M9203A

PXIe high-speed digitizer / wideband digital receiver
2 channels, 12-bit, up to 3.2 GS/s,
DC up to 2 GHz bandwidth

Introduction

The Keysight M9203A is a very fast and low noise PXIe High-Speed Digitizer/Wideband Digital Receiver featuring wide analog bandwidth, making it ideal for wireless, radar and satellite communication applications or any application requiring wideband signal capture with very high dynamic range. Thanks to its PCI Express® backplane connection, the M9203A supports continuous data streaming to disk.

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Overview

Product Description

The M9203A is a dual-slot 3U PXIe 12-bit High-Speed Digitizer/Wideband Digital Receiver running at up to 3.2 GS/s, with up to 2 GHz[1] instantaneous analog bandwidth and provides up to 4 GB of DDR3 acquisition memory. The M9203A features a large Xilinx Virtex-6 FPGA that can implement different functionalities depending on which firmware option you choose.

The M9203A can also be combined with the Keysight PathWave VSA Software and Keysight U1092A Multichannel Acquisition Software for advanced multichannel signal analysis.

Example Applications

- Wireless communication (5G, LTE)
- Emerging communication standards (e.g., DOCSIS 3.1)
- Radar and wideband signal capture
- Radar and satellite communication applications
- Semiconductor automated test

1. 2 GHz refers to the front-end bandwidth. The digitizer can operate in the 1st and 2nd Nyquist zones (using undersampling), but real-time bandwidth is limited by Nyquist to a maximum of [sampling rate/2], capped by the bandwidth option.

Product Features

- 12-bit ADC resolution
- 2 channels (1 when interleaving with -INT option)
- Up to 3.2 GS/s sampling rate (with -INT option)
- DC to 2 GHz input frequency range
- Up to 4 GB (1 GSamples/Ch) of DDR3 acquisition memory
- 50 Ω input impedance, DC coupled
- Selectable 1 V or 2 V full scale range (FSR)
- ±2x FSR input voltage offset range
- ±200 fs channel-to-channel skew stability
- 15 ps RMS trigger time interpolator (TTI) precision
- Enhanced real-time processing using configurable Xilinx Virtex-6 FPGAs[1]
- High data throughput PCIe® Gen2 (x8) backplane
- Real-time digital down-conversion (-DDC option) on 2 phase-coherent channels
- Real-time baseband raw data streaming and recording bundle (-CB0)
- Real-time digital down-conversion with I/Q data streaming and recording bundle (-CB2)
- Support for Windows and Linux

Uncompromising Values

- Fast PXIe 12-bit wideband digitizer with on-board real-time processing
- Capture wide bandwidth signals
- High dynamic range acquisition for better measurement fidelity
- Capable of switching between multiple firmware programs
- Self-trigger mode for unequaled synchronous noise reduction
- Reduced test time by tuning and zooming on signals (-DDC option)
- Dual channel phase-coherent streaming and recording with up to 320 MHz alias protected instantaneous bandwidth (IBW) via bundle -CB2
- Support for Windows and Linux

1. Access to the FPGA for custom processing requires -FDK option and bitfiles that have been created using the legacy Keysight U5340A FPGA Development Kit.

Hardware Platform

Hardware Overview

The M9203A is PXI Express compliant. Designed to benefit from fast data interfaces, the product can be integrated in PXIe and PXI Hybrid chassis slots. The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated measurements systems.

Block Diagram

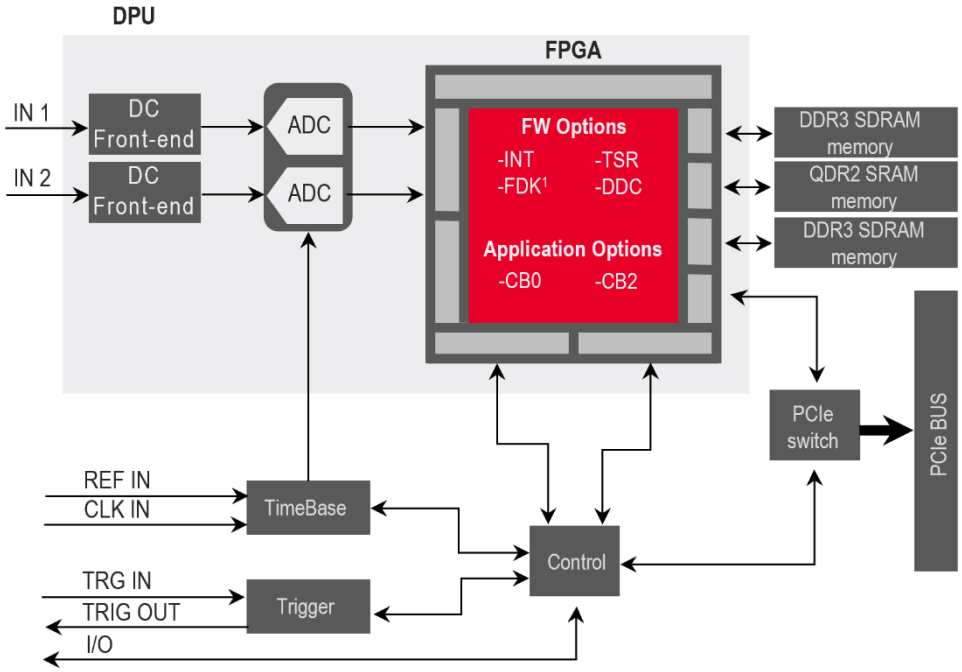

Figure 1. Simplified block diagram of the M9203A PXIe High-Speed Digitizer/Wideband Digital Receiver

On-Board Real Time Processing

At the heart of the M9203A PXIe High-Speed Digitizer/Wideband Digital Receiver is a data processing unit (DPU) based on the powerful Xilinx Virtex-6 FPGA. This DPU is responsible for controlling the module functionality, data flow and real-time signal processing. This powerful feature allows data reduction and storage to be carried out at the digitizer level, minimizing transfer volumes and speeding-up analysis. The M9203A also provides open access to its on-board processing FPGAs for custom algorithm implementation using the -FDK option. The FPGA bitfiles for these custom algorithms can be created using the legacy U5340A FPGA Development Kit[1].

1. The U5340A application is not required to load FPGA bitfiles to M9203A; they can be loaded via the Keysight MD2 soft front panel (SFP) software application, or via an MD2 driver call.

Software Platform

I/O Libraries

Keysight IO Libraries Suite offers fast and easy access to the M9203A digitizer using a standardized interface and ensuring compatibility and upgradability of the software applications.

The Keysight IO Libraries Suite displays all the modules in your system. From here you can view information about the installed software or launch the modules' soft front panel directly from Keysight Connection Expert (KCE). In addition, KCE offers an easy way to find the correct driver for your instrument.

Drivers

The module comes with the IviDigitizer class compliant Keysight MD2 IVI-COM and IVI-C drivers that work in the most popular development environments including Visual C/C++, C#, VB.NET, MATLAB, and LabVIEW. Linux is also supported using the IVI-C driver.

Easy Software Integration

To help you get started and complete complex tasks quickly, the M9203A digitizer is supplied with a comprehensive portfolio of module drivers, documentation, examples, and software tools to help you quickly develop test systems with your software platform of choice.

Compliance

The M9203A is PXI Express compliant. Designed to benefit from fast data interfaces, the product can be integrated in PXIe and PXI Hybrid chassis slots.

Figure 2. M9203A front panel with analog inputs and multiple I/O signals

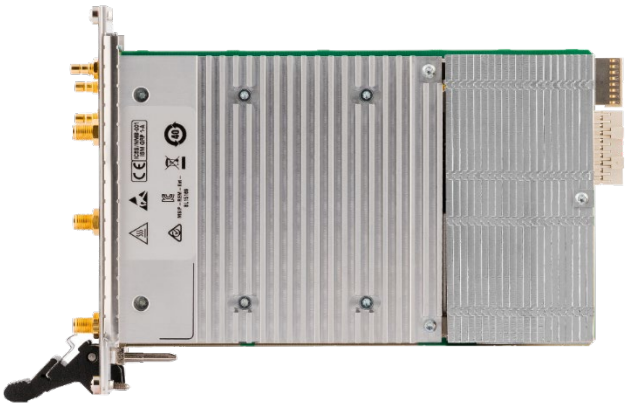

Figure 3. M9203A PXIe 12-bit High-Speed Digitizer/Wideband Digital Receiver offers a small size for easy integration within a PXIe chassis

Software Applications

In addition, the M9203A includes the Keysight MD2 soft front panel (SFP) graphical interface. This software application can be used to explore the capabilities of the Keysight modular high-speed digitizers.

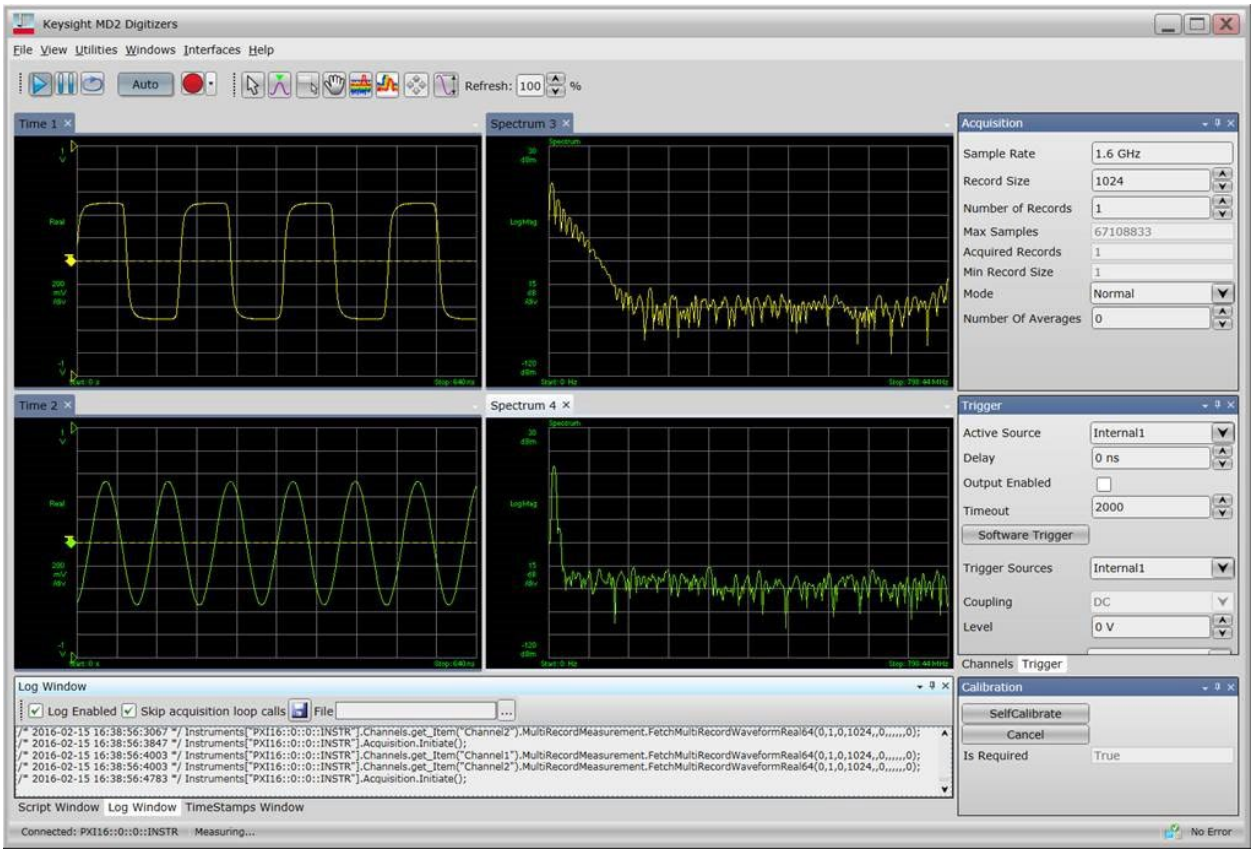

Figure 4. MD2 software front panel (SFP) interface

The M9203A is also supported by the Keysight U1092A Multichannel Acquisition Software. This provides easy control and monitoring of advanced data acquisition systems with many channels and is ideal for single-shot applications.

For advanced measurement analysis, the M9203A PXIe can be combined with Keysight's PathWave VSA Software, the industry's standard for signal analysis and demodulation. The M9203A allows fast connection to the PathWave VSA software through its high data throughput PCIe backplane, compared to traditional instruments.

Firmware Options

The M9203A high-speed digitizer provides various firmware options[1]:

- DGT: Digitizer firmware
- INT: Interleaved channel sampling functionality
- FDK: Custom firmware capability
- TSR[2]: Triggered simultaneous acquisition and readout
- DDC: Wideband real-time digital down-conversion

Easy Firmware Switch

A simple call to the configuration function will switch the M9203A FPGA bitfile to the required option. e.g. Switching the loaded firmware from the -FDK option to the -DDC option.

DGT Digitizer Firmware

This is the standard digitizer firmware which:

- Allows standard data acquisition; digitizer initialization, setting of acquisition and clocking modes, management of channel triggering for best synchronization, storing data in internal memory and/or transferring data through the backplane bus.
- Implements multi-record acquisition functionality.
- Supports fixed internal clocking frequency with internal or external reference, and variable frequency external clock.
- Offers programmable binary decimation to lower the sample rate by a factor of 2^n, where n is an integer in the range of 1 to 10 for single record mode. e.g. Decimate 1.6 GS/s to 1.5625 MS/s.
- Trigger time interpolator (TTI); the high precision integrated time to digital converter can be used to increase time measurement accuracy.

INT Interleaved Channel Sampling Functionality

This option allows two channels to be combined to reach 3.2 GS/s in one channel acquisition mode.

FDK Custom Firmware Capability

This option enables the loading of custom firmware created with the legacy U5340A FPGA development kit[3] to the on-board Virtex-6 DPU FPGA.

1. Firmware option functionality cannot be mixed when running a unit with multiple options, but they can be run one after another (i.e. the -DDC function cannot be used within the -FDK option, however the customer could load an FPGA bitfile that includes their own DDC implementation as part of the custom algorithm).
2. Only available with DGT option.
3. 11 W maximum power is dedicated to FPGA processing; the custom firmware design must fit within this power provision.

TSR Triggered Simultaneous Acquisition and Readout

The TSR architecture guarantees no lost triggers at high repetition rate for specific configurations[1]:

- Larger memory size increases the maximum margin for host computer processing time and allows for short to very long record size.
- The architecture allows the continuous acquisition of new records while reading previous ones.
- High precision integrated time to digital converter can be used to increase time measurement accuracy.

DDC Real-Time Digital Down-Conversion

The real-time digital down-conversion option (-DDC), in addition to basic digitizer functionality, implements real-time digital decimation and filtering of the digitized data, allowing the user to tune and zoom on signals of interest. This exclusive IP algorithm provides very powerful and flexible digital down-conversion on both channels. The filters and local oscillators (LO) are synchronized to maintain constant phase and timing relationships allowing phase-coherent post processing.

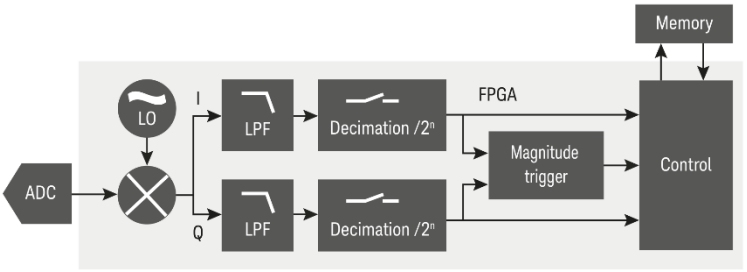

Figure 5. Single channel digital down-converter (DDC)

The -DDC option provides real-time frequency span/analysis bandwidths up to 320 MHz[2]. The center frequency of each channel can also be varied independently, ranging from DC to 1.6 GHz[3]. The -DDC option provides three main functions:

- Frequency shifting (tune)
  - Independently shifting the IF signal of each channel into baseband, allowing the analysis bandwidth to be set around the signal of interest.
- Data reduction (zoom)
  - Reducing the bandwidth and sample rate to match the analyzed signal, decreasing the amount of data that needs to be transferred for a given capture duration, which in turn accelerates post-processing operations.
- Magnitude trigger
  - Setting the magnitude level that the down converted signal needs to achieve at a specified frequency and bandwidth to generate a digital trigger on both channels.

These functions allow isolation of the signal of interest from other signals in a crowded spectrum, improving dynamic range as the integrated noise is reduced, and increasing both SNR and the effective number of bits (ENOB). The resulting advantage for your application is reduced test time, with improved overall test efficiency.

1. Please contact Keysight to find out the repetition rate that can be achieved in your application.
2. If DDC streaming/recording is required then the -CB2 bundle should be considered.
3. DC to 1.6 GHz only applies if -F10 option is ordered, otherwise the upper frequency is limited to 650 MHz.

Application Options

The M9203A high-speed digitizer can be configured with application specific options:

- CB0: Multichannel baseband streaming and recording of raw data at 1.6 GS/s
- CB2: Multichannel digital down-converter streaming and recording of I/Q data at 1.6 GS/s

CB0 Multichannel Baseband Streaming and Recording

This bundle enables continuous gapless acquisition, implementing:

- Real time multichannel phase-coherent baseband data acquisition.
- Data streaming to host.
- Multichannel recording to disk of all raw data samples for later analysis.

The -CB0 option is added to a pre-configured M9203A that consists of:

- 1.6 GS/s sampling rate (-SR2)
- Full bandwidth (-F10)
- 4 GB acquisition memory (-M40)
- Digitizer firmware (-DGT)

This streaming and recording bundle provides:

- Guaranteed recording specification[1] from DC to 640 MHz[2].
- Data throughput optimization (raw data samples recorded using 12-bit, 10-bit or 8-bit mode).
- Support for solutions that require up to 4 individually triggered modules in the same chassis.
- An intuitive command line application that is used to control the digitizer.
- Support for the recording of data to Keysight PathWave VSA compatible waveform files, enabling VSA to be used as a graphical user interface (GUI) for the reading, display, selection, analysis, and export of data.

1. Maximum streaming and recording performance is guaranteed using an additional qualified host computer system with a specific storage configuration. Keysight can supply and install this host computer system – please contact your local Keysight office for additional information.
2. Real-time bandwidth is limited by Nyquist to a maximum of [sampling rate/2], capped by the bandwidth option. However, it is common practice to calculate real-time bandwidth as [sampling rate/2.5] to fully resolve oscillations at the maximum frequency of interest.

CB2 Multichannel DDC Streaming and Recording

This bundle enables continuous gapless acquisition, implementing:

- Real time multichannel phase-coherent baseband data acquisition.
- Data streaming to host.
- Multichannel recording to disk of all I/Q samples for later analysis.

The -CB2 option is added to a pre-configured M9203A that consists of:

- 1.6 GS/s sampling rate (-SR2)
- Full bandwidth (-F10)
- 4 GB acquisition memory (-M40)
- Digitizer firmware (-DGT).

This streaming and recording bundle provides:

- Guaranteed recording specification[1] up to 320 MHz IBW, with tunable intermediate frequency.
- Data throughput optimization (I/Q samples recorded using 32-bit, 16-bit or 12-bit mode).
- Support for solutions that require up to 4 individually triggered modules in the same chassis.
- An intuitive command line application that is used to control the digitizer.
- Support for the recording of data to PathWave VSA compatible waveform files, enabling it to be used as a graphical user interface (GUI) for the reading, display, selection, analysis, and export of data.

Portable Multichannel Streaming & Recording Solutions

Streaming and recording solutions based on -CB0 / CB2 require a host PC and several terabytes of hard drive space to store the captured data.

When a solution is being used in a fixed location, this can be achieved using an external workstation connected to the PXIe chassis via a high-bandwidth PCIe adapter and cable. However, this physical setup can be impractical if the solution needs to be used in multiple locations.

Keysight application note 5992-3994 explains how to construct a portable M9203A streaming solution using PXIe RAID storage, and suggests configurations that maximize streaming and recording performance for up to 8 channels.

1. Maximum streaming and recording performance is guaranteed using an additional qualified host computer system with a specific storage configuration. Keysight can supply and install this host computer system – please contact your local Keysight office for additional information.

Technical Specifications and Characteristics

Analog Input (IN1 and IN2 SMA Connectors)

Number of channels		2 (without -INT option), 2 or 1 (with -INT option)
Impedance		50 Ω ±2 %
Coupling		DC
Full scale ranges (FSR)		1 V and 2 V (3.98 dBm and 10 dBm)
Maximum input voltage		1V FSR: Clamp at ±3.6 V, absolute max. DC voltage rating ±4.6 V 2V FSR: Clamp at ±6.3 V, absolute max. DC voltage rating ±5.0 V
Input voltage offset		-2xFSR to +2xFSR
Input frequency range (-3 dB bandwidth)	-F05, -SR2	*DC to 650 MHz (nominal) in 1V FSR at 1.6 GS/s* *DC to 650 MHz (nominal) in 2V FSR at 1.6 GS/s*
	-F05, -SR2, -INT	*DC to 650 MHz (nominal) in 1V FSR at 3.2 GS/s* *DC to 650 MHz (nominal) in 2V FSR at 3.2 GS/s*
	-F10, -SR2	*DC to 1.9 GHz (nominal) in 1V FSR at 1.6 GS/s* *DC to 2.0 GHz (nominal) in 2V FSR at 1.6 GS/s*
	-F10, -SR2, -INT	*DC to 1.4 GHz (nominal) in 1V FSR at 3.2 GS/s* *DC to 1.4 GHz (nominal) in 2V FSR at 3.2 GS/s*
DC gain accuracy		*±0.5% (nominal) in 1V FSR* *±0.7% (nominal) in 2V FSR*
Offset accuracy		±0.5% in 1V FSR ±1.5% in 2V FSR
Time skew[1]	Channel-to-channel skew[2]	*±50 ps (nominal) in same module* *±150 ps (nominal) between multiple modules of same chassis*
	Channel-to-channel skew stability[3]	*±200 fs pk (nominal)* *75 fs RMS (nominal)[2]*
Bandwidth limit filters		*650 MHz (nominal) for -SR2*
Effective number of bits (ENOB)[4]		*@ 410 MHz 9.1 (nominal)*
Signal to noise ratio (SNR)[4]		*@ 410 MHz 57 dB (nominal)*
Spurious free dynamic range (SFDR)[4]		*@ 410 MHz 64 dBc (nominal)*
Total harmonic distortion (THD)[4]		*@ 410 MHz -64 dB (nominal)*

1. The channel-to-channel skew is defined as the magnitude of time delay difference between two digitized channel inputs, granted the same signal is provided to each channel at the exact same time.
2. The measurement represents the maximum time skew between 2 channels of a single unit, measured with a Sinefit method on 100 kSamples, for a sinusoid signal at 400 MHz and averaged 10 times.
3. Skew and offset stability are measured at 25 °C in a climatic chamber. The skew and offset between channels are measured every 5 minutes over 12 hours and after 1 hour stabilization time and the values represent the dispersion of the measurements.
4. Measured for a -1 dBFS input signal in internal clock mode with option -F10 at 1.6 GS/s (option -SR2).

Digital Conversion

Resolution			12 bits
Acquisition memory (total)		-M02 -M10 -M40	256 MB (64 MSamples/ch); standard 1 GB (256 MSamples/ch); option 4 GB (1 GSamples/ch); option
Sample clock sources			Internal or external
Internal clock sources			Internal or external reference
	Maximum real-time sampling rates	-SR2 -SR2, -INT	1.6 GS/s 3.2 GS/s
	Sampling jitter[1]		*225 fs (nominal)*
	Clock accuracy		±5.0 ppm *(±1.5 ppm typical at room temperature)*
External clock source (CLK IN SMA connector)			
	Impedance		*50 Ω (nominal)*
	Frequency range[2]	-SR2	1.8 GHz to 3.2 GHz
	Signal level		*+5 dBm to +15 dBm (nominal), 0 V DC*
	Coupling		AC
External reference clock (REF IN SMB connector)			
	Impedance		*50 Ω (nominal)*
	Frequency range		*100 MHz ±1 kHz (nominal)*
	Signal level		*-3 dBm to +3 dBm (nominal)*
	Coupling		AC
Acquisition modes			Single shot Sequence (multi-record)[3] Continuous

1. Jitter figure based on phase noise integration from 100 Hz to 1600 MHz.
2. The sampling rate corresponds to half of the external clock frequency in 2-channel mode (non-interleaved channels). In interleaved mode (only available with the INT option), the sampling rate corresponds to the frequency of the external clock signal.
3. Up to 131,072 records. Record maximum length = memory size / number of channels.

Trigger

Trigger modes			Positive or negative edge
Trigger sources			External, Software, Channel
Channel trigger frequency range			DC to 250 MHz
External trigger (TRG IN SMB connector)			
	Coupling		DC
	Impedance		*50 Ω (nominal)*
	Level range		*±5 V (nominal)*
	Amplitude		0.5 V pk-pk
	Frequency range		*DC to 2 GHz (nominal)*
Maximum time stamp duration		-SR2	32 days
Trigger time interpolator resolution[1]			*6.25 ps (nominal)*
Trigger time interpolator precision[1]			*15 ps RMS (nominal)*
Rearm time (deadtime)		-SR2	*500 ns (nominal)*
Trigger out (TRG OUT SMB connector)[2]			1 (programmable), 50 Ω source
		Signal level	*0.8 Vpp ±2.5 Voffset (nominal) into high impedance*
Control IO (I/O 1 and 2 MMCX Connectors)[3]			
Output functions			Acquisition active Trigger is armed Trigger accept resynchronization 100 MHz reference clock divided by 2[4] Sampling clock divided by 32[4] Low level High level FPGA synchronization
Input/output functions			FPGA programmable I/O

Real-Time Digital Down-Conversion (-DDC Option)

Acquisition modes		Basic digitizer or DDC digitizer[5,6]
Number of synchronous DDC channels		2 in a single module Up to 8 across 4 modules in the same PXIe chassis
Center frequency tuning range (LO)	-F10 -F05	DC to 1.6 GHz DC to 650 MHz
Center frequency tuning resolution		0.01 Hz
Independent channel center frequency tuning		Yes
Independent channel frequency span		No

1. At maximum sample rate or at decimated sampling rate down to 1/16 of the highest sample rate (1/32 of the highest sample rate with interleaving).
2. At 10 MHz on a 50 Ω load.
3. I/0 3 reserved for future use.
4. Only on I/O 1.
5. Real-time DDC is active only for the 1.6 GS/s sampling rate mode (non-interleaved mode).
6. In DDC mode, each sample is a pair of I & Q samples. Each sample is coded on 32 bits (16-bit I and 16-bit Q) for the highest decimated sample rate (i.e. n>0), otherwise the coding is made on 64 bits (32-bit I and 32-bit Q).

Environmental and Physical[1]

Temperature range	Operating	0 to +50 °C (sea-level to 10,000 feet)[2] 0 to +45 °C (10,000 to 15,000 feet)[2]
	Non-operating	-40 to +70 °C
Altitude		Up to 15,000 feet (4,572 meters)
EMC		Complies with European EMC Directive – 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 à la norme NMB-001 du Canada.
Acoustic		European Machinery Directive Acoustic noise emission LpA < 70 dB Operator position Normal operation mode
Power Dissipation		
+ 3.3V	+ 12 V	Power on PXI connector
3.2 A (typical)	*3.5 A (typical)*	*55 W (typical)*
Mechanical Characteristics		
Form factor		3U/2-slot PXI-Express Chassis slot compatibility: PXI Hybrid, PXIe Front panel complies with IEEE1101.10 certification
Size		Length 185 mm x Width 130 mm x Height 40mm
Weight		0.8 kg (1.76 lbs)

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.

System Requirements

Topic	Windows	Linux
Operating systems	Windows 10 (64-bit), all versions	Linux with Kernel versions 3.x, 4.x & 5.0 - 5.4. Linux with Kernel versions 5.15 & 6.0 are also supported but require a driver patch (available from the Linux driver page at Keysight.com)
Processor speed	1 GHz 64-bit (x64), no support for Itanium 64	As per the minimum requirements of the chosen distribution
Available memory	1 GB minimum[1]	As per the minimum requirements of the chosen distribution
Available disk space	2.5 GB available hard disk space, includes:[2] – 1 GB for Keysight IO Libraries Suite – 1 GB for Microsoft .NET Framework Note: 400 MB for high-speed digitizer applications.	100 MB
Display	Minimum of 1024 x 768, 96 or 120 DPI	No display required
Browser	Use a supported version of Internet Explorer; see https://support.microsoft.com/en-gb/help/17454/lifecycle-faq-internet-explorer	Distribution supplied browser

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 50°C, unless otherwise stated, and after a 45-minute warm-up period. Data represented in this document are specifications unless otherwise noted.

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.

- ***Typical*** describes characteristic performance, which 80% of instruments will meet when operated over a 20 to 30°C temperature range. Typical performance is not warranted.
- ***Nominal*** describes representative performance that is useful in the application of the product when operated over a 20 to 30°C temperature range. Nominal performance is not warranted.

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

Calibration Intervals

The M9203A is factory calibrated and shipped with a certificate of calibration.

Calibration is recommended every year in order to verify product performance.

1. On older PCs with minimum RAM, installation can take a long time when installing the IO Libraries Suite and the .NET Framework.
2. Due to the installation procedure, less disk space may be required for operation than is required for installation. The amount of space listed above is required for installation. The .NET Framework Runtime Components are installed by default with most Windows installations, so you may not need this amount of available disk space.

Configuration and Ordering Information

Software Information

Chassis Slot Compatibility: PXI Hybrid, PXIe

Supported operating systems	See system requirements
Keysight IO libraries	Includes: VISA libraries, Keysight Connection Expert, IO Monitor

Related Products

Model	Description
M9010A	10-slot PXIe Chassis, PCIe Gen 3
M9018B	18-slot PXIe Chassis, PCIe Gen 2
M9019A	18-slot PXIe Chassis, PCIe Gen 3
M9048A	PCIe Desktop Adapter, PCIe Gen 2 (x8)
M9021A	PCIe Cable Interface, PCIe Gen 2 (x8)
Y1202A	PCIe Cable, 2.0 m Long, PCIe Gen 3 (x8)
M9036A	PXIe Embedded Controller
M9037A	PXIe High Performance Embedded Controller
M9393A	PXIe Performance Vector Signal Analyzer: 50 GHz
M9362AD01	PXIe Quad Down-converter: 10 MHz to 50 GHz
U1092A-S0x	Keysight wMAQS Multichannel Acquisition Software
89601200C	PathWave VSA Software, Transportable License

Accessories

Model	Description
U5300A-102	MMCX Male to BNC Male Cable, 1 m Long
U5300A-112	SMB Female to BNC Female Cable, 0.1 m Long
U5300A-110	XA110 SMA Input Overvoltage Protection Kit
Y1212A	PXI Slot Blockers, Qty 5, Single Slot
Y1213A	PXI EMC Filler Panels, Qty 5, Single Slot

Typical System Configuration

Model	Description
M9203A	PXIe 12-bit Digitizer, 2 Channels
M9018B	18-slot PXIe Chassis, PCIe Gen 2
M9021A	PCIe Cable Interface, PCIe Gen 2 (x8)
Y1202A	PCIe Cable, 2.0 m Long, PCIe Gen 3 (x8)

Ordering Information

Model	Description	
M9203A	PXIe High-Speed Digitizer/ Wideband Digital Receiver, 12-bit, 3.2 GS/s, FPGA Signal Processing	
	Includes:	Software, example programs and product information on CD MMCX male to BNC male cable, 1m (qty 1)

Configurable Options

Sampling Rate		
✓	M9203A-SR2	1.6 GS/s sampling rate version (3.2 GS/s sampling rate with -INT option)
Bandwidth		
✓	M9203A-F05	650 MHz bandwidth
	M9203A-F10	Full bandwidth
Memory		
✓	M9203A-M02	256 MB (64 MSamples/ch) acquisition memory
	M9203A-M10	1 GB (256 MSamples/ch) acquisition memory
	M9203A-M40	4 GB (1 GSamples/ch) acquisition memory
Firmware		
✓	M9203A-DGT	Digitizer firmware
	M9203A-DDC	Wideband real-time digital down-conversion
	M9203A-INT	Interleaved channel sampling functionality
	M9203A-FDK	Custom firmware capability
	M9203A-TSR	Triggered simultaneous acquisition and readout
Applications		
	M9203A-CB0	Digitizer streaming and recording
	M9203A-CB2	Digital down-converter streaming at 1.6 GS/s

Services

Calibration		
	M9203A-UK6	Commercial Calibration Certificate with Test Data
	M9203A-A6J	ANSI Z540-1-1994 Calibration
	M9203A-1A7	Calibration + Uncertainties + Guardbanding (not Accredited)
Recalibration Service Plans		
	R-50C-011-3 / 5	Calibration Plan - Return to Keysight - 3 / 5 years
Return to Service Center Warranty and Service Plans		
	R-51B-001-C / 3C / 5C	Return to Keysight Warranty - 1 / 3 / 5 years
KeysightCare Service Plans		
	R-55A-001-2 / 3 / 5	KeysightCare Assured - Extend to 2 / 3 / 5 years (includes Return to Keysight Extended Warranty)

✓ These options represent the standard configuration.

Instrument Upgrades

Description	Upgrade Number	Additional Information
Bandwidth upgrade from 650 MHz to full bandwidth	M9203AU-F10	**Return to Keysight for upgrade**
Memory upgrade from 256 MB to 1 GB	M9203AU-M10	Customer installable license key
Memory upgrade from 1 GB to 4 GB	M9203AU-M40	Customer installable license key
Memory upgrade from 256 MB to 4 GB[1]	M9203AU-M10 M9203AU-M40	Customer installable license keys
Processing upgrade from option -DGT to option -DDC	M9203AU-DDC	Customer installable license key
Upgrade to enable Interleaved sampling	M9203AU-INT	Customer installable license key
Upgrade to allow FPGA programming (custom firmware capability)	M9203AU-FDK	Customer installable license key
Triggered simultaneous acquisition and readout	M9203AU-TSR	Customer installable license key
Digital streaming and recording	M9203AU-CB0	Customer installable license key
Digital down converter streaming and recording at 1.6 GS/s	M9203AU-CB2	Customer installable license key

1. Upgrading from 256 MB to 4 GB requires two upgrade licenses.