Keysight Technologies
M9300A
PXIe Frequency Reference

Data Sheet

KEYSIGHT
TECHNOLOGIES
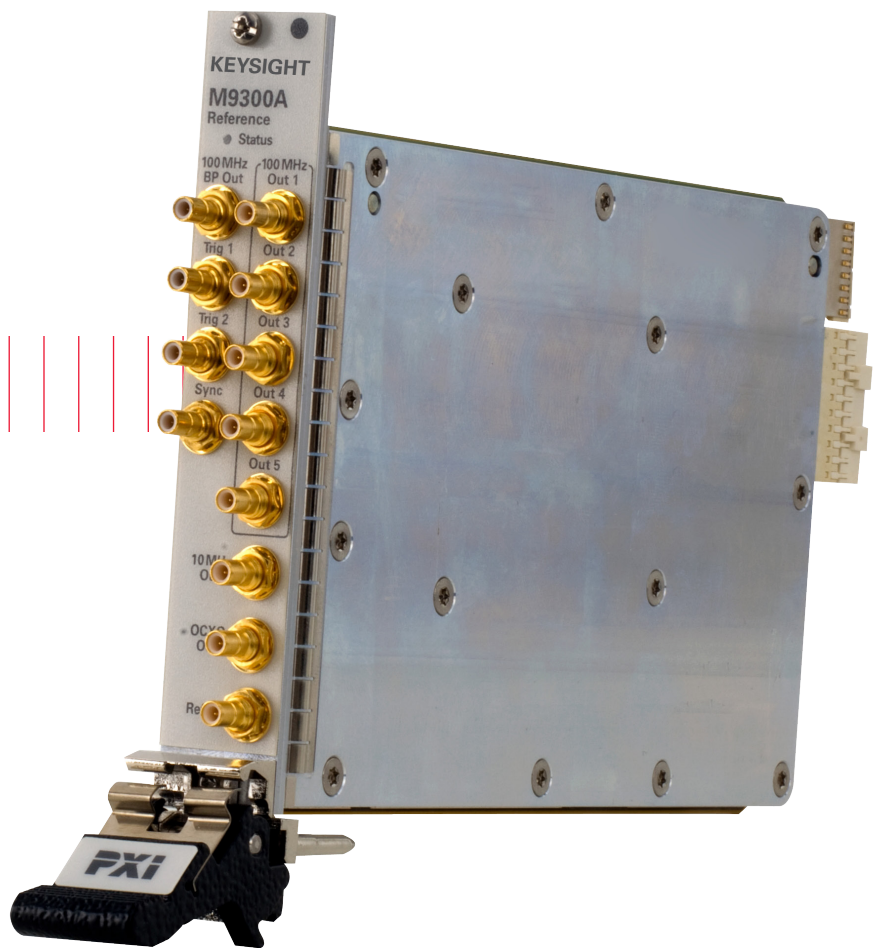
Overview

Product Description

The Keysight Technologies, Inc. M9300A PXIe frequency reference is a PXIe compatible compact modular instrument that can be used as a 10 MHz or 100 MHz reference in various solutions. A single M9300A can be shared with up to four M9381A VSGs, as shown in Figure 1, or five M9380A CW sources to form a multi-channel solution in one compact chassis. It can also be used to generate a clean 100 MHz clock in wideband 2 and 4 channel hardware configurations, as shown in Figure 2.

Instrument control is provided through a soft front panel and programmatic interfaces tuned to your application development environment of choice.

Figure 1. One M9300A PXIe Frequency Reference can be shared with four M9381A PXIe Vector Signal Generators in one chassis.

Product Features

– Locks to another reference with a value from 1 to 110 MHz.
– Five 100 MHz outputs
– One 10 MHz output
– Internal 10 MHz OCXO timebase output

Uncompromising Values

– Reduces development time and simplifies integration into existing test environments with multiple drivers and programmatic interfaces.
– Reduces startup time with Keysight IO libraries easy con-figuration, one-step software install, and soft front panel.
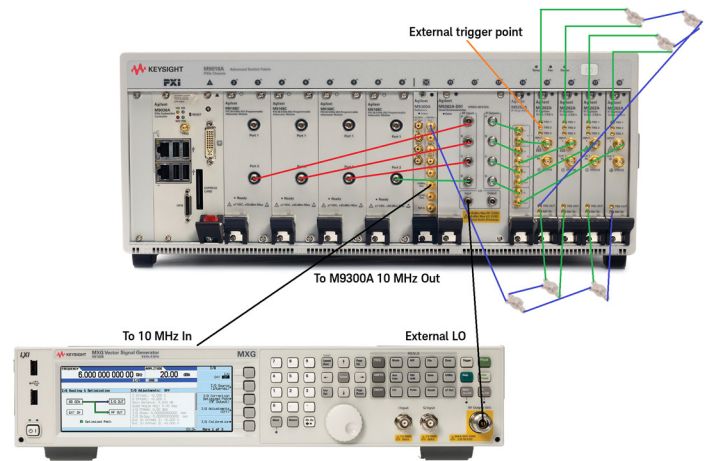– Fast repair turnaround time with Calibrated Core Exchange strategy.

Figure 2. M9300A PXIe Frequency Reference in a 4-channel VSA external LO setup.

Challenge the Boundaries of Test
Keysight Modular Products

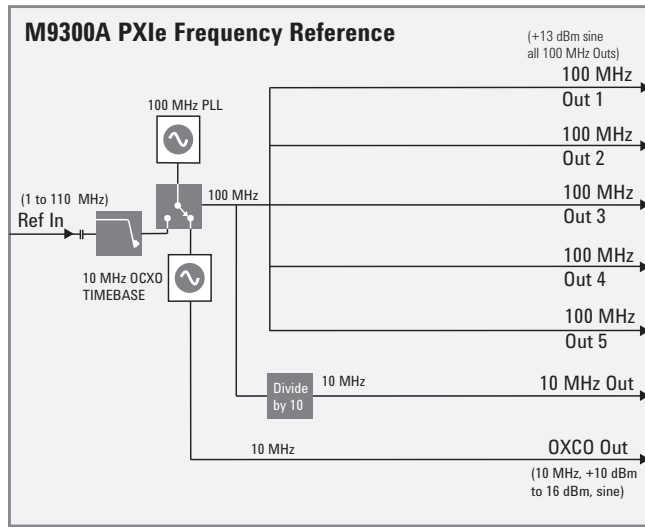# Technical Specifications and Characteristics

Block diagram

Figure 3. M9300A PXIe frequency reference block diagram.

Definitions for specifications

Temperatures referred to in this document are defined as follows:
– Operating ambient temperature = 0 to 55 ° C and individual module temperature of ≤ 75 ° C
– Room temperature = 20 to 30 ° C and individual module temperature of ≤ 55 ° C

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

Specifications are warranted under the following conditions:
– Calibrated instruments that have been stored for a minimum of 2 hours within the operating ambient temperature range
– 30 minute warm-up time
– Calibration cycle maintained

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 at room temperature.
– **Nominal** describes representative performance that is useful in the application of the product when operated at room temperature.

Note: All graphs contain measured data from several units 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.
– Keysight chassis and slot blockers optimize module temperature performance and reliability of test.
– At operating ambient temperatures above 45 °C, chassis fan should be set to high.

Technical Specifications and Characteristics (continued)

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*

Phase Noise (nominal)
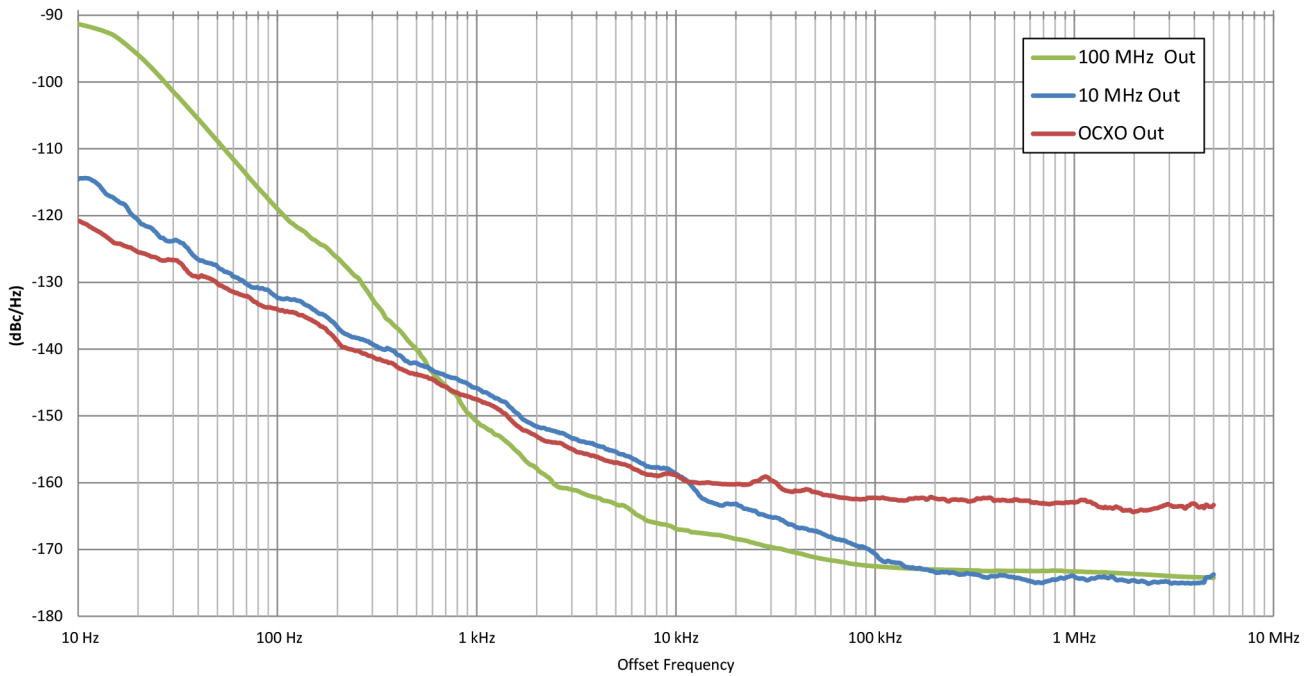
Technical Specifications and Characteristics (continued)

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	< ± .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
Achievable initial calibration accuracy (at time of shipment)	**± 5 x 10 -8**
Frequency stability - Temperature effects	
20 to 30 °C	< ± 10 ppb
Full temperature range	< ± 50 ppb
Frequency stability - 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)

Environmental and physical specifications		
Temperature	Operating	0 to 55 °C
	Non-Operating (Storage)	−40 to +70 °C
Humidity [1]		Type tested at 95%, +40 °C (non-condensing)
Altitude		Up to 15,000 feet (4,572 meters)
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		1 PXIe slot
Dimensions		Length 210 mm, Width 22 mm, Height 130 mm
Weight		0.551 kg (1.215 lbs)
Power drawn from chassis		≤ 18 W

System requirements		
Topic	**Windows 7 and Vista Requirements**	**Windows XP Requirements**
Operating systems	Windows 7 (32-bit and 64-bit)	Windows XP, Service Pack 3
	Windows Vista, SP1 and SP2 (32-bit and 64-bit)	
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64)	600 MHz or higher required
	(no support for Itanium 64)	800 MHz recommended
Available memory	4 GB minimum	3 GB minimum
	8 GB or greater recommended	
Available disk space [2]	1.5 GB available hard disk space, includes:	1.5 GB available hard disk space, includes:
	– 1 GB available for Microsoft .NET Framework 3.5 SP1 [28]	– 1 GB available for Microsoft .NET Framework 3.5 SP1 [28]
	– 100 MB for Keysight IO Libraries Suite [3]	– 100 MB for Keysight IO Libraries Suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended	Super VGA (800 x 600) 256 colors or more
	(Super VGA graphics is supported)	
Browser	Microsoft Internet Explorer 7.0 or greater	Microsoft Internet Explorer 6.0 or greater

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.
2. Because of the installation procedure, less memory may be required for operation than is required for installation.
3. NET framework runtime components are installed by default with Windows 7 and Windows Vista. Therefore, you may not need this amount of available disk space.

Software

Instrument connection software			
	Keysight IO Library	The 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 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**	
lVI-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

Calibration and traceability		
Factory Calibration	The M9300A Frequency Reference 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's 35 Worldwide Service Centers – On-site by Keysight – By self-maintainers	More information visit www.keysight.com/find/infoline
R1282A Annual Calibration Service	– Keysight Calibration – Keysight Calibration + Uncertainties – Keysight Calibration + Uncertainties + Guardbanding – Standards Compliance – ANSI Z540.3-2006, ISO 17025:2005, ANSI Z540-1-1994, ISO 9001:2008	Additional service, notincluded in the warranty
N7800A Calibration and Adjustment Software	The M9300A Frequency Reference 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 M9300A 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	3-year warranty (return to Keysight) 15 days typical turnaround repair service	Included
R-51B-001-5Z	5-year return to Keysight warranty assurance plan 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
M9300A	PXIe Frequency Reference Includes: Software, example programs and product information on CD Return to Keysight Warranty—3 Years

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
Keysight IO Libraries (version 16.2 or newer)	Includes: VISA Libraries, Keysight Connection Expert, IO Monitor

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
M9018A	18-slot PXIe Chassis
M9036A	PXIe Embedded Controller [1]

Advantage services: Calibration and warranty	
Keysight Advantage Services is committed to your success throughout your equipment's lifetime	
R-51B-001-5Z	5-year return to Keysight warranty assurance plan
R-51B-001-3X	Express Warranty - 3 years
R-51B-001-5X	Express Warranty - 5 years
N7800A	Calibration & Adjustment Software

1. PC desktop and PC laptop controllers are also available. Please see the M9381A PXIe VSG Configuration Guide (literature no. 5991-0897EN) for more information.

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www.lxistandard.org
LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

www.pxisa.org
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.

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