Agilent M9210A
PXI-H Digitizing Scope

Data Sheet

10-bit, 2-4 GS/s
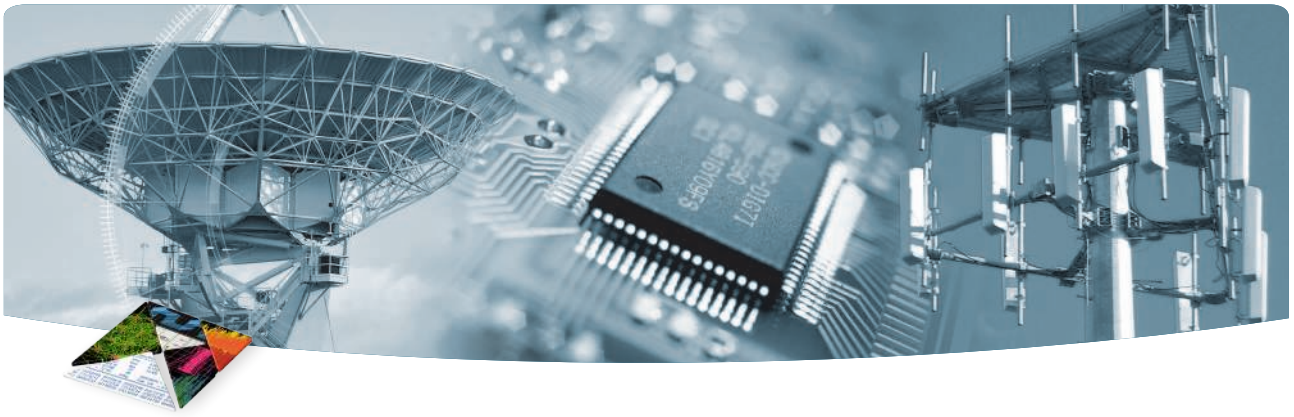
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Agilent Modular Products

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Agilent Technologies

OVERVIEW

Introduction

Agilent Technologies M9210A is a high-speed, wide bandwidth 10-bit Digitizing Scope providing scope-like measurements on fast signals, making it ideal for Automated Test Equipement (ATE) in Aerospace & Defense and Telecommunication wideband applications.

Product Description

The M9210A is a one-slot 3U PXI Hybrid high-speed Digitizing Scope featuring 2 channels with 1.4 GHz/300 MHz (50 Ω/1 MΩ input) analog bandwidth and up to 4 GS/s real-time sampling rate, significantly reducing data acquisition and testing times. The M9210A Digitizing Scope comes with on-board memory of up to 512 MS. It is the best alternative to the Agilent VXI E1428.

The M9210A allows multi-module synchronization thanks to the auto-synchronous bus system able to reach picoseconds-level accuracy between multiple channels.

Applications

- Aerospace and defense
- Wireless communication
- Semiconductor testing
- Wideband applications (e.g. radar)

Features

- 10-bit resolution
- 2 independent channels at up to 2 GS/s real-time each
- Channel interleaving mode at up to 4 GS/s real-time
- > 1.4 GHz bandwidth in 50 Ω
- > 250 MHz bandwidth in 1 MΩ
- Selectable 50 Ω/1 MΩ input impedance
- Selectable AC/DC coupling
- Programmable input voltage range from 50 mV to 5 V in 50 Ω and 5 V to 50 V in 1 MΩ (in a 1, 2, 5 sequence)
- Variable input voltage offset
- Different trigger features
- Up to 256 MS/channel memory
- Auto-synchronous bus system with picoseconds-level accuracy for multi-module synchronization
- PXI Hybrid backplane
- IVI-C, IVI-COM and LabVIEW drivers

Customer values

- Best accuracy measurements
- Fastest digitizing scope
- Measure the fastest signals
- Scope-like features
- Large on-board memory
- Multi-module synchronization
- Multiple programmatic interfaces enable easy integration into existing test environments
- Software support for easy integration
- Reduced development time

EASY SETUP ... TEST ... AND MAINTENANCE

Hardware platform

Compliance

The M9210A is PXI compliant, using either a cPCI (J1/J2), PXI-1 or PXIe Hybrid slot. Designed to benefit from fast data interfaces, the products can be integrated with other test and automation modules in cPCI, PXI, and PXIe chassis (hybrid 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. Products include multimeters, waveform generators, local oscillators, digitizers, downconverters and switch multiplexers.

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 helps you by displaying ALL of the modules in your system, whether they are PXI, PXIe, or AXIe. From here you can view information about the installed software or launch the modules' soft front panel directly from Agilent Connection Expert.

In addition, the Agilent Connection Expert (ACE) offers an easy way to find the correct driver for your instrument.

Drivers

The M9210A Digitizing Scope 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. The module comes with IVI-COM, IVI-C, LabVIEW and MATLAB software drivers that work in the most popular T&M development environments including, LabVIEW and LabWindows/CVI from National Instruments, MATLAB from The MathWorks, Microsoft C/ C++, C#, and VB.NET.

Easy software integration

To help you get started and complete complex tasks quickly, the module software support provides context sensitive help, complete documentation and code examples that allow a quick module set up and basic acquisition functionalities. These code examples can be easily modified, so that the card can be quickly integrated into a test system. Included are application code examples for LabVIEW, LabWindows/CVI, Visual Studio C, C++, and C#, Visual Basic, and MATLAB.

Software applications

In addition, the M9210A includes Agilent MD1 soft front panel (SFP) graphical interface. This simple software application can be used to control, verify the functionality and explore the capabilities of the Agilent digitizers. The MD1 SFP contains some standard scope measurements like: mean, RMS, min/max, pk-pk amplitude, overshoot, rise/fall time, slew rate, and many others.
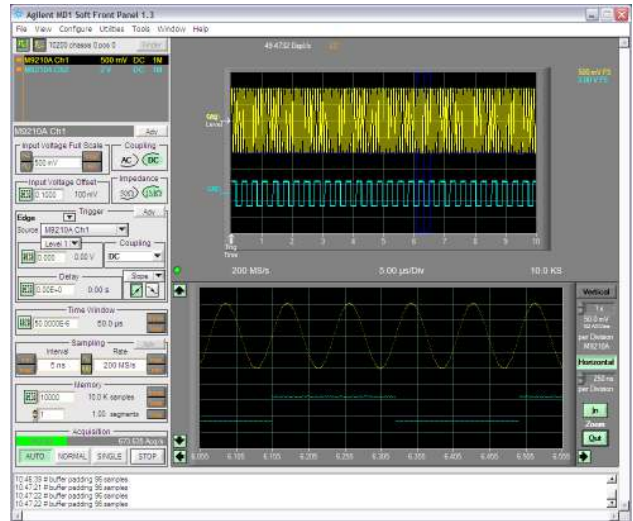
The Agilent MD1 soft front panel software has two main windows, the acquisition parameters to control the module and the acquired waveform display.

MD1 Waveform Parameters window showing the scope-like measurements values.

Figure 1. MD1 soft front panel

Calibration intervals

The M9210A is factory calibrated and shipped with a calibration certificate.

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

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Analog Input (INPUT 1 and INPUT 2 BNC connectors)	
Number of channels	2 (simultaneously sampled)
Impedance	50 Ω ± 1% 1 MΩ ± 1% *(18 pF, typical)*
Coupling	AC, DC (SW selectable)
Full scale (FS) ranges	0.05, 0.1, 0.2, 0.5, 1, 2, 5 V peak-peak in 50 Ω 0.5, 1, 2, 5, 10, 20, 50 V peak-peak in 1 MΩ
Maximum overload protection	± 5 V DC (continuous without damage)
DC accuracy	± 2.5% FS in 50 mV full scale range ± 2% FS in full scale ranges ≥ 100 mV
Bandwidth limit filters (BWL) *(nominal)*	20 MHz, 200 MHz, 700 MHz
Offset range	± 2 V for ≤ 500 mV full scale ranges 50 Ω : ± 5 V for 1 to 5 V full scale ranges 1 MΩ: ± 20 V for 1 to 5 V full scale ranges 1 MΩ: ± 200 V for 10 to 50 V full scale ranges
Offset accuracy	± 1% FS
AC coupling cutoff frequency (-3 dB)	32 Hz *(nominal)*
-3dB Bandwidth (no filters)	> 1.4 GHz *(1.5 GHz, typical)* in 50 Ω > 250 MHz *(300 MHz, typical)* in 1 MΩ
Effective bits (ENOB) [1]	
@ 10.7 MHz (200 MHz BWL)	7.2 *(typical)* (6.8, min) in 50 Ω 7.0 *(typical)* (6.5, min) in 1 MΩ
@ 99.5 MHz (700 MHz BWL)	6.8 *(typical)* in 50 Ω
@ 410 MHz (700 MHz BWL)	6.6 *(typical)* (6.2, min) in 50 Ω
THD in 50 Ω and 500 mV full scale range @ 2 GS/s [1]	
@ 10.7 MHz	–57 dB *(typical)* (-49 dB, max)
@ 99.5 MHz	–55 dB *(typical)* (-46 dB, max)
@ 410 MHz	–44 dB *(typical)* (-36 dB, max)

Digital Conversion	
Resolution	10 bits
Acquisition memory	256 kpoints/channel (standard) 32 Mpoints/channel (M06 option) 256 Mpoints/channel (M51 option)
Sample clock sources	Internal or external
Internal clock source	Internal or external reference
Real-time sampling rates	**2 synchronous channels:** 10 MS/s to 2 GS/s in 1, 2, 2.5, 5 sequence
	1 interleaved channel (2 converters/channel): 4 GS/s and 10 MS/s to 2 GS/s in 1, 2, 2.5, 5 sequence
Sampling jitter (internal reference)	1.2 ps RMS *(nominal)*
Clock accuracy	± 2 ppm
External clock source (CLK IN MMCX connector)	
Impedance	50 Ω ± 2% *(typical)*
Modes	Continuous
Frequency range	200 MHz to 2 GHz
Amplitude	> 500 mV peak-peak *(nominal)*
Maximum overload protection	± 5 V DC (continuous without damage)
External Reference clock (CLK IN MMCX connector)	
Frequency range	10 MHz ± 0.3%
Amplitude	> 500 mV peak-peak
Maximum overload protection	± 5 V DC (continuous without damage)

1. *Measured at 2 GS/s for an input signal amplitude of 80% FS.*

Digital Conversion

Acquisition modes	Single shot Sequence (up to 1000 segments in standard configuration, 16000 with M06 option and 125000 with M51 option)
Intersegment dead time	350 ns in standard configuration *(nominal)* 1.8 us with M06 and M51 options *(nominal)*

Trigger

Trigger modes	Edge (positive and negative), Window (In/Out), HF (divide by 4), logic
Trigger sources	Internal (INPUT 1, INPUT2), External (TRIGGER IN), PXI Star
External trigger (TRIGGER IN BNC connector)	
Coupling	DC, AC LF reject (50 Hz cutoff) and HF reject (50 kHz cutoff)
Impedance	50 Ω ± 2% *(typical)*
Level range	± FS/2 for FS = 0.5, 1, 2 or 5 V
Maximum overload protection	± 5 V DC (continuous without damage)
Frequency range	DC to 1 GHz for Edge, Window or Pattern trigger modes DC to 2 GHz in HF mode
Amplitude range	> 15% FS
Trigger time resolution	15 ps *(nominal)*

Control IO (I/O A and I/O B MMCX connectors)

Functions	Input	Trigger enable input
	Output	10 MHz reference clock Acquisition skipping to next segment Acquisition active Trigger is armed
Signal levels		TTL and CMOS compatible (3.3 V)

Trigger output (TRG OUT MMCX connector)

Level offset	± 2.5 V (no load) *(typical)*
Amplitude	± 0.8 V (no load), 15 mA *(typical)*
Rise/fall time	2.5 ns *(typical)*

Environmental and Physical [1]

Temperature range	Operating Non-operating	0 °C to 40 °C −40 °C to +70 °C
Relative humidity		Type tested at 95%, +40 °C (non-condensing)
Required airflow		> 2 m/s in situ
Safety		Complies with EN61010-1
EMC Complies with European EMC Directive 2004/108/EC		Complies with European EMC Directive 2004/108/EC • IEC/EN 61326-1 or 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.

Power dissipation

+3.3 V	+5 V	+12 V	−12 V	Total power
3.9 A *(nominal)* (6.8 A [2])	4.0 A *(nominal)*	0.12 A *(nominal)*	15 mA *(nominal)*	35 W *(nominal)* (44 W [2])

Dimensions	• 3U/1-slot PXI/CompactPCI standard • Chassis slot compatibility: cPCI(J1), PXI-1, PXIe Hybrid • Front panel complies with IEEE1101.10 certification and compliance
Weight	0.9 lb/ 0.4 kg

1. *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.*
2. *With M06 and M61 options*

CONFIGURATION

Hardware

Model [1]	Description
M9210A	PXI-H high-speed Digitizing Scope: 10-bit, 2-4 GS/s
M9210A-M06	Memory: 64 Msample acquisition
M9210A-M51	Memory: 512 Msample acquisition

1. For the M9210A to work properly, at least one PXI chassis and one PXI controller type must be available.

Accessories

Software and product information on CD (included)	
U1093A-AS5	AS bus 2 connector
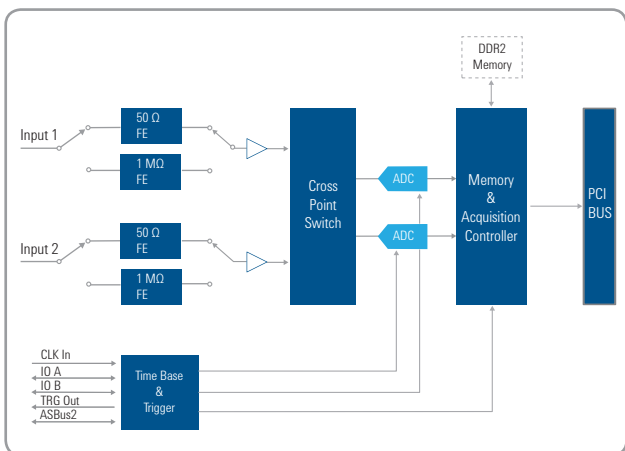
Figure 2: Simplified block diagram of the M9210A PXI-H Digitizing Scope.

Related products

Model	Description
M9211A	PXI-H UWB IF Digitizer: 10-bit, 4 GS/s, 3 GHz
M9362A-D01	PXIe Microwave Quad Downconverter: 10 MHz to 26.5 GHz
M9018A	18-slot PXIe Chassis
M9021A	PCIe Cable Interface

Software

Model	Description
Supported operating systems	Microsoft Windows® XP (32-bit), Microsoft Windows® Vista (32/64-bit), 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++), LabVIEW, LabWindows/CVI, MATLAB
Agilent IO Libraries	Includes: VISA Libraries, Agilent Connection Expert, IO Monitor

System requirements

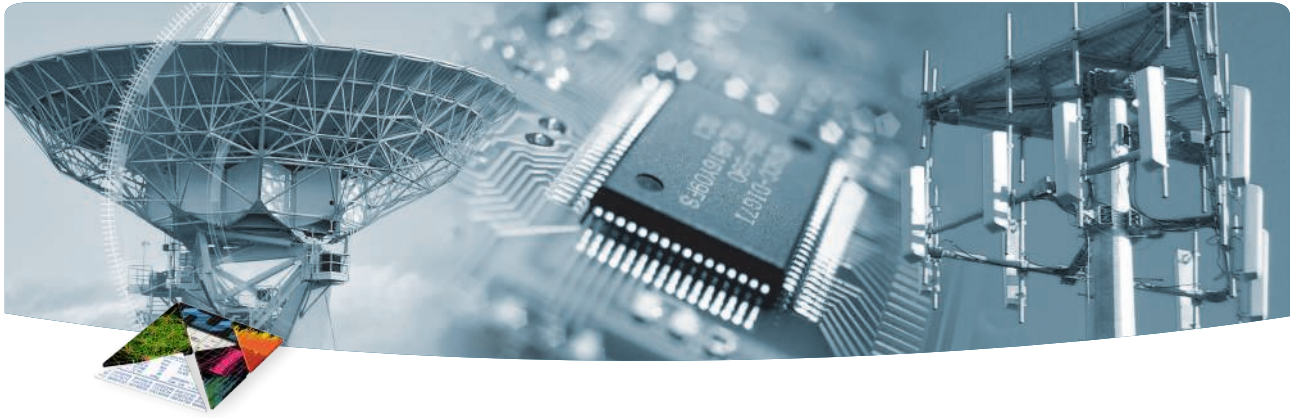|			
Operating Systems	Windows XP, Service Pack 3 or later (32-bit)	Windows Vista, SP1 and SP2 (32-bit and 64-bit), Business, Ultimate, Enterprise, Home Basic, and Home Premium	Windows 7 (32-bit and 64-bit) Starter, Home Basic, Home Premium, Professional, Ultimate, and Enterprise
Processor speed	600 MHz or higher required 800 MHz recommended	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium 64	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium 64
Available Memory	256 MB minimum (1 GB or greater recommended)	1 GB minimum	1 GB minimum
Available Disk Space	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP[1] • 100 MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP[1] • 100 MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP[1] • 100 MB for Agilent IO Libraries Suite
Video	Super VGA (800x600) 256 colors or more	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)
Browser	Microsoft Internet Explorer 6.0 or greater	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater

1. 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.

ORDERING

Model [1]	Description
M9210A	PXI-H high-speed Digitizing Scope: 10-bit, 2-4 GS/s
M9210A-M06	Memory: 64 Msample acquisition
M9210A-M51	Memory: 512 Msample acquisition

1. *For the M9210A to work properly, at least one PXI chassis and one PXI controller type must be available.*

WARRANTY AND CALIBRATION

Advantage Services: Calibration and Warranty	
Agilent Advantage Services is committed to your success throughout your equipment's lifetime.	
Included	3-year warranty (return to Agilent), standard
R-51B-001-5Z	5-year return to Agilent warranty assurance plan

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 40 °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.

The Modular Tangram

The four-sided geometric symbol that appears in this document is called a tangram. The goal of this seven-piece puzzle is to create identifiable shapes—from simple to complex. 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—hardware, software—Agilent can help you create the system you need, from simple to complex.

Challenge the Boundaries

Agilent Modular Products

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3 WARRANTY	**Three-Year Warranty** www.agilent.com/find/ThreeYearWarranty
	Agilent Advantage Services www.agilent.com/find/AdvantageServices
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Product specifications and descriptions in this document subject to change without notice.

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