Keysight Technologies

M9380A PXIe CW Source

1 MHz to 3 GHz or 6 GHz

Data Sheet

KEYSIGHT TECHNOLOGIES

Overview

Introduction

With high-power levels and accurate measurements, the M9380A CW source provides the Keysight Technologies, Inc. quality and performance in the PXI form factor—a trusted Keysight product with global services and support, fast repair and a wide scope of calibration utilities.

Product description

The M9380A PXIe CW source is a compact modular solution that provides frequency coverage from 1 MHz to 3 or 6 GHz. A typical M9380A configuration includes three individual PXIe modules—M9310A source output, M9301A synthesizer and the M9300A frequency reference—designed for fast data interfaces and high-speed automated test systems. Instrument control is provided through a soft front panel and programmatic interfaces tuned to your application development environment of choice.

Product features

- Frequency coverage from 1 MHz to 3 or 6 GHz
- Output power of +18 dBm across the frequency range
- Output power level of +19 dBm from 1 MHz to 5 GHz
- Better than ±0.4 dB absolute amplitude accuracy
- License key upgraded frequency range and output power
- One day startup assistance
- Return to Keysight warranty—3 years
- Chassis slot compatibility: PXIe slot

Uncompromising values

- Keeps costs manageable—purchase what you need today and easily upgrade later using license-key upgrades without returning your modules to Keysight.
- Reduces development time and simplifies integration into existing test environments with multiple drivers and programmatic interfaces.
- Reduces startup time with Keysight IO libraries easy configuration, one-step software install, and integrated instrument level CW source soft front panel.
- Fast repair turnaround time with calibrated core exchange strategy.

Applications

- Aerospace and defense
- Interference injection
- LO substitution
- Wireless component test

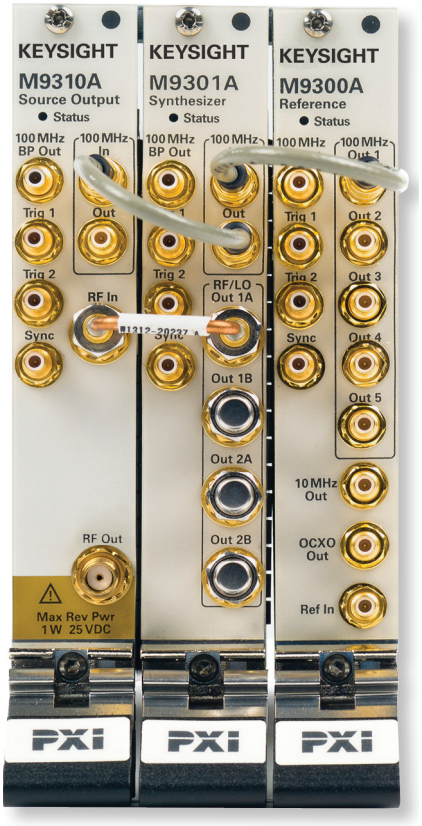

Figure 1. M9380A PXIe CW source with three modules consisting of the M9310A PXIe source output, M9301A PXIe synthesizer, and M9300A PXIe frequency reference.

Technical Specifications and Characteristics

Block diagram

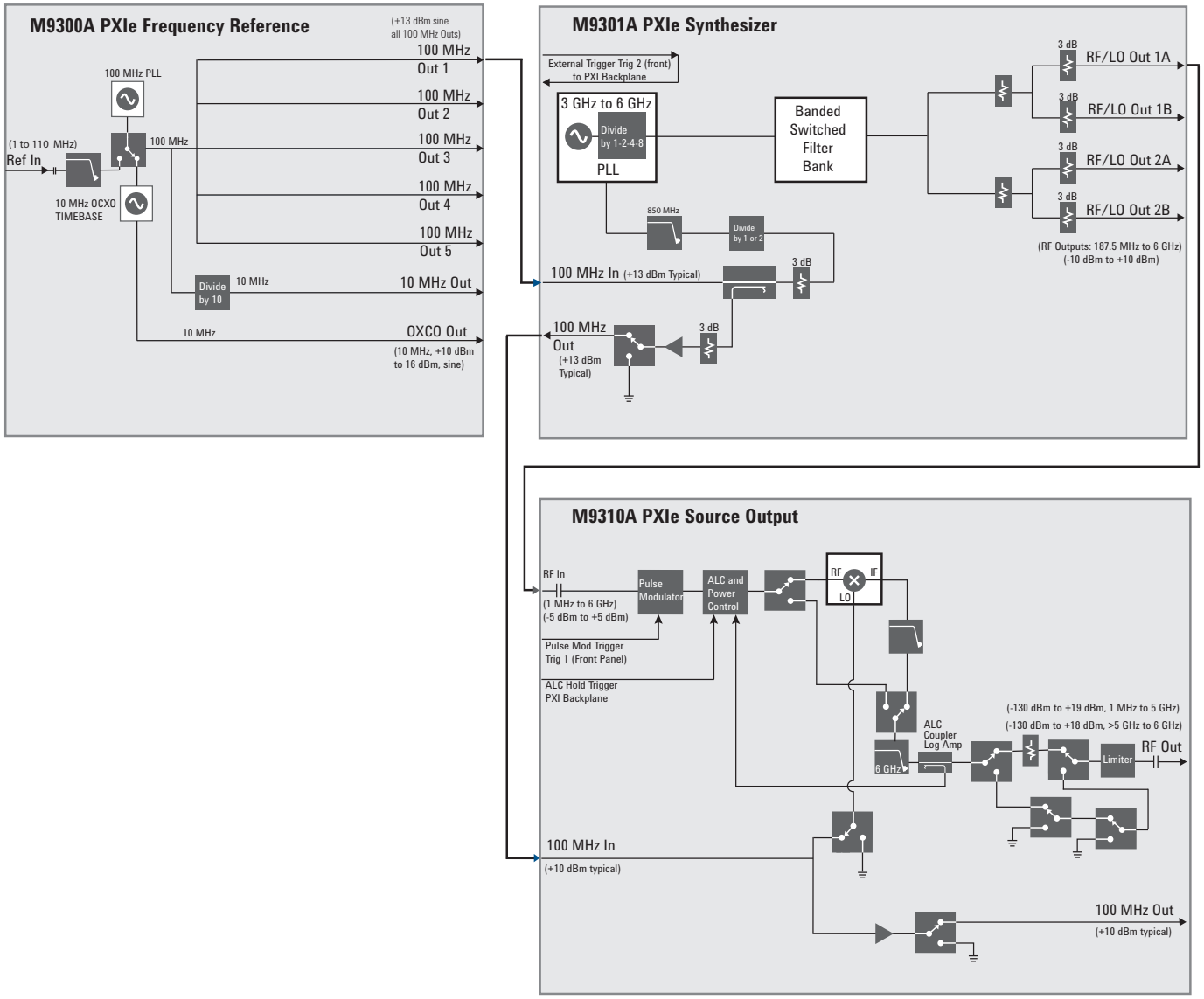

Figure 2. M9380A PXIe CW source with three modules consisting of the M9300A PXIe frequency reference, M9301A PXIe synthesizer and M9310A PXIe source output.

Technical Specifications and Characteristics

Definitions for specifications

Temperatures referred to in this document are defined as follows:

- Full temperature range = Individual module temperature of ≤ 75 °C, as reported by the module, and environment temperature of 0 to 55 °C.
- Controlled temperature range = Individual module temperature of ≤ 55 °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
- 45 minute warm-up time
- Calibration cycle maintained
- When used with Keysight M9300A frequency reference
- When used with Keysight interconnection 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.

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.
- At environment temperatures above 45 °C, chassis fan should be set to high.

Additional information

- All graphs contain measured data from one unit and is representative of product performance at the controlled temperature range unless otherwise noted.
- The specifications contained in this document are subject to change.

Technical Specifications and Characteristics (continued)

Frequency

Frequency range		
Option F03	1 MHz to 3 GHz	
Option F06	1 MHz to 6 GHz	
Resolution	0.01 Hz	
Frequency switching speed [1]		
	≤ 5 ms, nominal	
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*	

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). Simulataneous carrier frequency and amplitude switching.

Technical Specifications and Characteristics (continued)

Frequency (continued)

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 hour warm-up*
Yearly	*< ±0.1 ppm/year, after 72 hours warm-up*
Total 10 years	*< ±0.6 ppm/10yrs, after 72 hours 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 MHz 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 (continued)

Amplitude

Output parameters				
Settable range	**Standard**		**Option 1EA**	
	+10.7 to -130 dBm		+20 to -130 dBm	
Resolution				
ALC on [1]	*0.02 dB, nominal*			
ALC off	*0.3 dB, nominal*			
Maximum output power				
Frequency	Standard	Option 1EA		
1 MHz to 5 GHz	+10 dBm	+19 dBm		
> 5 to 6 GHz	+10 dBm	+18 dBm		
Absolute level accuracy in CW mode [ALC on] [2]				
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. Settable to 0.01 dB.
2. Specifications apply at the controlled temperature range. For temperatures outside this range, absolute level accuracy degrades by ± 0.02 dB/°C.

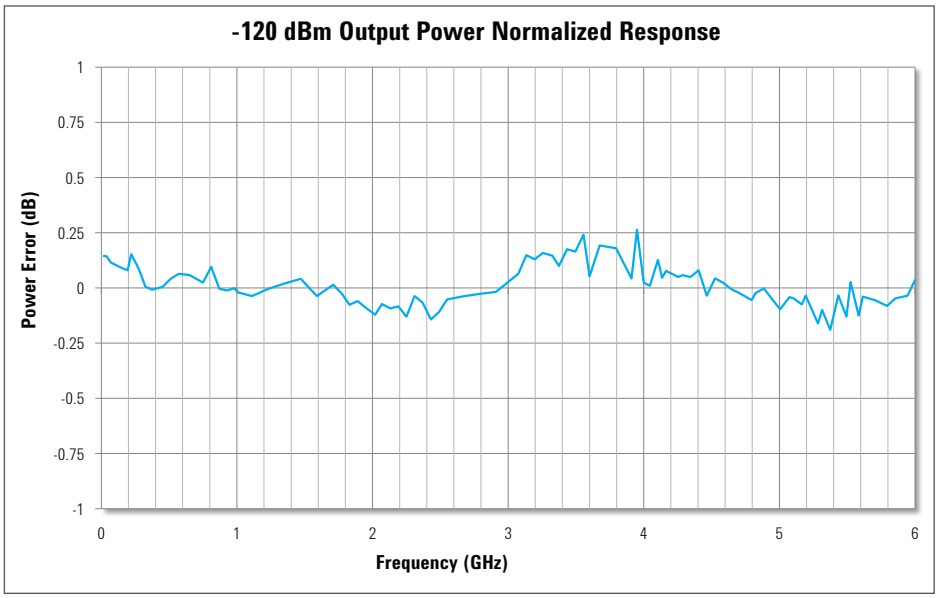

Figure 3. Output power normalized response at –120 dBm.

Technical Specifications and Characteristics (continued)

Amplitude (continued)

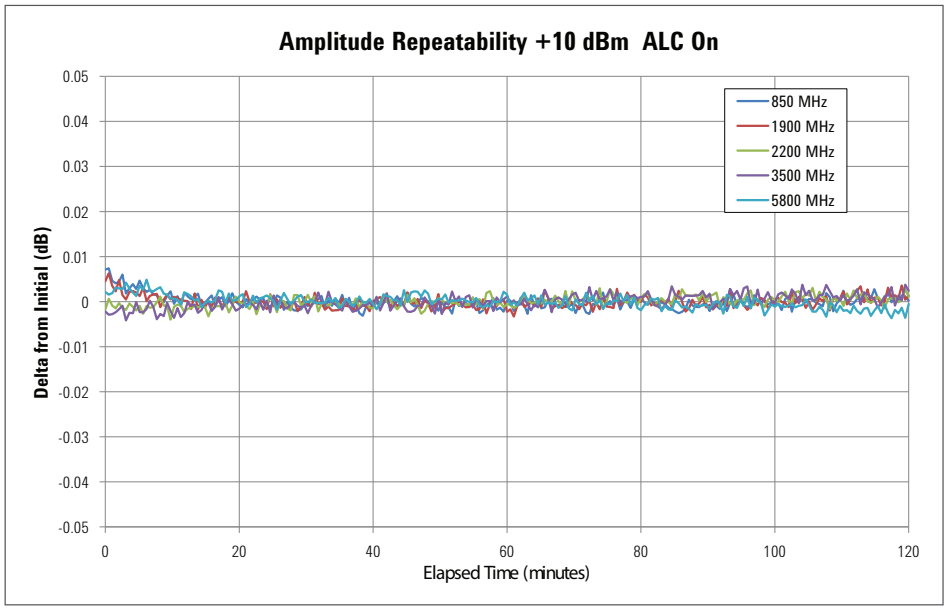

Figure 4. Amplitude repeatability at various carrier frequencies. Repeatability measures the ability of the instrument to return to a given power setting after a random excursion to any other frequency and power setting. It should not be confused with absolute level accuracy.

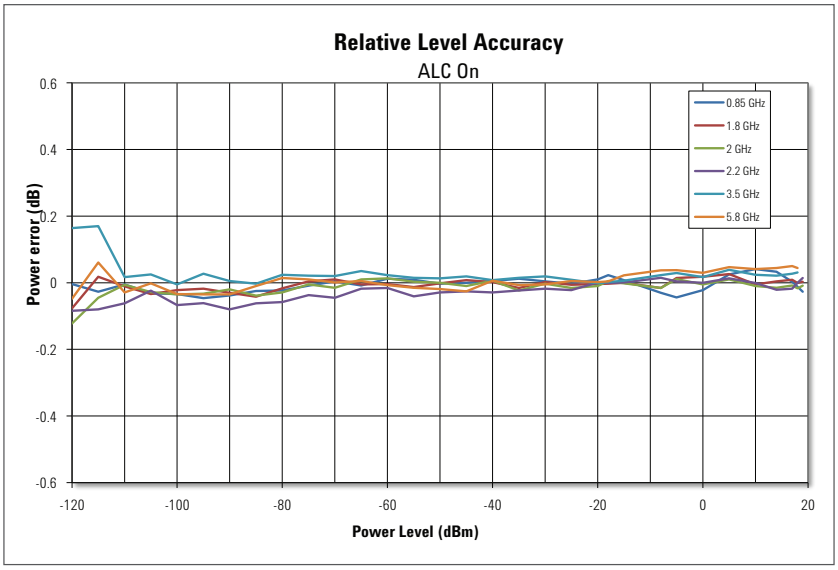

Figure 5. Relative level accuracy at various carrier frequencies.

Technical Specifications and Characteristics (continued)

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*

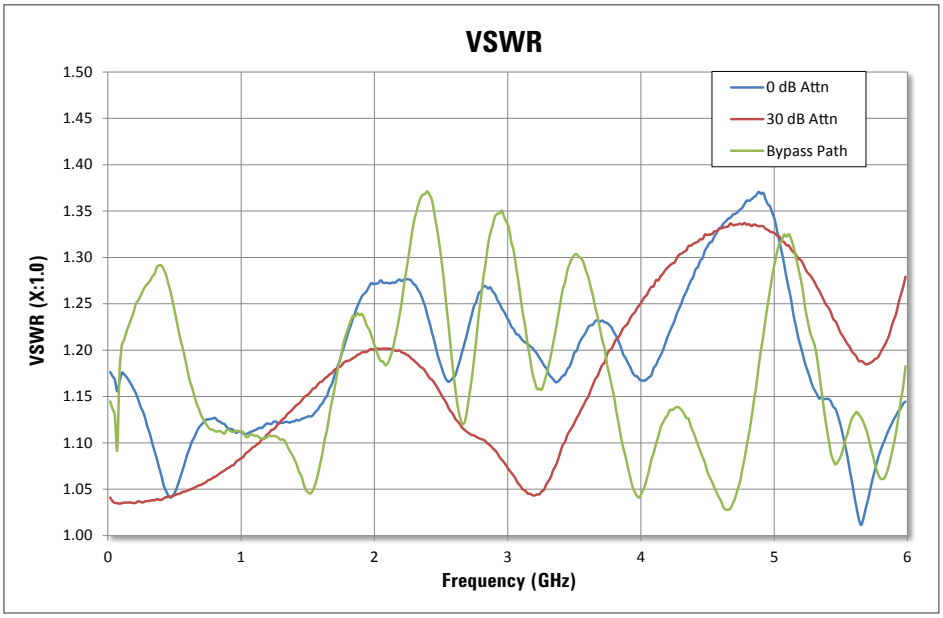

Figure 6. Measured VSWR from 1 MHz to 6 GHz.

Technical Specifications and Characteristics (continued)

Spectral purity

Phase noise at 20 kHz offset	
1 GHz	*-122 dBc/Hz, typical*
2 GHz	*-117 dBc/Hz, typical*
3 GHz	*-112 dBc/Hz, typical*
6 GHz	*-108 dBc/Hz, typical*

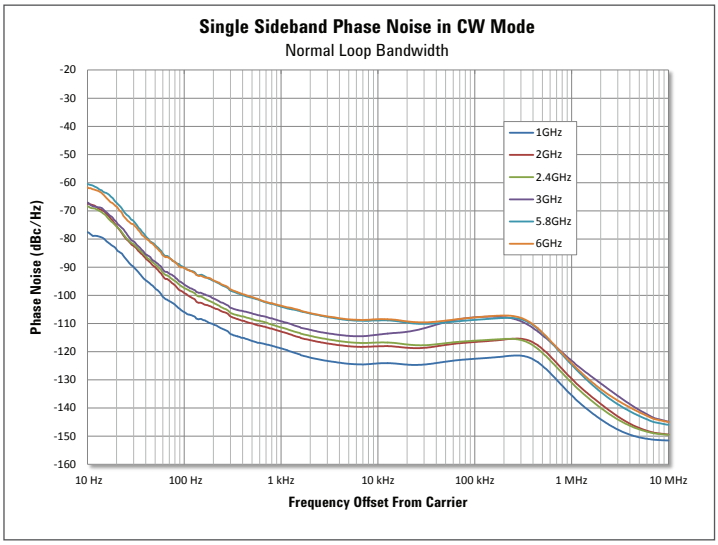

Figure 7. Single sideband phase noise in normal loop bandwidth from 10 Hz to 10 MHz, offset at 1, 2, 2.4, 3, 5.8, and 6 GHz.

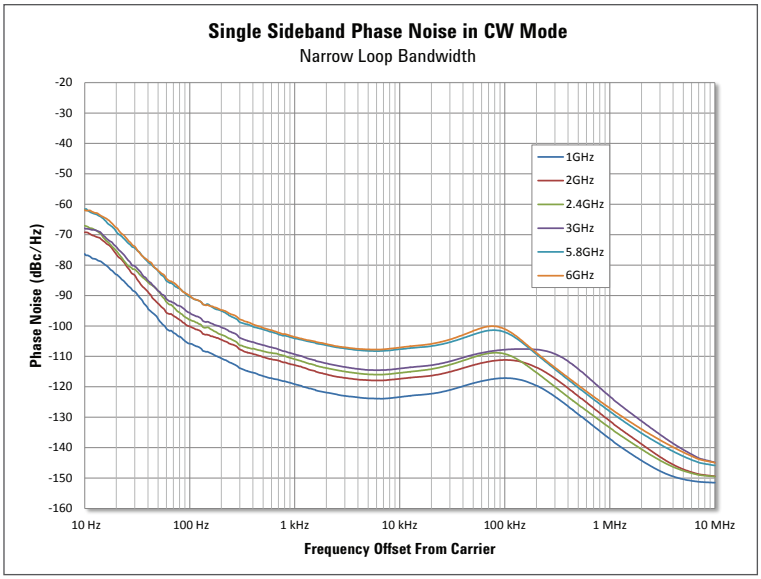

Figure 8. Single sideband phase noise in narrow loop bandwidth from 10 Hz to 10 MHz, offset at 1, 2, 2.4, 3, 5.8, and 6 GHz.

Technical Specifications and Characteristics (continued)

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	**Windows 7 requirements**
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 Windows 7. Therefore, you may not need this amount of available disk space.

Technical Specifications and Characteristics (continued)

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 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			45 minutes	
Size	M9300A M9301A M9310A		1 PXIe slot 1 PXIe slot 1 PXIe slot	
Dimensions	**Module**	**Length**	**Width**	**Height**
	M9300A	210 mm	22 mm	130 mm
	M9301A	210 mm	22 mm	130 mm
	M9310A	210 mm	22 mm	130 mm
Weight	M9300A M9301A M9310A		0.551 kg (1.215 lbs) 0.535 kg (1.179 lbs) 0.551 kg (1.215 lbs)	
Power drawn from chassis	M9300A M9301A M9310A		≤ 18 W ≤ 25 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 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
Module setup and usage			
	Keysight 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
Programming			
Driver		**Development environments**	
IVI-COM IVI-C LabVIEW MATLAB		Visual Studio (VB.NET, C#, C/C++), VEE LabVIEW, LabWindows/CVI, MATLAB	Included on CD-ROM shipped with module or online
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, LabVIEW, VEE, SystemVue.	Free software download at www.keysight.com/find/commandexpert
Programming examples		Each module includes programming examples for Visual Studio.net, LabVIEW, MATLAB, LabWindows, and Keysight VEE Pro.	Included on CD-ROM shipped with module or online at www.keysight.com/find/m9380a

Setup and Calibration Services

Assistance		
One day startup assistance	Gain access to a technical expert who will help you get started quickly with the M9380A CW source 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 M9380A CW 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	More information visit www.keysight.com/find/infoline
N7800A Calibration and adjustment software	The M9380A CW 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 M9380A 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	Keysight'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 Keysight warranty–3 years 15 days typical turnaround repair service	Included
R-51B-001-5Z	Return to Keysight 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	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

Configuration and Ordering Information

Ordering information

Model	Description
M9380A	PXIe CW source: 1 MHz to 3 or 6 GHz Includes: M9301A PXIe Synthesizer M9310A PXIe Source Output One day startup assistance Module interconnect cables Software, example programs and product information on CD Return to Keysight Warranty–3 Years
Base configuration	
M9380A-F03	Frequency range: 1 MHz to 3 GHz
M9380A-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 M9380A modular instruments)
Configurable options	
Frequency range	
M9380A-F03	1 MHz to 3 GHz
✓ M9380A-F06	1 MHz to 6 GHz
Power	
✓ M9380A-1EA	High output power
Calibration	
M9380A-UK6	Commercial calibration certificate with test data for M9380A (M9301A, M9310A)
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

✓ Recommended configuration

Software information

Supported operating systems	Microsoft Windows 7 (32/64-bit)
Standard compliant drivers	IVI-COM, IVI-C, LabVIEW, MATLAB
Supported application development environments (ADE)	VisualStudio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Keysight IO libraries (version 16.3 or newer)	Includes: VISA Libraries, Keysight Connection Expert, IO Monitor
Keysight Command expert	Instrument control for SCPI or IVI-COM drivers

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

Related products

Model	Description
M9021A	PCIe cable interface
M9045B	PCIe ExpressCard adaptor for laptop connectivity
Y1200B	PCIe cable for laptop connectivity
M9048A	PCIe desktop adaptor for desktop connectivity
Y1202A	PCIe Cable for desktop connectivity
M9381A	PXIe Vector Signal Generator
M9300A	PXIe Frequency Reference

Advantage services:
Calibration and warranty

Keysight Advantage Services is committed to your success throughout your equipment's lifetime

R-51B-001-5Z	Return to Keysight warranty - 5 years
R-51B-001-3X	Express warranty - 3 years
R-51B-001-5X	Express warranty - 5 years
N7800A	Calibration & adjustment software

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PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Three-Year Warranty

www.keysight.com/find/ThreeYearWarranty
Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.

Keysight Assurance Plans

www.keysight.com/find/AssurancePlans
Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.

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Belgium	0800 58580
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