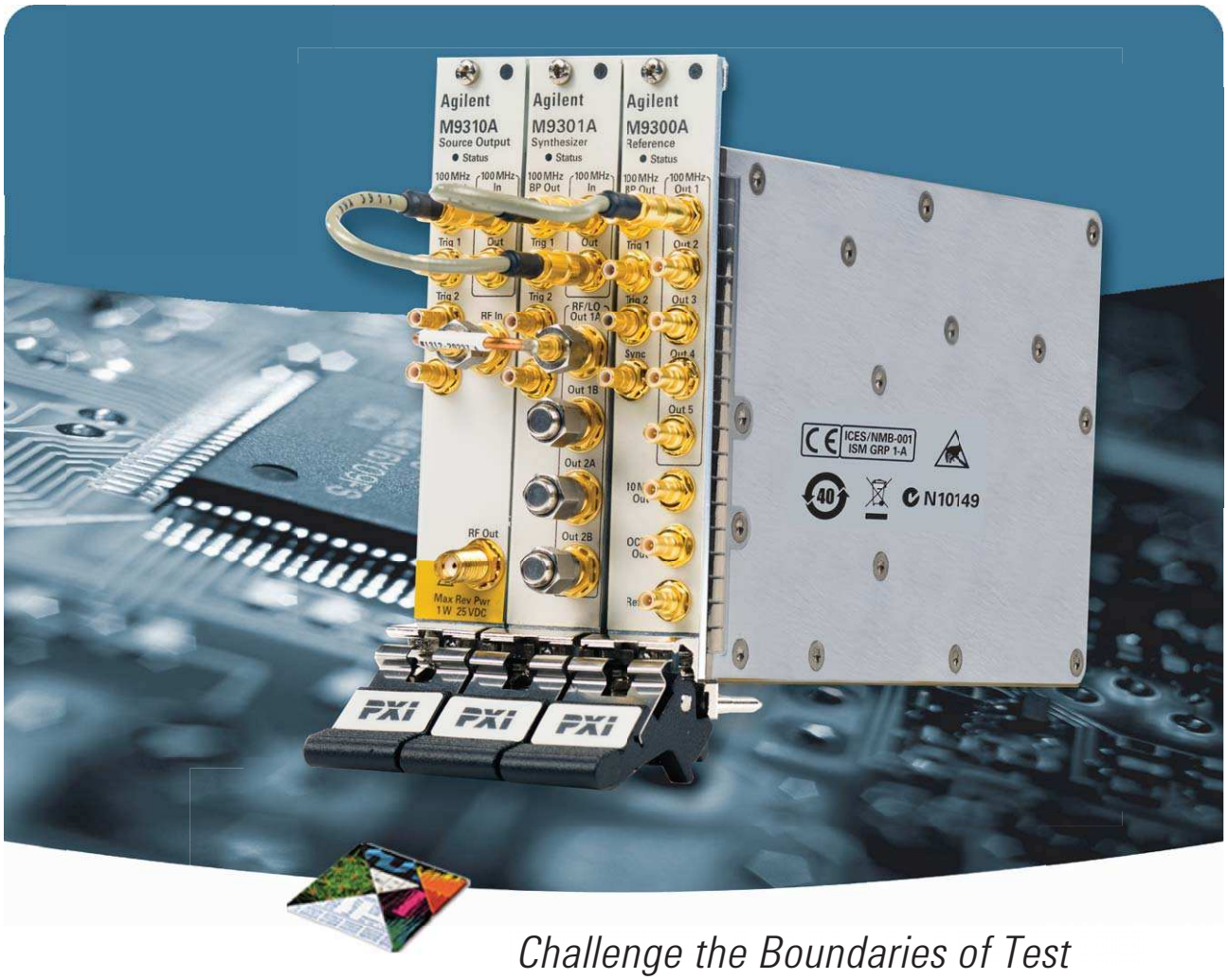
Agilent M9380A
PXIe CW Source

1 MHz to 3 GHz or 6 GHz

Data Sheet

Accurate and High-Powered



Challenge the Boundaries of Test
Agilent Modular Products

Anticipate ___Accelerate ___Achieve

Agilent Technologies

OVERVIEW

Introduction

With high-power levels and accurate measurements, the M9380A CW source provides Agilent quality and performance in the PXI form factor—a trusted Agilent 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 3.0 GHz or 6.0 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 3.0 GHz or 6.0 GHz.
- Output power of +18 dBm across the frequency range.
- Output power level of +19 dBm from 1 MHz to 2.5 GHz.
- Better than ± 0.4 dB absolute amplitude accuracy.
- License key upgraded frequency range and output power.
- One day start up assistance
- Return to Agilent 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 Agilent.
- Reduces development time and simplifies integration into existing test environments with multiple drivers and programmatic interfaces.
- Reduces startup time with Agilent IO libraries easy configuration, one-step software install, and integrated instrument level CW source soft front panel.
- Fast repair turn-around time with Calibrated Core Exchange strategy.

Applications

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

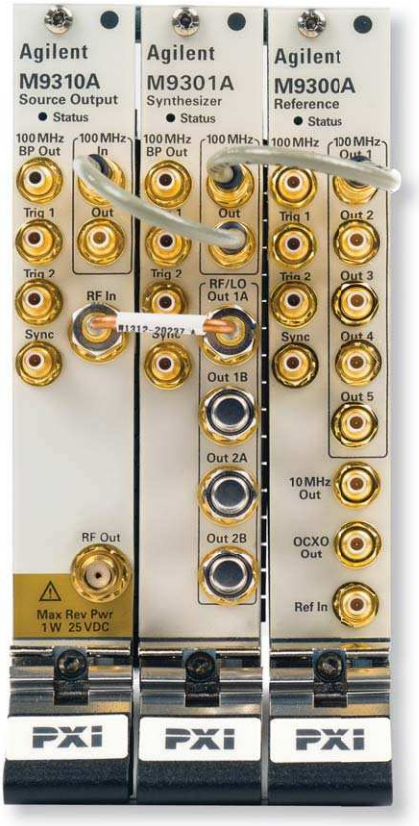


Figure 1. M9380A PXIe CW Source with three modules consisting of the M9310A PXIe source output, M9301A PXIe synthesizer, and M9300A PXIe frequency reference.

EASY SETUP

Software Platform

IO libraries

Agilent IO Libraries Suite offers FAST and EASY connection to instruments and the newest version extends that capability to include modular instruments.

The Agilent IO Libraries Suite automatically detects instruments connected to the PC and configures the interface. Included with the IO Libraries is the Agilent Connection Expert (ACE). With ACE, the PXI resource manager will discover and display the chassis and all the PXI, PXIe, and PCIe modules in your system—whether Agilent or other vendor's. From here you can find the right driver, view information about the installed software or launch the module's soft front panel. Agilent is ensuring interoperability in PXI systems making it truly an open standard.

Drivers

Agilent provides instrument drivers that work with your choice of software that saves time and preserves software and hardware investments. Agilent modular instruments come with IVI-COM, IVI-C, LabVIEW and MATLAB software drivers that work in the most popular T&M development environments including, VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB.

Easy software integration

The M9380A features a one step driver installation that installs all the instrument level driver components, example programs and documentation for each module that is included in the M9380A. This saves significant time during the initial installation and start up and makes it easier to manage the software components.

Included are application code examples for VisualStudio® (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB, which provide set up and basic acquisition functionality. These application code examples are easily modified to quickly integrate the module into your measurement system.

EASY TEST

Hardware Platform

The M9380A is PXIe compliant and designed to benefit from fast data interfaces and integrated with other test and automation modules in cPCI(J1), PXI-1, or PXIe Hybrid chassis slots. The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. A wide array of complementary PXI products are currently available from Agilent. Products include multimeters, waveform generators, local oscillators, digitizers, and switch multiplexers.

Software Applications

Interfaces

The Agilent soft front panels provide easy to use instrument communications. The M9380A has one soft front panel for controlling the combined modules that make up the CW source. The single graphical user interface guides developers through module setup. Users can quickly configure the instrument parameters. More sophisticated functions are available through the instrument's numerous programmatic interfaces. The modular products support interfaces for VisualStudio, MATLAB, and LabVIEW. The interfaces are implemented using the IVI standard supporting both IVI-COM and IVI-C.

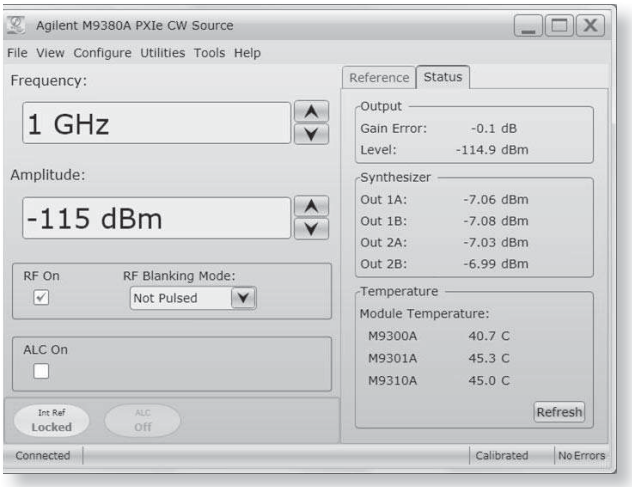


Figure 2. Agilent M9380A PXIe CW source soft front panel.

EASY MAINTENANCE

Calibration

The modular products are factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate. A one year calibration cycle is recommended.

The M9380A is supported by the Agilent N7800A Calibration Software to perform calibrations that tests all product specifications and is compliant with ISO 17025:2005, ANSI/NCSL Z540.3-2006, and Measurement Uncertainty per ISO Guide to Expression of Measurement Uncertainty, 1995.

The Calibration Status utility helps ensure your M9380A is calibrated by managing the calibration interval and providing messages regarding instrument and module calibration status.

Self Test

A self test utility runs a set of internal tests which verifies the health of the modules and reports their status.

Express Warranty

Reduce downtime with the fastest repair service in the industry. The express warranty upgrades the global warranty to provide:

- 5 day typical turnaround repair service in the US, Japan, China and many EU countries or up to a 10 day improvement in turnaround time in the rest of the world.
- Priority return shipment.

One Day Start Up Assistance

An Agilent Technologies applications engineer will help you get started quickly by installing the modules in a chassis, configuring the controller, loading software and making your first measurements.

Repair

Replacement Core Exchange Assembly allows for fast and easy module repairs while retaining the module's original serial number.

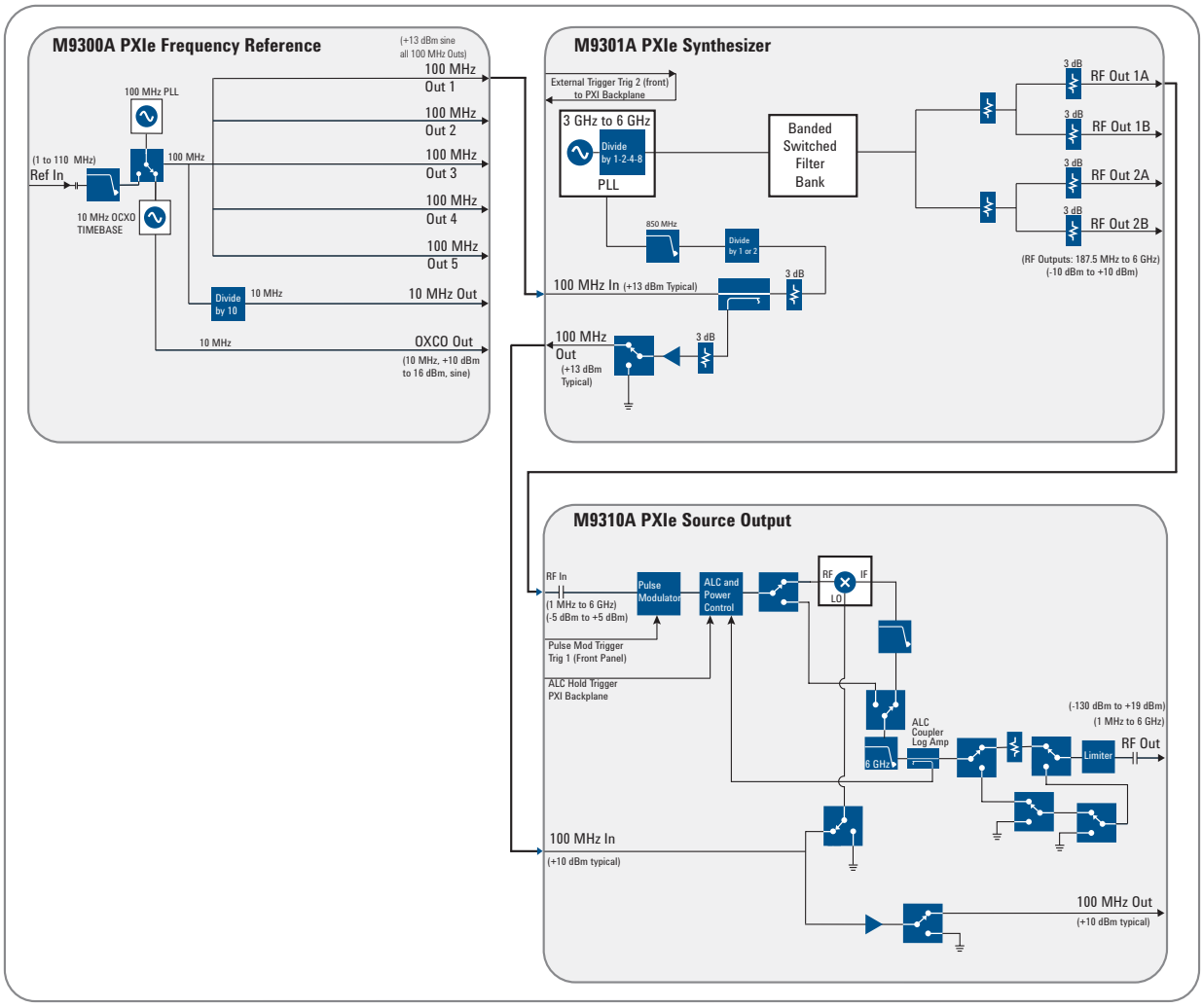


Figure 3. M9380A PXIe CW source with three modules consisting of the M9300A PXIe frequency reference, M9301A PXIe synthesizer and M9310A PXIe source output.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Definitions for Specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of 2 hours within the operating temperature range of 0 to 55 °C, *(and individual module temperature of ≤ 75 °C)*, unless otherwise stated. Data represented in this document are specifications unless otherwise noted.

Specifications are warranted under the following conditions:

- 30 minute warm-up time
- Calibration cycle maintained
- When used with Agilent M9300A frequency reference

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 over a 20 to 30 °C temperature range.*
- ***Nominal*** *describes representative performance that is useful in the application of the product when operated over a 20 to 30 °C temperature range.*

Note: All graphs contain measured data from one unit and is representative of product performance at room temperature unless otherwise noted.

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 ambient temperatures above 45 °C, chassis fan should be set to high.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

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 (20 to 30 °C and individual module temperature of ≤ 55 °C) or within 0.5 dB (0 to 55 °C and individual module temperature of ≤ 75 °C). If the ALC is off, the settle limit is 0.5 dB above +10 dBm, (20 to 30 °C and individual module temperature of ≤ 55 °C).

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Frequency accuracy	
Same as accuracy of internal time base or external reference input	
Internal timebase	
Accuracy	± aging rate ± temperature effects ± gravitational sensitivity
Frequency Stability Aging rate	
Daily	*< ± .5 ppb/day, after 72 hour warm-up*
Yearly	*< ± .10 ppm/year, after 72 hours warm-up*
Total 10 years	*< ± 0.6 ppm/10yrs, after 72 hours warm-up*
Temperature effects	
20 to 30 °C	*< ± 10 ppb at +20 to +30 °C (referenced to 25 °C)*
Full temperature range	*< ± 50 ppb (referenced to 25 °C)*
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*
Gravitational sensitivity	
In any of the 3 orthogonal axis	*< 5 ppb/g*

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*

Output Parameters		
Settable range	**Standard**	**Option 1EA**
	+10.7 to -130 dBm	+20 to -130 dBm
Resolution		
ALC On [2]	*0.02 dB, nominal*	
ALC Off	*0.3 dB, nominal*	

2. Settable to 0.01 dB.

AMPLITUDE

Maximum output power		
Frequency	**Standard**	**Option 1EA [3]**
1 MHz to 2.5 GHz	+10 dBm	+19 dBm
> 2.5 GHz to 6 GHz	+10 dBm	+18 dBm
Amplitude switching speed		
	≤ 5 ms, nominal	

Absolute level accuracy [ALC on] [4]					
Frequency	**< +19 to -20 dBm**	**< -20 to -90 dBm**	**< -90 to -100 dBm**	**<-100 to -120 dBm**	**<-120 to -130 dBm**
1 MHz to 400 MHz	±0.5 dB *±0.2 dB, typical*	±0.55 dB *±0.2 dB, typical*	±0.62 dB *±0.2 dB, typical*	±0.85 dB *±0.3 dB, typical*	*±0.8 dB, nominal*
> 400 MHz to 3 GHz	±0.4 dB *±0.2 dB, typical*	±0.55 dB *±0.2 dB, typical*	±0.62 dB *±0.2 dB, typical*	±0.85 dB *±0.3 dB, typical*	*±0.8 dB, nominal*
> 3 GHz to 6 GHz	±0.5 dB *±0.2 dB, typical*	±0.6 dB *±0.2 dB, typical*	±0.65 dB *±0.25 dB, typical*	±1.0 dB *±0.45 dB, typical*	*±0.8 dB, nominal*

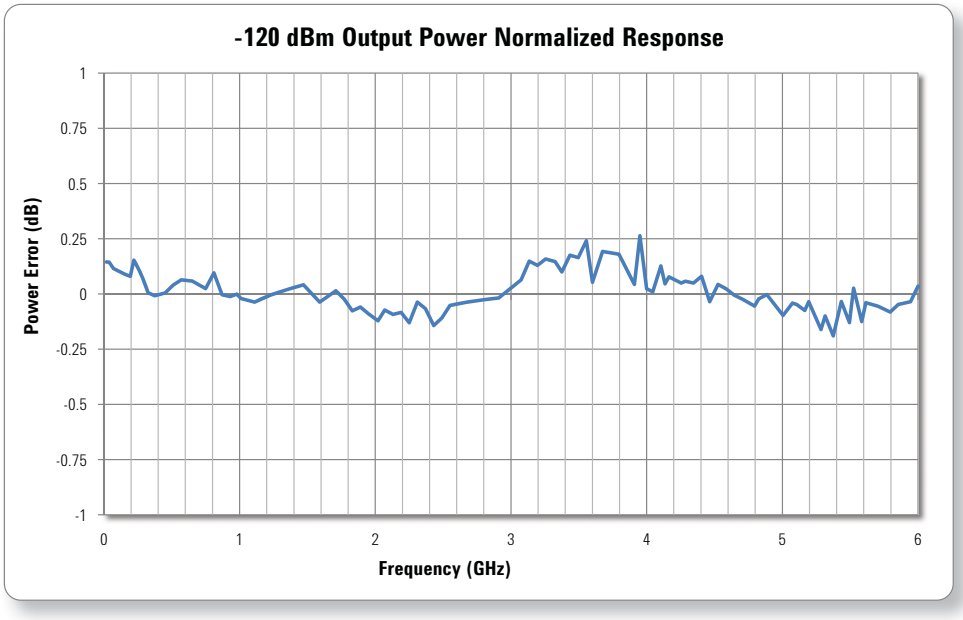


Figure 4. Output power normalized response at –120 dBm.

3. Specifications apply between 20 and 30 °C (and individual module temperature of < 55 °C).
4. Specifications apply between operating ambient temperature range of 20 to 30 °C (and individual module temperature of ≤ 55 °C). For temperatures outside this range, absolute level accuracy degrades by ± 0.02 dB/°C.

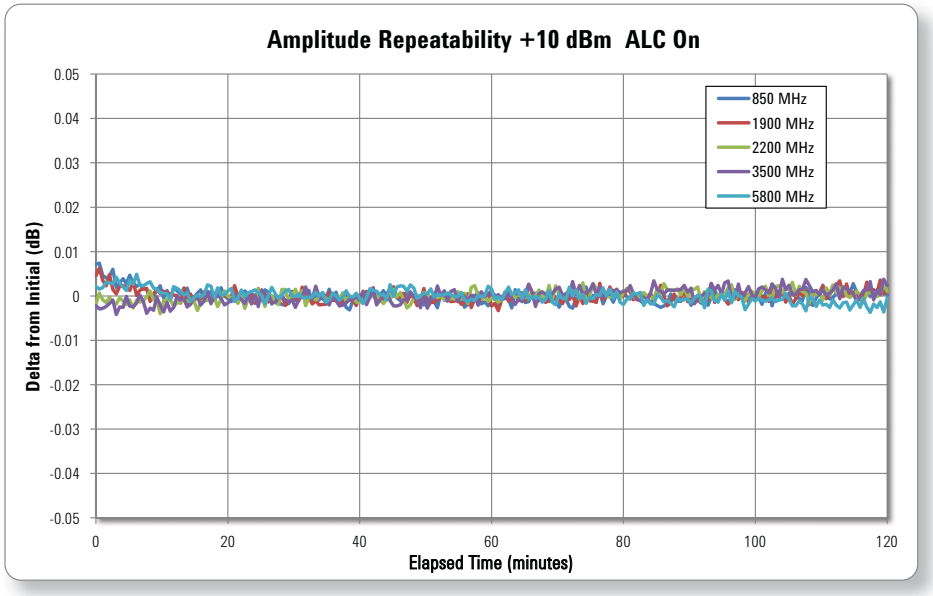


Figure 5. Amplitude repeatability at various carrier frequencies. Repeatability measures the ability of the instrument to return to a given power setting after a random excursion to any other frequency and power setting. It should not be confused with absolute level accuracy.

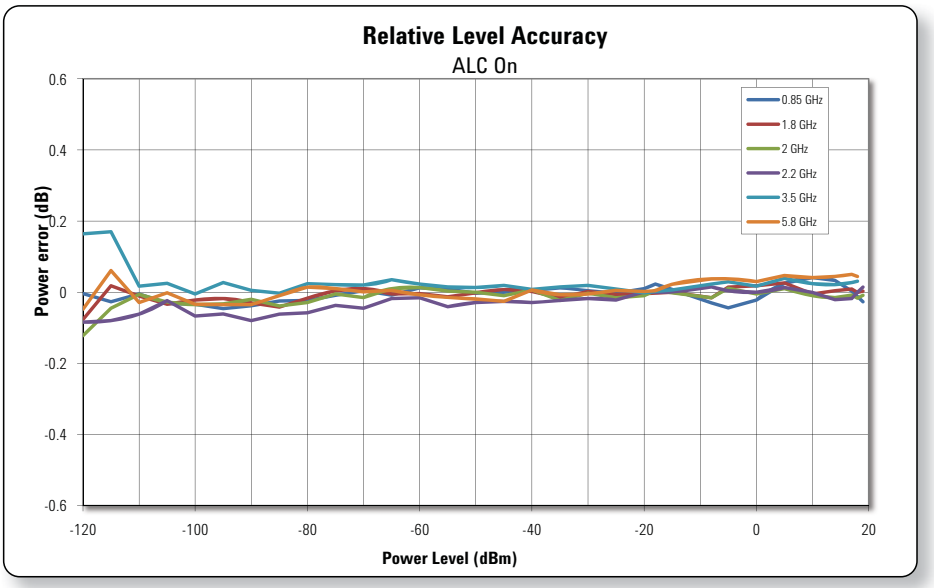


Figure 6. Relative level accuracy at various carrier frequencies.

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*

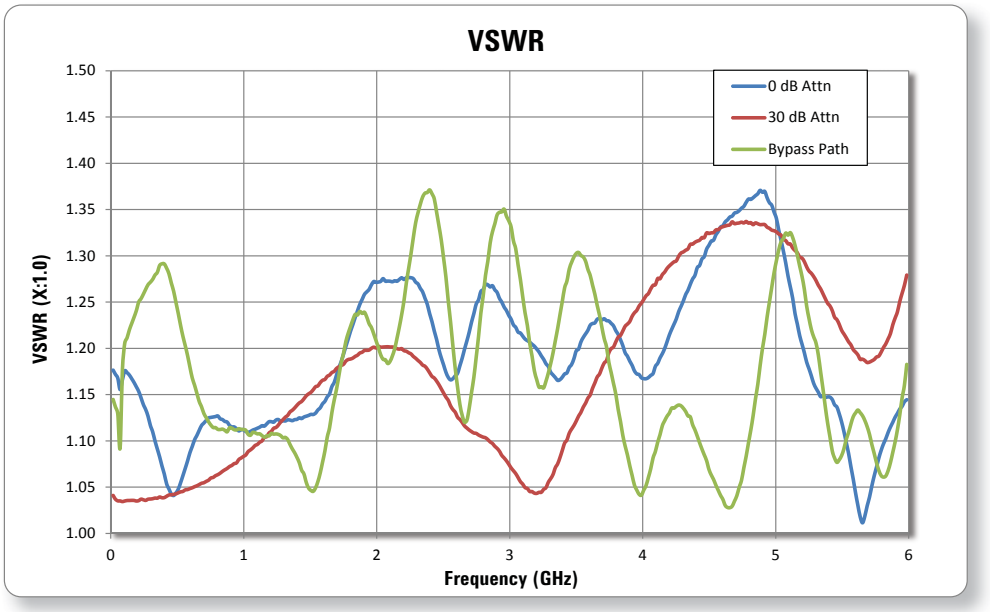


Figure 7. Measured VSWR from 1 MHz to 6 GHz.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

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*

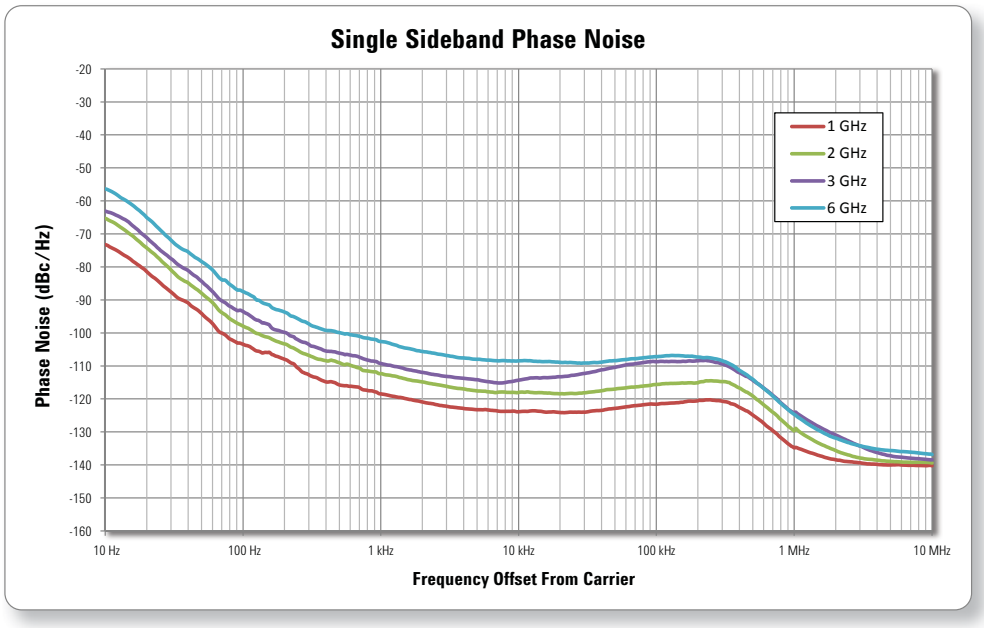


Figure 8. Single sideband phase noise from 10 Hz to 10 MHz, offset at 1, 2, 3, and 6 GHz.

Broadband noise floor				
Range				
1 MHz to 6 GHz	< -140 dBc/Hz, nominal, at +10 dBm output power level			
Harmonics				
Range	**< 0 dBm**	*< 0 dBm*	**< +10 dBm**	*< +10 dBm*
1 MHz to < 400 MHz	< -43 dBc	*-46 dBc, typical*	< -35 dBc	*-37 dBc, typical*
400 MHz to 1.4 GHz	< -29 dBc	*-31 dBc, typical*	< -27 dBc	*-29 dBc, typical*
> 1.4 GHz to 3 GHz	< -35 dBc	*-39 dBc, typical*	< -30 dBc	*-33 dBc, typical*
Nonharmonics [5]				
Nonharmonic miscellaneous spurious [6]	*< -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			

5. Non-harmonics include mixing spurs for frequencies below 400 MHz, synthesizer spurs, and other miscellaneous chassis and power supply products, for offsets >10 kHz.
6. With Agilent M9036A embedded controller.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

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 and Vista Requirements	Windows® XP Requirements
Operating systems	Windows 7 (32-bit and 64-bit) Windows Vista, SP1 and SP2 (32-bit and 64-bit)	Windows XP, Service Pack 3
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64) (no support for Itanium 64)	600 MHz or higher required 800 MHz recommended
Available memory	4 GB minimum 8 GB or greater recommended	3 GB minimum
Available disk space [7]	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 [8] • 100 MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 [8] • 100 MB for Agilent IO Libraries Suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Super VGA (800 x 600) 256 colors or more
Browser	Microsoft® Internet Explorer 7.0 or greater	Microsoft® Internet Explorer 6.0 or greater

7. Because of the installation procedure, less memory may be required for operation than is required for installation.
8. NET Framework Runtime Components are installed by default with Windows Vista and 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 [9]			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			30 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	

9. 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.

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 start up assistance Module interconnect cables Software, example programs and product information on CD Return to Agilent Warranty—3 Years
Base Configuration	
M9380A-F03	Frequency range: 1 MHz to 3 GHz
M9380A-300 Required for warranted specifications	PXIe Frequency Reference: 10 MHz and 100 MHz Adds M9300A PXIe Frequency Reference: 10 MHz and 100 MHz (M9300A module can support multiple M9380A modular instruments)

Configurable Options	
Frequency	
M9380A-F03	Frequency range: 1 MHz to 3 GHz
✓ M9380A-F06	Frequency range: 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	
✓ M9036A	PXIe Embedded Controller
✓ M9018A	18-Slot PXIe Chassis

✓ *Recommended Configuration*

Figure 9. M9380A PXIe CW source with three modules consisting of the M9310A PXIe source output, M9301A PXIe synthesizer, M9300A PXIe frequency reference, an Agilent M9036A PXIe embedded controller all placed within the Agilent M9018A PXIe chassis.

CONFIGURATION AND ORDERING INFORMATION

Software Information

Supported operating systems	Microsoft Windows® XP (32-bit) Microsoft Windows® 7 (32/64-bit) Windows Vista®, SP1 and SP2 (32-bit and 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
Agilent IO Libraries (version 16.2 or newer)	Includes: VISA Libraries, Agilent Connection Expert, IO Monitor
Agilent 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

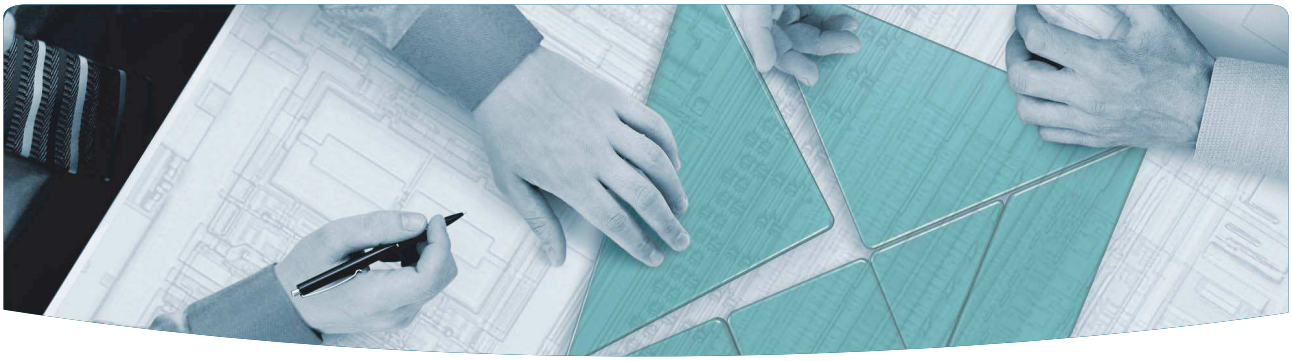
Related Products

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

Advantage Services: Calibration and Warranty

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

R-51B-001-3C	Return to Agilent Warranty - 3 years
R-51B-001-5C	Return to Agilent Warranty - 5 years



The Modular Tangram

The four-sided geometric symbol that appears throughout this document is called a tangram. This seven-piece puzzle originated in China a few centuries ago. The goal is to create shapes—from simple to complex—that form an identifiable silhouette. 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—architecture, hardware, software—Agilent can help you create the system you need, from simple to complex.

Challenge the Boundaries of Test

Agilent Modular Products

PXI **www.pxisa.org**

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Revised: January 6, 2012

5991-0283EN

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