

Keysight Technologies

M9389A PXIe Vector Network Analyzer Source

1 MHz to 6 GHz

Data Sheet



Overview

The Keysight Technologies, Inc. M9389A PXIe vector network analyzer source is a component for the M9485A PXIe vector network analyzer. The M9485A provides a true multiport VNA with up to 12-ports in one chassis.

For more information, see <http://www.keysight.com/find/pxivna>



Figure 1. M9389A PXIe VNA source consists of the following two modules: M9309A PXIe VNA synthesizer and M9310A PXIe source output.

Technical Specifications and Characteristics

Block diagram

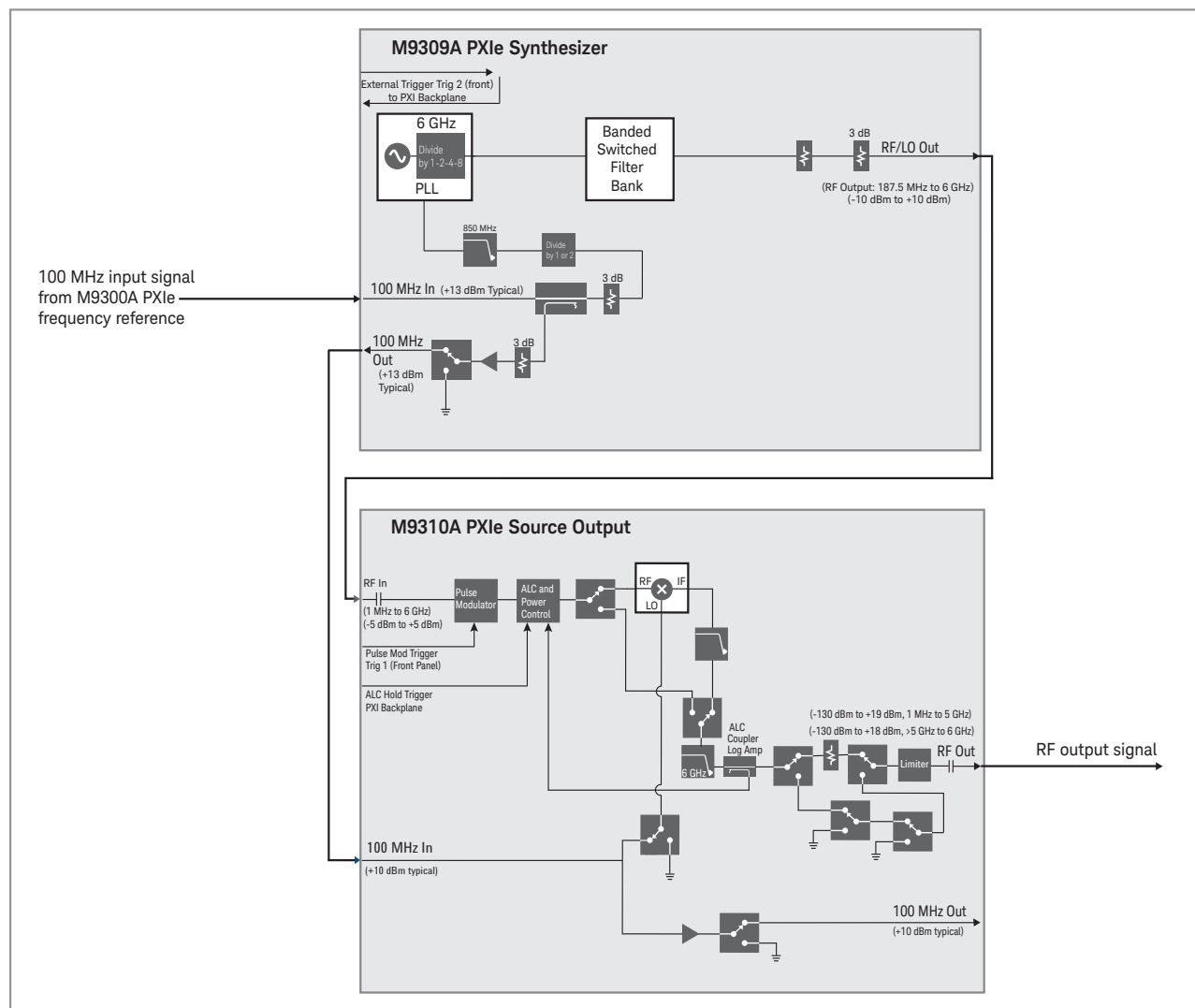


Figure 2. M9389A PXIe VNA source block diagram with two modules: the M9309A PXIe VNA synthesizer and M9310 PXIe source output.

Technical Specifications and Characteristics

Definitions for specifications

Temperatures referred to in this document are defined as follows:

- Full temperature range = Individual module temperature of $\leq 75^{\circ}\text{C}$ as reported by the module, and environment temperature of 0 to 55°C .
- Controlled temperature range = Individual module temperature of $\leq 55^{\circ}\text{C}$ 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 under the following conditions unless otherwise noted.

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

Characteristics describe product performance that is useful in the application of the product. 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.

Recommended best practices in use

- Use slot blockers and EMC filler panels in empty module slots to ensure proper operating temperatures. Keysight chassis and slot blockers optimize module temperature performance and reliability of test.
- Set chassis fan to high at environmental temperatures above 45°C .

Additional information

- All graphs contain measured data from one unit and are representative of product performance within the controlled temperature range unless otherwise noted.
- The specifications contained in this document are subject to change.
- The M9389A is only intended for use as part of the M9485A PXIe vector network analyzer. It is not intended to be used as a standalone instrument.

Technical Specifications and Characteristics

Frequency

Frequency	
Range	1 MHz to 6 GHz
Resolution	0.01 Hz
Switching speed ¹	< 5 ms, nominal

Amplitude

Output parameters				
Settable range	+20 to -130 dBm			
Resolution				
ALC on ²	0.02 dB, nominal			
ALC off	0.3 dB, nominal			
Maximum output power				
1 MHz to 5 GHz	+19 dBm			
> 5 to 6 GHz	+18 dBm			
Absolute level accuracy in CW mode [ALC on] ³				
Frequency	< Max power to -20 dBm	< -20 to -110 dBm	< -110 to -120 dBm	< -120 to -130 dBm
1 MHz to 3 GHz	± 0.4 dB ± 0.15 dB, typical	± 0.5 dB ± 0.15 dB, typical	± 0.7 dB ± 0.25 dB, typical	± 0.8 dB, nominal
> 3 to 6 GHz	± 0.5 dB ± 0.15 dB, typical	± 0.6 dB ± 0.25 dB, typical	± 1.0 dB ± 0.5 dB, typical	± 0.8 dB, nominal

1. Mean time from IVI command to carrier frequency settled within 1 ppm or 1 kHz whichever is greater and amplitude settled within 0.2 dB (at the controlled temperature range) or within 0.5 dB (at the full temperature range). If the ALC is off, the settle limit is 0.5 dB above +10 dBm (at the controlled temperature range). Simultaneous carrier frequency and amplitude switching.
2. Settable to 0.01 dB.
3. Specifications apply within the controlled temperature range. For temperatures outside this range, absolute level accuracy degrades by ± 0.02 dB/°C.

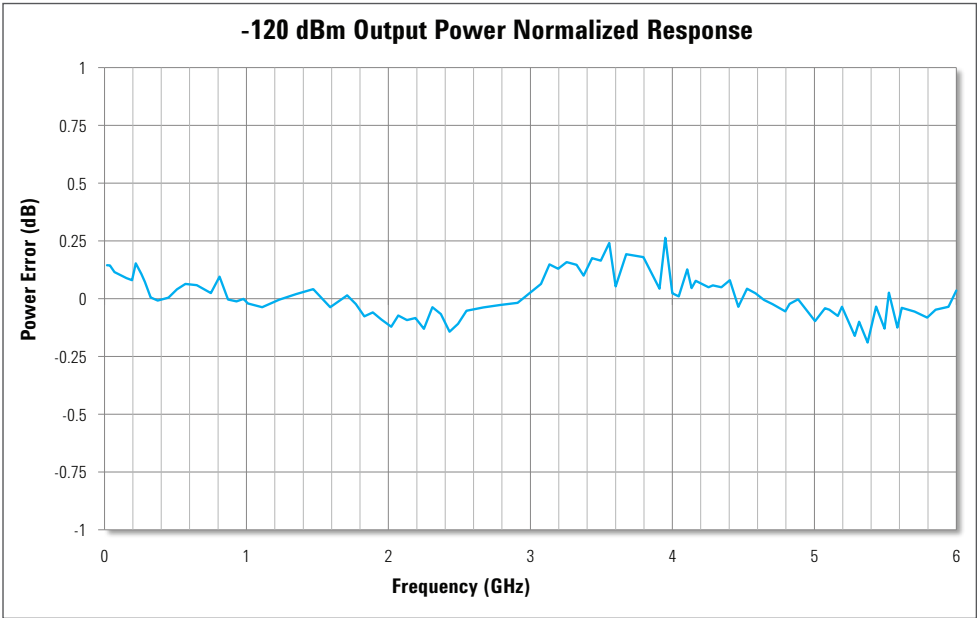


Figure 3. Output power normalized response at -120 dBm.

Technical Specifications and Characteristics

Amplitude (continued)

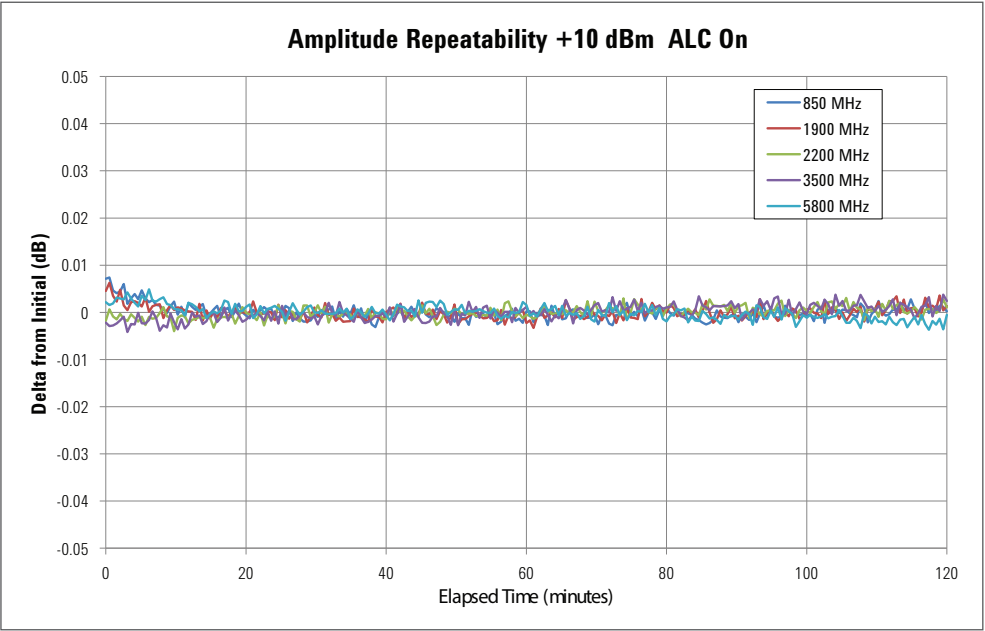


Figure 4. Amplitude repeatability at various carrier frequencies. Repeatability measures the ability of the instrument to return to a given power setting after a random excursion to any other frequency and power setting. It should not be confused with absolute level accuracy.

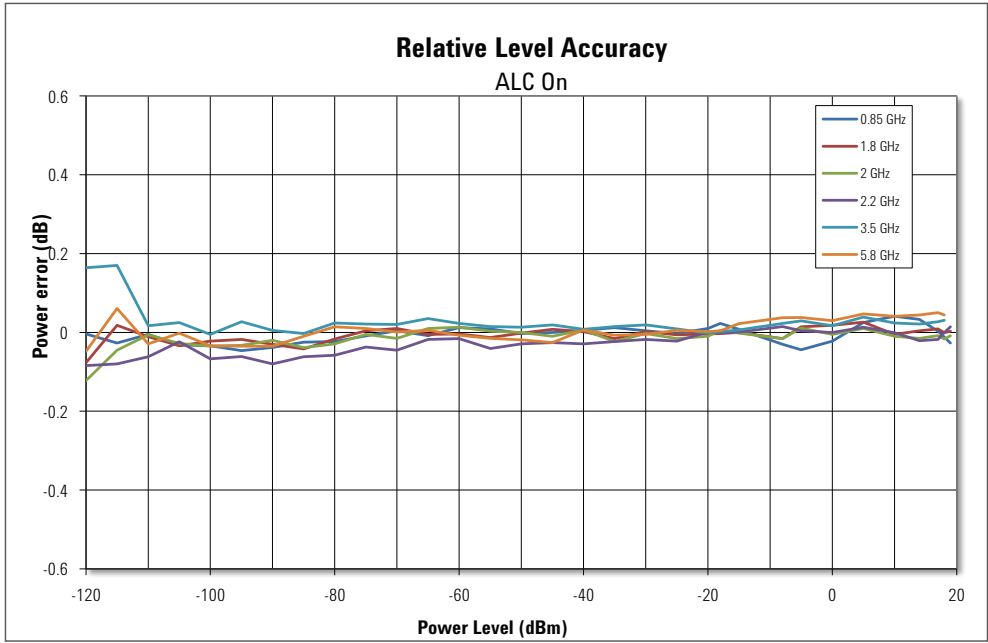


Figure 5. Relative level accuracy at various carrier frequencies.

Technical Specifications and Characteristics

Amplitude (continued)

VSWR	
1 MHz to 6 GHz	< 1.5:1, nominal
Maximum reverse power	
1 MHz to 6 GHz	1 W, nominal
Max DC voltage	25 VDC, nominal

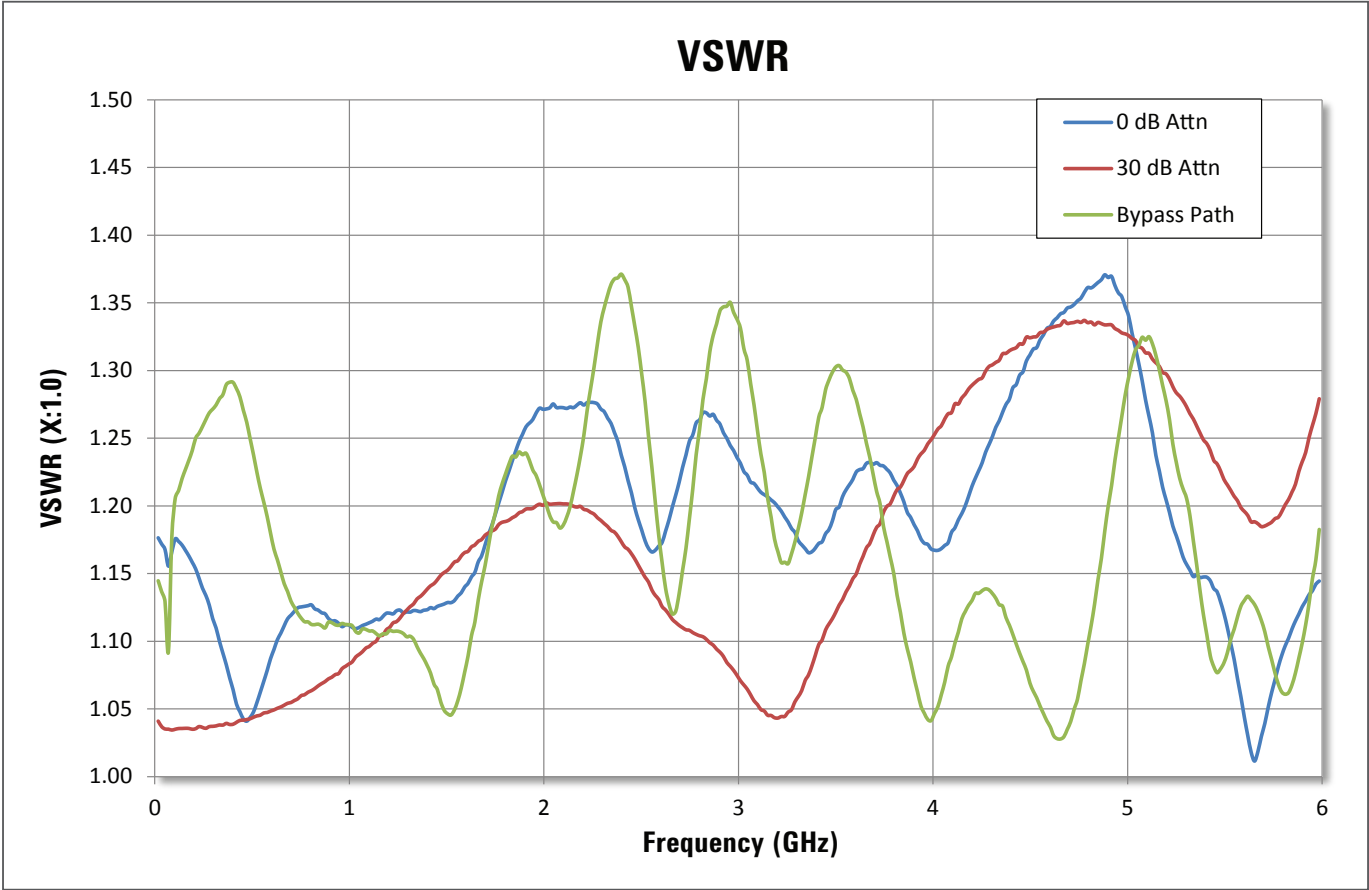


Figure 6. Measured VSWR from 1 MHz to 6 GHz.

Technical Specifications and Characteristics

Spectral purity

Phase noise	20 kHz offset
1 GHz	-124 dBc/Hz, typical
2 GHz	-119 dBc/Hz, typical
3 GHz	-114 dBc/Hz, typical
6 GHz	-109 dBc/Hz, typical

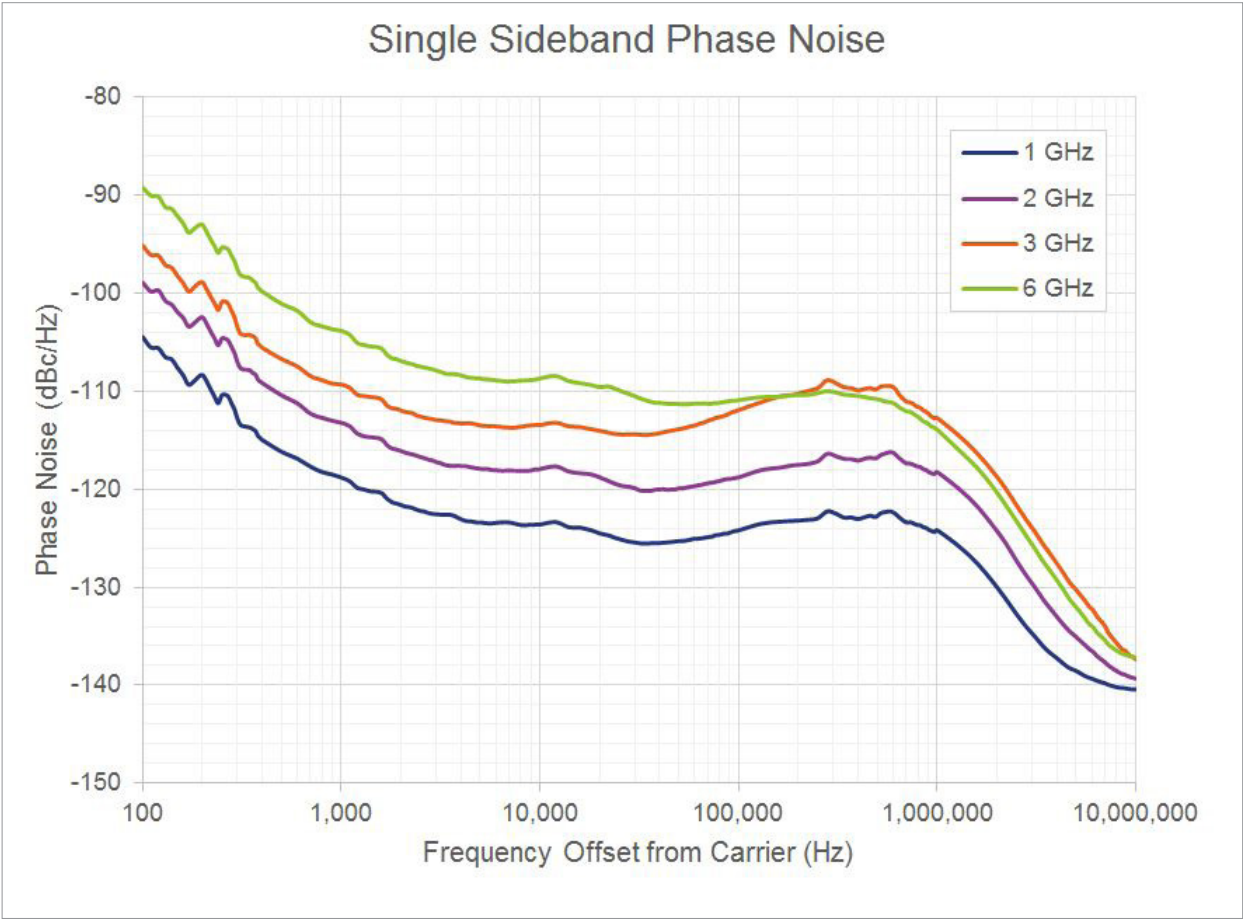


Figure 7. Single sideband phase noise from 100 Hz to 10 MHz offsets, at 1, 2, 3 and 6 GHz RF frequencies.

Technical Specifications and Characteristics

Spectral purity (continued)

Broadband noise floor				
Range				
1 MHz to 6 GHz		< -140 dBc/Hz, nominal, at +10 dBm output power level		
Harmonics				
Range	≤ 0 dBm		≤ +10 dBm	
1 MHz to < 400 MHz	< -43 dBc	-46 dBc, typical	< -35 dBc	-37 dBc, typical
400 MHz to 1.5 GHz	< -29 dBc	-31 dBc, typical	< -27 dBc	-29 dBc, typical
> 1.5 GHz to 3 GHz	< -35 dBc	-39 dBc, typical	< -30 dBc	-33 dBc, typical
Nonharmonics ¹				
Nonharmonic miscellaneous spurious ²		< -70 dBc, nominal		
Nonharmonic HET band mixing spurs (0 dBm)		< -67 dBc, nominal		
Nonharmonic Frac-N		< -66 dBc, nominal		
Subharmonics				
1 MHz to 6 GHz		none		

Analog modulation

Pulse parameters	
Pulse on/off ratio 1 MHz to 400 MHz	> 85 dB, typical
Pulse on/off ratio > 400 MHz to 6 GHz	> 95 dB, typical
Pulse rise/fall time	< 10 ns, nominal

System requirements

Topic	
Operating systems	Windows 7 (32-bit and 64-bit)
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64) (no support for Itanium 64)
Available memory	4 GB minimum 8 GB or greater recommended
Available disk space ³	1.5 GB available hard disk space, includes: – 1 GB available for Microsoft .NET framework 3.5 SP1 ⁴ – 100 MB for Keysight IO libraries suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)
Browser	Microsoft Internet Explorer 7.0 or greater
Keysight IO libraries	Version 16.3.16603.3 or later

1. Non-harmonics include mixing spurs for frequencies below 400 MHz, synthesizer spurs, and other miscellaneous chassis and power supply products, for offsets >10 kHz.
2. With a Keysight M9036A embedded controller.
3. Because of the installation procedure, less memory may be required for operation than is required for installation.
4. .NET framework runtime components are installed by default with Windows 7. Therefore, you may not need this amount of available disk space.

Technical Specifications and Characteristics

Environmental and physical specifications

Temperature	Operating Non-operating (storage)	0 to 55 °C -40 to +70 °C		
Humidity ¹		Type tested at 95%, +40 °C (non-condensing)		
Altitude		Up to 15,000 feet (4,572 meters)		
Connectors	RF OUT	SMA female		
EMC	Complies with the essential requirements of the European EMC Directive as well as the current editions of the following standards (dates and editions are cited in the Declaration of Conformity): – IEC/EN 61326-1 – 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		45 minutes		
Size	M9309A M9310A	1 PXIe slot 1 PXIe slot		
	Module	Length	Width	Height
Dimensions	M9309A	210 mm	22 mm	130 mm
	M9310A	210 mm	22 mm	130 mm
Weight	M9309A M9310A	0.535 kg (1.179 lbs) 0.551 kg (1.215 lbs)		
Power drawn from chassis	M9309A M9310A	≤ 22 W ≤ 28 W		

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

Software

Instrument connection software



Keysight
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 Keysight 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.keysight.com/find/iosuite

Setup and Calibration Services

Calibration and traceability

Factory calibration	The M9389A PXIe VNA source 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 Keysight worldwide service centers – On-site by Keysight – By self-maintainers	For more information visit www.keysight.com/find/infoline
N7800A calibration and adjustment software	The M9389A PXIe VNA source is supported by Keysight's calibration and adjustment software. This is the same software used at Keysight 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.keysight.com/find/calibrationsoftware
Keysight calibration status utility	The Keysight calibration status utility helps ensure your M9309A is calibrated by managing the calibration interval and providing messages regarding instrument and module calibration status.	Included in base configuration

Support

Support		
Core exchange program	Keysight'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

Configurations and Ordering Information

Ordering information

Model	Description
M9389A	PXIe VNA source: 1 MHz to 6 GHz includes: M9309A PXIe VNA synthesizer M9310A PXIe source output Module interconnect cables

Calibration

Advantage services: Calibration	
Keysight Advantage Services is committed to your success throughout your equipment's lifetime	
N7800A	Calibration & adjustment software

Related products

Model	Description
M9485A	PXIe vector network analyzer
M9018A	PXIe 18-slot chassis
M9037A	PXIe embedded controller
M9309A	PXIe VNA synthesizer
M9300A	PXIe frequency reference

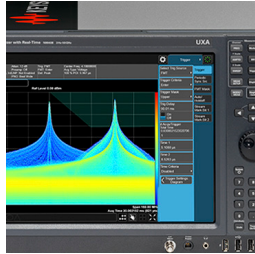
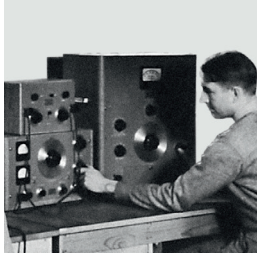
Accessories

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 for M9018A 18-slot chassis

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