agilent.com/find/iosuite
Programming			
Driver		Development environments	
IVI-COM IVI-C MATLAB		Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB	Included on CD-ROM shipped with module.
Programming assitance			
	Command expert	Assists in finding the right instrument commands and setting correct parameters. A simple interface includes documentation, examples, syntax checking, command execution, and debug tools to build sequences for integration in Excel, MATLAB, Visual Studio, VEE, and SystemVue.	Free software download at www.agilent.com/find/commandexpert
Programming examples		Each module includes programming examples for Visual Studio.net, MATLAB, and Agilent VEE Pro.	Included on CD-ROM shipped with module.
Signal analysis software			
	X-Series measurement applications for modular instruments	The X-Series measurement applications transform modular PXI VSAs into standards based RF transmitter testers. Provides conformance measurements for communications standards including : LTE, WLAN 802.11ac and others.	Licensed software. For more information, visit www.agilent.com/find/pxi-x-series_apps
	89600 VSA	89600 VSA software sees through the complexity of emerging and existing industry standards, serving as your window into complex signal interactions.	Licensed software. For more information, visit www.agilent.com/find/vsa
	SystemVue	SystemVue is a system-level EDA platform for designing communications and defense systems. Used with the M9393A, SystemVue enables you to create model-based design validation tests to ensure consistency from design to manufacturing.	Licensed software. For more information, visit www.agilent.com/find/systemvue

SETUP AND CALIBRATION SERVICES

Assistance		
One day startup assistance	Gain access to a technical expert who will help you get started quickly with the M9393A PXI Performance VSA and its powerful software tools. The flexible instruction format is designed to get you to your first measurements and familiarize you with ways to adapt the equipment to a specific application.	Included in base configuration
Calibration and traceability		
Factory calibration	The M9393A PXI Performance VSA ships factory calibrated with an ISO-9002, NIST-traceable calibration certificate.	Included in base configuration
Calibration cycle	A one year calibration cycle is recommended.	
Calibration sites	• At Agilent worldwide service xenters • On-site by Agilent • By self-maintainers	For more information visit www.agilent.com/find/infoline
N7800A calibration and adjustment software	The M9393A PXI Performance VSA is supported by Agilent's calibration and adjustment software. This is the same software used at Agilent service centers to automate calibration. The software offers compliance tests for ISO 17025:2005, ANSI/NCSL Z540.3-2006, and measurement uncertainty per ISO Guide to Expression of Measurement Uncertainty.	Licensed software. For more information, visit www.agilent.com/find/calibrationsoftware
Agilent calibration status utility	The Agilent calibration status utility helps ensure your M9393A is calibrated by managing the calibration interval and providing messages regarding instrument and module calibration status.	Included in base configuration

SUPPORT AND WARRANTY

Warranty		
Global warranty	Agilent's warranty service provides standard coverage for the country where product is used. • All parts and labor necessary to return to full specified performance • Recalibration for products supplied originally with a calibration certificate • Return shipment	Included
Standard	Return to Agilent warranty—3 years 15 days typical turnaround repair service	Included
R-51B-001-5Z	Return to Agilent warranty—5 years 15 days typical turnaround repair service	Optional
R-51B-001-3X Express warranty 3 years	The express warranty upgrades the global warranty to provide, for 3 years, a 5 day typical turnaround repair service in the US, Japan, China and many EU countries.	Optional
R-51B-001-5X Express warranty 5 years	The express warranty upgrades the global warranty to provide, for 5 years, a 5 day typical turnaround repair service in the US, Japan, China and many EU countries.	Optional
Support		
Core exchange program	Agilent's replacement core exchange program allows fast and easy module repairs. A replacement core assembly is a fully functioning pre-calibrated module replacement that is updated with the defective module serial number, allowing the replacement module to retain the original serial number.	For qualified self-maintainers in US only
Self-test utility	A self-test utility runs a set of internal tests which verifies the health of the modules and reports their status.	Included in base configuration

CONFIGURATION AND ORDERING INFORMATION

Ordering information

Model	Description
M9393A	PXIe performance vector signal analyzer: 9 kHz to 8.4, 14, 18, or 27 GHz Includes: M9308A PXIe synthesizer M9365A PXIe downconverter M9214A PXIe IF digitizer One day startup assistance Module interconnect cables Software, example programs and product information on CD Return to Agilent warranty—3 Years
Base configuration	
M9393A-F08	Frequency range: 9 kHz to 8.4 GHz
M9393A-B04	Analysis bandwidth, 40 MHz
M9393A-M01	Memory, 128 MSa
M9393A-300 Required for warranted specifications	PXIe frequency reference: 10 and 100 MHz Adds M9300A PXIe frequency reference: 10 and 100 MHz (M9300A module can support multiple M9393A modular instruments)

For a complete list of of the M9393A PXI Performance VSA product options, please consult the M9393A configuration guide, literature number 5991-4580EN.

Configurable options	
Frequency	
M9393A-F14	9 kHz to 14 GHz
M9393A-F18	9 kHz to 18 GHz
M9393A-F27	9 kHz to 27 GHz
Switching speed	
M9393A-UNZ	Fast tuning
Analysis bandwidth	
M9393A-B10	100 MHz
M9393A-B16	160 MHz
Memory	
M9393A-M05	512 MSa
M9393A-M10	1024 MSa
Pre-amplifier	
M9393A-P08	8.4 GHz preamplifier
M9393A-P14	14 GHz preamplifier
M9393A-P18	18 GHz preamplifier
M9393A-P27	27 GHz preamplifier
Other	
M9393A-UK6	Commercial calibration certificate with test data for M9393A (M9308A, M9365A, M9214A)
M9300A-UK6	Commercial calibration certificate with test data for M9300A (module only)
Related products in recommended configuration	
M9037A	PXIe embedded controller
M9018A	18-slot PXIe chassis

CONFIGURATION AND ORDERING INFORMATION

Software information

Supported operating systems	Microsoft Windows 7 (32/64-bit)
Standard compliant drivers	IVI-COM, IVI-C, MATLAB
Supported application development environments (ADE)	VisualStudio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Agilent IO libraries (version 16.3 or newer)	Includes: VISA libraries, Agilent Connection Expert, IO monitor
Agilent Command Expert	Instrument control for SCPI or IVI-COM drivers
89600 VSA Software (version 17.21 or newer)	89601B-200 Basic VSA software 89601B-300 Hardware connectivity 89601B-SSA Spectrum analysis 89601B-AYA digital demodulation 89601B-BHF Custom OFDM 89601B-B7T cdma2000®/1xEV-DO 89601B-B7U W-CDMA/HSPA+ 89601B-B7R WLAN 802.11a/b/g/j/p 89601B-BHJ WLAN 802.11ac MIMO 89601B-B7X TD-SCDMA 89601B-BHD LTE FDD 89601B-BHG LTE FDD - Advanced 89601B-BHE LTE TDD 89601B-BHH LTE TDD - Advanced 89601B-B7W 1xEV-DO 89601B-B7R 3G bundle 89601B-BHC RFID 89601B-BHK Custom IQ
X-Series Measurement Applications for Modular Instruments transportable perpetual license.	M9063A Analog M9064A VXA Vector Signal Analysis M9071A GSM/EDGE/Evo M9072A cdma2000®/cdmaOne M9073A W-CDMA/HSPA+ M9076A 1xEV-DO M9077A WLAN 802.11a/b/g/n/ac M9079A TD-SCDMA/HSDPA M9080B LTE/LTE-A FDD M9081A *Bluetooth*® M9082B LTE/LTE-A TDD

Accessories

Model	Description
Y1212A	Slot blocker kit: 5 modules
Y1213A	PXI EMC filler panel kit: 5 slots
Y1214A	Air inlet kit: M9018A 18-slot chassis
Y1215A	Rack mount kit: M9018A 18-slot chassis

Related products

Model	Description
M9381A	PXIe vector signal generator
M9380A	PXIe CW source
M9300A	PXIe frequency reference
M9021A	PCIe cable interface
M9045B	PCIe express card adaptor for laptop connectivity
Y1200B	PCIe cable for laptop connectivity
M9048A	PCIe desktop adaptor for desktop connectivity
Y1202A	PCIe cable for desktop connectivity

Advantage services: Calibration and warranty	
Agilent Advantage Services is committed to your success throughout your equipment's lifetime	
R-51B-001-5Z	Return to Agilent warranty - 5 years
R-51B-001-3X	Express warranty - 3 years
R-51B-001-5X	Express warranty - 5 years
N7800A	Calibration & adjustment software

The modular tangram

The four-sided geometric symbol that appears in this document is called a tangram. The goal of this seven-piece puzzle is to create identifiable shapes—from simple to complex. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements—hardware, software—Agilent can help you create the system you need, from simple to complex.

Challenge the Boundaries of Test

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Product specifications and descriptions in this document subject to change without notice.

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