
Keysight M9538A AXIe Embedded Controller



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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.

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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 an AXle 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 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

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



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M9538A
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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Electronic
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Directive
2002/96/EC

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.



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5 Glossary

1 Introduction

The Keysight Technologies M9538A is a third-generation AXIe embedded controller, offering advanced features such as TPM 2.0, AXIe-wide PCIe® support, 4K video outputs, and an optional high-speed disk cache.

Designed for high-performance, compact AXIe systems, this powerful one-slot module seamlessly integrates into hybrid test systems with the latest Thunderbolt™ 4 technology, along with GP-IB, USB, and LAN front panel interfaces. Thunderbolt 4 provides unparalleled data transfer speeds and connectivity options, making it ideal for demanding applications. Powered by a high-performance Intel Core i7 quad-core processor with Hyper-Threading Technology, it excels in high-performance applications and multi-tasking environments.

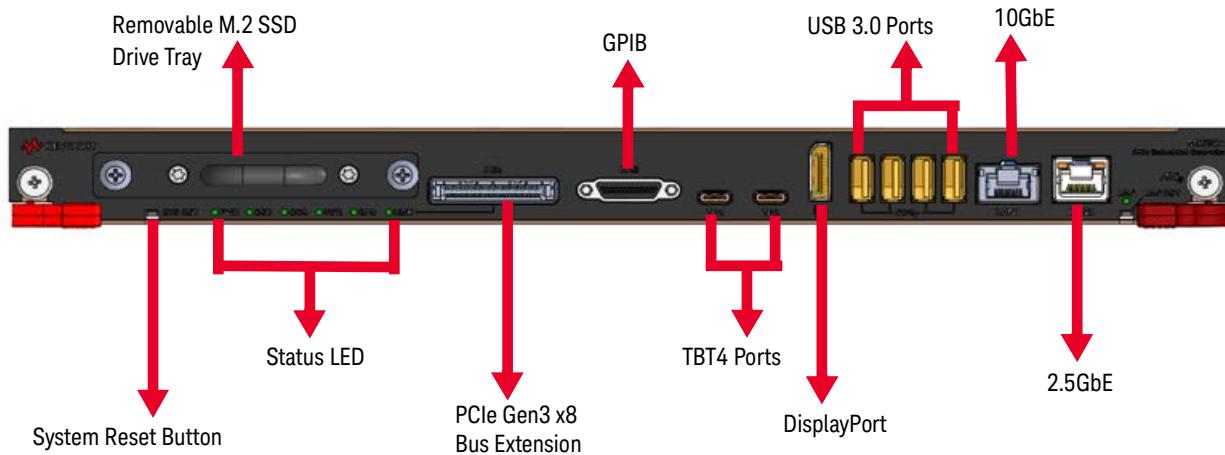
The Keysight M9538A has the following key features:

- Intel i7-1185G7E 2.8 GHz, quad-core processor
- Single-slot AXIe controller module
- Front removable 1TB M.2 2280 NVMe™ solid state drive with additional rear optional NVMe SSD
- 16 GB DDR4 RAM memory standard with an option for 64 GB
- Gen 3 x16 PCIe link to the AXIe backplane providing up to 16 GB/s max data bandwidth from CPU to AXIe backplane (actual data bandwidth depends on chassis capability)
- Gen 3 x8 PCIe IPASS connector on the front for controlling a second AXIe chassis or connection to RAID storage
- One GP-IB connector
- Two USB-C connectors to support USB4/Thunderbolt 4
- One 4K capable DisplayPort 1.2
- Four USB 3.0
- Two LAN ports (one 2.5GbE and one 10GbE)
- Available with Window 11 operating system (64-bit)
- TPM 2.0 Security

The M9538A is built to support the latest AXIe wide PCIe standard while providing backward compatibility with a chassis that is compliant to the original AXIe-1 standard. This means it can support an AXIe chassis with PCIe fabrics ranging from x4 Gen 2 to x16 Gen 3. In addition to the PCIe fabric, the M9538A also provides an Ethernet channel for access to the AXIe Ethernet fabric.

M9538A at a Glance

The following image shows the front panel for the M9538A.

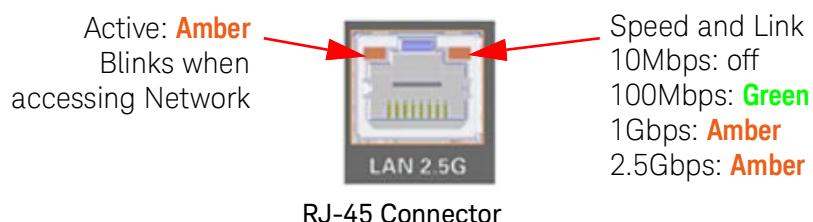
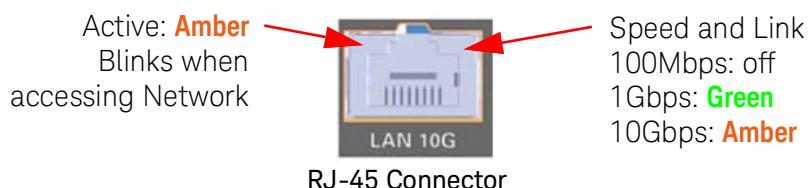


Front Panel LED Definitions

The following tables list the front panel LEDs 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	Green	When the Solid State Drive (SSD) is active, the LED will flash. Off means no SSD activity.
OOS (Out of Service)	Off Red or Blinking red	Off indicates the BIOS POST is okay and the OS is operating normally. Solid red indicates the OS is shut down. Blinking red indicates BIOS POST during boot.
USR	N/A	The USR LED is reserved for Keysight use. The LED should never turn on or flash.
SPD		AXIe Backplane PCIe Link Speed Indicator.
	Off	No Link
	White	Gen 1 speed
	Blue	Gen 2 speed
	Green	Gen 3 speed
Link		PCIe Cable Link Speed Indicator.
	Off	No Link
	White	Gen 1 speed
	Blue	Gen 2 speed
	Green	Gen 3 speed
LAN	N/A	Reserved for future use.

Gigabit Ethernet (GbE) LEDs



Both LEDs off indicates 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.

CAUTION

IMPORTANT: Keysight M9502A or M9505A AXIe chassis must have firmware revision 1.4.2/2.2.2 or later and Keysight M9506A AXIe chassis must have firmware revision 1.1.17 or later for the M9538A to identify and communicate with other chassis module. Refer to the Keysight chassis web pages for information on updating the chassis firmware at www.keysight.com/find/M9502A, www.keysight.com/find/M9505A or www.keysight.com/find/M9506A.

NOTE

The drivers and Keysight's IO Libraries Suite installed on the M9538A controller are the current versions available when the module shipped from the factory. You should regularly check Keysight's web sites and download the latest drivers and software:

- www.keysight.com/find/M9538A for the embedded controller
- www.keysight.com/find/iosuite for IO Libraries

Periodically check for the latest AXIe chassis firmware:

- www.keysight.com/find/M9502A for the 2-slot AXIe chassis
- www.keysight.com/find/M9505A for the 5-slot AXIe chassis
- www.keysight.com/find/M9506A for the 5-slot AXIe chassis

Accessories

Accessory Number	Description
Y1201A	Thunderbolt 4 Cable and Clamp Kit
Y1205A	USB-C Cable with Screw Lock
Y1206A	Keyboard and optical mouse
Y1239A	Spare M.2 NVMe SSD with carrier Win 11/64 bit/1 TB for M9538A
Y1260A	GPIB Cable
Y1262A	Display Port Cable
Y1269A	Display Port to HDMI adapter

Related Products

Product	Description
M9502A	AXIe Chassis, 2-slot with Embedded System module
M9505A	AXIe Chassis, 5-slot with Embedded System module
M9506A	AXIe Chassis, 5-slot with Embedded System module

Upgrading from the M9537A

If you already have a Keysight M9537A Embedded Controller and you are upgrading to an M9538A, be aware of the following:

- The BIOS is not compatible.

Functional Description

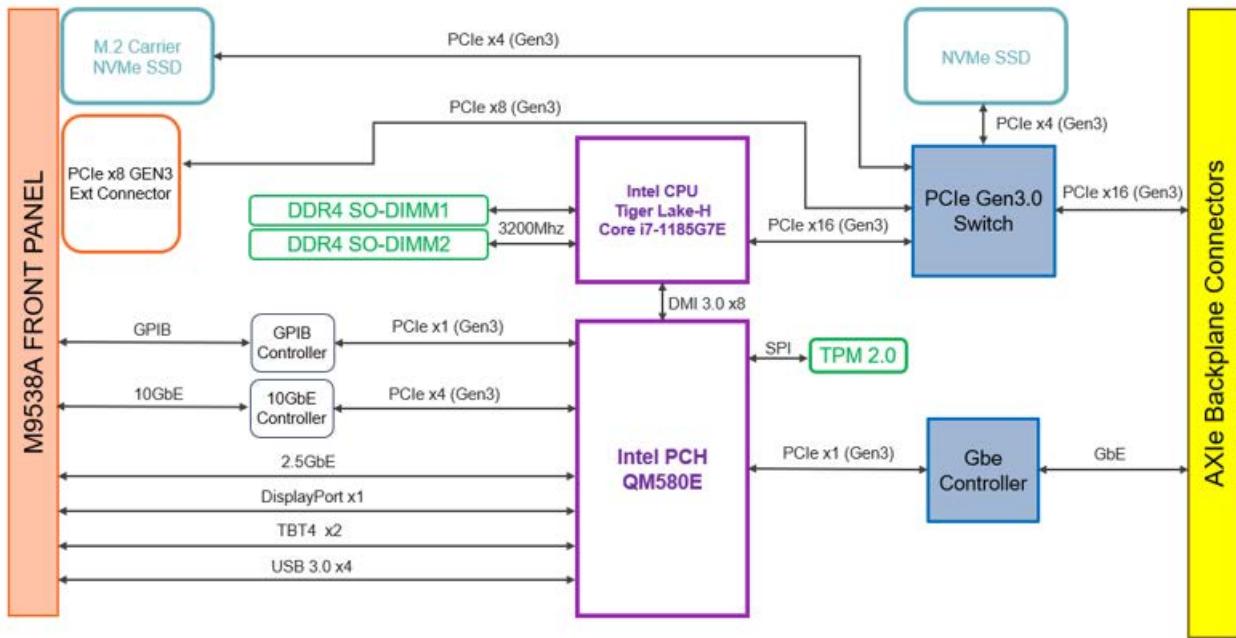


Figure 1 M9538A Block Diagram

The 11th-generation Intel i7-1185G7E quad-core processor offers superior CPU, graphics, enhanced security and media performance. Built into the M9538A, it provides:

- Lower power consumption, higher performance per watt, faster loading times for demanding applications, with best multitasking performance
- Intel Hyper-Threading Technology with a total of 8 simultaneous threads
- Direct media interface (DMI) 3.0 with 8 GT/s data bandwidth in each direction

The PCI Express 3.0 Interface feature provides up to 8 GT/s for fast access to peripheral devices and networking with up to 16 lanes. Intel Turbo Boost Technology facilitates increased processor's frequency.

Intel i7-1185G7E Processor	
L3 Cache	12 MB
Clock Speed	1.8 GHz
Typical Power Consumption	15 W
Memory Types	DDR4-3200

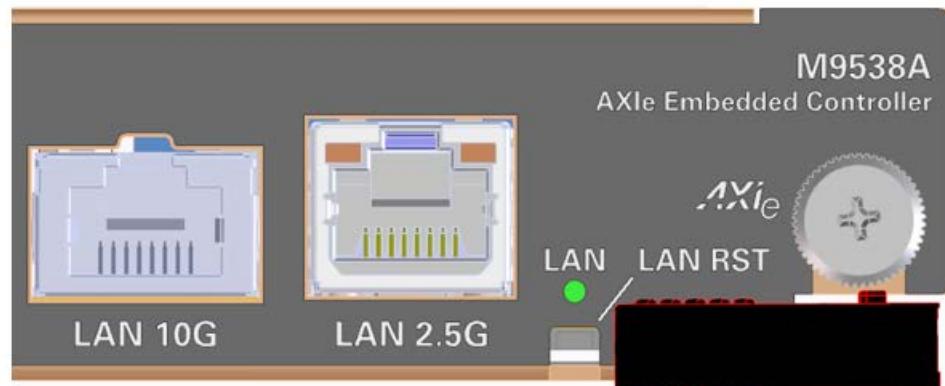
The M9538A has two 260-pin SODIMM memory sockets, which support DDR4-3200 RAM. Each socket can support 16 GB or 32 GB memory modules for a total maximum memory capacity of 64 GB. The standard configuration utilizes a single 16 GB memory module.

I/O interfaces

The Keysight M9538A has the following I/O interfaces.

Ethernet

The M9538A has two RJ-45 connectors with link speed/activity LEDs on the faceplate.



USB

Keysight's M9538A provides four USB 3.0 Type A ports on the faceplate. All USB ports are compatible with SuperSpeed, Hi-Speed, Full-Speed and Low-Speed USB devices. The M9538A controller supports multiple boot devices. The boot priority and boot device can be configured in BIOS. USB to VGA display adapters are also supported.

Thunderbolt 4

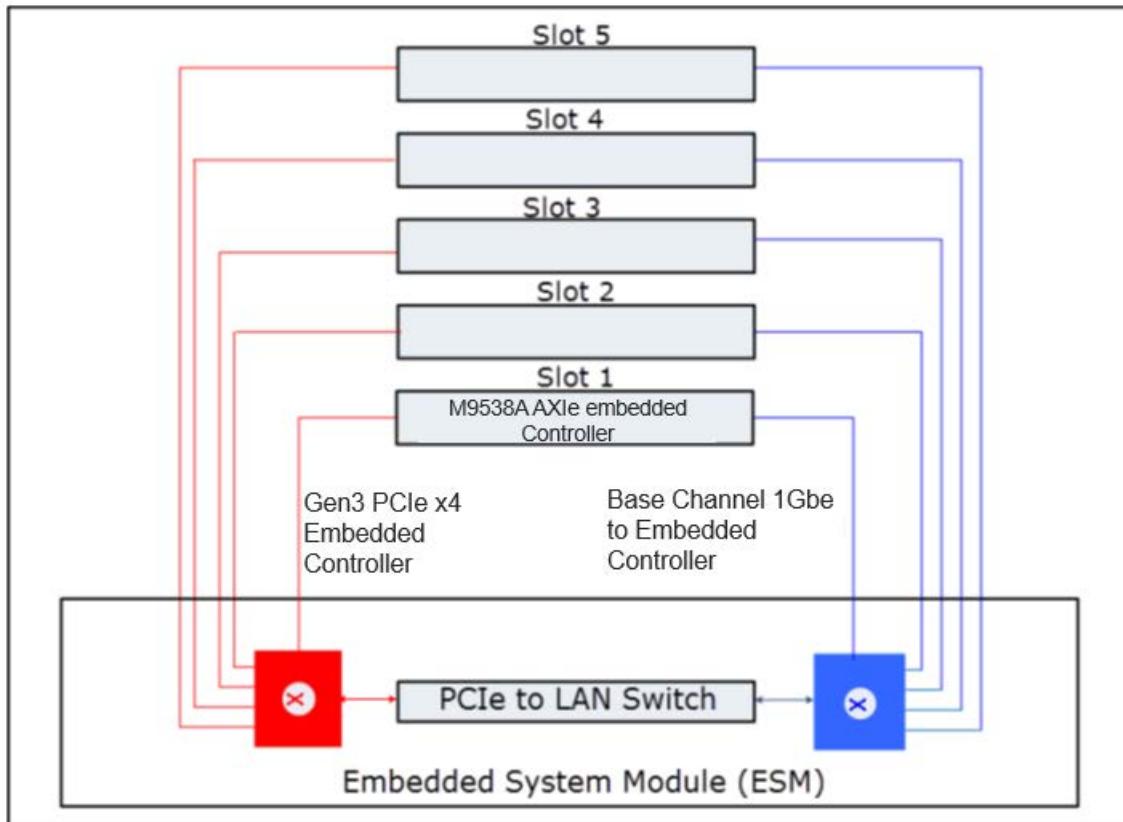
M9538A is equipped with two Thunderbolt 4 (TBT4) ports which features power charging, PCIe connectivity , and video display. Port 1 can deliver up to 37.5W power and supports USB PD 5V @ 3A, 9V @ 3A, 12V @ 3A, 15V @ 2.5A while the port 2 can deliver up to 15W power and supports USB PD 5V @ 3A. These Thunderbolt-4 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.

DisplayPort Video Connector

The built-in Intel HD graphics provides exceptional performance and supports up to three 4K monitors. For highest (4K) performance, use the Y1262A DisplayPort cable. For configuration flexibility, the Y1261A DisplayPort to DVI adapter is available. Please note that the DisplayPort to DVI adapter does not support screen resolutions as high as 4K. **Use of non-Keysight DisplayPort cable and DisplayPort adapters may not work with the M9538A as the system has only been tested with Y1261A and Y1262A.**

PCIe backplane interface

The M9538A PCIe interface is configured as the root complex. The following image shows a conceptual diagram of M9538 installed in M9505A AXIe Chassis.



GPIB

The GPIB connector on M9538A 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

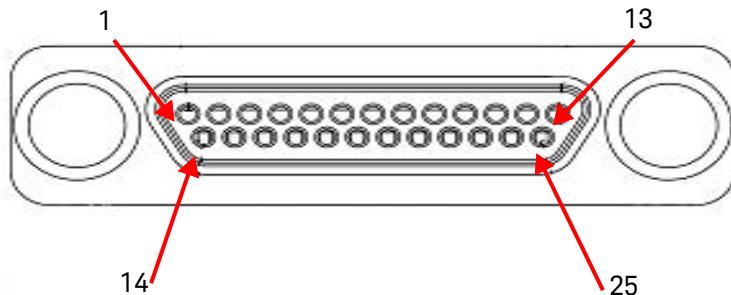
NOTE

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. The cable is compatible with the M9037A Embedded Controller, but is not compatible with the M9036A. It is available from Keysight as an accessory cable, part number Y1260A.

NOTE

You must have Keysight IO Libraries Suite version 21.1.17 (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			

Front Panel PCIe

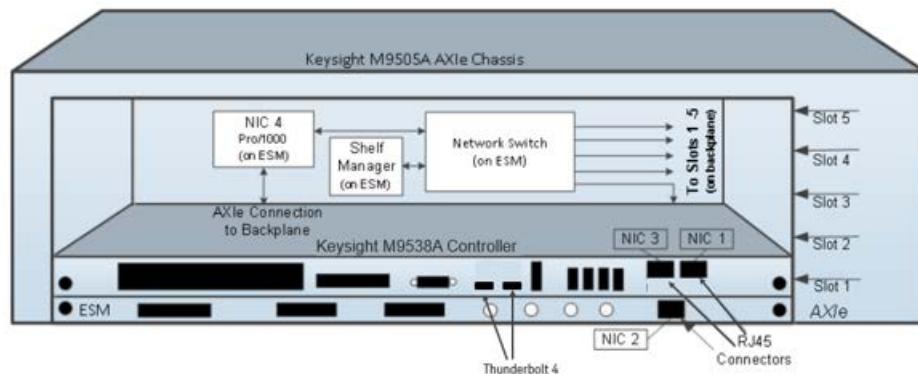
The Front Panel PCIe port has a capacity of 8 Links at Gen3. Using the Front Panel PCIe port, Keysight's M9538A controller can manage the instruments in multiple PXIe or AXIe chassis. The Keysight Multi-Chassis Designer (www.keysight.com/find/pxie-multichassis) is an interactive tool to help you design multi-chassis systems.

Using the LAN Ports

If you install the Keysight M9538A controller in a Keysight AXIe chassis (such as the M9502A, M9505A, or M9506A), there are a total of three LAN ports on the front panels; two on the M9538A controller and one on the Embedded System Module (ESM). Windows Device Manager shows a total of four (4) individual Network Interface Cards (NICs); one connects to the chassis backplane.

CAUTION

Changing the LAN port connection or removing the LAN cable, may cause Keysight Connection Expert to lose track of LAN-enabled instruments. Reboot the chassis to restore the complete list of LAN-enabled instruments.



NIC numbers correspond to the numbering in the figure above

- > Keyboards
- > Mice and other pointing devices
- > Monitors
- > Network adapters
 - Intel(R) Ethernet Controller (3) I225-V
 - Intel(R) Ethernet Controller X550
 - Intel(R) I210 Gigabit Network Connection
 - Intel(R) I210 Gigabit Network Connection #2
 - WAN Miniport (IKEv2)
 - WAN Miniport (IP)
 - WAN Miniport (IPv6)
 - WAN Miniport (L2TP)
 - WAN Miniport (Network Monitor)
 - WAN Miniport (PPPOE)

NOTE

When use with M9506A, M9538A can be installed in any slot.

Selecting M9538A LAN ports

The controller uses Keysight IO Library Suite to keep track of all instrument connections. Any change to LAN connections after running Keysight Connection Expert (adding, removing, or changing LAN cable connections) may cause a change in LAN address. This causes Keysight Connection Expert to lose track of instruments. If your application programs rely on a specific IP address, these programs may cease to operate when you change LAN cable connections.

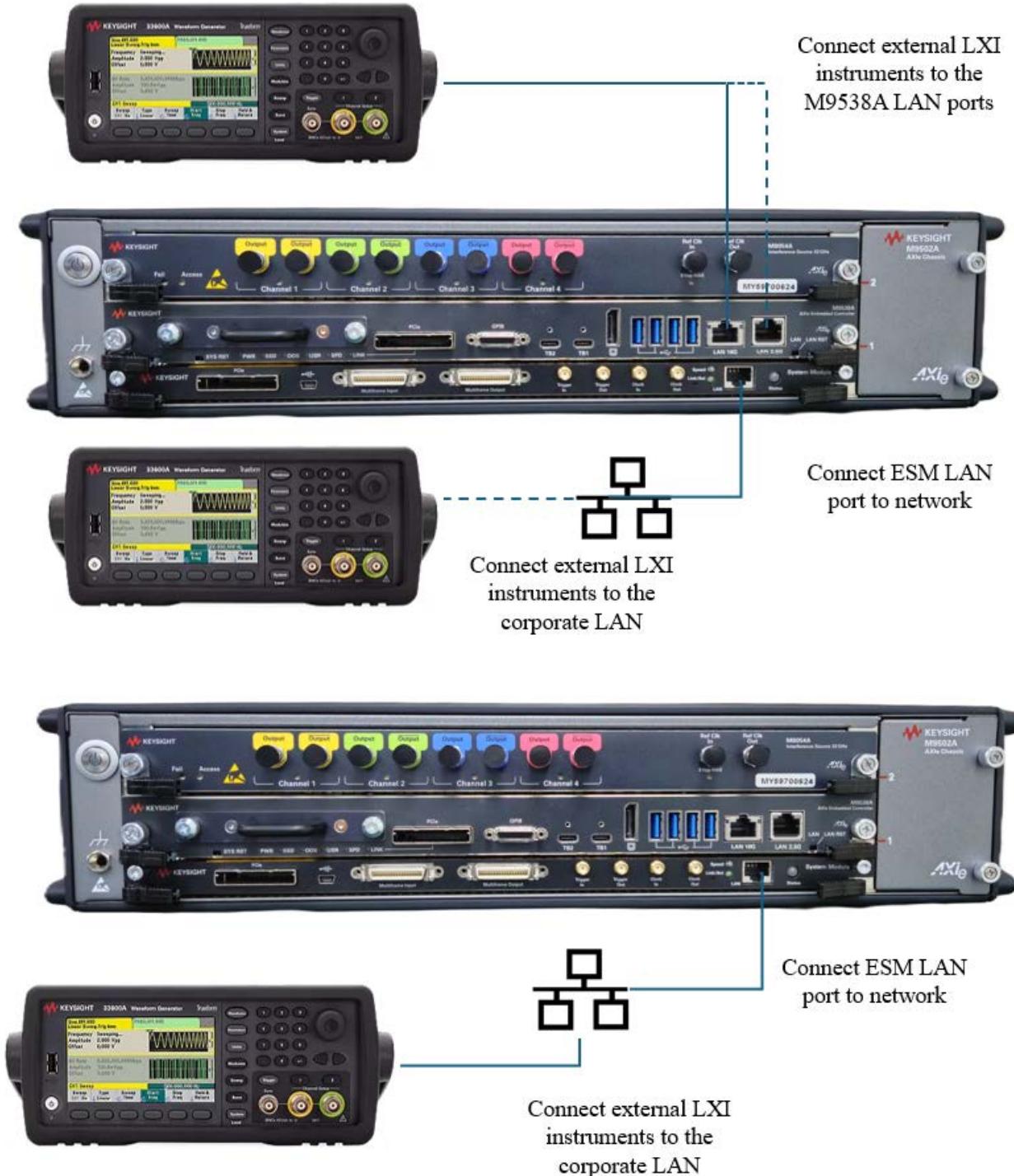
Embedded System Module LAN connection

Changes to the Embedded System Module (ESM) LAN connection can be detected only when the ESM is powered up. Whenever you change the ESM LAN connection, do the following:

- 1 Power down the M9538A using the Shut down selection on the Windows Start menu.
- 2 After shut down is complete, power down the chassis using the chassis power button.
- 3 Make the desired change to the LAN connection.
- 4 Use the chassis power button to power up the chassis and M9538A controller.
- 5 After Windows starts, verify that your LAN interface is operating correctly.



The above image shows the recommended LAN connections to the AXIe chassis ESM and the M9538A.



The above images show possible Alternate LAN Connections. You may need to manually add instrument IP addresses to Keysight Connection Expert.

Recommendations

As a general rule, connect a network LAN cable to the ESM's LAN port and connect LXI instruments to the M9538A's LAN ports. While other configurations are viable, this configuration provides the fastest and most consistent reporting in Keysight Connection Expert.

- The location at which the network and instruments are connected, when the chassis and controller are first powered on, determines how quickly Keysight Connection Expert locates network instruments. If necessary, shut down the controller and chassis and reboot.
- If you move a LAN cable while chassis power is applied, Connection Expert may not find all of the instruments available on the network.

For example, if the LAN cable is connected to the ESM when power is first applied to the chassis and subsequently moved to one of the two LAN ports on the controller (while the chassis is still powered on), Connection Expert may only find the M9538A controller and AXIe modules installed in the chassis. Shut down the controller and chassis and reboot to restore Connection Expert's ability to locate other network instruments.

- Connect external LAN-enabled instruments (LXI instruments) to the M9538A controller LAN ports. This allows Keysight Connection Expert to automatically find the instruments. These instruments will have a local LAN IP address or private network range.

LXI instruments may be connected to the ESM's LAN port but Connection Expert may not automatically find them when these instruments are not located on the same LAN subnet range. However, instruments may be added manually using Connection Expert's Add Address feature.

Related Documentation

Because the Operating System and M9538A drivers were installed at the factory and no additional drivers are required, no printed documentation other than the Startup Guide is supplied with the Controller Module. The latest M9538A documents are available at Keysight.com. There is a link on the desktop to open a document set.

Adobe Reader is required to view the documentation. It is available free at www.adobe.com. You should install this on your M9538A prior to attempting to open a .PDF file. For the latest M9538A documentation, go to www.keysight.com/find/M9538A.

2 Controller Operating System

This section provides general system configuration and preventative maintenance procedures that the customer is responsible for.

See the “[BIOS Setup](#)” on page 41 for information about setting the boot devices.

Microsoft Windows

The Keysight M9538A comes with the Windows Operating System (64-Bit) pre-installed along with Keysight's IO Libraries Suite. In general, the M9538A operates as any other Windows PC.

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 11 Enterprise LTSC

Figure 2 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. However, the first time you install and turn on the M9538A and Windows starts, you must accept the End User License Agreement (EULA). A copy of the Windows EULA is in the M9538A at: **C:/boot/SoftwareLicenseTerms.rtf** or **C:/boot/SoftwareLicenseTerms.txt**.

If you want to verify Windows Activation, do the following:

- 1 In “Windows 11 Enterprise LTSC”, 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.

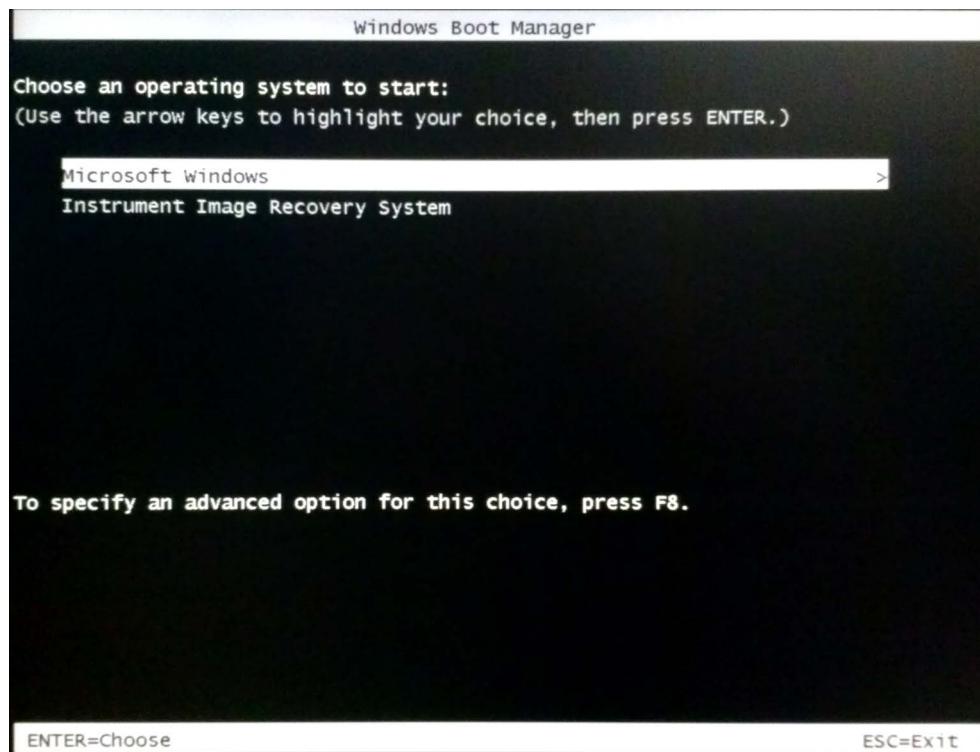
Controller Startup

After installing the M9538A controller in an AXIe chassis, press the chassis' power on button. After a few moments, the controller beeps indicating it passed its POST self tests. The following screen will display for a few moments:



Allow the controller to run through its normal startup routine. You can press the DEL key to enter the BIOS Setup utility. For more information, see ["BIOS Setup"](#) on page 41.

You may see the following screen. If so, either press the Enter key or simply ignore it to allow the Windows operating system to start normally.



After a few moments, Windows starts.

NOTE

Microsoft Win 11 is the only operating system installed on your M9538A. There is a small system partition for the Keysight Recovery System. If you select this option, the Recovery System menu opens.

Using the NVMe Drive

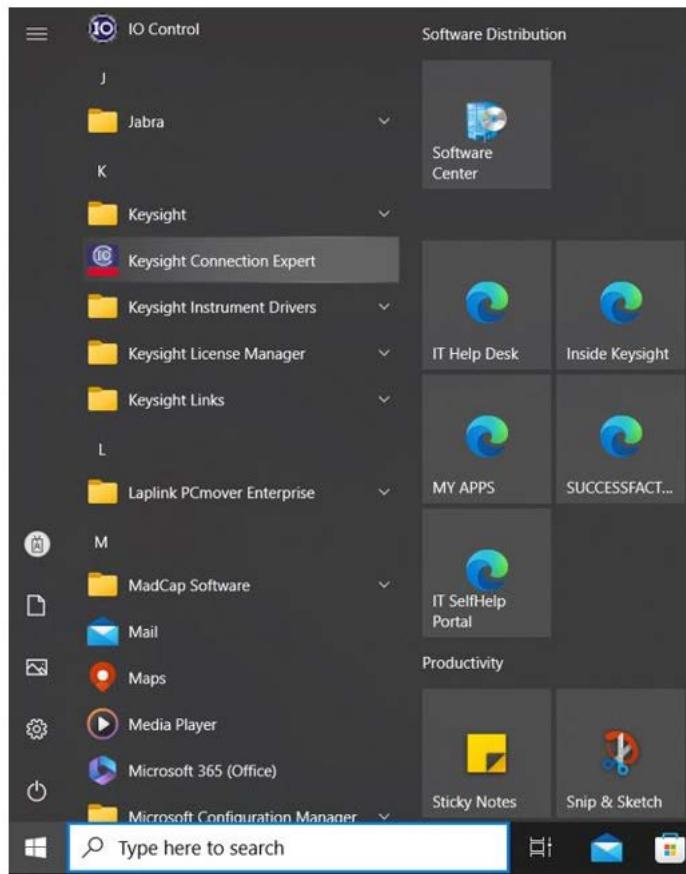
If you purchased the optional rear Ultra-high-speed NVMe disk cache (option M9538-NVM, a SSD drive mounted internal in the controller) you can use it to store data. The NVMe drive uses a x4 PCIe Gen 3 interface.

The optional rear NVMe drive is available for use and appears in the Windows File Explorer as the “**D**” drive. The front panel NVMe disk drive appears as the “**C**” drive. Of course, you can re-assign these drives as needed.

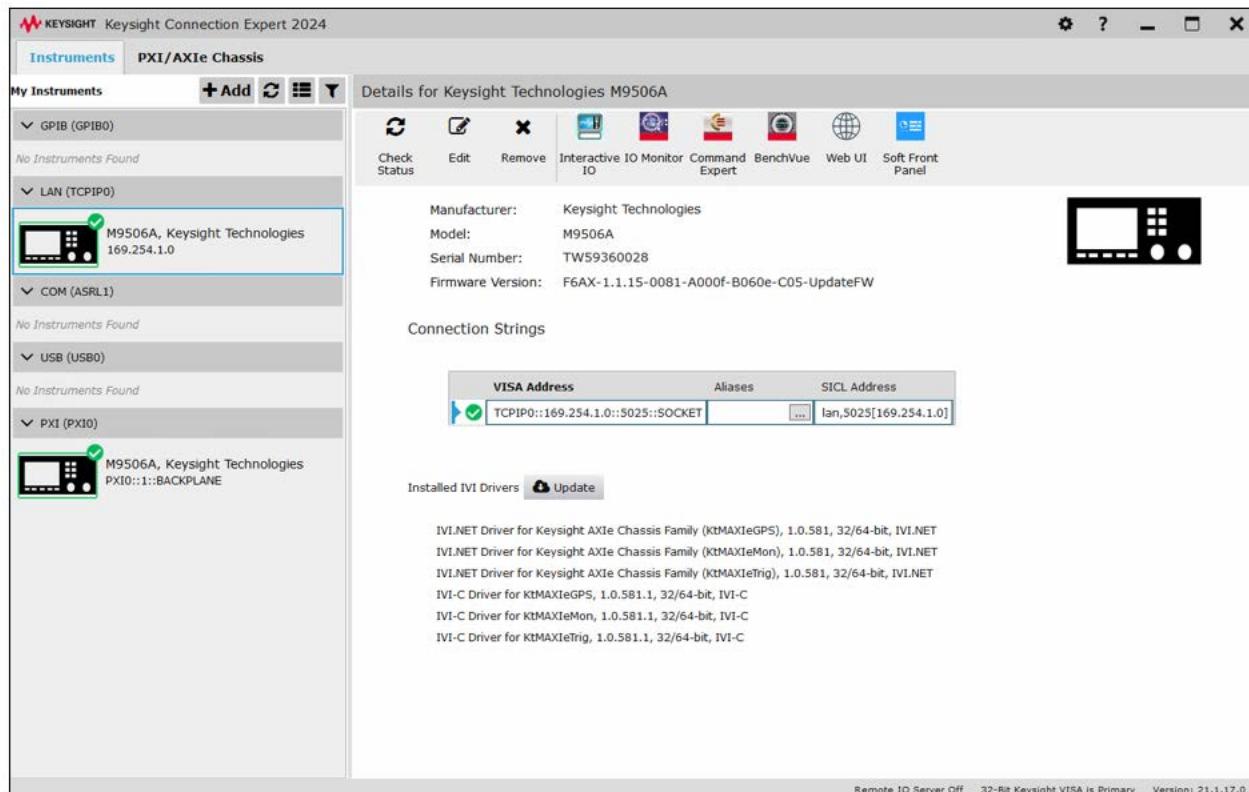
Using Keysight Connection Expert

From the Windows Start button, select All Programs. Scroll down to the Keysight IO Libraries Suite folder then select Keysight Connection Expert. Alternately, you can double-click the IO Control icon (IO) in the lower right Windows Notification area to run Keysight Connection Expert.

The following image shows the start menu for Windows 11 Enterprise LTSC.

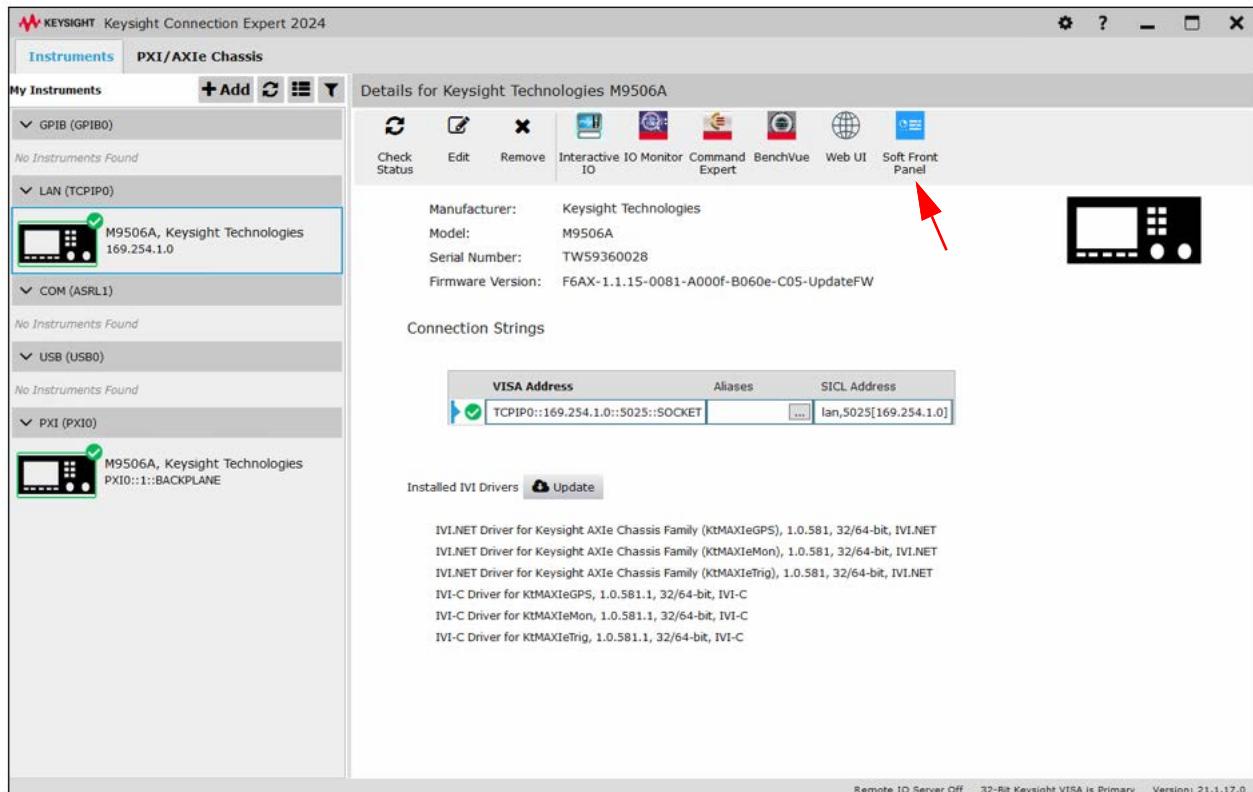


The following image shows Keysight Connection Expert. Refer to the Keysight IO Libraries Suite documentation for information on using Connection Expert.

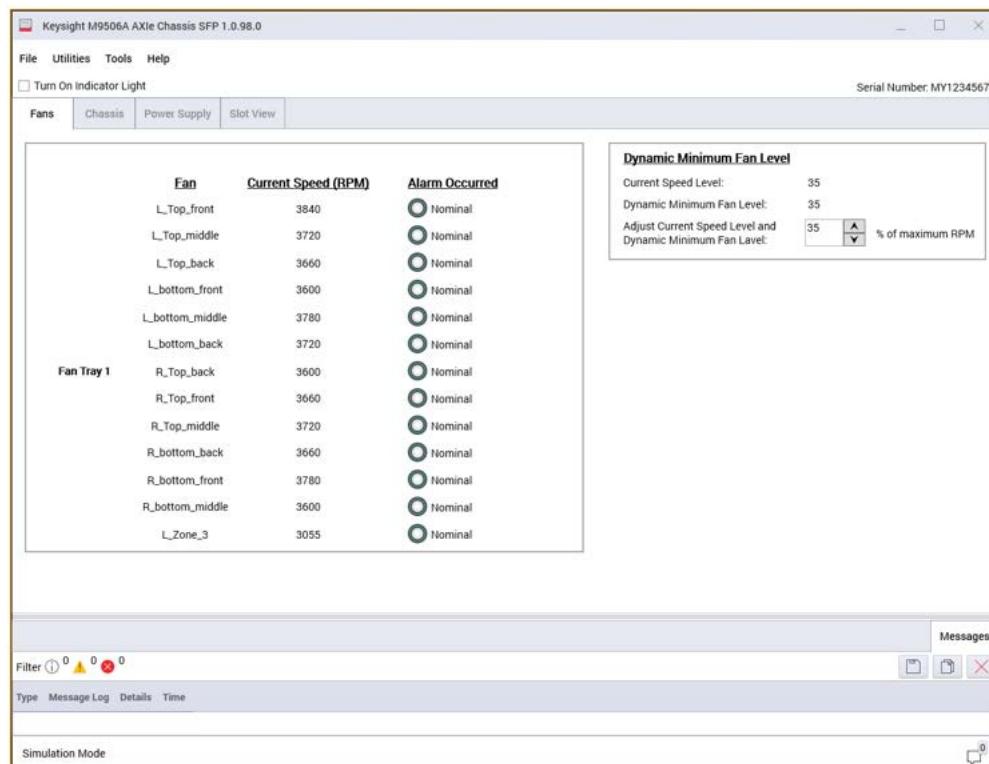


AXIe Chassis Soft Front Panel

To view and use the chassis Soft Front Panel (SFP) in your M9538A, click the **Soft Front Panel** icon.

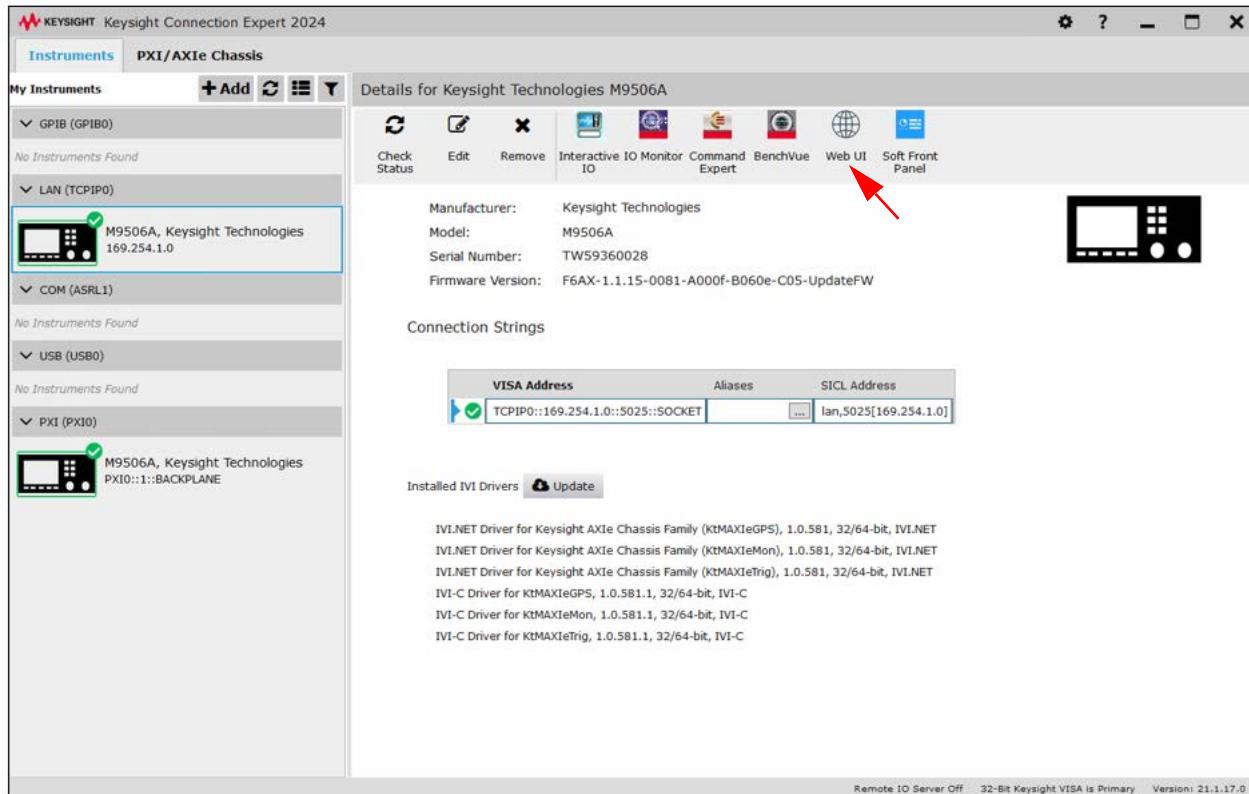


This opens the SFP software as shown in the following image. For instructions on using the SFP, refer to the SFP help.

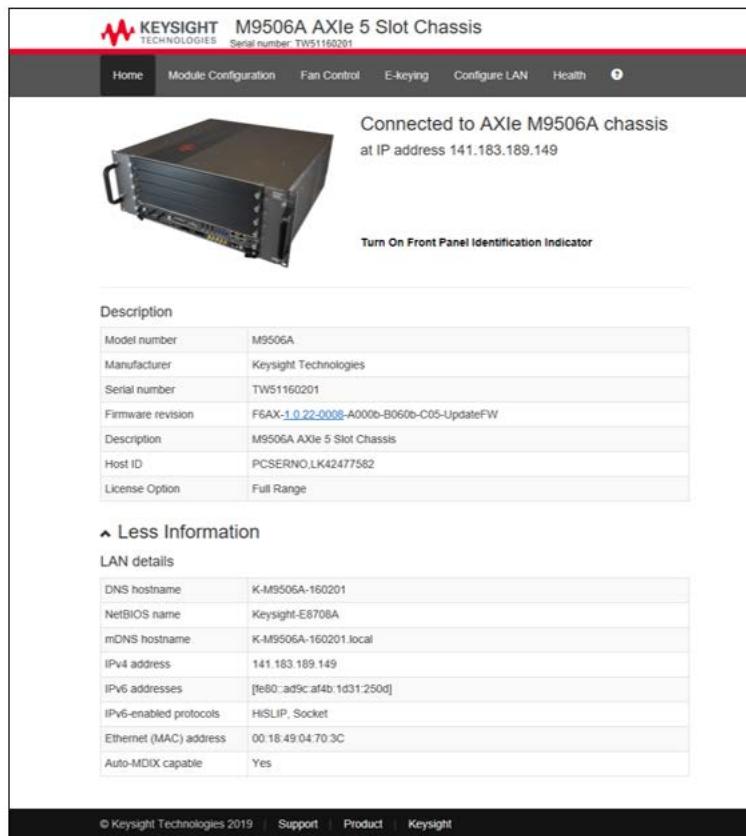


AXIe Chassis Web Page

Click on the **Web UI** icon to launch the chassis Web Interface. The chassis Web Home page loads in a new window using the default browser.



For detailed information on the AXIe chassis web page, see the *Keysight M9502A /M9505A/M9506A AXIe Chassis User Guide*.



The Home Page displays identifying information about your chassis and web connection. It displays additional information if you click the Advanced Information drop-down menu button.

On the top panel of the page are seven tabs: The *Home* Page, The *Module Configuration* Page, the *Fan Control* Page, the *E-Keying* Page, the *Configure LAN* Page, the *Health* Page, and the *Help* Page. Of these seven tabs, only two are relevant to the M9538A Controller:

Module Configuration Page - This tabs allows you to view basic product and model information for instrument modules loaded -- such as the M9538A -- in the chassis.

Chassis Health Page - Displays PSU voltages, fan speeds and temperature. Provides detailed event alarms for the chassis and any installed Intelligent Platform Management Bus (IPMB)-equipped instrument modules.

- 1 Click on the *Module Configuration* tab. This opens the Module Configuration Page which provides the module's serial number and revision.

Module Slot	Product Name	Description
5	-empty-	Product Serial Number Revision Manufacturer
4	-empty-	S/N Revision Manufacturer
3	M8197A Synchronization Module	Product Serial Number 0123456789 Revision Rev 1.0 Manufacturer Keysight Technologies
2	M8197A Synchronization Module	Product Serial Number 0123456789 Revision Rev 1.0 Manufacturer Keysight Technologies
1	AXIe System Controller	Product Serial Number TW64030008 Revision A2 Manufacturer Keysight Technologies

- 2 Click the Chassis Health Page tab.

This opens the Chassis Health page as shown that provides backplane rail voltages and operating temperatures in the M9538A Controller.

KEYSIGHT TECHNOLOGIES M9506A AXIe 5 Slot Chassis
Serial number: 0123456789

Home Module Configuration Fan Control E-keying Configure LAN **Health**

Chassis Health

Sensors

Module Slot	Instrument	State	Sensor Readings					
5	-empty-		ID	Type	Name	Lower Critical	Reading	Upper Critical
	Status	Active						
4	LPT_AMP_REF blade	Active						
	Status		ID	Type	Name	Lower Critical	Reading	Upper Critical
	Nominal		5	Voltage	ADC +12.0V	11.28 Volts	12.20 Volts	12.74 Volts
	Nominal		6	Voltage	ADC +1.0V	0.92 Volts	1.01 Volts	1.08 Volts
	Nominal		7	Voltage	+3.3V	3.01 Volts	3.29 Volts	3.55 Volts
	Nominal		8	Voltage	+2.5V	2.20 Volts	2.47 Volts	2.81 Volts
	Nominal		9	Voltage	ADC +3.3V IPMI	3.11 Volts	3.34 Volts	3.51 Volts
3	Nominal		10	Voltage	+1.8V PROM	1.61 Volts	1.78 Volts	2.01 Volts
	Nominal		0	Temperature	LM83 TEMP		29.00 degrees C	75.00 degrees C
	Nominal		1	Temperature	FPGA TEMP		54.00 degrees C	75.00 degrees C
	LPT_AMP_REF blade		Active					
	Status		ID	Type	Name	Lower Critical	Reading	Upper Critical
	Nominal		3	Voltage	ADC +12.0V	11.28 Volts	12.31 Volts	12.74 Volts
	Nominal		4	Voltage	ADC +1.0V	0.92 Volts	1.03 Volts	1.08 Volts
Nominal		5	Voltage	+3.3V	3.01 Volts	3.27 Volts	3.55 Volts	
Nominal		6	Voltage	+2.5V	2.20 Volts	2.51 Volts	2.81 Volts	

DisplayPort Video

DisplayPort is designed to be compatible with legacy display monitors. You will need to use a Keysight-approved DisplayPort to DVI, HDMI, VGA adapter or Thunderbolt 4 display option. 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.

NOTE

DisplayPort cables and DisplayPort adapters not approved by Keysight may not work with the M9538A as the system has only been tested with Thunderbolt 4 Y1201A, Y1261A, and Y1262A adapters. Legacy displays (HDMI, DVI, VGA) which have not been tested by Keysight may not work with the M9538A.

Using Multiple Monitors

Keysight's M9538A controller supports monitor configurations through one DisplayPort connectors. Another option to connect another monitor is by using a Thunderbolt 4 connection. Once you have connected the three monitors, you may want to configure their arrangement.

Audio

There is no audio hardware or drivers included in the M9538A controller. Other than the Power-On Self Test (POST) beeps, you will hear no sound from the controller. This means that there are no Windows alerts or sounds. If you need audio, you can add USB speakers.

Windows Configuration Review

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.

Open the Windows Firewall to look the status of, or make changes to, the firewall settings. On “Windows 11 Enterprise LTSC”, right click **Start** > **Control Panel** > **System & Security** > **Windows Firewall**.

Windows Update

The factory default setting for Windows Automatic Updates is to check for updates and notify the user if updates are available. The intent is to not automatically install updates. With the goal that your M9538A is not modified, unless you accept an update. See the CAUTION on the next page.

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

Microsoft Windows Update can sometimes be slow. There are many factors that can interfere with Windows Update speed. If you find that is too slow, 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 LTSB, you would select “x64 Win 11 LTSB”.
- 4 Download each KB.
- 5 Install each KB.
- 6 Repeat this process until Windows Update says there are no more updates.

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

A 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.

Auto Login

Your M9538A 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 M9538A 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 11 Enterprise LTSC”:

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 M9538A across the LAN from another computer. It only works if the accounts have passwords.

If your Administrator account password is set, Remote Desktop Connection is enabled by default.

NOTE

Anyone with network access to your M9538A can control your M9538A 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's 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 M9538A 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, 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.

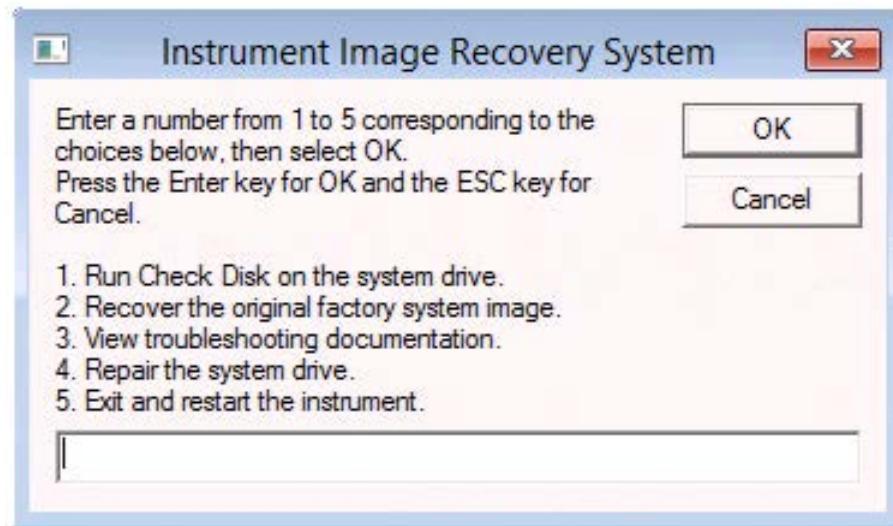
Microsoft Windows is the only operating system installed on your M9538A. There is a small system partition for the Keysight Recovery System on the SSD. During the OS boot process, you are given the choice to boot normally or boot from the recovery partition.

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 M9538A. 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 (1 TB) SSD in your M9538A. 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 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 M9538A. 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 M9538A.

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 M9538A controller supports USB CD-ROM drives, USB flash disks, or a USB external hard drive as the first boot device. For more information, see [“BIOS Setup”](#) on page 41. 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 11, create a recovery drive.
- Periodically create a complete system image. See [page 35](#).
- Back-up your important data daily to an external memory device.

Chassis Shutdown

As with any PC, you should not shut down Windows-based instruments by either turning off the power via an external power source or by pulling the power plug out from the rear panel. This could corrupt the operating system. The only approved way to shut down the controller is to execute the Windows shutdown process and then turn off the chassis via the chassis On/Off button.

CAUTION

Pressing the chassis power button immediately removes power from the controller. This may cause loss of data or damage to the controller.

Power Down Modes

Keysight's M9538A defaults to the Windows High Performance Power Plan. This plan does not allow the controller display to shut off or the controller to enter a sleep or hibernate mode. In the following discussion, the power modes or states are:

- S0—Power on and fully operational
- S1—Standby (sleep), CPU clock stopped, CPU/RAM powered on.
- S2—Low Power (sleep), CPU powered off, context cache lost.
- S3—Suspend to RAM (sleep), all context lost, system memory retained.
- S4—Suspend to Disk (hibernation), context data written to SSD.
- S5—Power Off (G2, Soft Off), requires reboot, LAN Port 2 is powered.

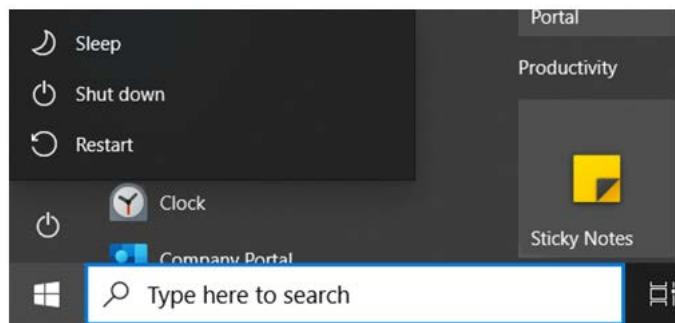
NOTE

You should not enable the Microsoft Windows sleep or hibernate modes. It is possible that the M9538A controller could go into sleep mode while it is running a user test program. The controller may not have proper chassis enumeration when it wakes up.

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

Your only options from the start menu are Shut down and Restart as shown in the following graphic.

Here is the Shut down button and Restart menu item for Windows 11.



If you install the M9538A controller in a chassis M9502A/M9505A/M9506A AXIe chassis, consult your chassis manual for power down behavior.

Things Not To 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.

Application Software

Do not remove files under the **C:\Program Files** or **C:\Program Files (x86)** folders 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 pre-installed 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 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.

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.

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 of these identifiers 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 (ASL) web site at www.keysight.com/find/softwarelicense. You will need the license order number and certificate number as well as a valid login and password.

- If either of the following occurs, you will need to verify and possibly reissue the license.
 - The SSD is reimaged, 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.

Microsoft Operating System Licensing

When you purchased your M9538A, you purchased one Microsoft license. You can run the operating system image on any computer, if you run it on one computer at a time. For example, if you have a single M9538A and made a copy of the operating system by copying to another SSD, you can run either SSD on your M9538A without breaking the licensing agreement.

For example, if you copied the Windows 11 SSD, you can only have one instance of Windows 11 running at a time. You cannot run Windows 11 on both M9538A at the same time. If you want both M9538A to run Windows 11, to conform to the license agreement, you must purchase an additional license. When you purchase additional SSD with carrier, each purchase comes with one Microsoft license.

Drivers

All of the M9538A Controller or M9502A/M9505A/M9506A AXle chassis drivers were installed on your controller at the factory. You should not need to reinstall them. However, you should periodically check www.keysight.com/find/M9502A, www.keysight.com/find/M9505A, or www.keysight.com/find/M9506A for updated drivers and firmware.

3 BIOS Setup

The Basic Input/Output System (BIOS) is a program that provides a basic level of communication between the processor and peripherals. The BIOS setup program includes menus for configuring settings and enabling M9538A 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.

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

NOTE

Depending on your application, you may never need to update the BIOS on your M9538A. However, you should always upgrade to the latest Keysight BIOS. Any BIOS update for the M9538A will be available on the Keysight web site:
www.keysight.com/find/M9538A.

The BIOS is custom designed specifically for the M9538A. Do not attempt to replace it with a generic BIOS.

CAUTION

Modifying BIOS settings may cause unexpected behavior in the M9538A. If this happens, restore the factory default settings. Do not change a BIOS setting unless you are absolutely certain of what it does.

Passwords

There are two passwords that may be set using the BIOS Setup utility:

- **Administrator Password:** If the Administrator Password is set, then before the BIOS Setup utility can be entered, a message box appears asking for that Password. After the Administrator Password is entered the controller will continue into the BIOS Setup utility.
- **User Password:** If the User Password is set, before the black splash screen is displayed, a message box appears asking for that Password. After entering the User Password, the controller continues to the black Splash Screen. At that time if you press the **[Delete]** key, you will enter the Setup utility. Notice the Administrator Password was NOT needed even if it is set.

This can be configured from the BIOS screen Security.

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 M9538A 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 BIOS screen Advanced > Miscellaneous.

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 M9538A 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.

This can be configured from the BIOS screen Save & Exit.

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 BIOS screen Main > System Management.

4 Service Information

This chapter provides minimal service information.

Keysight's M9538A AXIe Embedded Controller has few replaceable parts. Always observe Electrostatic Discharge precautions (see "["Static-safe Handling Procedures"](#)).

General Troubleshooting Hints

NOTE

IMPORTANT: Keysight M9502A or M9505A AXIe chassis must have firmware revision 1.4.2/2.2.2 or later and Keysight M9506A AXIe chassis must have firmware revision 1.1.17 or later for the M9538A to identify and communicate with other chassis module. Refer to the Keysight chassis web pages for information on updating the chassis firmware at www.keysight.com/find/M9502A, www.keysight.com/find/M9505A or www.keysight.com/find/M9506A.

- In the event of a system malfunction causing the M9538A controller to stop or to fail to boot, clear the CMOS memory and restore the controller BIOS to its factory default setting.
- Make certain you have the latest drivers installed.
- Make certain you have the latest BIOS installed.

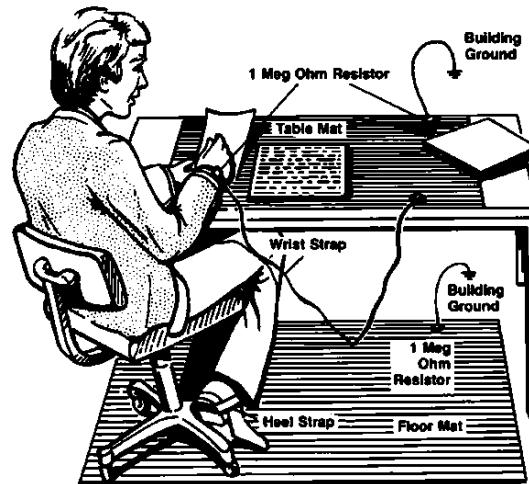
If you are having problems with GPIB, make certain you are using the correct GPIB cable. The cable for the M9538A is a micro type 2 GPIB cable with standard pin wiring and not compatible with the cable used on the M9036A PXIe Embedded Controller.

Static-safe Handling Procedures

Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform at work on electronic assemblies. The figure shows a static-safe work station using two types of ESD protection:

- 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 $1 \text{ M}\Omega$ 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.

Clear CMOS Memory

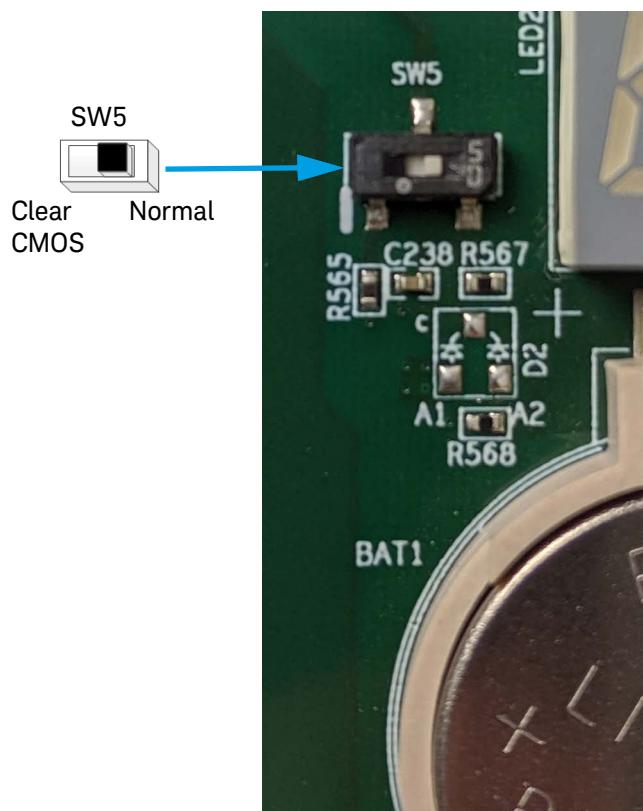
If you encounter an abnormal condition that causes M9538A to halt or fail to boot, clear the CMOS to restore the controller BIOS to its factory default settings.

CAUTION

Always observe ESD precautions. See ["Static-safe Handling Procedures" on page 44](#).

To Clear the CMOS:

- 1 Execute the Windows shut down process on the controller. This powers-down the chassis. Do not unplug it from the AC outlet.
- 2 Remove the M9538A Embedded Controller from the chassis.
- 3 Remove the NVMe SSD cover. See [Figure 4](#) on page 50. If you have installed an NVMe SSD, you will need to remove it. See ["Removing the Optional Rear NVMe Drive" on page 49](#).
- 4 Remove the CMOS battery from its holder. See ["CMOS Battery Backup" on page 46](#).
- 5 Locate SW5 on the board. It is next to the CMOS battery. Set SW5 to the **Clear CMOS** position.



- 6** Wait at least 30 seconds then return the switch to its **Normal** position.
- 7** Re-install the CMOS battery.
- 8** Re-install the NVMe SSD if you had to remove it earlier (Step 3 above).
- 9** Replace the NVMe SSD cover.
- 10** Reinstall the controller back into the AXIe chassis.
- 11** Power on the chassis.
- 12** Press the <Delete> key when the controller beeps. This should be concurrent with the main startup screen.
- 13** Load Optimized defaults in the BIOS setup.
 - a** The Main setup menu reports some basic information of controller.
 - b** Use the down arrow key (↓) to select System Date and System Time.
 - c** Set these to the correct current date and time.

NOTE

System date and time should be set before executing the next step. <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.

- 14** Press the <F4> key to save the settings and then the <ESC> key to exit the BIOS setup.

CMOS Battery Backup

The M9538A is provided with a 3.0 V “coin cell” lithium battery. This battery backs up the Real Time Clock. To replace the battery, proceed as follows:

CAUTION

Always observe ESD precautions. See “[Static-safe Handling Procedures](#)” on page 44.

- 1** Execute the Windows shut down process on the controller. This powers-down the chassis. Do not unplug it from the AC outlet.
- 2** Remove the M9538A Embedded Controller from the chassis.
- 3** Remove the NVMe SSD cover. See [Figure 4](#) on page 50. If you have installed an NVMe SSD, you will need to remove it. See “[Removing the Optional Rear NVMe Drive](#)” on page 49.
- 4** Locate and remove the CMOS battery. Press the battery release latch (1). The battery should pop out (2).

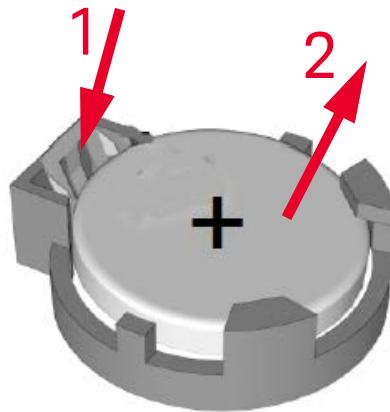


Figure 3 Remove/Replace the CMOS Backup Battery

- 5 Place the new battery in the socket. Make sure that you correctly orient the battery for installation. The positive pole (+) must be on the top. You may find it helpful to angle the battery in and pull back on the battery release latch.

NOTE

Replace the lithium battery with an identical battery (CR2032 or equivalent).

- 6 Replace the NVMe SSD if you removed it earlier (Step 3 above).
- 7 Re-install the NVMe SSD Cover.
- 8 Install the embedded controller back in the AXle chassis and apply power.

NOTE

The battery's operational temperature range is less than that of the M9538A's storage temperature range. For exact range information, refer to the battery manufacturer's specifications.

NOTE

Ensure that the battery is correctly replaced. Replace the battery only with an identical type (CR2032 or equivalent). Dispose of used batteries according to the manufacturer's instructions. Typical battery life varies considerably and depends on operating temperature and standby (shutdown) time of the system. Typical life expectancy of a 225mAh battery is 4 to 5 years with an average on-time of 8 hours per working day at an operating temperature of 30°C. To ensure that the lifetime of the battery has not been exceeded, you should change the battery after 3 to 4 years of service.

Replacing the Controller's Front Panel SSD

The Keysight M9538A embedded controller comes with a 1TB M.2 Solid State Drive (SSD).

To remove the SSD with carrier from the M9538A, perform the following steps:

- 1 Shutdown the M9538A and power off the AXle chassis. You do not need to remove the M9538A 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.

To insert the SSD with carrier into the M9538A, perform the following steps:

- 1 Insert the SSD with carrier into the M9538A 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 M9538A front panel when properly installed.

- 3 Tighten the front panel two thumb screws to secure the SSD carrier to the M9538A. If the thumb screws do not thread properly, the SSD may not be fully inserted.

Replacing the Optional Rear NVMe Drive

The following NVMe disk and mounting hardware is available from Keysight:

Part Number	Description
M9538-35500	M9538A Optional Rear Ultra-High-Speed 1TB NVMe Disk
M9537-01200	NVMe Mechanical Mounting Kit

Removing the Optional Rear NVMe Drive

- 1 Execute the Windows shut down process on the controller. This powers-down the chassis. Do not unplug it from the AC outlet.
- 2 Remove the M9538A Embedded Controller from the chassis. Observe all anti-static precautions.
- 3 Remove the two screws holding the NVMe cover.

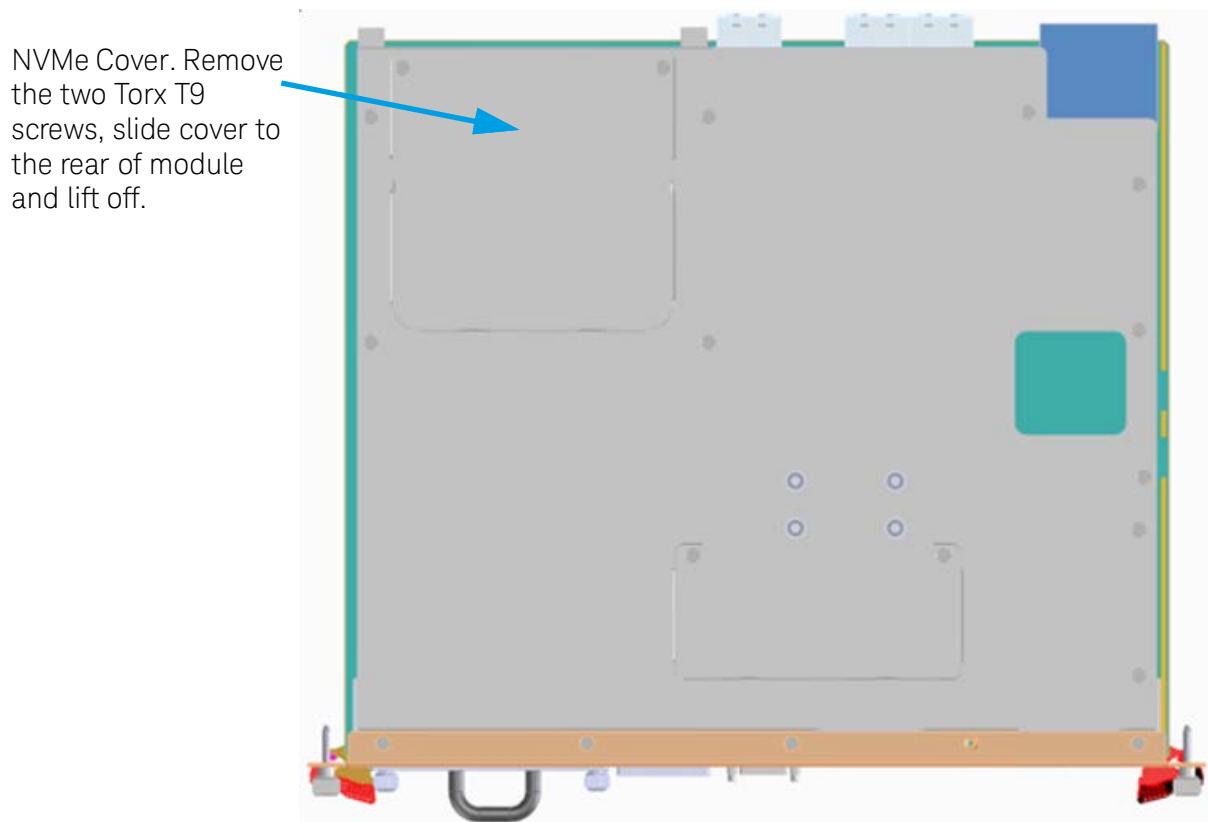


Figure 4 Optional Rear NVMe SSD Cover. Use a T9 Torx Screwdriver to Remove.

- 4 Slide the cover toward the rear of the controller to release it.
- 5 Lift cover to remove it.

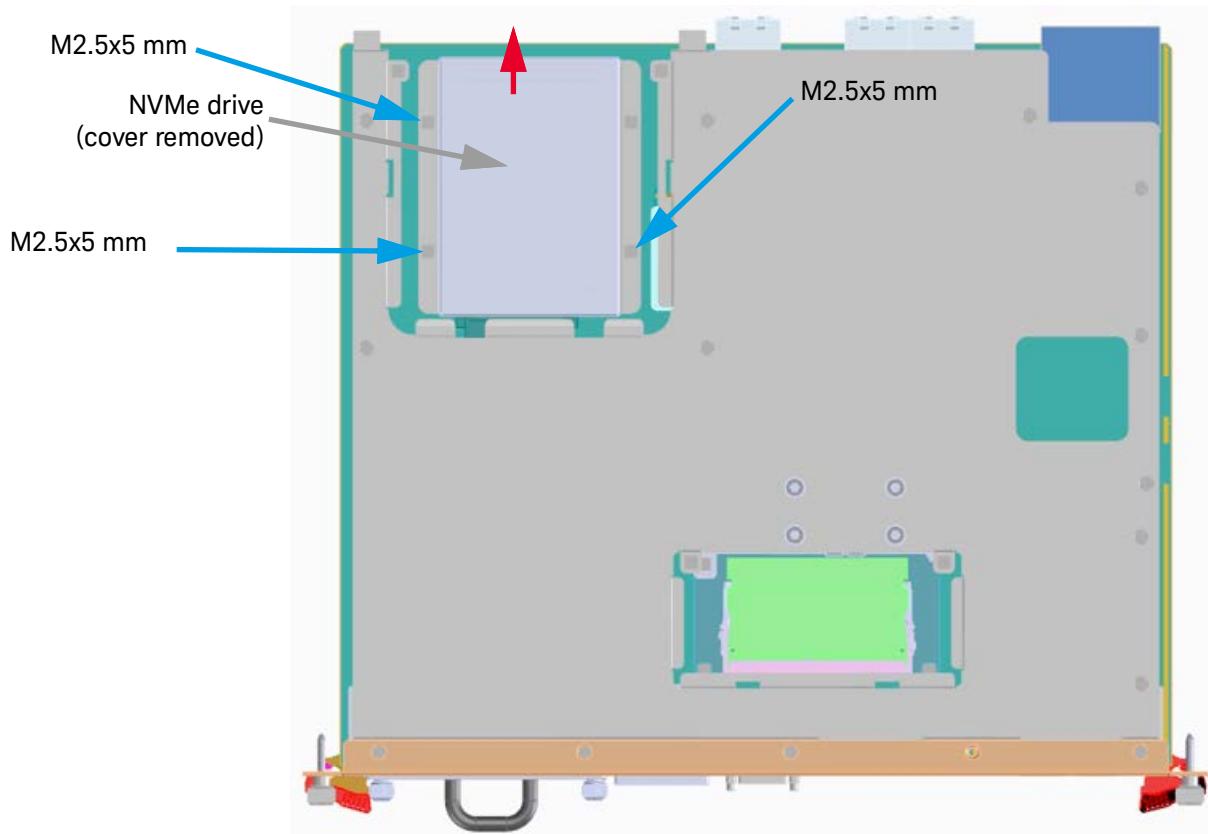


Figure 5 NVMe Drive in the M9538A (Top Cover Removed)

- 6 Use a Torx M9 driver to remove the four NVMe bracket mounting screws. These are indicated by the blue arrows above.

CAUTION

Do not try to lift the SSD straight up. It is still connected to the controller board.

- 7 Carefully slide the NVMe SSD, out of the controller (red arrow). When the NVMe is free of the connector, lift it up away from the controller.

- 8 Remove the four mounting M3x5 mm screws to remove the mounting rails.

To re-install the NVMe SSD, reverse the previous steps. Also, refer to the following instructions to mount a new NVMe drive.

Install a New Optional Rear NVMe Drive

To install a new NVMe drive you will need the following:

Part Number	Description
M9538-35500	M9538A Optional Rear Ultra-High-Speed 1TB NVMe Disk
M9537-01200	NVMe Mechanical Mounting Kit

Mounting Rails

NVMe Drive



Figure 6 NVMe Replacement Drive and Mounting Kit

NOTE

Observe all anti-static precautions.

- 1 Align the mounting rails to the disk drive as shown below. Note the orientation of the rails to the drive.

Align rails to NVMe drive.
Note the orientation of the rails.

Use M3x5 mm screws to mount rails to drive.
These are not shown in the photograph, they are under the rails.



Figure 7 Install Mounting Rails to NVMe Drive

- 2 Align the appropriate holes in the rails to mount them to the drive. Use the four M3x5 mm screws.
- 3 Carefully, slide the replacement drive into the M9538A NVMe cavity. Align the mating connector on the drive and the M9538A motherboard.
- 4 Slide the drive into the mating connector.
- 5 Use the four M2.5x5 mm screws to secure the drive to the motherboard.



Figure 8 Use M2.5x5 mm screws to mount drive to motherboard

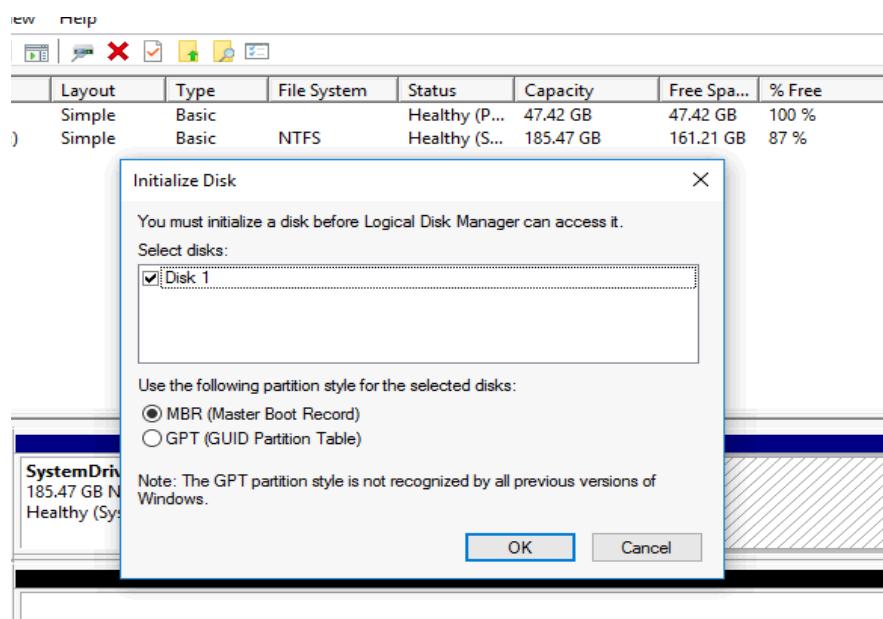
- 6 Replace the NVMe drive cover on the M9538A top cover.

Format the NVMe Drive

When you boot the M9538A to Windows the NVMe device driver is automatically assigned to the drive, but you must run Disk Management to format the drive. The instructions is the same for Windows 11.

Instructions to format the NVMe drive:

- 1 Click Start and type “Disk Management”.
- 2 The following screen pops up showing the default selection of MBR. Change it to GTP then click OK.



- 3 Right click on the “Unallocated” area of Disk 1. A menu will pop-up; select “New Simple Volume...”.
- 4 Click “Next”. Keep clicking “Next” buttons as they appear until you get to “Finish”.
- 5 Click on “Finish”. Disk Management will format the drive.
- 6 Once formating has finished, the drive is operational.

Installing Additional Memory Modules

Keysight's M9538A has two RAM memory connectors; one on top of the other. The module comes standard with one 16 GB memory module (installed in the bottom position). Each socket can support 16 GB or 32 GB memory modules for a total maximum memory capacity of 64 GB. The controller uses DDR4-3200 260 pin SODIMM memory modules.

CAUTION

Always observe ESD precautions. See “[Static-safe Handling Procedures](#)” on page 44.

To remove memory modules from the controller:

- 1 Power off the AXIe chassis.
- 2 Remove the M9538A controller from the AXIe chassis. Observe all anti-static precautions.
- 3 Position the controller, top side up on the workbench as shown in Figure 9.

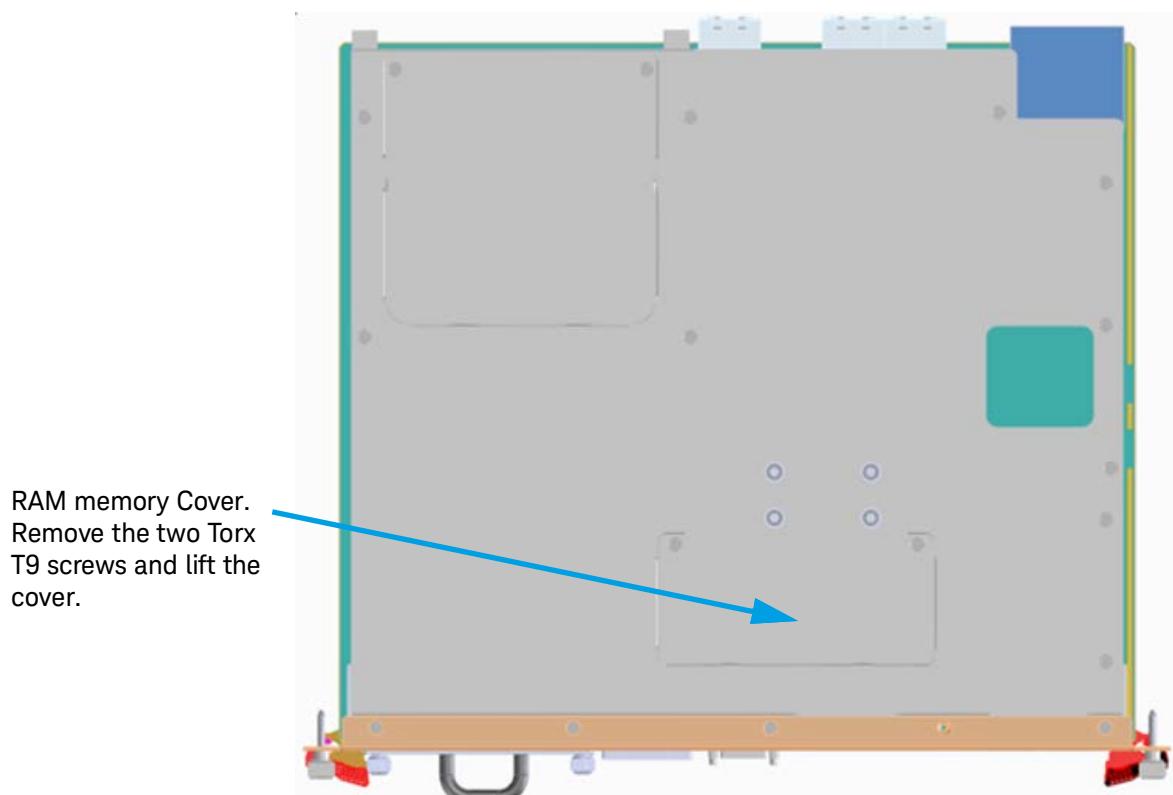


Figure 9 M9538A Memory Modules. Use a T9 Torx Screwdriver to Remove and Replace Screws

- 4 Remove the two screws holding the RAM memory cover.
- 5 Remove the RAM memory cover.

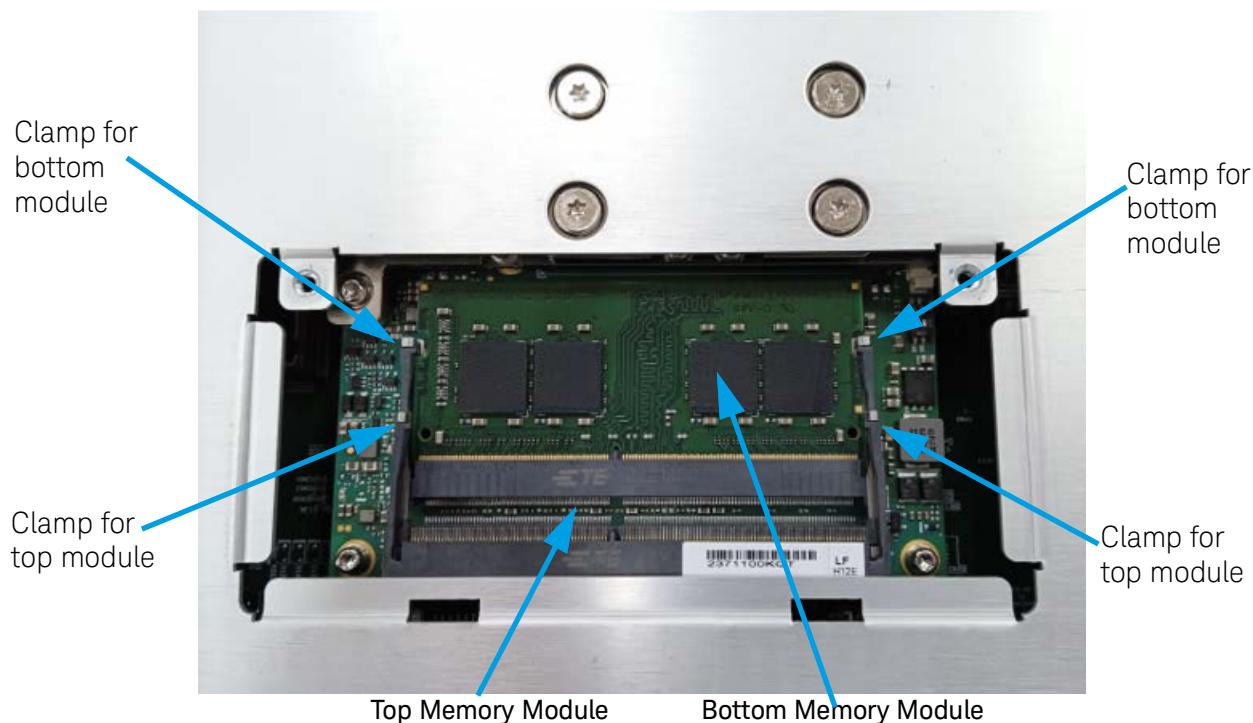


Figure 10 M9538A Memory Modules (both top and bottom modules shown)

- 6 Spread the two memory clamps for the module you want to remove/install.
 - a If you are removing memory modules, remove the top module before releasing the clamps for the bottom module. The memory module should pop up. Carefully slide the memory module out of the edge connector.
 - b If you are installing memory modules, install the bottom module and ensure the clamps are fixed in place before installing the top module. Carefully place the memory module in the socket. Press the module into the clamps until they lock the module in place.
- 7 Ensure the modules are properly seated in the connectors and the clamps are firmly in place.
- 8 Replace the RAM Memory cover on the controller.

Replace the controller module in the AXIe chassis and power it up. The controller BIOS should automatically detect the memory change.

To verify the amount of memory installed in your controller: from the Windows **Start** menu, select **Computer**. Select **System Properties**. Under **System**, locate **Installed memory (RAM)**.

NOTE

The M9538A was tested with the following RAM module configurations:

- one 16 GB RAM module
- two 32 GB RAM modules (a total of 64 GB RAM)

Other configurations should work but have not been tested. A maximum of 64 GB may be installed in the controller.

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 16 GB modules or 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
M9538-55516	16 GB RAM Module
M9538-55532	32 GB RAM Module

Memory Declassification

Some test equipment users have a need to “declassify” or “sanitize” their instruments for security purposes. This involves following a procedure to clear all user data from the instrument’s memory. The result is a sanitized instrument that can be removed from a secure area without any chance of classified data being recovered from it. For complete declassification information, refer to the *M9538A Security Guide*.

Procedure for Declassifying a Faulty Controller

Even if the M9538A is not able to power on, it may be declassified by removing the SSD and NVMe drives from the controller.

For additional information, go to www.keysight.com/find/security and enter the model number of your controller (M9538A).

Glossary

Many of the terms in this manual and glossary are AXIe, ATCA or PICMG specific. Refer to the relevant specifications for more detail on these terms.

AXIe - Advanced TCA eXtensions for Instrumentation is a platform for general purpose modular instrumentation. It is an open industry standard aimed at test equipment and instrumentation. It builds on the experience of VXIbus, PXI and LXI technologies.

Base Channel - Supports a 10/100/1000 Base-T LAN port on the backplane of the AXIe shelf.

NVMe - NVMe Express (NVMe) is a logical device interface specification for accessing non-volatile storage media attached via PCI Express (PCIe) bus. "NVM" stands as an initialism for "non-volatile memory", which is commonly flash memory that comes in the form of solid-state drives (SSDs).

PCI - Peripheral Component Interface bus. A standard for connecting hardware in a computer.

PCIe - PCI Express. Peripheral Component Interface Express (or PCIe) A standard to replace PCI.

Glossary

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