M9203A PXIe Wideband Digitizers

Two CH, 12-bit, up to 3.2 GSa/s, DC up to 2 GHz bandwidth

KEYSIGHT

Notices

Copyright Notice

© Keysight Technologies 2023

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

M9203-90001

Published By

Keysight Technologies
Chemin des Aulx, 12
1228 Plan-Les-Ouates
Switzerland

Edition

Edition 2.0, April, 2023
Printed In Malaysia

Regulatory Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. To review the Declaration of Conformity, go to http://www.keysight.com/go/conformity.

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR OF ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT SHALL CONTROL.

KEYSIGHT TECHNOLOGIES DOES NOT WARRANT THIRD-PARTY SYSTEM-LEVEL (COMBINATION OF CHASSIS, CONTROLLERS, MODULES, ETC.) PERFORMANCE, SAFETY, OR REGULATORY COMPLIANCE, UNLESS SPECIFICALLY STATED.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is "commercial computer software," as defined by Federal Acquisition Regulation ("FAR") 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement ("DFARS") 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at http://www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

The following safety precautions should be observed before using this product and any associated instrumentation.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid

possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product.

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

The types of product users are:

- Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring operators are adequately trained.

- Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

- Maintenance personnel perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

- Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespans, improper module performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from chassis.

Keysight products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring

circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits – including the power transformer, test leads, and input jacks – must be purchased from Keysight. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keysight to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call an Keysight office for information.

WARNING

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers. For continued protection against fire hazard, replace fuse with same type and rating.

PRODUCT MARKINGS:

The CE mark is a registered trademark of the European Community.

Australian Communication and Media Authority mark to indicate regulatory compliance as a registered supplier.

**ICES/NMB-001
ISM GRP.1 CLASS A**

This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

MSIP-REM-Kst-BL15169

South Korean Class A EMC Declaration. This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. A 급 기기 (업무용 방송통신 기자재) 이 기기는 업무용 (A 급) 전자파적 합기기로서 판 매자 또는 사용자는 이 점을 주 의하시기 바라 며 , 가정외의 지역에서 사 용하는 것을 목적으 로 합니다.

This product complies with the WEEE Directive marketing requirement. The affixed product label (above) indicates that you must not discard this electrical/electronic product in domestic household waste. **Product Category**: With reference to the equipment types in the WEEE directive Annex 1, this product is classified as "Monitoring and Control instrumentation" product. Do not dispose in domestic household waste. To return unwanted products, contact your local Keysight office, or for more information see http://about.keysight.com/en/companyinfo/environment/takeback.shtml.

This symbol indicates the instrument is sensitive to electrostatic discharge (ESD). ESD can damage the highly sensitive components in your instrument. ESD damage is most likely to occur as the module is being installed or when cables are connected or disconnected. Protect the circuits from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any built-up static charge by touching the outer shell of any grounded instrument

chassis before touching the port connectors.

This symbol on an instrument means caution, risk of danger. You should refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

This symbol denotes a hot surface. The side cover of the module will be hot after use and should be allowed to cool for several minutes.

CLEANING PRECAUTIONS:

WARNING

To prevent electrical shock, disconnect the Keysight Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally. To clean the connectors, use alcohol in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

Contents

Documentation Map

Startup Guide

Product website

Product DVD

Access to all Documentation

Startup Guide

- Unpack product
- Verify shipment
- Install software
- Install & connect hardware
- Verify operation
- Troubleshooting

User Manual

In-depth information and reference material specific to your digitizer product

Datasheet

- Product description
- Technical specifications

Soft Front Panel (SFP)
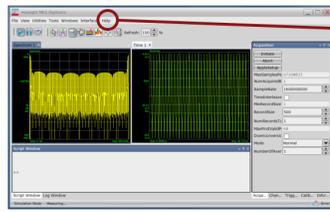
SFP embedded help
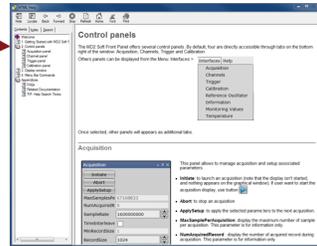
- Product Theory of operation
- Configuration
- Self test
- Self calibration
- Error report

Visual Studio

IVI Driver embedded help

Press F1 with focus on Method
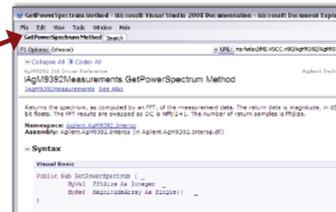
- IVI-COM and IVI-C driver programmer's reference

LabVIEW

IVI Driver embedded help

Context help with link to detailed information
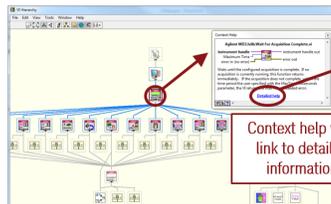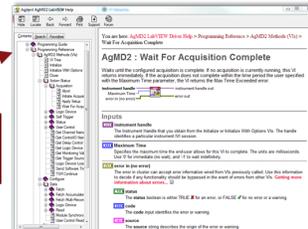
- LabVIEW driver programmer's reference

M9203A PXIe High-Speed Digitizer Introduction

The scope of this Startup Guide is to detail the processes of receiving and installing the Keysight M9203A PXIe High-Speed Digitizer, installing the required software, and verifying basic module operation.

If you have any questions after reviewing this information, please contact your local Keysight representative or contact us through our website at www.keysight.com/find/contactus.

Related Documentation

If you have run the Keysight MD2 software installer on your PC, this Startup Guide and the related product documentation listed below have been installed to your hard drive.

Document	Description and location
Startup Guide	Includes procedures to help you to unpack, inspect, install (software and hardware), perform instrument connections, verify operation, and troubleshoot your product. **Start > Keysight MD2 Digitizer > M9203A Startup Guide**
User Manual	Provides in-depth information and reference material specific to your digitizer product. **Start > Keysight MD2 Digitizer > M9203A User Manual**
Data Sheet	In addition to a detailed product introduction, the data sheet supplies full product specifications. **Start > Keysight MD2 Digitizer > M9203A Data Sheet**
Soft Front Panel (help system)	Provides information on the use of the driver Soft Front Panel. **Start > Keysight MD2 Digitizer > MD2 SFP Help**
IVI Driver reference (help system)	Provides detailed documentation of the IVI-COM and IVI-C driver API functions, as well as information to help you get started with using the IVI drivers in your application development environment. **Start > Keysight MD2 Digitizer > AgMD2 IVI Driver Help**
LabVIEW Driver reference (help system)	Provides detailed documentation of the LabVIEW G driver API functions. **Start > Keysight MD2 Digitizer > LabVIEW Help**

Follow the Startup Sequence

This StartUp Guide is intended to lead the user through the four steps of product installation as summarized in the diagram below. An optional fifth step shows how to perform an operational verification of the M9203A PXIe High-Speed Digitizer.

Step 1: Unpack and Inspect

Step 2: Verify Shipment

Step 3: Install Drivers and Software

Step 4: Install Modules

WARNING   Closely follow the startup process flow in this document. Deviating from the sequence can cause unpredictable system behavior, damage your system, and may cause personal injury.

Step 1: Unpack and Inspect the Module

CAUTION The module is shipped in materials which prevent damage from static. The module should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

Electrostatic Discharge (ESD) Precautions
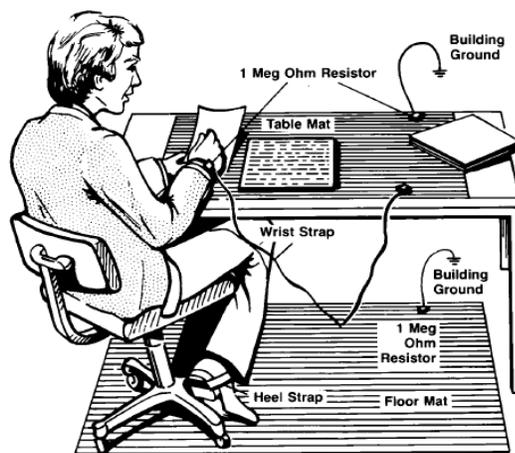
Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform all work on electronic assemblies. The figure (left) shows a static-safe work station using two types of ESD protection: conductive table-mat and wrist-strap combination, and conductive floor-mat and heel-strap combination. Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 MΩ of isolation from ground.

WARNING DO NOT use these techniques for a static-safe work station when working on circuitry with a voltage potential greater than 500 volts.

Inspect for Damage

After unpacking a module, inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty (see warranty information at beginning of this document).

CAUTION To avoid damage when handling a module, do not touch any exposed components or connector pins.

NOTE See http://www.keysight.com/find/tips for information on preventing damage to your Keysight equipment.

Return a Module for Service

Should it become necessary to return a module for repair or service, follow the steps below:

1. Review the warranty information shipped with your product.

2. Contact Keysight to obtain a Return Material Authorization (RMA) and return address. For assistance finding Keysight contact information, go to www.keysight.com/find/assist (worldwide contact information for repair and service).

3. Write the following information on a tag and attach it to the malfunctioning equipment:

   - Name and address of owner. A P.O. box is not acceptable as a return address.

   - Product model number (for example, M9203A).

   - Product serial number. The serial number label is located on the top cover of the module. The serial number can also be read from the Soft Front Panel interface, but only after the hardware is installed.

   - Description of failure or service required.

4. Pack the module in its original ESD bag and packing carton. If the original carton is not available, use bubble wrap or packing peanuts and place the instrument in a sealed container and mark the container "FRAGILE".

5. On the shipping label, write ATTENTION REPAIR DEPARTMENT and the RMA number.

NOTE   If any correspondence is required, refer to the product by serial number and model number.

Step 2: Verify M9203A Shipment Contents

The following items are also included with your M9203A PXIe High-Speed Digitizer order:

Part Number	Quantity	Description
M9203A	1	PXIe High-Speed Digitizer.
U1092-80001	1	Coaxial cable, MMCX (male) to BNC (male), 1 m.
M9700-10001	1	Keysight MD2 High-Speed Digitizer Software & Product Information DVD.
M9700-10005	1	Keysight High-Speed Digitizer Streaming Application Software DVD
M9203-90001	1	Startup Guide in hard copy.
5962-0476	1	Certificate of Calibration.
9320-6741	1	ROHS (China addendum).

Step 3: Install the Software

System Requirements

Requirements	Windows	Linux
Operating system	Windows 10® (32 or 64-bit), all versions **Note:** If using the Streaming Application Software DVD, Windows 10® (64-bit) is required.	Linux Kernel 3.x, 4.x & 5.0 to 5.4
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium64	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]: 1.5 GB for Keysight IO Libraries Suite 1 GB for Keysight MD2 **Note:** 400 MB for Streaming Applications Software	100 MB
Display	Minimum of 1024 x 768, 96 or 120 DPI	No display required
Browser	Use a supported version of Microsoft Edge, Google Chrome, or Mozilla Firefox.	Distribution supplied browser

[1] On older PCs with minimum RAM, installation can take a long time when installing the IO Libraries Suite and the .NET Framework.

[2] Because of 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.

Hardware Requirements

Item	Requirements
Chassis	PXIe chassis (Keysight M9010A PXIe 10-slot chassis, M9019A 18-slot chassis, or M9046A high-power 18-slot chassis recommended).
Host Controller	Remote PC Host Controller, or Embedded PXIe controller: recommended PCs and configurations for M90xxA PXIe chassis are available in following document: http://literature.cdn.keysight.com/litweb/pdf/5990-7632EN.pdf?

Install the Software - instructions for Windows

CAUTION   Check if the Keysight MD2 software is installed already on your computer. If yes, first uninstall the Keysight MD2 software from the **Control Panel** › **Programs and Features** before installing the Keysight IO Libraries Suite (IOLS).

Keysight IO Libraries Suite (IOLS)

The Keysight IO Libraries Suite (IOLS) contains the Keysight Connection Expert. This software is available at www.keysight.com/find/IOsuite. This software must be installed first.

NOTE   For Keysight IO Libraries Suite, the recommended version is indicated on MD2 Driver DVD or on www.keysight.com/find/MD2. Follow instructions on the IO Libraries Suite Downloads page for installing the IO Libraries Suite.

Instrument Software

The instrument software, which includes device drivers (IVI-C, IVI-COM) and documentation is delivered with your shipment (part number M9700-10001) or can be downloaded from www.keysight.com/find/MD2.

NOTE   Version 1.12 or higher of the Keysight MD2 High-Speed Digitizer Software is required.

1. From the Keysight MD2 High-Speed Digitizer Software & Product Information DVD, launch the installer; OR, if the software was downloaded from the web, run the downloaded installer.
2. Follow the installer prompts. Choose a "Complete" installation to install all software and documentation, or a "Custom" installation to select from a listing of components and other features.
3. After installation is complete, shut-down the PC.

High-Speed Digitizers Streaming Application Software DVD for Windows

The Streaming Application Software DVD installs the software required for the options M9203A-CB0 and M9203A-CB2. This software is included with your shipment (DVD part number M9700-10005).

> **NOTE** **Installation of the Streaming Application Software DVD is only required if option M9203A-CB0 or M9203A-CB2 is present in the Digitizer.**

1. Install Keysight MD2 High-Speed Digitizer Software.
2. From the Streaming Application Software DVD, launch the installer.
3. Follow the installer prompts and select the applications you want to install.

Install the Software – instructions for Linux

> **CAUTION** Do not install Keysight IO Libraries Suite (IOLS) on the same Linux system as the MD2 Instrument Drivers. The MD2 drivers interact directly with the Digitizer hardware. MD2 on Linux is not compatible with IOLS on Linux.

Introduction

MD2 High-Speed Digitizer Instrument Drivers are available from Keysight for both Windows and Linux platforms. The Linux version can be installed on systems with kernel 3.x, 4.x & 5.0 to 5.4.

For kernels up to version 6.0, a patch is available. This is especially beneficial to customers using Ubuntu 20.04, who might otherwise have to downgrade to kernel version 5.4.

The name of the file that is downloaded from the Linux MD2 Driver webpage is *LinuxMD2-2.5.1.tar.gz*. Extracting this file creates a directory called *LinuxMD2-2.5.1-0.72847M*. This directory includes a README file and seven subdirectories, namely:

   centos-7, centos-8, debian-10, debian-9, Docs, ubuntu-18.04, and ubunto-20.04

To install MD2, you must switch to the directory that is appropriate for your distribution. For example, if the distribution is *Ubuntu 18.04* (kernel version 5.4), switch to *ubuntu-18.04*.

Note that the exact commands vary from one distribution to another. As an example, for Centos distributions, *.rpm* packages are installed with the `rpm` command. For Debian distributions, *.deb* packages are installed with the `dpkg` command.

The instructions in the following section apply to Ubuntu 18.04. For other distributions, adapt accordingly, if necessary.

For more information, refer to the README file.

Instructions for installing the MD2 Drivers on Linux

> **NOTE** Before unpacking the Linux package, make sure dkms is installed. Example:
> `dkms status`
> If dkms is not already installed, install it. Example:
> `sudo apt-get install dkms`

1. Download LinuxMD2-2.5.1.tar.gz from the MD2 High-Speed Digitizer Instrument Drivers download page for Linux.
2. Extract the distributions.
   `tar -xvf LinuxMD2-2.5.1.tar.gz`

3. Change to the directory that matches your Linux distribution.
4. Install all packages at once. For example:
   `sudo dpkg -i *.deb`

> **NOTE** It is not strictly necessary to install all packages. For basic operation of the modules, packages *agmodinst-dkms*, *ktvisa*, *md2-driver*, and *md2-firmware* must be installed. Refer to the README file for details.

Instructions for installing the MD2 Driver Patch for Linux kernel 5.15 or 6.0

The instructions in the previous section guide you to install all packages, including *agmodinst*. However, for Linux kernel version 5.15 or 6.0, building the kernel driver fails if the previous steps are followed. Therefore, a patch must be installed.

1. Download the patch file.
   It is an updated version of *agmodinst*, namely: `agmodinst-dkms_3.5.7_all.deb`.
2. Install the updated driver.
   `sudo dpkg -i agmodinst-dkms_3.5.7_all.deb`
   This replaces the previous version 3.5.5 and should build successfully.

Create Symbolic Link

The following instructions ensure that the configuration file for the MD2 driver is found. This step is required for all Linux distributions.
```
sudo mkdir /etc/AgMD2
sudo ln -s /etc/AgMD2.ini /etc/AgMD2/AgMD2.ini
```

Step 4: Install the Module

> **CAUTION**   PXI hardware does not support "hot-swap" operation. Before installing the module into the chassis, power off the chassis to prevent damage to the module.

(4) The module can be installed in any PXIe slot marked with a peripheral slot compatibility image (a circle containing the slot number).

(7) H The module can also be installed in any hybrid PXIe slot marked with a peripheral slot compatibility image (the letter "H" and a solid circle containing the slot number).

1. Make sure the chassis is connected to the main supply, but power switch is in the Off (Standby) position.
2. If the chassis has multiple fan speed settings, ensure that the fans are set to automatic. Do not set the fan speed to low or turn it off.
3. Position the chassis so that there is ample space between the chassis fan intake and exhaust vents.
4. If using a remote controller, install the System Interface Card in the slot identified by the triangle symbol: ⚠️1
5. Install the module into the appropriate slots of the chassis by placing the module card edges into the front module guides (top and bottom). Ensure that the ejector handle is pushed down and slide the module to the rear.
6. When resistance is felt, latch the module by pulling up on the ejector handle.
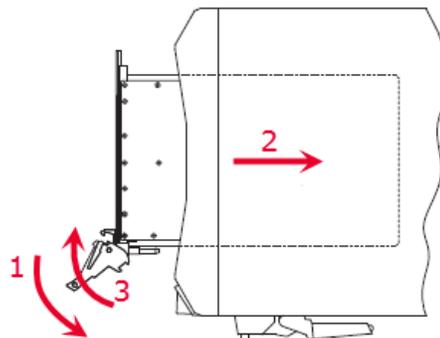
Installing a module into a PXI chassis

7. Tighten the screws on the module front panel. Performance may suffer if the screws are not tightened.
8. Verify that the chassis fans are operable and free of dust and other contaminants that may restrict airflow.

9. Install all chassis covers and filler panels after installing the module. Missing filler panels may prevent necessary air circulation inside the chassis.

10. Plug in and power up the PXIe chassis (If you are using a remote controller, reboot the host PC).

11. Check the status LED on the module front panel, it should be orange or red when the power is applied, if not there is a problem with either the module or the chassis.

12. Follow the New Hardware Wizard's instructions to install the driver.

13. Reboot the system.

Multi-module synchronization

The M9203A PXIe Digitizer includes the ability to maintain synchronization across multiple modules within the same PXIe chassis.

For details about multi-module location in the chassis and configuration prior to synchronization, refer to M9203A User Manual> **Multi-Module Synchronization** section.

Once the modules and chassis are configured, the multi-module acquisition can be performed. **MD2 Soft Front Panel** can be used to verify the configuration and synchronize the modules: See MD2 SFP Help > **Specific modes > Multi-module synchronization**.

M9203A Front Panel Features

Front Panel Connectors

Connector	Type	Description		
Trig In	SMB male	External trigger input, 50 Ω DC terminated, ±5 V range.		
In 1, 2	SMA female	Analog signal inputs, DC-coupled and 50 Ω terminated. The input Full Scale Ranges are selectable:		
		Voltage	**1 V FSR**	**2 V FSR**
		Recommended maximum operating voltage	±3 V	±4.3 V
		Clamp level	±3.6 V	±6.3 V
		Absolute maximum DC voltage rating	±4.6 V	±5 V
		Please refer to datasheet for details about input frequency range.		
JTAG	Micro USB	Provides connection to the DPU for use with the U5340A FPGA Development Kit.		
Trig Out	SMB male	Trigger Out signal.		
I/O 1, 2, 3	MMCX female	User configurable Input / Output signal. 3.3 V CMOS and TTL compatible.		
Clock In	SMA female	External clock input. AC coupled and 50 Ω terminated, signal level: +5 to +15 dBm. Frequency from 1.8 GHz to 3.2 GHz.		
Ref In	SMB male	External reference clock input, AC coupled and 50 Ω terminated. It can accept a 100 MHz signal from -3 to +3 dBm.		

NOTE Digitizer can usually work with signals present at the external reference and clock inputs (Ref In and Clock In). However, to ensure the best performance, or if the calibration is found to be unreliable, it is recommended to remove such signals when working with internal clock.

Front Panel LEDs

Indicator	Purpose	Color	State	Meaning
DPU	DPU status		Off	DPU is not configured
			Green, blinking	Module initialization in progress
			Green	Module OK (firmware not yet loaded)
			White	DPU firmware loaded (ready)
STATUS	Module status		White, blinking	Firmware initialization in progress
			Green, blinking	Module initialization in progress
			Orange, blinking	Warning
			Red, blinking	Error
			Green	OK (ready)

NOTE   If warning or error status is observed, please try the following steps:

- Power-cycle the PC (If using a remote controller, observe the power sequence requirements).
- If the error persists, contact Keysight technical support http://www.keysight.com/find/contactus.

Step 5: Verify Operation of the M9203A Module

Keysight Connection Expert (Windows only)

The intention of this step is to verify correct operation of the newly installed module. Run **Keysight Connection Expert** by clicking the task bar icon **IO**, and select

Connection Expert.

The list of installed modules is displayed. The instrument properties may be viewed by clicking on the desired instrument from the list on the left.

Review the configuration data and then click on **Start soft front panel** to launch the **MD2 Soft Front Panel**. This will provide control of the module for calibration, test and other operational verification procedures.
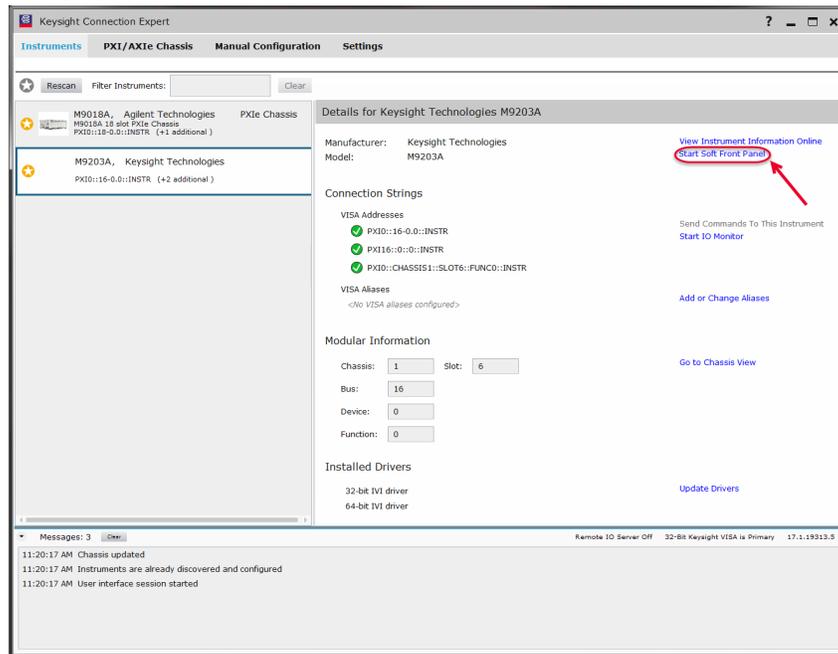
NOTE If the module does not appear in the Keysight Connection Expert, first try the **Rescan** button. If that does not work, restart your PC or embedded controller and restart Keysight Connection Expert again.

Driver Graphical Interface: MD2 Soft Front Panel (Windows only)

The **Keysight MD2 SFP** (Soft Front Pannel) is a graphical interface for High-Speed Digitizer Instrument Drivers that enables the control of any supported digitizers.

The MD2 SFP can be launched from **Keysight Connection Expert**, either directly or from the **Windows Start Menu > Keysight MD2 Digitizer>Keysight MD2 SFP**.
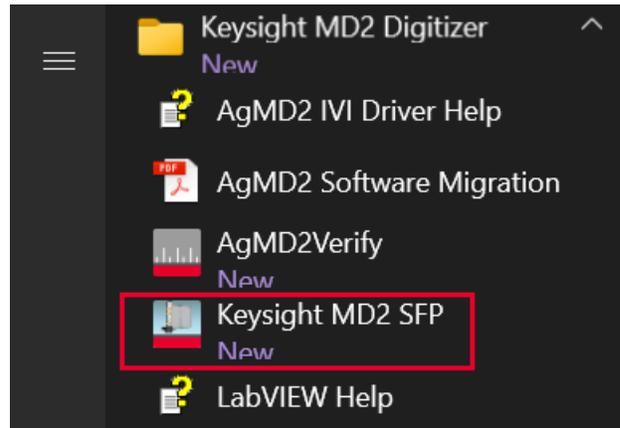
The **Connection window** opens with the selection of the digitizer to monitor. After selecting your digitizer, click **Connect**. For details, please refer to **MD2 SFP Help**.

Example of display after running a high-speed digitizer acquisition with the MD2 SFP (Acquisition parameters depends on your digitizer).

Perform a Verification of the M9203A (optional)

Requirements for Verification

The correct operation of the M9203A may be verified by the use of a simple application which carries out several performance checks on a signal acquired from an external Function Generator.

Required Hardware

An external signal source is required. Almost any sine wave or function generator capable of generating a signal with an amplitude of 300 mV rms into 50 Ω at a frequency of 1 MHz may be used.

Hardware	Description
RF Analog Signal Generator	e.g. Keysight N5181B
SMA cable	50 Ω Coaxial cable with SMA(m)

Operational Verification Procedure

CAUTION   Do not exceed the maximum voltage level at the INPUT connector (±3.6 V DC)

1. Configure the RF Generator to produce a Sine signal with a Frequency of 1.0 MHz, an Amplitude of 300 mV rms (+2.55 dBm).

2. Connect the Signal Generator output to the IN 1 connector, and enable the output.

3. Perform one of the following steps, depending on whether you are a Windows or Linux user:
   - In Windows, launch the *AgMD2Verify* utility from **Windows Start Menu > Keysight MD2 Digitizer > AgMD2Verify**.
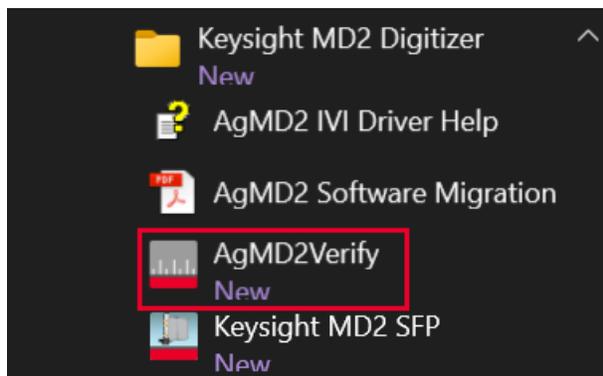
A command shell window will open. Select the instrument PXI address. Then, **Press any key** to start the test.

- In Linux, the **AgMD2Verify** utility is installed by the **md2-verify** pack under `/usr/bin/AgMD2Verify`. After installation, you can launch **AgMD2Verify** or **AgMD2Verify <PXI_address>**, specifying the PXI address in case of multiple instruments.
For example: `--$ AgMD2Verify <PXI51::0::0::INSTR>`.

The screen capture below shows the result of a successful verification:


> **NOTE** AgMD2Verify checks the version of the Control FPGA firmware. If the version is not up-to-date, the tool will automatically propose to update the firmware using the "Firmware Update Utility". Once the Control FPGA firmware has been updated successfully, please power off your computer and restart it again for the update to take effect. You may then proceed with the AgMD2Verify utility as described in this section.

If a problem is found

1. Verify that you have made all configuration settings as shown above.
2. Verify that the RF generator is ON and producing the desired signals at the end of the cable. This can be done with an oscilloscope.
3. Verify that the problem is reproducible.
4. Contact Keysight technical support for assistance. Contact details may be found at: www.keysight.com/find/contactus.

Keeping Documentation up-to-date (Windows only)

M9203A datasheet and manuals are included in the MD2 software download. The documentation can be opened from the Windows Start menu.
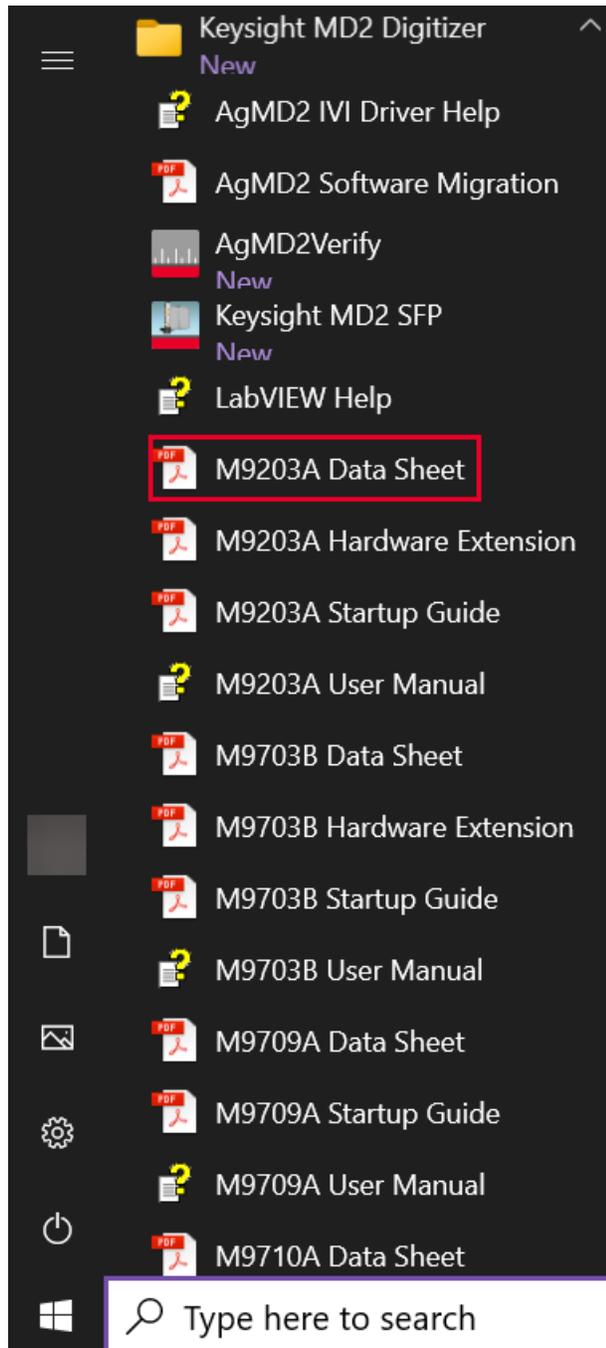
The same documentation is also available from the Keysight website. Occasionally, it is necessary to make changes to the datasheet or manuals. The changes appear immediately in the documentation posted on the website. If you find that the

documents that you open from the Start menu are not in agreement with those on the Keysight website, you can follow these steps to bring them into alignment.

1. Open folder "C:\Program Files\Keysight\MD2\Help" and identify the file that must be replaced.

   - File names are self-explanatory: <*Model*>*_DataSheet.pdf*, or <*Model*>_*StartupGuide.pdf*.

2. Click the hyperlink that opens the required file at www.keysight.com, and save it using the appropriate file name (or save as the default name, and rename it later).

3. Ensure the file in question at "...\MD2\Help" is not currently in use, and move the downloaded file to this location.

4. When prompted that "the destination folder already has a file named <file name>", choose to "replace the file in the destination".

M9203-90001