M9038A PXIe Embedded Controller



KEYSIGHT

USER GUIDE

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General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product must not be impaired if it is used in a manner specified in the operation instructions.

Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power. Note the external markings described under "Safety Symbols".

Ground the Instrument

Keysight chassis' are provided with a grounding-type power plug. The instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

Do Not Operate in an Explosive Atmosphere

Do not operate the module/chassis in the presence of flammable gases or fumes.

Do Not Operate Near Flammable Liquids

Do not operate the module/chassis in the presence of flammable liquids or near containers of such liquids.

Cleaning

Clean the outside of the Keysight module/chassis with a soft, lint-free, slightly dampened cloth. Do not use detergent or chemical solvents.

Do Not Remove Instrument Cover

Only qualified, service-trained personnel who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.

Keep away from live circuits

Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment

Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Keysight Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

DO NOT block the primary disconnect

The primary disconnect device is the appliance connector/power cord when a chassis used by itself, but when installed into a rack or system the disconnect may be impaired and must be considered part of the installation.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Keysight Sales and Service Office to ensure that safety features are maintained.

In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel

CAUTION

Do NOT block vents and fan exhaust: To ensure adequate cooling and ventilation, leave a gap of at least 50mm (2") around vent holes on both sides of the chassis.

Do NOT operate with empty slots: To ensure proper cooling and avoid damaging equipment, fill each empty slot with a PXIe filler panel module.

Do NOT stack free-standing chassis: Stacked chassis should be rack-mounted.

All modules are grounded through the chassis: During installation, tighten each module's retaining screws to secure the module to the chassis and to make the ground connection.

WARNING

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 lifespan, 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 the chassis.

Safety and Regulatory Symbols

CAUTION

A CAUTION denotes a hazard. It calls attention to an operating procedure or practice, 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 denotes a hazard. It calls attention to an operating procedure or practice, 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.

Products may display the following symbols:


Warning, risk of electric shock


Refer to manual for additional safety information.


Earth Ground.


Chassis Ground.


Alternating Current (AC).


Standby Power. Unit is not completely disconnected from AC mains when switch is in standby.


Antistatic precautions should be taken.

CAT I
CAT II
CAT III
CAT IV

IEC Measurement Category I, II, III, or IV

For localized Safety Warnings, Refer to Keysight Safety document (p/n 9320-6792).



The CSA mark is a registered trademark of the Canadian Standards Association and indicates compliance to the standards laid out by them. Refer to the product Declaration of Conformity for details.



Notice for European Community: This product complies with the relevant European legal Directives: EMC Directive and Low Voltage Directive .



The Regulatory Compliance Mark (RCM) mark is a registered trademark. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.

ICES/NMB-001

ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB-001 du Canada.



This symbol represents 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 this product.



The UK conformity mark is a UK government owned mark. Products showing this mark comply with all applicable UK regulations.



M9038A
MSIP-REM-Kst-xxxxx

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.

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This product complies with the WEEE Directive (2002/96/EC) marking requirement. The affixed product label (see below) 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 a “Monitoring and Control instrumentation” product.

Do not dispose in domestic household waste.

To return unwanted products, contact your local Keysight office for more information.



Contents

1 Introduction

Related Documentation 9
M9038A at a Glance 10
Front Panel LED Indicators 11
M9038A Functional Description 12
CPU, Memory and Chipset 13
I/O Interfaces 14
M.2 Port 17
Upgrading from the M9036A 17
M9038A Accessories 18
Support Information 18

2 Using the Controller

Electrostatic Discharge (ESD) 19
Controller Startup 20
Chassis Power Inhibit Functionality 22
Using Keysight Connection Expert 23
DisplayPort Video 24
Audio 24
Welcome to the Unified Extensible Firmware Interface (UEFI) 25
BIOS Settings 26
BIOS Passwords 26
PCIe Boot (Holdoff) Time 26
Restoring Defaults (User Set or Factory Defaults) 27
Automatic Power-on 27
Monitor System Status 27
Windows Configuration Review 28
Windows OS Versions 28
Microsoft Windows OS is Activated 28
End User License Agreement (EULA) 28
Windows Security 29
Windows Update 29
Auto Login 30
Default Administrator Password: Keysight4u! 30
Change Administrator Password 30
Remote Desktop Connection 31
Windows Time Service 31
User Data Backup 32
System Backup and Recovery 32

Restoring Drive C to Factory Default System Image . . . 33
Create a System Image . . . 33
Restoring to a System Image that You Created Earlier . . . 36
Chassis and Controller Shutdown . . . 37
PXIe Chassis and INHIBIT Switch . . . 38
Things to not do . . . 39
Windows Registry . . . 40
Application Software . . . 40
SSD Drive . . . 40
Software Application Licenses . . . 41
Using Multiple SSD in a single M9038A . . . 41
Drivers . . . 41

3 Controller Maintenance

BIOS Setup . . . 43
Normal BIOS Operation and Updates . . . 44
Accessing the BIOS Setup Utility . . . 44
BIOS Main Setup Menu . . . 45
Default Settings . . . 45
Clear CMOS . . . 47
BIOS Password . . . 49
PCIe Boot (Holdoff) Time . . . 51
PCIe Performance . . . 51
Above 4G Decoding . . . 51
Monitor System Status . . . 52
System Date and Time . . . 52
Updating the M9038A BIOS . . . 53
Replacing the CMOS Battery . . . 54
Replacing the SSD . . . 55
Memory Modules . . . 57

1 Introduction

Keysight's M9038A is a Windows PC that fits in slot 1 of a PXIe chassis. It is a 3U, 4-slot PXIe Embedded Controller providing:

- Intel® Coffee Lake 6-Core i7-9850HE processor
- 32GB standard (or optional 64 GB) 260-pin DDR4-2666 RAM Memory*
- 512GB NVMe M.2 solid state drive (SSD) front panel removable
- Integrated IO on the front panel includes one Gigabit Ethernet port and one 10 Gigabit Ethernet, four USB 2.0 ports†, two USB 3.0 ports, one GPIB connector, one DisplayPort video port (also known as DisplayPort++), two Thunderbolt‡ 3.0 ports (USB-C with PD 3.0)
- Preloaded with Keysight IO Libraries and Microsoft Windows operating system
- Pre-installed IVI drivers for the Keysight PXIe chassis

Related Documentation

A Windows OS and all M9038A drivers **required to operate the controller and chassis** were installed at the factory, no additional drivers are required. Complete M9038A documentation, as well as the PXIe Chassis Family documentation, is pre-installed on the M9038A SSD. It can be found from the Windows Start menu under Keysight. Descriptions of the PXIe Chassis Family can be found at: www.keysight.com/find/pxie-chassis.

Adobe Reader is required to view the documentation supplied on the M9038A. It is available free at: www.adobe.com. You should install this on your M9038A prior to attempting to open a PDF file.

For the latest M9038A specifications, go to: www.keysight.com/find/M9038A.

For the IVI driver, help file, program examples, etc. go to:
C:\Program Files\IVI Foundation\IVI\Drivers\KtMTrig
or
C:\Program Files (x86)\IVI Foundation\IVI\Drivers\KtMTrig

* The M9038A has two 260-pin, SODIMM memory sockets that support DDR4-2666 RAM. The standard M9038A configuration is 32 GB.

† The USB 2.0 and 3.0 ports do not support the USB Battery Charging specification. Do not connect non-standard or defective USB devices.

‡ Thunderbolt™ is the brand name of an interface standard developed by Intel (in conjunction with Apple) that allows connection of external peripherals to a computer. Charging devices such as laptop computers over Thunderbolt 3 is not supported.

M9038A at a Glance

The following figure shows the front panel for the M9038A PXIe Controller. Detailed information about the module follows in this manual.

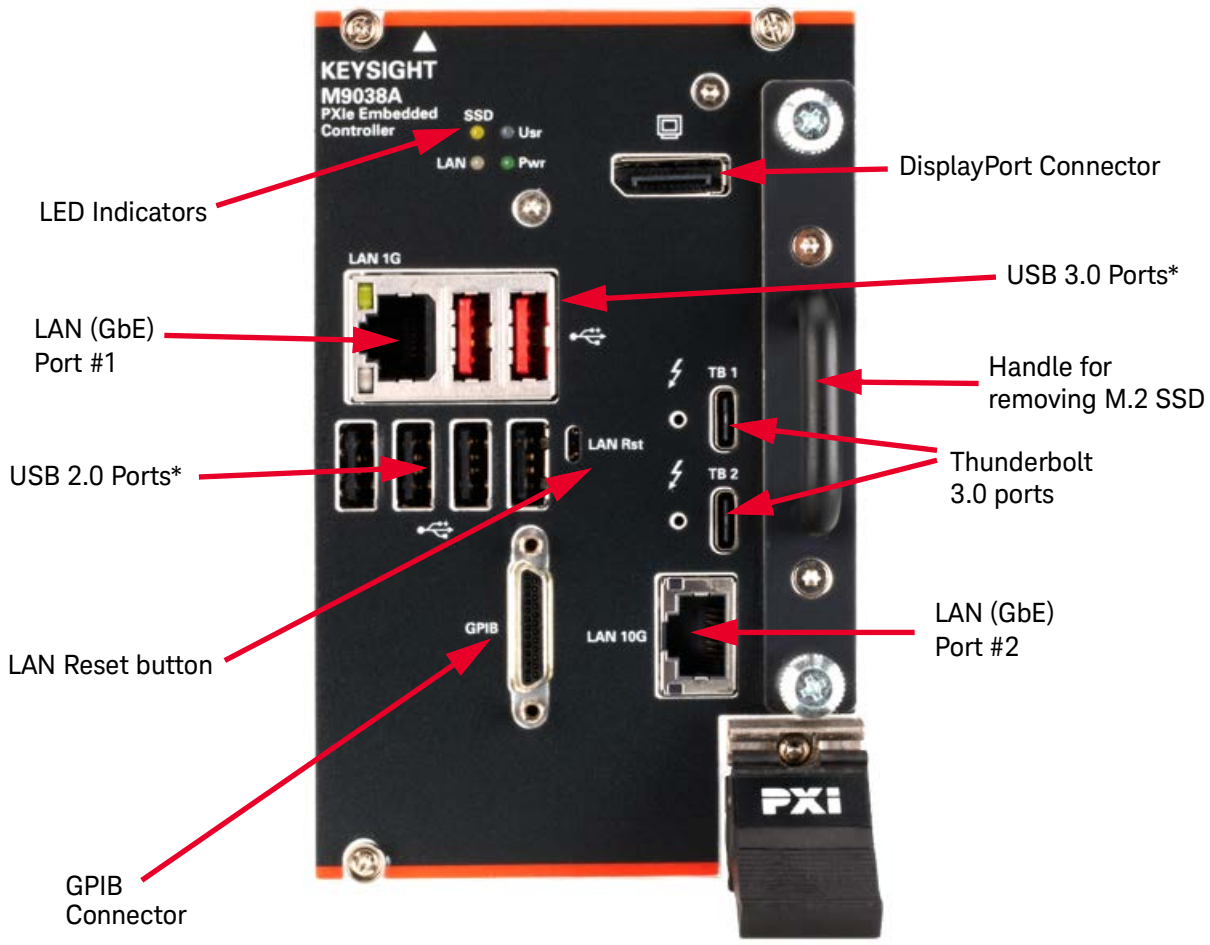


Figure 1 M9038A Embedded Controller Front Panel

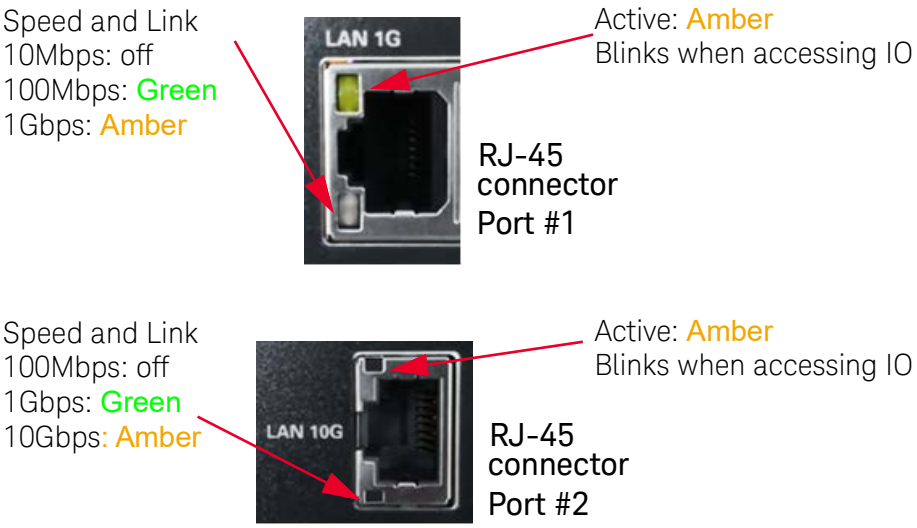
* The USB 2.0 and 3.0 ports do not support the USB Battery Charging specification. Do not connect non-standard or defective USB devices.

Front Panel LED Indicators

The following table lists the LEDs on the front panel and a brief description of their use and what they indicate.

LED Indicator	Color	Description
Pwr	Green	If the LED is on, the power supply to the controller is good and the system should boot.
SSD	Amber	When the Solid State Drive (SSD) is active, the LED will flash.
LAN	N/A	These two LEDs are reserved for Keysight use only. The LEDs should never turn on or flash.
Usr	N/A	

Gigabit Ethernet (GbE) LEDs



Both LEDs off indicate that the network link is not established or system is powered off.

LAN Rst Switch

The LAN Rst switch is reserved for Keysight use only. Depressing the LAN Rst switch has no effect.

M9038A Functional Description

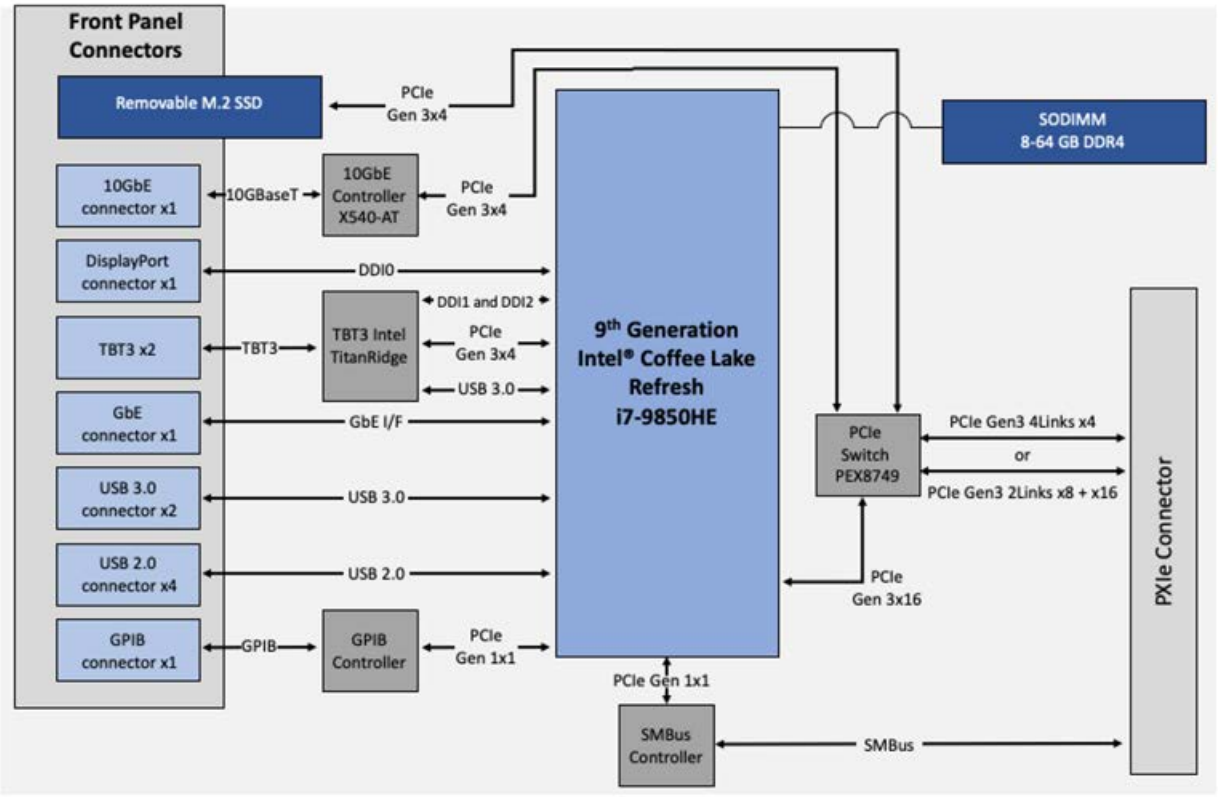


Figure 2 M9038A Embedded Controller Functional Block Diagram

CPU, Memory and Chipset

By introducing Intel 6 core technology, the M9038A has more computing engines in a single processor, which can execute independent tasks at the same time in a multi-tasking environment. Combining this superior performance with a variety of instrument platforms makes the M9038A an ideal solution for your hybrid PXIe-based testing system.

The M9038A is also specifically designed to deliver excellent durability and reliability. A large aluminum heat sink dissipates heat generated by CPU and other critical components uniformly to maintain a stable operating temperature.

Processor

- Intel® Coffee Lake 6-Core i7-9850HE processor
- DMI (Direct Media Interface) with bus speed 8 GT/s

Chipset

- Intel QM370

Memory

- Two standard 260-pin DDR4 SODIMM sockets
- Supports +1.2V DDR4, 2666 MHz RAM per socket (up to 64 GB total)
- Supports non-ECC, unbuffered memory

NOTE

The M9038A was tested with the following RAM module configurations:

- **one 32 GB RAM module**
- **two 32 GB RAM modules (a total of 64 GB RAM)**

Other configurations have not been tested.

CMOS Backup Battery

Keysight's M9038A is equipped with a 3.0 V "coin cell" lithium battery. This battery powers the clock circuit and retains configuration memory in CMOS RAM while the system is turned off. However, the battery is not user replaceable.

I/O Interfaces

USB*

Keysight's M9038A provides four USB 2.0 Type A ports and two USB 3.0 Type A ports on the faceplate. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The M9038A controller supports multiple boot devices. The boot priority and boot device can be configured in BIOS. USB to VGA display adapters are also supported.

Differences between USB 2.0 and USB 3.0 USB 3.0 is the latest version of the Universal Serial Bus (USB). It provides better speed and more efficient power management than USB 2.0. USB 3.0 is backward compatible with USB 2.0 devices; however, data transfer speeds are limited to USB 2.0 levels when these devices inter-operate.

	USB 2.0	USB 3.0
Backwards Compatibility:	USB 1.1	USB 1.1 and USB 2.0 (data transfer speeds are limited to USB 1.1 or USB 2.0 levels)
Speed:	480 Mbps (known as High Speed/ HS)	10 times faster than USB 2.0. Super Speed or SS, 4.8 Gbps
Signaling Method:	Half duplex	Full duplex (Asynchronous -- it can send and receive data simultaneously)
Power:	Up to 500 mA	Up to 900 mA. Allows better power efficiency with less power for idle states. Can power more devices from one hub.
Number of wires within cable:	4	9
Cables and Connectors	Grey color	Blue color. USB 3.0 receptacles are electrically compatible with USB 2.0 plugs if they physically match. USB 3.0 type-A plugs and receptacles are completely backward compatible, and USB 3.0 type-B receptacles accept USB 2.0 and earlier plugs. However, USB 3.0 type-B plugs will not fit into USB 2.0 and earlier receptacles. This means that USB 3.0 cables cannot be used with USB 2.0 and USB 1.1 peripherals, although USB 2.0 cables can be used with USB 3.0 devices, if at USB 2.0 speeds.

* The USB 2.0 and 3.0 ports do not support the USB Battery Charging specification. Do not connect non-standard or defective USB devices.

DisplayPort Video Connector

The DisplayPort (also known as DisplayPort++) video connectors connect the M9038A to standard video monitors. The DisplayPort video ports provide a maximum resolution of 4096 x 2304. Resolution for other video interfaces (such as VGA) depends on the adapter used. For detailed information about the DisplayPort video, refer to "DisplayPort Video" on page 24.

Thunderbolt-3 Connector

Keysight's M9038A provides two Thunderbolt-3 ports (USB-C with PD 3.0), supporting a maximum of 40Gbps transfer speed and power delivery of maximum 37.5 W (only on TB1 with 15V @ 2.5A).

These Thunderbolt-3 ports also connect to display monitors. Multiple monitors are supported in star or daisy chain (up to two 4K displays) connection. It supports maximum resolution of 4K and 5K.

Ethernet

The M9038A has two RJ-45 connectors with link speed/activity LEDs on the faceplate.

GPIB Connector

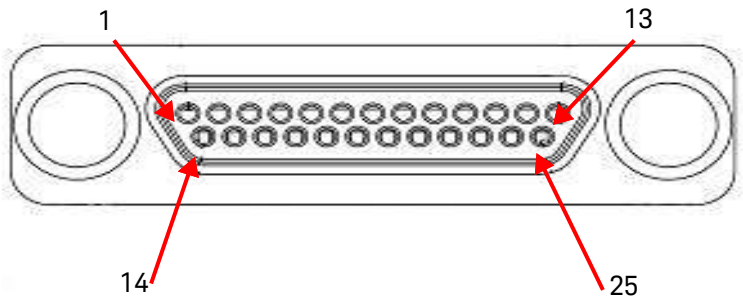
The GPIB connector on M9038A is a D-sub 25-pin connector and is used to control external bench-top instruments. You need an optional GPIB adapter cable to connect instruments. The on-board GPIB controller has the following features:

- Compatible with the IEEE 488 standard
- On-board 2 KB FIFO for read/write operations
- Connect up to 14 instruments
- GPIB is a standard VISA Resource

NOTE A GPIB cable is NOT supplied with the controller. Note that the GPIB cable is a standard micro type 2 GPIB cable with standard pin wiring and is not compatible with the M9036A Embedded Controller GPIB cable. It is available from Keysight as an accessory cable, part number Y1260A. Please use a GPIB cable of less than 1m or the recommended one.

NOTE You must have Keysight IO Libraries Suite version 2020 Update 1.0 (or later) to use the GPIB.

The following table provides the pin-out of the front panel D-sub 25-pin GPIB connector.



Pin	Signal	Description	Pin	Signal	Description
1	DIO1#	GPIB Data 1	14	DIO6#	GPIB Data 6
2	DIO2#	GPIB Data 2	15	DIO7#	GPIB Data 7
3	DIO3#	GPIB Data 3	16	DIO8#	GPIB Data 8
4	DIO4#	GPIB Data 4	17	REN	Remote Enable
5	EOI	End or Identify	18	GND	Signal Ground
6	DAV	Data Valid	19	GND	Signal Ground
7	NRFD	Not Ready for Data	20	GND	Signal Ground
8	NDAC	Not Data Accepted	21	GND	Signal Ground
9	IFC	Interface Clear	22	GND	Signal Ground
10	SRQ	Service Request	23	GND	Signal Ground
11	ATN	Attention	24	GND	Signal Ground
12	Shield	Chassis Ground	25	GND	Signal Ground
13	DIO5#	GPIB Data 5			

M.2 Port

The M9038A provides a M.2 connector and is shipped with a pre-installed 512 GB M.2 NVMe solid state drive (SSD). The SSD may be replaced from the module's front panel without removing the module from the chassis.

Upgrading from the M9036A

If you already have a Keysight M9036A Embedded Controller and you are upgrading to an M9038A, be aware of the following:

- The GPIB connector and cables are not compatible.
- The video cables and adapters are not compatible.
- The M9038A, unlike the M9036A and M9037A, does not have a Soft Front Panel nor its own drivers. The PXIe chassis driver provides the IVI KtMTrig drivers to provide Trigger Manager functionality. The IVI KtMTrig driver can be found at:

  C:\Program Files\IVI Foundation\IVI\Drivers\KtMTrig
  and
  C:\Program Files (x86)\IVI Foundation\IVI\Drivers\KtMTrig

Any programs/applications that have been written utilizing the M9036A drivers will have to be updated.

M9038A Accessories

Accessory Number	Description
Y1205A	USB-C Cable with Screw Lock
Y1206A	Keyboard and optical mouse
Y1260A	GPIB Cable*
Y1262A	DisplayPort Cable
Y1268A	Spare SSD and upgrade COA with carrier Win 10 IoT Ent 2019 LTSC HE/64 bit/512GB
Y1268B	Spare SSD and upgrade COA with carrier Win 11 IoT Ent 2024 LTSC 24H2/64 bit/512GB
Y1269A	DisplayPort to HDMI adapter

* This is not the same GPIB cable used on the Keysight M9036A PXIe Controller, they are not compatible.

Support Information

If you have feedback or need help using these Keysight products, contact Keysight Technical Support:

Support, Manuals, & Downloads:
www.keysight.com/find/support

Phone Support: +1 800 829 4444

Fax: +1 800 829-4433

Hours: 8:00am - 8:00pm ET, Mon - Fri

2 Using the Controller

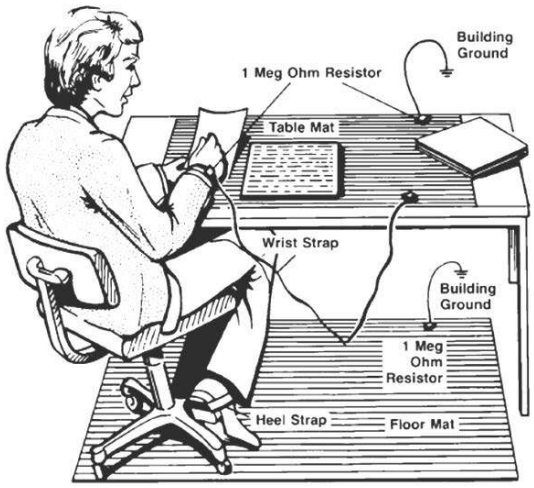
Your M9038A comes with the Windows Operating System pre-installed along with Keysight's IO Libraries Suite. This chapter provides general system configuration and preventive maintenance procedures that you are responsible for. In general, the M9038A operates as any other PC.

Electrostatic Discharge (ESD)

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. The following figure shows an example of a static-safe work station using two types of ESD protection. Purchase acceptable ESD accessories from your local supplier.

- Conductive table-mat and wrist-strap combination.
- 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.



Inspect for damage

After unpacking the embedded controller, carefully inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty.

CAUTION To avoid damage when handling a module; do not touch exposed connector pins. In an ESD event, user may experience a temporarily loss or flicker of the display; this is normal.

Controller Startup

After inserting the M9038A controller into slot 1 of a PXIe chassis, press the chassis' power on button. After a few seconds, the controller will beep indicating it passed its Power On Self Test (POST). To boot into Windows from the splash screen, no action is needed. However, you have 2 other options. You can press the <**DELETE**> key to enter the BIOS setup or press **<F7>** or **<Ctrl>** for the boot device menu.



Figure 3 M9038A boot splash screen

Without pressing anything, you see the following Windows Boot Manager screen for 5 seconds. Either press the **Enter** key or simply wait and the Windows OS will start

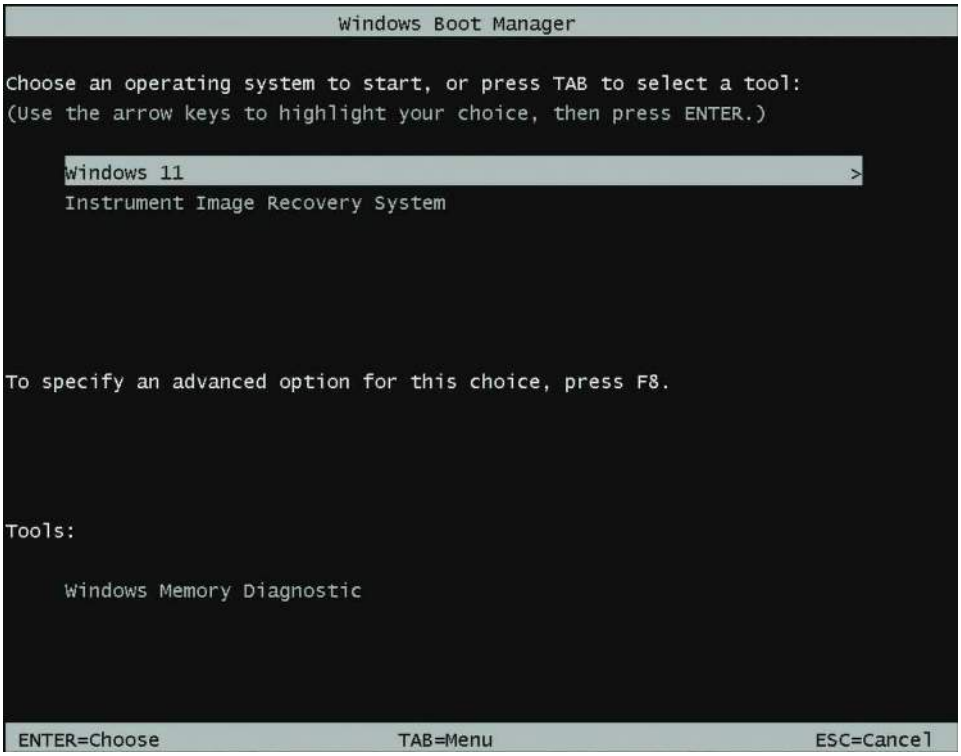


Figure 4 Windows Boot Manager screen

NOTE

Microsoft Windows is the only general purpose operating system installed on your M9038A. The SSD includes a small system partition for the **Instrument Image Recovery System**. If you select the Keysight Recovery System, the Windows Boot Manager opens a menu with five selections.

Enter your selection and press the **OK** button. Follow the instructions on the screen.

NOTE

The M9038A will boot quickly and also shutdown quickly. For example, using “Windows 10/Windows 11” in an M9019A PXIe Chassis with no modules, the time from power-on to Windows 10/Windows 11 being active is 35 seconds. The shutdown time, from pressing the power off button on the chassis, is 5 seconds. If instrument modules are in the chassis or more chassis are added, these durations will increase slightly. However, some modules, such as a RAID controller, will increase the durations much more.

Chassis Power Inhibit Functionality

On some PXIe chassis, the controller may go into a state where the blue Status LED on the front panel is constantly lit but the controller never boots.

- For a Keysight 18-Slot PXIe chassis, this may happen when the rear panel Inhibited switch is set to “MAN.” If the controller is stuck in this state, toggling (pulse low for a minimum of 500 ms) the Inhibit pin (pin 5) on the DB-9 connector causes the system to reboot. Alternately, change the Inhibit switch to the Default position and then power-on or reboot the chassis.
- For other chassis, refer to the manufacturer’s chassis documentation.

Using Keysight Connection Expert

Keysight Connection Expert is a convenient GUI program for examining the state of the embedded controller, chassis, and modules. With the Connection Expert it is easy to see the equipment connected to the embedded controller and start Soft Front Panels (SFP).

To start Connection Expert double-click the IO control icon ( ) in the lower right Windows Notification area. Alternatively, you can start it from the start menu. For “Windows 10/Windows 11” click on **Start** then **Keysight Connection Expert**.

The Connection Expert Chassis tab shows the content of each slot of the chassis. For example, the following figure shows a single chassis system with the M9038A in slot 1. With a single click you can start the chassis SFP.

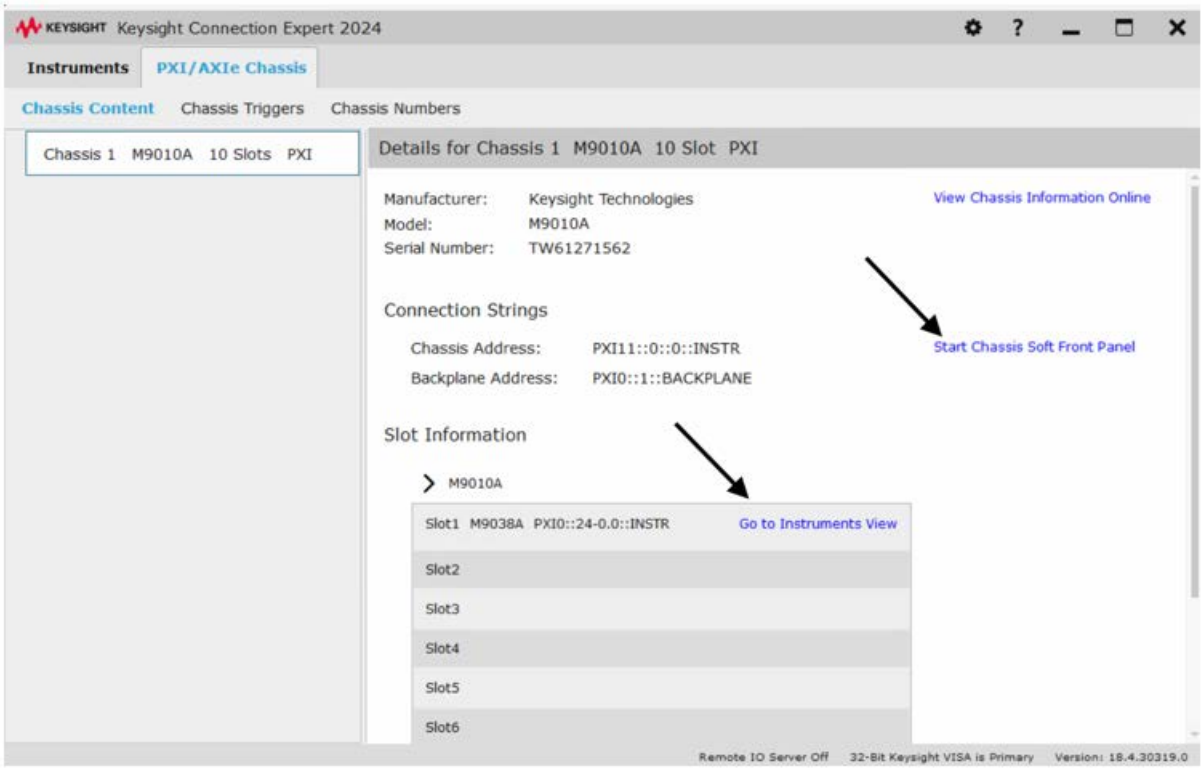


Figure 5 Keysight Connection Expert - Chassis Tab

DisplayPort Video

DisplayPort* is designed to be compatible with legacy display monitors. However, you may need a simple and inexpensive DisplayPort to DVI, HDMI, or VGA adapter. DisplayPort provides high resolution and long video cables. You must purchase an adapter for other video interfaces (such as VGA); maximum resolution depends on the adapter used.

A standard copper DisplayPort cable can support a video resolution of up to 3840 by 2160 over a length of 6.5 feet or 1080p resolution up to 50 feet.

Audio

There is no audio hardware or drivers included in the M9038A controller. Other than the Power-On Self Test (POST) beeps, you will hear no sound from the controller. That means that there are no audible Windows alerts or sounds. If your applications needs audio, you can add USB connected speakers and microphone.

* DisplayPort (also known as DisplayPort++) is a digital display interface developed by the Video Electronics Standards Association (VESA). The interface is primarily used to connect a video source to a display device such as a computer monitor, though it can also be used to carry audio.

Welcome to the Unified Extensible Firmware Interface (UEFI)

The M9038A PXIe controller introduces a change of the BIOS. The traditional PC BIOS has been replaced by UEFI which is the software/firmware interface between the operating system and platform firmware. Driving this change are the advantages of UEFI:

- Runs in 64 bit mode
- Supports drives over 2.2 TB
- Provides a higher level of Security and Secure Boot and TPM 2.0
- Provides faster boot times

The UEFI setup program interface looks and works like the older BIOS setup screens. This includes menus for configuring settings and enabling M9038A controller features. **For continuity, the following documentation will continue to use the name BIOS even though UEFI is very different from the legacy BIOS.**

BIOS Settings

The BIOS setup program includes menus for configuring settings and enabling M9038A controller features. In general, you should leave the BIOS settings alone. If you are knowledgeable in BIOS settings you may want to set the following.

- BIOS Passwords
- PCIe Boot (Holdoff) Time
- Restoring Defaults (User Set or Factory Defaults)
- Automatic Power-on
- Monitor System Status

NOTE

Depending on your application, you may never need to update the BIOS on your M9038A. However, you should always upgrade to the latest Keysight BIOS. Any BIOS update for the M9038A will be available on the Keysight web site: www.keysight.com/find/M9038A.

The BIOS is custom designed specifically for the M9038A. Do not attempt to replace it with a generic BIOS.

You can look up your current BIOS version by booting to the BIOS screen or running the command “msinfo32.exe” from the run menu option.

CAUTION **Modifying BIOS settings may cause unexpected behavior in the M9038A. If this happens, follow the instructions under "Clear CMOS" on page 47 and then restore the factory default settings. Do not change a BIOS setting unless you are absolutely certain of what it does.**

BIOS Passwords

There are two BIOS passwords that may be set using the BIOS Setup Utility: Administrator BIOS Password and User BIOS Password. These BIOS passwords impact the boot behavior of the M9038A and have nothing to do with the similar sounding login accounts of the Windows10/Windows 11 operating systems.

Administrator BIOS Password When set, you must enter this password to get into the BIOS Setup Utility. If you do not try to enter the BIOS Setup Utility (by hitting DEL at the Keysight splash screen), you will not be prompted for this password and the system will boot to Windows.

User BIOS Password When set you must enter this password to get to the Keysight splash screen. If you do not enter the password, the M9038A will not boot. If the User BIOS Password is set, then the Administrator BIOS Password is disabled.

Please see more information at "BIOS Password" on page 49.

PCIe Boot (Holdoff) Time

You should not need to change the PCIe Boot time. However, some PXIe instrument modules may take longer to be ready for enumeration than the PXI link ready requirement of 100ms. Consequently, it is possible for some controllers to enumerate the chassis before all of the individual modules are ready and therefore not enumerate them. If you have a situation where Keysight Connection Expert and/or the Windows Device Manager consistently do not find specific instrument modules when the chassis powers up, increase the wait time (valid range is 0 to 60 seconds). Configure this from the **Advanced** BIOS screen **> Holdoff Timer**.

Restoring Defaults (User Set or Factory Defaults)

There are two types of stored default settings. They are

- **Factory Default Values:** The initial optimal setting that were shipped with the M9038A from the factory. Both the User Password and the Administrator Password are cleared.
- **User Default Values:** You can modify the BIOS settings and save them to memory and restore them when needed.

Automatic Power-on

By the default setting, the M9038A will turn on as soon as it senses that power is applied. This means that the chassis will power up as soon as you insert the controller into an chassis. Alternate BIOS settings are:

- Start the system only when the chassis power switch is pressed.
- Power the system to its last power state prior to losing power.

This can be configured from the **Main** BIOS screen **> Power-up Mode**.

Monitor System Status

The BIOS monitors the following on the controller module:

- PCIe switch temperature
- CPU temperature
- Main PC board temperature
- Power supply voltages

These can be observed from the **Main** BIOS screen.

Windows Configuration Review

You must review the Windows OS configuration to ensure that it meets your needs and that you have the appropriate configuration for your security requirements.

Windows OS Versions

You can identify the version of Windows you are running by looking at the start button:

Start Button ICON	Windows OS Version
	Windows 10 IoT Enterprise 2019 LTSC HE (64-bit)
	Windows 11 IoT Enterprise 2024 LTSC 24H2 (64-bit)

Figure 6 Start button ICONs indicate the version of Windows OS

Microsoft Windows OS is Activated

Keysight ensures that your copy of Microsoft Windows operating system is activated at the time it ships from the factory. If you want to verify Windows Activation, do the following:

1. In “Windows 10/Windows 11”, right-click Windows **Start** button, then click **System**.
2. Scroll down to the bottom of the screen. Under **Windows Activation**, you can view the activation status.

End User License Agreement (EULA)

First time you turn on the M9038A and Windows starts, you must accept the End User License Agreement (EULA). A copy of the Windows EULA is in the M9038A at: **C:\boot\SoftwareLicenseTerms.rtf.**

Windows Security

If your system is connected to the Internet, you should take the following steps to ensure the operating system is protected:

- Use an Internet fire wall.
- Get the latest Windows updates.
- Install and use up-to-date anti-virus software.

Windows Update

The factory default setting for Windows Automatic Updates is to check for updates and notify the user if updates are available. It will not automatically install updates. This ensures that your M9038A is not modified, unless you accept an update.

In “Windows 10/Windows 11”, you can change the setting or manually updating the OS by right-clicking **Start**, click **Settings**, and then click on **Update & Security**.

CAUTION **Windows Automatic Update is turned off by default. You may choose to turn Windows Automatic Update on after starting the operating system. However, Keysight cannot be held responsible for changes to the system caused by the automatic update process. Enabling automatic Windows updates exposes the controller to periodic OS changes and possible new system behaviors.**

NOTE Downloading and installing Windows Updates can be network and CPU intensive (impacting system performance) and some Windows Updates automatically reboot the controller. Therefore, Windows updates should be performed when the system is not in normal use.

NOTE There is no 3rd party anti-virus software included with your controller. Anti-virus application software is the customer's responsibility. Having anti-virus software installed may have a slight impact on system performance.

CAUTION

Microsoft Windows update might happen without user acceptance. The factory image on your Embedded Controller has a default configuration set to notify you before downloading and installing any updates. However, Microsoft Windows will sometimes install updates without notifying the user, even if configured to not perform an update. If your application requires that Windows does not perform updates, please work with your IT department to determine the best solution. They may suggest isolating your network or setting up a firewall.

Microsoft Windows Update can sometimes be slow. There are many factors that can interfere with Windows Update speed. If you find that is to slow and you cannot wait, instead of waiting on Windows Update, you can perform an off-line install. Use the following procedure:

1. "check for updates" and note all the KB numbers that it is trying to download.
2. Browse to https://www.catalog.update.microsoft.com/Home.aspx and search for each KB by number.
3. In the search results select only the ones that match your installed OS. For example for Windows 11 x64 LTSC, you would select "x64 Win 11 LTSC".
4. Download each KB.
5. Install each KB.
6. Repeat this process until Windows Update says there are no more updates.

Auto Login

Your M9038A Windows default behavior is to automatically login to the Administrator account every time it boots. You do not need to type a password.

Default Administrator Password: **Keysight4u!**

The Keysight standard for the Administrator password is: **Keysight4u!**
Your M9038A default Administrator account is most likely set with this password.
If it is not set with this password, then there is no password.

Change Administrator Password

The default Administrator password is public knowledge. Keysight recommends that you change your password for improved security.

NOTE Anyone who knows your current Administrator password can change the password. When you change your password you must enter the current password. Because Auto Login is enabled, you may not notice if someone changed the password.

How to change your password for "Windows 10/Windows 11":

1. Click the **Start** button at the bottom left of your screen.
2. Click **Settings** from the list to the left.
3. Select **Accounts.**
4. Select **Sign-in options** from the menu.
5. Click on **Change** under Change your account password.

Remote Desktop Connection

The standard Microsoft application "Remote Desktop Connection" allows you to remotely login to the M9038A across the LAN from another computer. It only works if the accounts have passwords.

If your Administrator password is set on your M9038A, then the Remote Desktop Connection is enabled by default.

NOTE Anyone with network access to your M9038A can control your M9038A using the user name of local\Administrator and the publicly known default password of: **Keysight4u!**

For your environment, you must determine if this is a useful feature or a security problem. If it is a security problem, then change the password or disable Remote Desktop Connection.

Windows Time Service

The Windows Time Service synchronizes the embedded controller's date and time-of-day with a Network Time Protocol (NTP) server. Typically, the NTP server is on the Internet. You can enable or disable the Windows Time Service using the Services program.

- To start the Services program click Start, type "services", then click on Services.
- To look at the setting for the Windows Time Service, scroll down to Windows Time. Right click on Windows Time and select "Properties".
- If you want to Enable Windows Time Service and the Startup Type is set to Disabled, click on the drop-down menu and select Automatic. Click Start and then OK.

- If you want to Disable Windows Time Service and the Startup Type is not set to Disabled, click on the drop-down menu and select Disabled. Click Stop and then OK.

User Data Backup

All user data should be regularly backed up to an external memory device. This can be done across a network or to a USB device. Your IT department may already have a backup strategy which is suitable for the system and data. Also, user data back up must be done just prior to sending the controller back to Keysight for service.

The operating system supplied with your M9038A is licensed for use on the Solid State Drive (SSD) installed in the controller. If the SSD is replaced, you may be responsible to purchase or relicense the operating system.

System Backup and Recovery

After activating the Windows OS, you should create a complete System Image of your SSD as a backup in case you ever need to reinstall the operating system. There are several third-party backup solutions available. By definition, a system image is an exact copy of the computer hard drive. A system image includes the Windows operating system files as well as your system settings, application programs, and data files. You should regularly create a system image so that all data, applications, etc. have backups. The system image may be stored on a USB memory stick, multiple CD/DVDs, an external (USB) hard drive, or to a separate LAN drive.

When you restore your hard drive from a system image, it's a complete restoration—you cannot choose individual items to restore, and all of your current programs, system settings, and files are replaced with the contents of the system image. Therefore, you should also keep a regular backup of your data and applications.

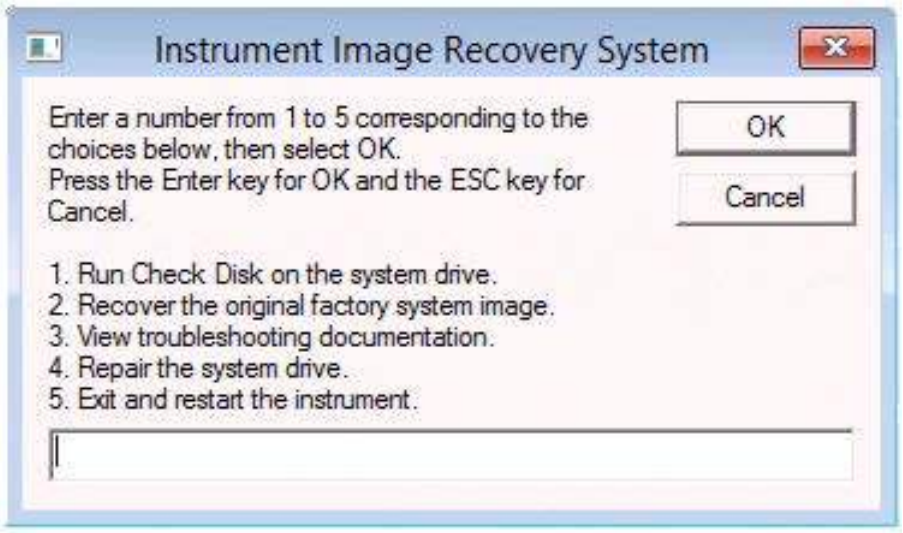
You can also create Windows Restore Points to return your system files and settings without affecting data or application files.

Microsoft Windows is the only operating system installed on your M9038A. There is a small system partition for the Keysight Recovery System on the SSD. During the OS boot process, you are given the choice to boot normally or boot from the recovery partition.

NOTE **Some third-party backup utilities may destroy Keysight's Recovery System partition. If this happens, the Keysight Recovery System will not work.**

Restoring Drive C to Factory Default System Image

During the boot process, you are given the choice to boot to the Windows operating system normally or boot from the recovery partition. If you select to boot from the recovery partition, you are prompted to review the Software End User License Agreement. Click **YES** to agree. If you click **NO** you can not proceed. The Windows Boot Manager opens a menu with five selections:



Enter your selection and press the **OK** button. Follow the instructions on the screen.

NOTE Selection number 2 restores Keysight's original factory system image. The original factory image overwrites all content of Drive C. You must first backup your data and files.

Create a System Image

You should regularly create a system image of the SSD on the M9038A. The following procedure explains how to create an initial system image after activating Windows.

NOTE If you purchase a replacement SSD drive (or hard disc drive) from a vendor other than Keysight, it must be the same size or larger than the original (512 GB) SSD in your M9038A. You cannot create a system image of one size of hard drive and then try to restore it to a smaller hard drive.

Always store your back up CDs/DVDs, hard drives, memory sticks, etc., in a secure place to prevent unauthorized access to your files

NOTE Some third-party disk backup utilities may destroy the Keysight backup partition. If this happens, the Keysight Recovery System will not work. Follow the instructions provided on the following pages carefully.

To create a complete image backup of the SSD, perform the following steps before running your image backup solution:

1. Unhide the Keysight Recovery Partition. If you do not do this, it remains hidden and not included in the system image.
   - **a** Click the Windows Start button.
   - **b** Type **CMD** into the **Search programs and files** text box.
   - **c** Press **CTRL+SHIFT+ENTER**. This is the keyboard shortcut allowing elevation to "Run as Administrator."
   - **d** In the DOS Command window, type: **CD** and press **Enter**.
   - **e** In the DOS Command window, type: **CD Keysight\Scripts.** Press **Enter**.
   - **f** Type: **HideUnhideRecoveryPartition.vbs unhide**
   - **g** Press **Enter**
   - **h** The Keysight Recovery Partition is now unhidden and should appear in the Windows File Explorer.
   - **i** Close the DOS Command window.
2. Connect a USB hard drive to the M9038A. Make certain that Windows identifies and can run the external hard drive. If you are using a LAN drive, make certain the LAN cable is connected to the M9038A.

NOTE The external drive must be formatted NTFS.

3. Run your system image backup solution.

4 When you have created the system backup, you can re-hide the Keysight Recovery Partition.

   a Click the Windows Start button.

   b Type **CMD** into the Search text box field.

   c Press **CTRL+SHIFT+ENTER**. This is the keyboard shortcut to trigger elevation to “Run as Administrator.”

   d In the DOS Command window, type: **CD** and press **Enter**.

   e In the DOS Command window, type: **CD Keysight\Scripts.** Press **Enter**.

   f Type: **HideUnhideRecoveryPartition.vbs hide**

   g Press **Enter**

   h The Keysight Recovery Partition is now hidden and should not appear in the Windows File Explorer.

   i Close the DOS Command window.

5 The system is now ready for use.

Restoring to a System Image that You Created Earlier

You can use the system image to restore the contents of your computer if your hard disk or entire computer stops working.

CAUTION When you restore your computer from a system image, it is a complete restoration. You cannot choose individual items to restore. All of your programs, system settings, and files are replaced with those on the system image.

Be sure to follow the instructions in your third-party backup utility to restore the system image. Typically, you will use the most recent backup. Once the system image is restored, your system should function exactly like it was at the time you created the system image.

NOTE **IMPORTANT:** You must regularly back-up your system image because if your SSD fails, there is no other way to get it back. This is required to completely restore your system on the replacement drive including any application files and data you saved on the drive.

The M9038A controller supports USB CD-ROM drives, USB flash disks, or a USB external hard drive as the first boot device. Refer to "Accessing the BIOS Setup Utility" on page 44 for information about setting the boot devices. These devices should be configured, installed, and tested with the supplied drivers before attempting to load a new operating system.

CAUTION To minimize the risk of data loss, you should do the following:

- Create a system repair disk for Windows 10/Windows 11, create a recovery drive.
- Periodically create a complete system image. page 33.
- Back-up your important data daily to an external memory device.

Chassis and Controller Shutdown

As with any PC, Windows-based instruments should not be shut down by either turning off the power via an external power source or by pulling the power plug out from the chassis rear panel. This could corrupt the operating system. The approved way to shut down the controller is to execute the Windows shutdown process which shuts down the M9038A controller then turns off the PXIe chassis. Pressing the chassis power button will also shut down Windows safely and put the chassis into Standby mode.

However, pressing and holding in the chassis power button will do a forced shutdown, just like pulling the power plug.

NOTE

You should not enable the Microsoft Windows sleep or hibernate modes, because you do not want the M9038A controller to go into sleep mode while it is running a user test program. Also, the controller may not have proper chassis enumeration when it wakes up from those modes.

If you have a USB keyboard with a Sleep button (sometimes this is a key with a moon logo), do not use it.

Do not use the Sleep or Hibernate modes from the Startup Button.

If you install the M9038A controller in a chassis other than a Keysight PXIe chassis, consult your chassis manual for power down behavior.

Wake on LAN

Wake on LAN* (WoL, also known as Remote Wake-Up) is an industry standard protocol for waking up computers that are in a low power mode (turned off but still has power applied) to be turned on by a network message. Keysight's M9038A supports WoL when the chassis and controller are powered down but AC power is still applied to the chassis.

Both LAN ports are powered from the auxiliary power supply in the chassis even if the power is turned off (as long as AC power is still connected to the chassis). The chassis INHIBIT switch must be in the DEFault position.

To configure the M9038A for WoL from power down:

1. Right click on the Windows 10/Windows 11 Start button and select **Device Manager > Network Adapters**.
2. Double click on the **Intel(R) Ethernet Connection I219-V**. This opens the Properties dialog box for the Port #1 NIC. Note that **Intel(R) I210 Gigabit Network Connection is for the LAN Port #2 NIC.**

* The term "Wake on LAN" is a trademark of IBM Corporation.

3 Select the **Power Management** tab, then select both the **Allow this Device to Wake the Computer**.

4 Click **OK** to save and exit the settings and then close the Windows Device Manager.

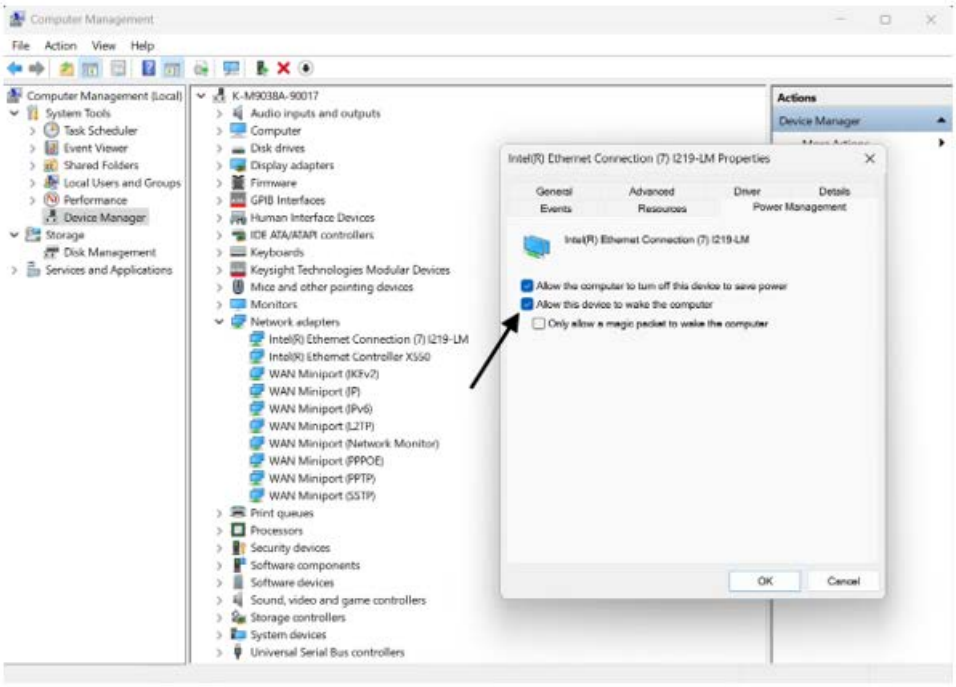


Figure 7 Set the Wake on LAN feature

Only allow a Magic Packet* to wake the computer. This mode wakes the M9038A from a power off state (S5) when it receives a Magic Packet*.

PXIe Chassis and INHIBIT Switch

Keysight chassis have an INHIBIT switch on the rear panel. It controls whether the M9038A controller or the Inhibit signal on the rear panel DB-9 connector is allowed to turn the chassis power on/off. The default (DEF) switch setting allows the M9038A controller to control chassis power.

For more information, refer to the chassis User Guide.

* The Magic Packet is a broadcast (UDP) frame targeted to the controller. It contains 6 bytes of all 255 (FFFFFFFFFFFF in hexadecimal) followed by sixteen instances of the controller's 48-bit MAC address, for a total of 102 bytes. Typical ports for sending WoL Magic Packets are UDP 7 and 9. There are a number of free network tools that can send WoL Magic Packets.

Default Position

If the chassis INHIBIT switch is set to the DEFAULT position and the chassis is powered up, momentarily pressing the chassis front panel ON button causes a clean shut down of the M9038A followed by the chassis powering down. The next press of the chassis ON button initiates the standard power up process.

Pressing the chassis ON button for greater than 5 seconds forces shut down of Windows followed by the chassis powering down. The next press of the chassis ON button initiates the power up process where the chassis will be powered up and then the M9038A brings up Windows. However, Windows safe mode may be displayed in this situation because of the forced shut down of Windows.

Manual Position

Set the rear panel INHIBIT switch to the MANUAL position if you want to remotely control the chassis power using the Inhibit signal on the rear panel DB-9 connector. A high (or open circuit) on the Inhibit signal powers up the chassis while a low on the Inhibit signal powers down the chassis. Applying a low on the Inhibit signal powers down the chassis and the M9038A simultaneously - that is, without shutting down Windows first. This may leave Windows in an unknown state. Therefore always shut down Windows prior to powering down the chassis using the Inhibit signal.

To avoid leaving Windows in an unknown state, the front panel ON button can be used with the rear panel Inhibit signal. In this situation, however, the chassis power is no longer completely controlled remotely, and local interaction is required.

If the chassis and M9038A are powered up, momentarily pressing the ON button causes an orderly shutdown of the M9038A, but the chassis remains powered and the M9038A System Status LED HS (Blue) remains on. At this point, you have two options:

- Momentarily press the ON button again to turn on the M9038A and bring up Windows.
- Complete the power down process by grounding the Inhibit signal (pin 5 of the rear panel DB-9 connector).

If the chassis and M9038A are powered up, pressing the chassis ON button for greater than 5 seconds causes a forced shut down of Windows but, as before, the chassis will not be powered off. At this point, you have the same two options listed in the previous paragraph. However, Windows safe mode may be displayed because of the forced shut down of Windows.

Things to not do

As with any PC, there are several system-level settings and files that you should not change, move, or delete as this could cause a number of difficulties.

Windows Registry

Do not manually make any changes to the registry unless you know exactly what you are doing. Making changes to the registry could affect the controller's ability to boot-up, execute programs, and display desired information.

Application Software

Do not remove files under the **C:\Program Files** folder by any means other than using the Add or Remove Programs utility found on the Control Panel. Do not remove any software application that was preinstalled by Keysight, even using the Add or Remove Program Utility, unless you are instructed by Keysight to do so while performing an update.

SSD Drive

Do not repartition the Solid State Drive (SSD) drive or rename any of the existing partitions. Doing so could cause the controller to either not have the disk space required or not be able to find needed data.

Software Application Licenses

Some software applications require a license to use to the software. For security reasons the licensing mechanism often uses a composite HostID which depends on several system identifiers. A change to any identifier may result in invalidating the licenses on that system. In general, you can retrieve “lost” Keysight software licenses at any time on the Keysight Software Licensing system (KSL) web site at:

support.keysight.com

On the **Keysight Support** page, select the **View More** button for **Assets**. On the **Assets** page, scroll to the bottom of the page and select **View Your Software Licenses** in the **Keysight Software Manager** section.

You will need the license order number and certificate number as well as a valid login and password.

If either of the following occurs, verify and possibly reissue the license.

- The SSD is re-imaged, replaced, or corrupted.
- The controller motherboard is replaced or the primary (system) BIOS serial number has changed.

For more information, refer to the software application documentation.

Using Multiple SSD in a single M9038A

The SSD is mounted on a carrier that can easily be inserted or removed from the M9038A (see “Replacing the SSD” on page 55). For some working environments, it is very convenient to use multiple SSD so that you can make changes to one SSD without disturbing the other. This is convenient when multiple people are using the same M9038A and they do not want to interfere with the other person’s project. It is also convenient when one person is supporting the M9038A as deployed to the factory floor, while developing new code for later deployment. From Keysight, you can purchase additional SSD with carrier and with a windows operating system (see “M9038A Accessories” on page 18). Alternatively, you can buy a new SSD from a 3rd party, copy your old SSD to the new SSD, install it in your carrier, and insert it into your M9038A.

Drivers

All of the M9038A Controller and chassis drivers were installed on your controller at the factory. You should not need to reinstall them. However, you should periodically check the M9038A web page (www.keysight.com/find/M9038A) for updated drivers.

For the chassis and trigger management driver, help file, program examples, etc. go to the following SSD folder:
C:\Program Files\IVI Foundation\IVI\Drivers

3 Controller Maintenance

This chapter covers information for users to maintain the controller.

BIOS Setup

The Unified Extensible Firmware Interface (UEFI) provides a basic level of communication between the processor and peripherals. In addition, the UEFI also contains code for various advanced features applied to the M9038A controller. The UEFI setup program includes menus for configuring settings and enabling M9038A controller features. From this point on, UEFI and the UEFI Setup program will be referred to as the BIOS.

NOTE

Depending on your application, you may never need to update the BIOS on your M9038A. However, you should always upgrade to the latest Keysight BIOS. Any BIOS update for the M9038A will be available on the Keysight web site: www.keysight.com/find/M9038A.

The BIOS is custom designed specifically for the M9038A. Do not attempt to replace it with a generic BIOS.

CAUTION

Changing BIOS settings may lead to incorrect controller behavior and possibly an unbootable controller. If this happens, follow the instructions under "Clear CMOS" on page 47 and then restore the default settings. Do not change a BIOS setting unless you are absolutely certain of what it does.

Normal BIOS Operation and Updates

The M9038A has two BIOS images, a Default and a Backup. The Default BIOS is what the system normally boots on, and is updatable by running a BIOS update script from a Windows console. Refer to "Updating the M9038A BIOS" on page 53.

However, if the Default BIOS becomes corrupt, the Baseboard Management Controller (BMC) detects that the Default BIOS was unable to boot, and re-configures serial connections to allow the Backup BIOS to boot the system. All subsequent boots will be from the Backup BIOS until the user repairs the Default BIOS using a provided tool from Keysight to restore the Default BIOS image to the original shipping BIOS image.

- Typically, all normal boots occur from the Default BIOS; the Backup BIOS is not used.
- Updates to the Default BIOS are done using BIOS update scripts from Keysight which are based on American Megatrends (AMI) tools.
- A BIOS update does not overwrite permanent SMBios data values (such as SerialNumber, BaseBoardVersion, UUID etc), but will clear the customer CMOS settings.

Accessing the BIOS Setup Utility

To start the BIOS setup program:

1. Power on or reboot your M9038A controller.
2. Press the <**Delete**> key when the controller beeps. This should be concurrent with the main startup screen. The BIOS setup program loads after a short delay.

The Main BIOS setup menu (see next page) is displayed when you first enter the BIOS setup program.

Use the following keys to navigate through the BIOS setup program:

- ←, → - Use the left/right arrow keys to move between the setup menus.
- ↑, ↓ - Use the up/down arrow keys to move between options in a menu.
- <**Enter**> - Use this key to enter a submenu or display all available settings for a highlighted configuration option.
- <**Esc**> - Use this key to return to the previous menu. This key serves as a shortcut to the Exit menu when user is at the top-level menus.
- <**+**> and <**-**> - Use these keys to cycle between available settings.
- <**Tab**> - Use this key to select time and date fields.
- <**F1**> - This key opens the general help window for the BIOS.
- <**F2**> - This key loads previous values into the BIOS.
- <**F3**> - This key restores default values into the BIOS.

- <F4> - This key saves the current configuration and exits the BIOS setup.
- <F9> - Use this key to load the optimal default BIOS settings.

BIOS Main Setup Menu

The Main setup menu reports some basic information of controller:

Current BIOS Version

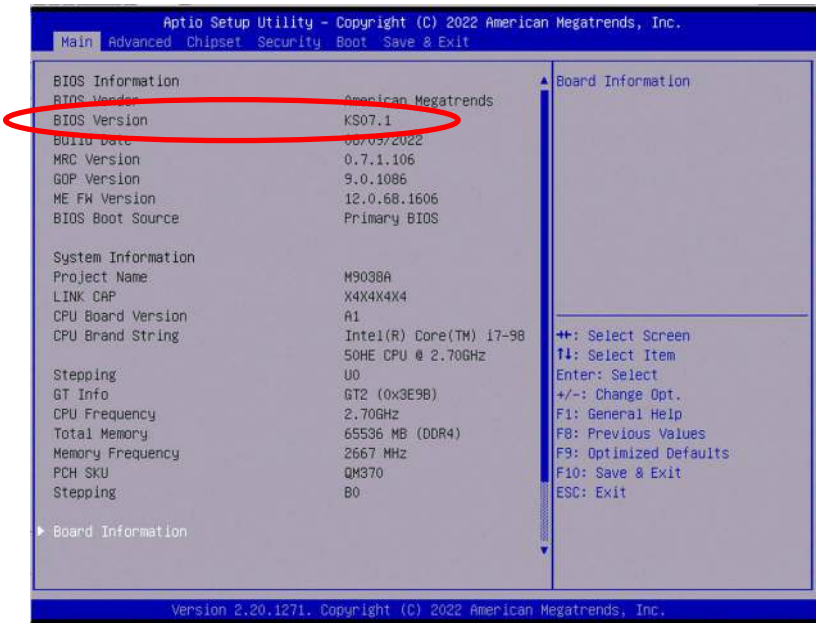


Figure 8 Main BIOS Setup Menu

- BIOS Information – This item includes the BIOS version and the date when the BIOS was built.
- Memory Information – This item shows the M9038A's memory size, type and speed detected by the BIOS.
- ME Information – This value indicates the version of management engine.
- Board Information – Such as hardware revisions and serial number.
- From this screen you can set the system date and time.

Default Settings

There are two types of stored default settings in the BIOS. They are:

- Factory Default Values: The initial optimal settings that were shipped with the M9038A. Both the User BIOS Password and the Administrator BIOS Password are cleared.
- User Default Values: The default settings that are saved by using the BIOS Setup Utility. After making changes, tab over to the Save & Exit tab, select the Save as User Defaults field.

Restoring Defaults

Default settings can be recovered by any of the following three processes:

- Execute a Clear CMOS (see "Clear CMOS" on page 47). This clears more data than **Restore Defaults** alone.
- Entering the BIOS Setup Utility then navigate to the **Save & Exit** tab, select **Restore Defaults**.
- Entering the BIOS Setup Utility then navigate to the **Save & Exit** tab then restore user defaults by selecting the **Restore User Defaults** field.

The first two processes result in the same factory default settings being restored. The Clear CMOS is used when the System or the Setup Utility cannot be entered because either the Administrator BIOS Password and/or the User BIOS Password is set and unknown. If the Setup Utility can be entered then use the Restore Default field to set all fields back to their default values and clear both BIOS passwords.

Restore Using Clear CMOS To clear the CMOS RAM, i.e., change the BIOS settings back to the Factory Default Setting, the chassis must be powered down and the M9038A must be removed. See "Clear CMOS" on page 47.

Restore Using the Setup Utility To restore the Factory BIOS settings then use the Setup Utility navigate to Save & Exit tab Restore Defaults field and press enter then do a save. The BIOS passwords will be cleared, the BIOS settings will return to their factory values. The User Default Values will NOT be cleared including any BIOS passwords stored with these values.

Difference between ClearCMOS and Restore Defaults

Both of these methods set the BIOS values to their factory settings. This includes clearing both the Administrator BIOS Password and the User BIOS Password. The ClearCMOS should be used when one or both Administrator and User BIOS Passwords are unknown, or when Restore Defaults does not work. If the ClearCMOS is used then the clock must manually be set to the correct date/time.

Restore the User Default Values

To restore the User Default Values use the BIOS Setup Utility then navigate to **Save & Exit** tab, select the **Restore User Defaults** field, press <**Enter**> then do a save. The BIOS passwords will be the values that were stored, the BIOS settings will set to their User Default values.

Clear CMOS

If you encounter an abnormal condition that causes M9038A to halt or fail to boot, clear the CMOS and restore the controller BIOS to its factory default settings.

CAUTION **Always observe ESD precautions. See "Electrostatic Discharge (ESD)" on page 19.**

To clear the CMOS:

1. Shut down the controller operating system. Do not unplug the chassis from the AC power.
2. Remove the M9038A Embedded Controller from the chassis. Observe all anti-static precautions.
3. Locate the Clear CMOS switch on the board. It is near the NVMe M.2 SSD. Move the switch from Normal to Clear. Refer to Figure 9 below.
4. Wait at least 30 seconds then return the switch to its Normal position.
5. Reinstall the controller back into the PXIe chassis.
6. Power on the chassis.
7. Press the <**Delete**> key when the controller beeps. This should be concurrent with the main startup screen. The BIOS setup program loads after a short delay.
8. Load Optimized defaults in the BIOS setup.
   - **j** The Main setup menu reports some basic information of controller. Refer to "Welcome to the Unified Extensible Firmware Interface (UEFI)" on page 25 for more information.
   - **k** Use the down arrow key (↓) to select the System Date and System Time.
   - **l** Set these to the correct current date and time.
   - **m** Press the <F4> key to save the settings and then the <ESC> key to exit the BIOS setup.

NOTE **System date and time should be set before pressing F4. F4 saves and then exits the BIOS setup utility. If the BIOS data is not saved before exiting the utility, then the last BIOS settings remain.**

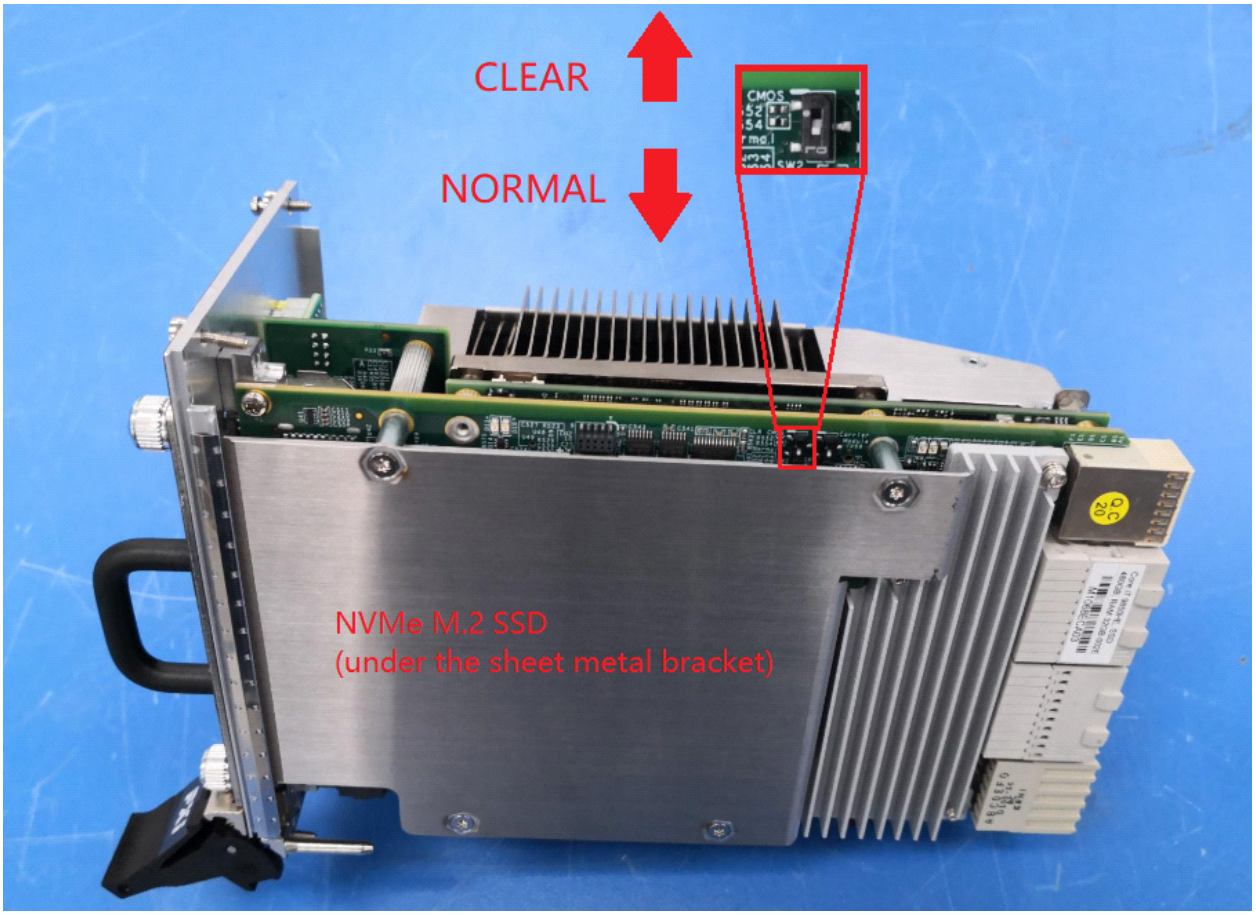


Figure 9 M9038A Switches

BIOS Password

There are two BIOS passwords that may be set using the BIOS Setup Utility: Administrator BIOS Password and User BIOS Password. **Figure 10** on page 50 shows what happens with BIOS passwords when the controller powers-up.

Note that these BIOS passwords have nothing to do with the Windows Operating System passwords. Although their names are similar to Windows login accounts, they have no impact once the Windows Operating System is booting.

Administrator BIOS Password

At power-on, if the Administrator BIOS Password is set then before the BIOS Setup Utility can be entered, a message box appears asking for the Administrator BIOS Password. After you enter the Administrator BIOS Password, the controller continues into the BIOS Setup Utility.

User BIOS Password

At power-on, if the User BIOS Password is set, then before the black splash screen is displayed, a message box will appear asking for the User BIOS Password. After you enter the User BIOS Password, the controller continues to the black Splash Screen. At that time if the [Delete] is pressed the Setup Utility will be entered. Notice the Administrator BIOS Password was NOT needed even if it is set.

Creating a BIOS Password

The Administrator and User BIOS passwords can be set or cleared by:

1 Pressing the <**Delete**> key during power-up. This should be concurrent with the main startup screen. The BIOS setup program loads after a short delay.

2 Then navigate to the **Security** tab in the BIOS Setup Utility and select (highlighting) the password to be changed.

- If the BIOS password is not already set, a message box appears asking for a BIOS password to be created, then another message box will ask for it to be entered again to confirm the BIOS password.
- If the BIOS password was already set, then a message box will appear asking for the password to be entered followed by a message box asking for the new password.
- If a new BIOS password is not entered (left blank) then a box will appear asking if the password should be cleared. Any changes to any passwords will be discarded unless a save (**Save & Exit** tab) is executed. The Administrator BIOS Password will be active on the next restart of the M9038A. The User BIOS Password will be requested when the Setup Utility is exited.

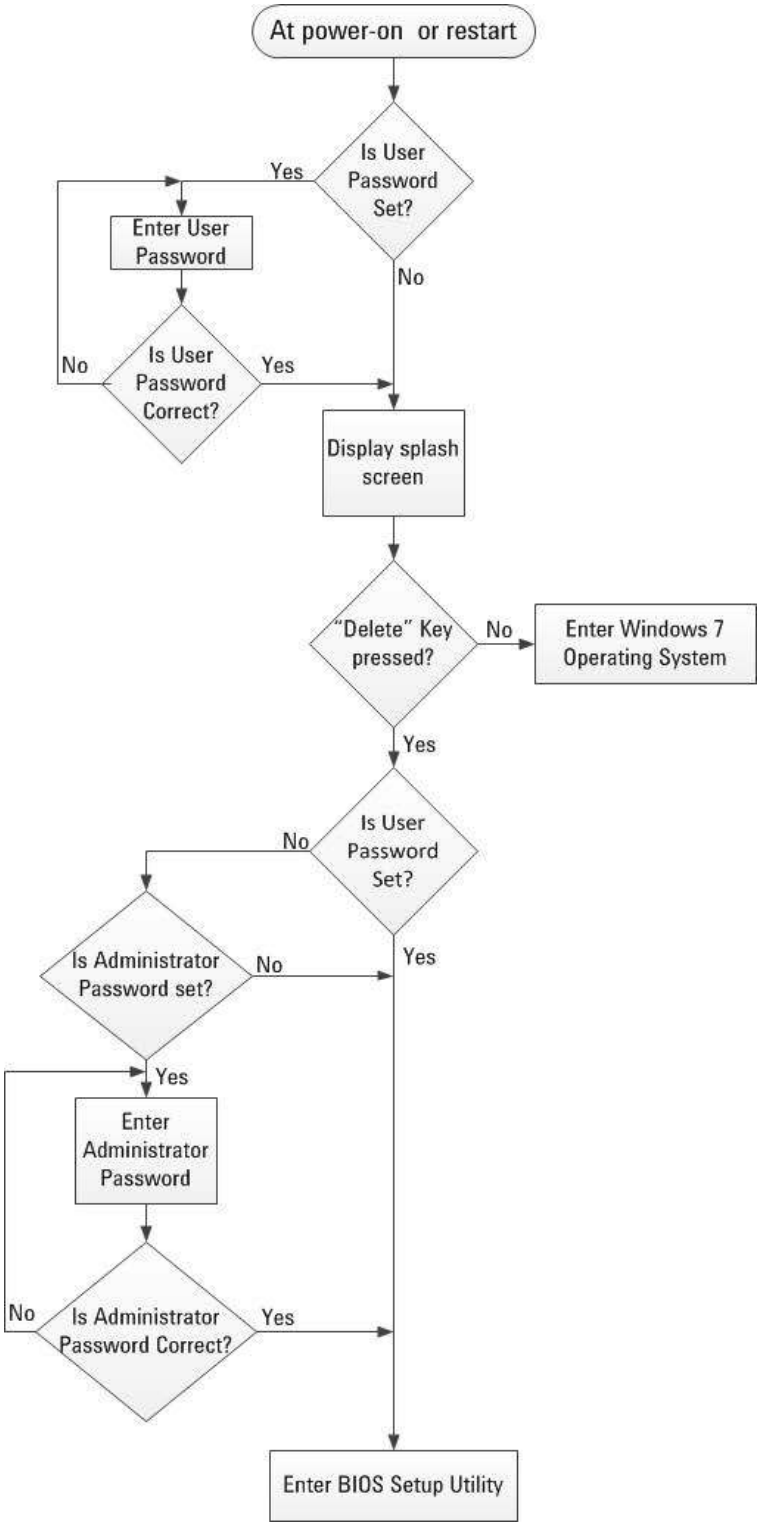


Figure 10 BIOS Password Flowchart

PCIe Boot (Holdoff) Time

You should not need to change the PCIe Boot time. However, some PXIe instrument modules may take longer to be ready for enumeration than the PXI link ready requirement of 100ms. Consequently, it is possible for some controllers (such as the Keysight M9038A Embedded Controller) to enumerate the chassis before all of the individual modules are ready and therefore not enumerate them. If you have a situation where Keysight Connection Expert and/or the Windows Device Manager consistently do not find specific instrument modules when the chassis powers up, increase the wait time (valid range is 0 to 60 seconds).

This can be configured from the **Chipset > Holdoff Timer**.

PCIe Performance

If your application performs intensive IO over PCIe, you should Enable **PCIe Performance**. This has the effect of disabling the CPU Processor Power Mangement (PPM) features of EIST and Turbo Mode. Tests have shown that PPM features must be disabled to support long running PCIe data transfers without momentary interruptions.

PCIe Performance is enabled by default. It can be enabled/disabled from the **Advanced** BIOS screen **> PCIe Performance.**

Both EIST and Turbo Mode can be independently enabled/disabled from the **Advanced** BIOS screen **> CPU.** However, their configuration options are only visible when PCIe Performance is set to disabled.

Above 4G Decoding

When the embedded controller is enumerating many PCIe devices, more memory mapped IO space is required for these devices. Enabling **Above 4G Decoding** allows 64 bit PCIe devices to use addresses in the 64 bit address space. Failure to enable **Above 4G Decoding** when it is needed will result in failure to enumerate some PCIe devices and/or chassis.

Above 4G Decoding is disabled by default. It can be configured from the **Chipset> Above 4G Decoding**.

Monitor System Status

The BIOS monitors the following on the controller module:

- PCIe switch temperature
- CPU temperature
- Main PC board temperature
- Power supply voltages

These can be observed from the **Main** Advanced BIOS screen under **Advanced Power Management > Power Consumption** and under **Thermal Management**.

System Date and Time

You can set the system date and time in the BIOS Main screen or in the Windows Operating System.

Updating the M9038A BIOS

Depending on your application, you may never need to update the BIOS on your M9038A. However, you should always upgrade to the latest Keysight BIOS. The BIOS' are custom designed specifically for the M9038A. Do not attempt to replace it with a generic BIOS.

Any BIOS update for the M9038A will be available on the Keysight web site: www.keysight.com/find/M9038A. Click on **Visit Technical Support**, then the **Drivers, Firmware, and Software** tab. Scroll down and click on the **M9038A BIOS** link. Under **Supporting Documentation** is an instruction sheet for updating the BIOS. The Keysight BIOS upgrade utility allows you to restore or upgrade the BIOS in your M9038A PXIe Embedded Controller.

Replacing the CMOS Battery

The M9038A is provided with a 3.0 V “coin cell” lithium battery. This battery backs up the Real Time Clock. However, the CMOS battery is not accessible by user, it has to be replaced at the service center. Please contact www.keysight.com/find/assist for service detail.

Replacing the SSD

The Keysight M9038A Embedded controller comes with a 512 GB, M.2 NVMe Solid State Drive (SSD).

Replacement SSD drives are available with installed operating system as:

- Y1268A -- Spare SSD and upgrade COA with carrier Win 10 2019 LTSC HE/64 bit/512GB
- Y1268B -- Spare SSD and upgrade COA with carrier Win 11 IoT Ent 2024 LTSC 24H2/64 bit/512GB

To remove the SSD with carrier from the M9038A, perform the following steps:

1. Power off the PXIe chassis. You do not need to remove the M9038A controller from the chassis to replace the SSD drive.
2. Loosen the two thumb screws securing the SSD cover to the controller's front panel.
3. Grab the handle and pull straight out.

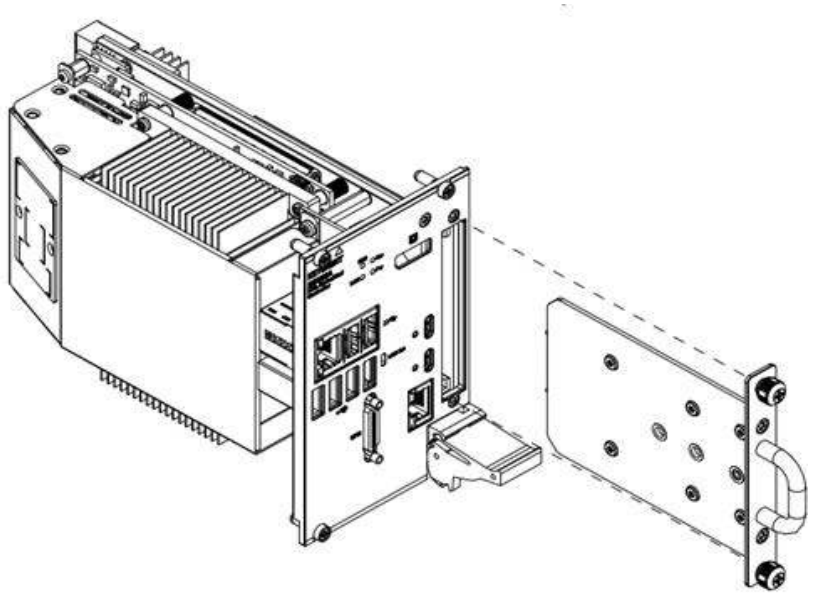


Figure 11 Remove the SSD Drive

To insert the SSD with carrier into the M9038A, perform the following steps:

1. Insert the SSD with carrier into the M9038A front panel so that it is completely seated into its connector.
2. The insertion resistance increases for the final connector mating.

CAUTION If the SSD does not easily insert, do not force it. Check the alignment and try again. The SSD carrier should be flush with the M9038A front panel when properly installed.

3 Tighten the front panel two thumb screws to secure the SSD carrier to the M9038A. If the thumb screws do not thread properly, the SSD may not be fully inserted.

Memory Modules

Keysight's M9038A has two memory connectors; one on top of the other. The module comes standard with one 32 GB memory module (installed in the bottom position). Optionally, a 32 GB memory may be factory installed. Memory modules can be installed bringing the total memory to 64 GB. The controller uses DDR4 2666 SODIMM memory modules.

CAUTION **Always observe ESD precautions. See "Electrostatic Discharge (ESD)" on page 19.**

To remove memory modules from the controller:

1. Power off the PXIe chassis.
2. Remove the M9038A controller from the PXIe chassis. Observe all anti-static precautions.
3. Position the controller, top side up on the workbench.
4. Remove the four screws and sheet metal bracket as shown in Figure 12.

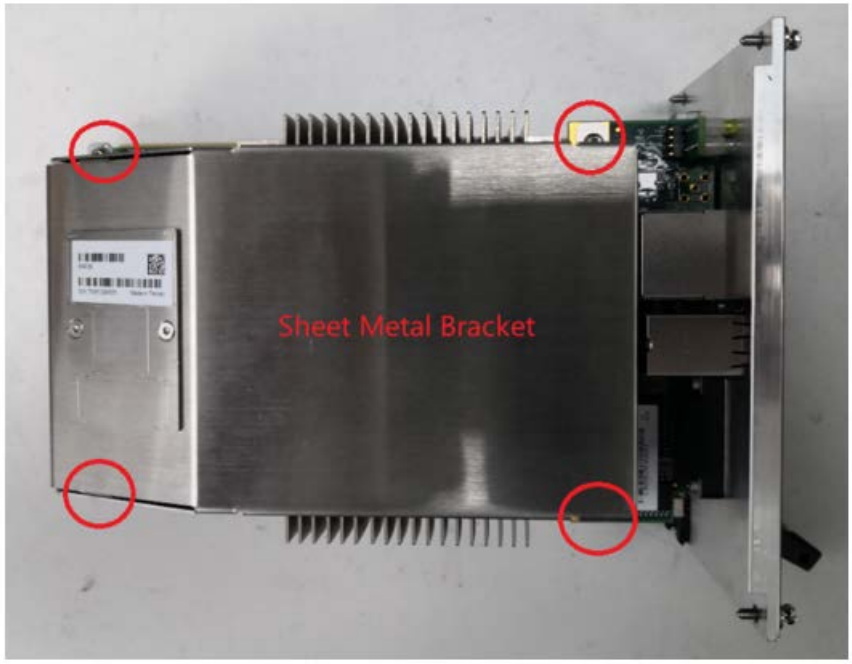


Figure 12 Remove sheet metal bracket

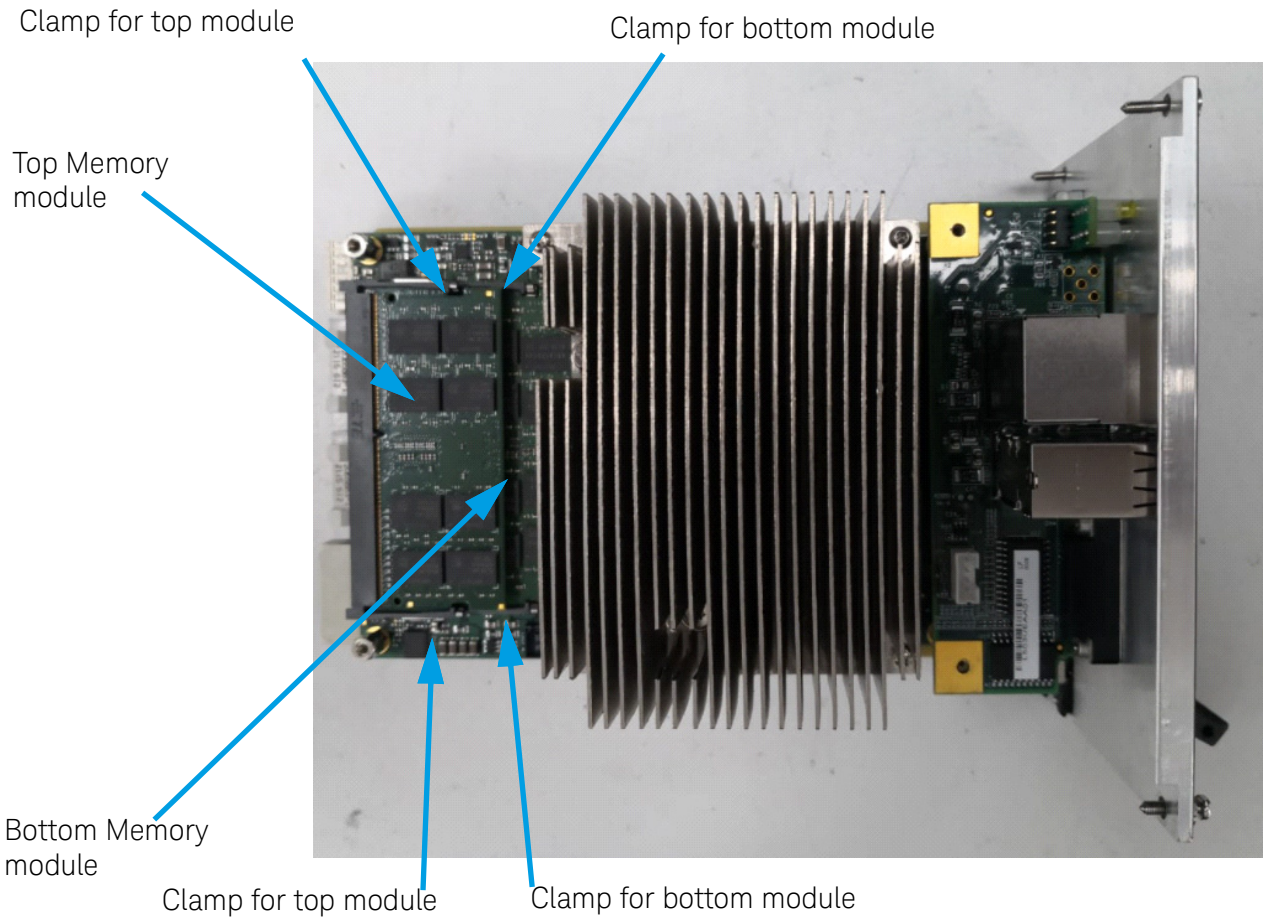


Figure 13 M9038A Memory Modules (both bottom and top modules shown)

5. Spread the two memory clamps for the module you want to replace.
6. The memory module should pop up. Carefully slide the memory module out of the edge connector.
7. If wish to install memory modules: Carefully place the memory module in the socket. Press the module into the clamps until they lock the module in place. Reinstall the sheet metal bracket.
8. Reinstall the controller module in the PXIe chassis and power it up. The controller BIOS should automatically detect the new memory.
9. To verify the amount of memory installed in your controller: Right click on the Windows **Start** menu, then select **System**. Under **Device Specifications**, locate **Installed RAM**.

NOTE

The M9038A was tested with the following RAM module configurations:

- one 32 GB RAM module
- two 32 GB RAM modules (a total of 64GB RAM)

Other configurations have not been tested.

NOTE

When replacing memory modules or installing additional memory modules, the two modules slots should have the same size and speed of modules. That is, both slots should have 32 GB modules, etc. Modules of different sizes in the slots are not supported.

The following RAM module is available from Keysight:

Part Number	Description
M9038-55532	32 GB RAM Module

Index

A

Application software, 42
Auto Login, 32

B

Backup, user data, 31, 32, 33
Battery, CMOS, 13
Block Diagram, 12

C

Chassis shutdown, 39
Chipset, 13
CMOS, 49
CMOS Backup Battery, 13
CPU, 13

D

Date, system, 47
Default Administrator Password
  Keysight4u!, 32
Description, functional, 12
Diagram, block, 12
DVI-I Connector, 10, 15

E

Ethernet, 15
ExpressCard 34, 10

F

Front Panel, 10
Functional Description, 12

G

GbE, 11
GbE connector, 10
Gigabit Ethernet, 11
Gigabit Ethernet LEDs, 11
GPIB, 15
GPIB Connector, 10

H

Hard drive, 42
Hard Drive,SSD Drive, 58

I

I/O Interfaces, 14

J

JP1. Clear CMOS, 49

K

Keysight Recovery System, 34

L

LAN Connector, 10
LED Indicators, 10
LED indicators, 11
LEDs, 11
  Gigabit Ethernet, 11
Licenses, 43
Licenses, Software application, 43

M

Memory, 13
Memory Modules, 60
Memory, information, 47
Modules,memory, 60

O

Operating System, controller, 19

P

Panel, front, 10
Processor, 13
PXI Trigger Connector, 10

R

Recovery, system, 21
Registry, 42
Replacing, Hard Drive, 58
Reset button, 10
Restoring Drive C to Factory Default System Image, 35

S

M.2 port, 17
Security, Windows, 30
Setup Utility, BIOS, 46
Shutdown, chassis, 39
Software application licenses, 43
SSD drive, 42
System
  date and time, 47
System recovery, 21

T

Time, system, 47

U

USB, 14
USB Ports, 10
User Data Backup, 33
User data backup, 31, 32, 33
Utility, BIOS Setup, 46

W

Windows Registry, 42
Windows security, 30
Windows Update, 31

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