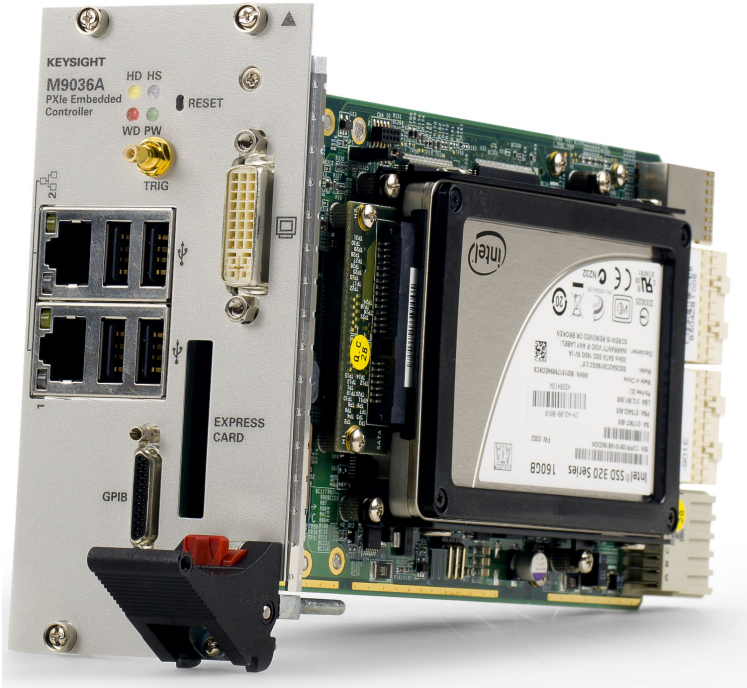


User
Guide

Keysight M9036A PXIe 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.

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 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 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 IEC Measurement Category I, II, III, or IV
- CAT II
- CAT III
- CAT IV

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



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ICES/NMB-001

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



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.



M9036A
MSIP-REM-Kst-
BLM9036A

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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Waste Electrical and
Electronic
Equipment (WEEE)
Directive
2002/96/EC

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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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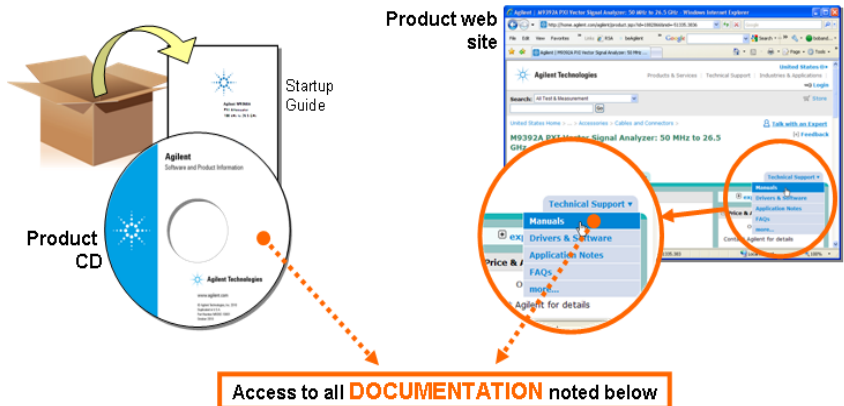
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Documentation Map



Startup Guide



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

Data Sheet



- Product description
- Technical specifications

User Guide



- Setup and configuration
- Operating System
- Basic service including installing additional memory, replacing the hard drive, etc.

1 Introduction

Keysight's M9036A is a 3U PXIe Embedded Controller providing:

- Intel Core i5-520E, 2.4 GHz processor
- 4GB (or optional 8GB) 1333 MHz DDR3 Memory*
- 160GB SATA 2.5 inch solid state drive (SSD)
- Integrated IO on the front panel includes two Gigabit Ethernet ports, four USB 2.0 ports, micro D-sub GPIB connector, ExpressCard 34, DVI-I Video, etc.
- Front Panel SMB Trigger Connector used to route an external trigger signal (TTL level) to and from the PXI backplane with software trigger
- Preloaded with Keysight IO Libraries Suite and one of these operating systems:
 - Windows Embedded Standard 7 (WES 7) 32-bit or 64-bit
 - Windows 10 Enterprise LTSB 2016 64-bit
- Pre-installed IVI drivers for the Keysight M9018A 18-slot PXIe chassis

Related Documentation

Because the Operating System and 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.

Complete M9036A documentation, as well as the M9018A chassis documentation, is available preinstalled on the M9036A SSD. From the Windows **Start** button, select **All Programs** > **Keysight** > **M9036A Embedded Controller** or **MXIe Chassis Family**.

For the latest specifications, check the Keysight web site at:
www.Keysight.com/find/M9036A.

For the IVI driver, help file, program examples, etc. go to:

`C:\Program Files\IVI Foundation\IVI\Drivers\AgM9036`

For the Soft Front Panel interface: from the Window's Start menu, select:

`Start>All Programs>Keysight>M9036 PXIe Embedded Controller>M9036 SFP`

* The M9036A has two 240-pin, RDIMM sockets which support DDR3-1333 REG/ECC RAM sticks. Each socket can support memory modules up to 4GB for a total memory capacity of 8GB. The standard M9036A configuration is a single 4GB memory stick with a factory option to add a second 4GB memory stick. Note: The capability of addressing 4GB memory is operating system dependent. A 32-bit OS system may not be able to address the full 4GB memory space. To use the full 4GB/8GB memory, a 64-bit OS must be used.

M9036A at a Glance

The following figure shows the front panel for the M9036A PXIe Controller. Detailed information about the module follows in this manual.

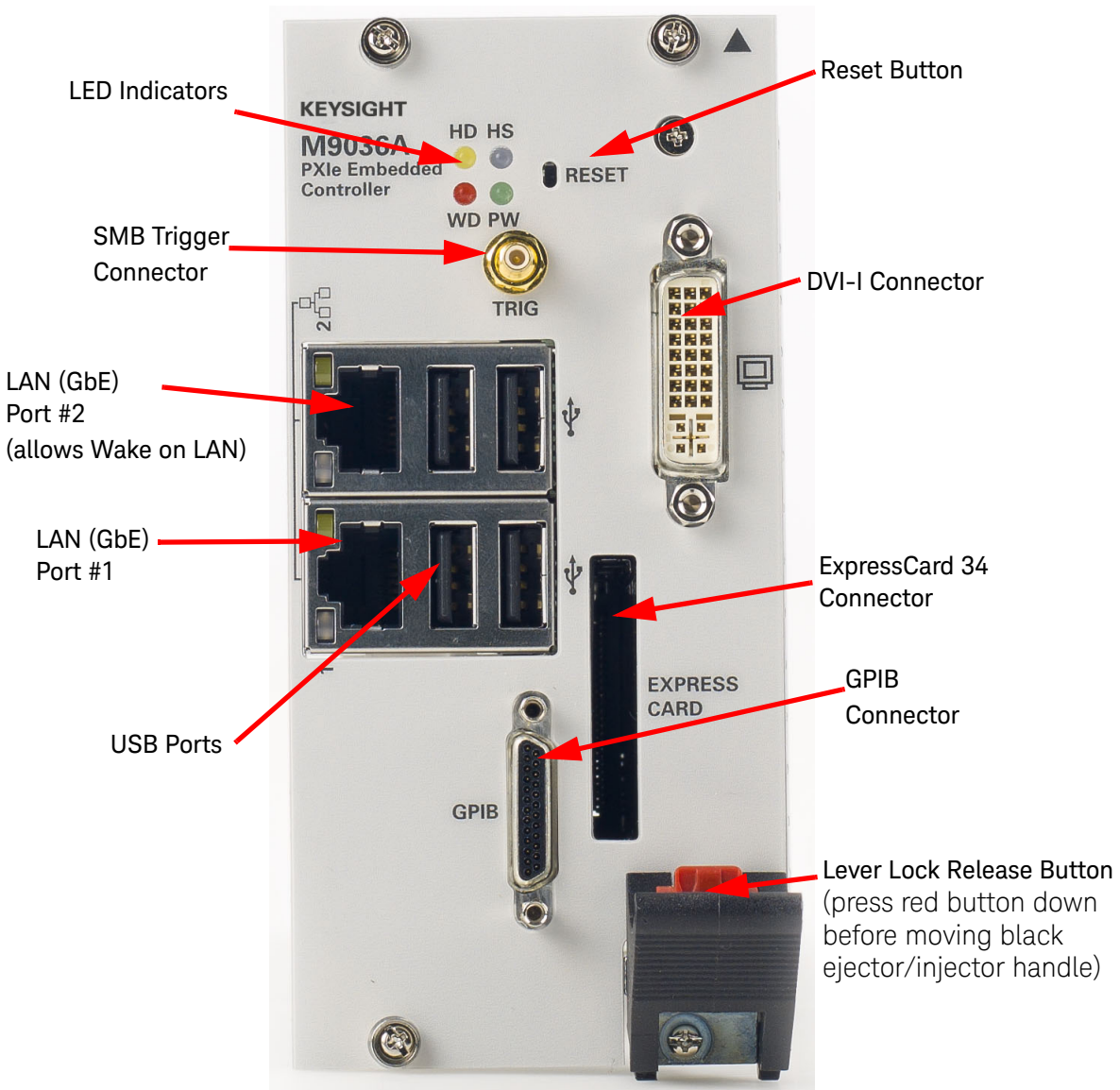


Figure 1 M9036A Embedded Controller Front Panel

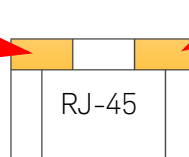
Front panel LED indicators

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	Yellow	When the Solid State Drive (SSD) is active, the LED will flash.
WD	Red	Not Used*
Status	Blue	<ul style="list-style-type: none"> If the LED is on and then turns off during system boot, then the system status is normal. If the LED continues blinking or stays on, it indicates the system is not able to shut down properly. When the chassis Inhibit switch is in the Manual position, a controller shutdown results in a Microsoft Windows shutdown; however, the controller is not able to shut down the chassis power supply. As a result, the LED remains on until the Inhibit pin is pulsed low (thus cycling the power supply) <u>OR</u> the chassis power button is pressed again causing Microsoft Windows to reboot.

Gigabit Ethernet (GbE) connector LED

LED2: Speed and
Link 1Gbps: Amber
100Mbps: Green

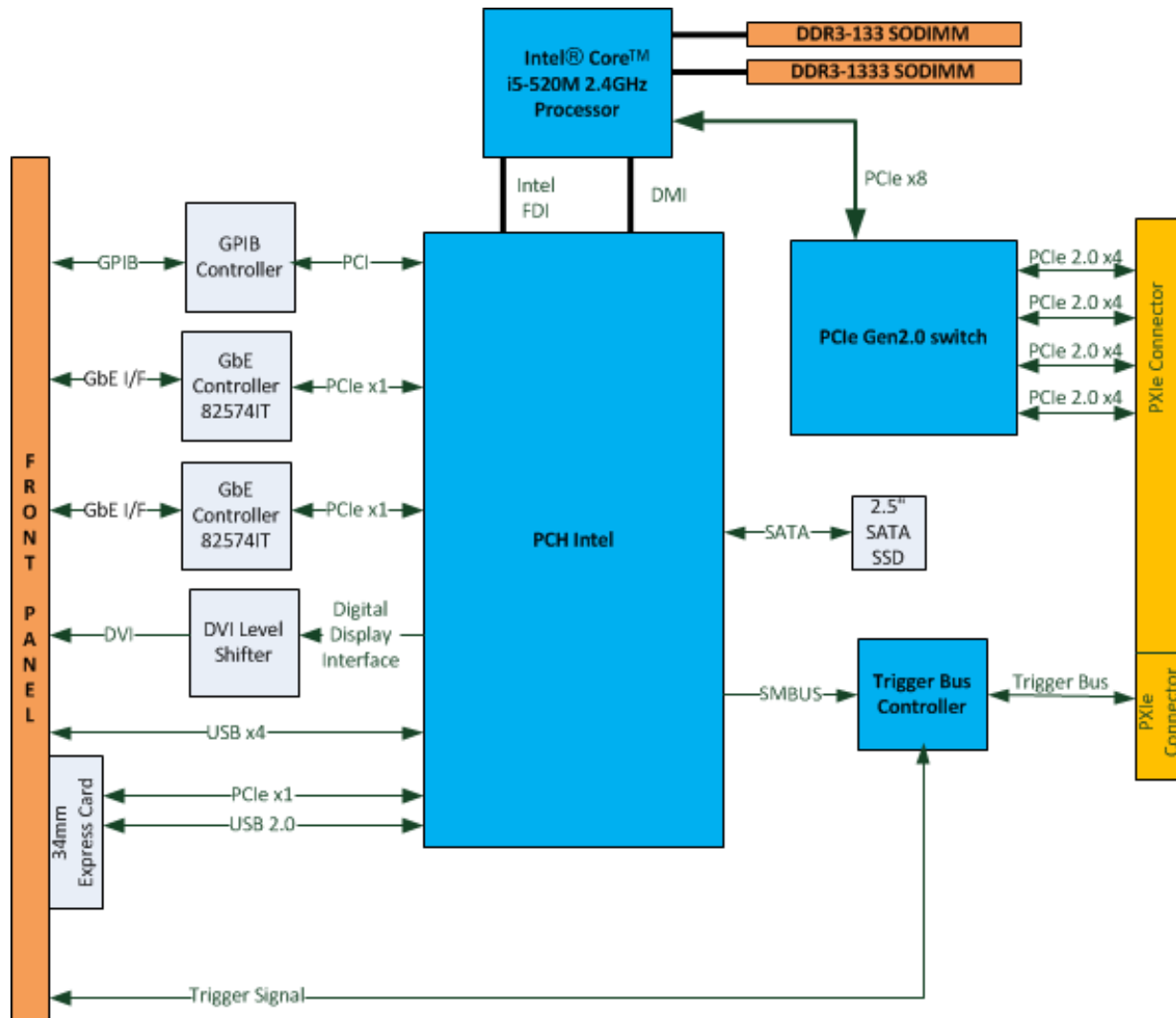


LED1: ACT
Blinking when
accessing IO

LED	Status	Description
Active/Link LED (yellow)	Off	Ethernet port is disconnected
	On	Ethernet port is connected but no data transmission
	Flash	Ethernet port is connected and is transmitting/receiving data
Speed LED	Off	10Mbps
	Green	100Mbps
	Amber	1000Mbps

* WD stands for Watchdog Timer and is not implemented in the M9036A. However, it is possible for this LED to turn on because of activity on the SMBus. Reboot the M9036A to turn the LED off.

M9036A Functional Description



Note: PCIe links are PCIe 1.0 unless otherwise noted

Figure 2 M9036A Embedded Controller Functional Block Diagram

CPU, Memory and Chipset

By introducing Intel dual core technology, the M9036A has two computing engines on a single processor, which can execute two independent tasks at the same time in a multi-tasking environment. Combining this superior performance with a variety of instrument platforms makes the M9036A an ideal solution for your hybrid PXIe-based testing system.

The M9036A 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 Core i5-520E 2.4GHz processor
- DMI (Direct Media Interface) with 1 GB/s of bandwidth in each direction

Chipset

- Mobile Intel QM57 Chipset

Memory

- Two standard 204-pin DDR3 SODIMM sockets
- Supports +1.5V DDR3, 1333 MHz RAM per socket (up to 8 GB total)
- Supports non-ECC, unbuffered memory

Peripherals

CMOS Backup Battery

Keysight's M9036A 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. For instructions on replacing the battery, refer to ["CMOS Battery Backup"](#) on page 57.

Reset Button

The front panel reset button is used to perform a hard reset for the M9036A. You can use a pin-like object to push the reset button.

I/O Interfaces

USB

Keysight's M9036A provides four USB 2.0 Type A ports on the faceplate. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The M9036A controller supports multiple boot devices. The boot priority and boot device can be configured in BIOS. USB to VGA display adapters are supported.

DVI-I Connector

The DVI-I connector connects the M9036A to a video monitor. DVI-I supports both digital (DVI) and analog (VGA) monitors. While connecting to an analog (VGA) monitor, you need to install the DVI-to-VGA adapter, which is shipped with the M9036A controller, on the DVI-I connector. DVI-I contains both the digital and analog connections, (DVI-D and DVI-A), it's essentially a combination of DVI-D and DVI-A video output within one connector (and cable). The DVI-I output provides up to 1920x 1200 60 Hz resolution or up to 2048 x 1536 at 75Hz resolution

DVI to VGA Adapter: The DVI to VGA adapter (really DVI-A to VGA adapters) connects a regular VGA/SVGA monitor to the DVI-I connector on the controller module. A DVI-I connection from a video card or monitor will connect to a digital signal (DVI-D) and an analog signal (VGA) as well.

Ethernet

- Two RJ-45 connectors with speed/link/active LED on the faceplate

GPIB connector

The GPIB connector on M9036A is a micro D-sub 25P connector and is used to control external bench-top instruments. You need the supplied GPIB adapter cable to connect instruments. The on-board GPIB controller has the following features:

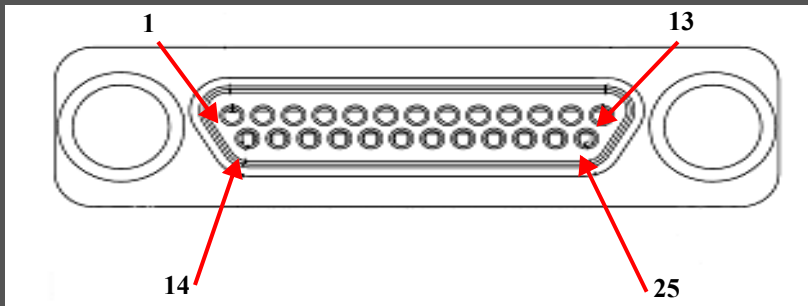
- Compatible with the IEEE 488 standard*
- Up to 1.5MB/s data transfer rates
- On-board 2 KB FIFO for read/write operations
- Connect up to 14 instruments
- GPIB is a standard VISA Resource

*Keysight's M9036A controller includes a GPIB library that implements the GPIB C26 capability. This means that it is a GPIB compliant controller implementation, but does not implement the GPIB Pass Control. If you need GPIB Pass Control, use a USB to GPIB adapter or a LAN to GPIB adapter such as the Keysight E5810A LAN/GPIB Gateway. Also, the M9036A does not support multi-threaded, multi-process GPIB applications.

NOTE

Because there is no industry standard for the front panel micro D-sub 25-pin GPIB connector, interoperability cannot be guaranteed with other similar GPIB cables. A replacement adapter cable may be ordered from Keysight with the part number: M9036-31301.

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



Pin	Signal	Description	Pin	Signal	Description
1	DI01#	GPIB Data 1	14	DI05#	GPIB Data 5
2	DI02#	GPIB Data 2	15	DI06#	GPIB Data 6
3	DI03#	GPIB Data 3	16	DI07#	GPIB Data 7
4	DI04#	GPIB Data 4	17	DI08#	GPIB Data 8
5	EOI	End or Identify	18	REN	Remote Enable
6	DAV	Data Valid	19	Ground	Signal Ground
7	NRFD	Not Ready for Data	20	Ground	Signal Ground
8	NDAC	Not Data Accepted	21	Ground	Signal Ground
9	IFC	Interface Clear	22	Ground	Signal Ground
10	SRQ	Service Request	23	Ground	Signal Ground
11	ATN	Attention	24	Ground	Signal Ground
12	Chassis Ground	Chassis Ground	25	Ground	Signal Ground
13	Ground	Signal Ground			

Keysight's Connection Expert shows the GPIB interface as a VISA resource connected to an Keysight 34420A DMM (VISA address is **GPIB0::22::INSTR**). Refer to the IO Libraries Suite documentation for general VISA programming information or your GPIB instrument documentation for specific VISA programming information.

NOTE

The National Instrument's NI-488.2 driver software is not compatible with Keysight's IEEE 488 driver. Anytime you install National Instrument's NI-488 driver (such as with LabVIEW) your M9036A GPIB port might stop working. The repair process is to uninstall the NI-488 driver (using the Windows Add/Remove program) and reinstall Keysight's GPIB driver:

If you need to use the NI-488.2 driver, you must first uninstall the Keysight driver:

- From the Windows Add/Remove program, select and uninstall the ADLINK GPIB driver (**ADLINK GPIB driver vx.xx**).
- Then install the NI-488.2 driver.
- To reinstall the Keysight driver:
 - From **C:/program files (x86)/Agilent/M9036/bin** run **AdlinkGpib_setup.exe** to reinstanciate the Keysight GPIB driver.

PXI trigger (TRIG)

The front panel PXI trigger connector is an SMB connector and is used to route an external trigger signal to or from the PXI backplane or from a software-generated trigger. Trigger signals are TTL compatible and edge sensitive. The M9036A provides the following trigger routing possibilities:

- From the front panel PXI trigger connector to a specified PXI backplane trigger bus line.
- From a selected PXI backplane trigger bus line to the front panel PXI trigger connector.
- From a software-generated trigger to a specified PXI backplane trigger bus line.
- From a software-generated trigger to the front panel SMB connector via a specified PXI backplane trigger bus line.

Trigger IO functions All trigger modes are programmable through the factory-installed IVI trigger driver (M9036). You can learn more about the trigger functions by using the M9036A Soft Front Panel software available at: Select the Windows **Start > All Programs > Keysight > M9036 PXIe Embedded Controller > M9036 SFP**.

Also, refer to the Trigger Driver help files for information on using the trigger functions. The help files are available at: Select the Windows **Start > All Programs > Keysight IVI Drivers > AgM9036 PXIe Embedded Controller > Documentation**.

- The default trigger route (the path established at power on or at ResetRoute) has no internal connection to the front panel SMB connector and no connection to any of the PXI backplane trigger lines.
- If you read the current trigger routing (GetRoute) at power on or after executing a ResetRoute, it will return the string: AgM9036TriggerRouteNone.
- Trigger routes other than the four described above and in the following diagrams are invalid and result in an error. For example, you cannot route a trigger from one backplane trigger bus line to another backplane trigger bus line. Similarly, you cannot route a trigger sourced by the front panel SMB connector back to itself.

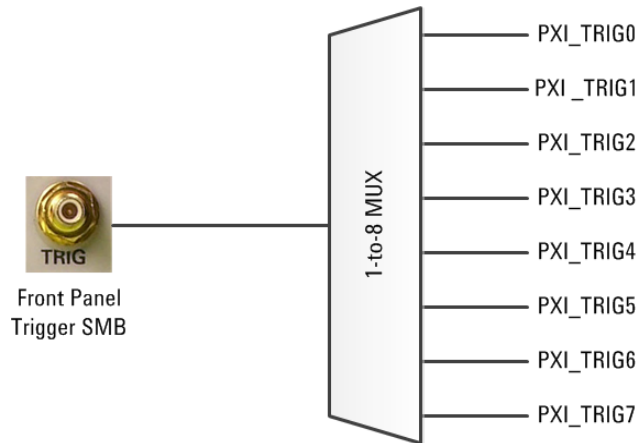
Refer to the following diagrams and explanations. Also, for an example program, refer to the IVI program examples; go to:

C:\Program Files\IVI Foundation\IVI\Drivers\AgM9036

Front panel SMB trigger connector to selected backplane trigger bus

Trigger Source:
Front Panel SMB Trigger Connector
(External)

Trigger Destination:
One of the eight PXI backplane trigger lines



IVI Driver Syntax (C#):

```
TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteExternalToTriggerBus,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
)
```

Notes:

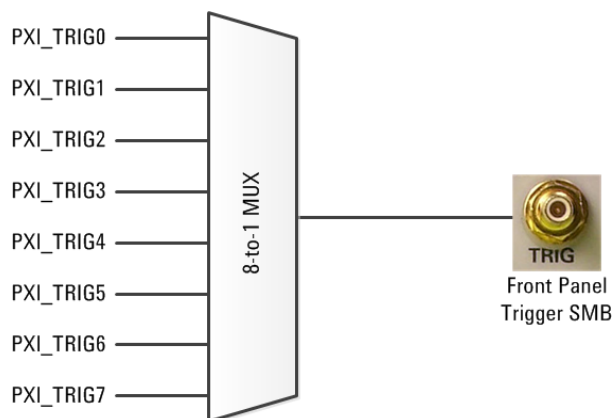
- You must select only one of the eight PXI backplane trigger bus lines (PXI_TRIG[0:7])
- **TriggerRouting.Enabled** returns “true” if and only if the trigger routing subsystem is enabled.
- Use **TriggerRouting.RouteConfiguration** to determine the current routing configuration.
- **TriggerRouting.ResetRoute()** opens all trigger routing paths and disables the trigger routing subsystem.

Selected backplane trigger bus to front panel SMB trigger connector

Trigger Source:

One of the eight PXI backplane trigger lines

Trigger Destination:

 Front Panel SMB Trigger Connector
(External)

IVI Driver Syntax (C#):

```

TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteTriggerBusToExternal,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
)

```

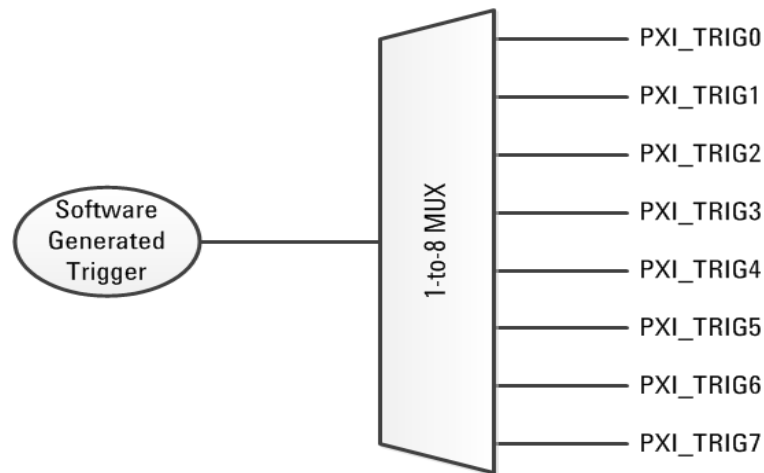
Notes:

- You must select only one of the eight PXI backplane trigger bus lines (PXI_TRIG[0:7])
- **TriggerRouting.Enabled** returns “true” if and only if the trigger routing subsystem is enabled.
- Use **TriggerRouting.RouteConfiguration** to determine the current routing configuration.
- **TriggerRouting.ResetRoute** opens all trigger routing paths and disables the trigger routing subsystem.

Software generated trigger to selected backplane trigger bus

Trigger Source:
Software Generated

Trigger Destination:
One of the eight PXI backplane trigger lines



IVI Driver Syntax (C#):

```
TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteSoftwareToTriggerBus,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
);
```

To set the software trigger level use the property:

```
TriggerRouting.SoftwareRouteTriggerState
```

For example, to create a negative-going edge (\neg):

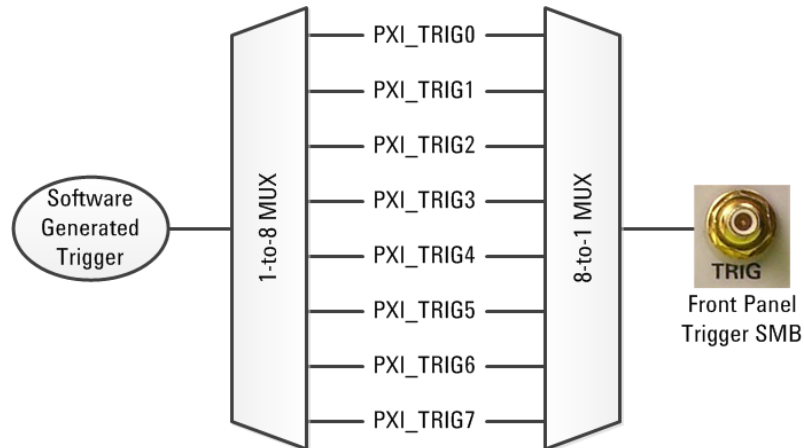
```
TriggerRouting.SoftwareRouteTriggerState = true;
TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteSoftwareToTriggerBus,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
);
TriggerRouting.SoftwareRouteTriggerState = false;
```

Notes:

- A “software trigger” does not generate a trigger pulse. The **SoftwareRouteTriggerState** property in the IVI driver defines a voltage level: True = 3.3V (asserted) and False = 0.0V (not asserted). To generate a pulse, you must toggle the state of the **SoftwareRouteTriggerState** property; that is, set the property to one state, wait for the desired length of pulse, and then set the property to the opposite state.
- You must select only one of the eight PXI backplane trigger bus lines (PXI_TRIG[0:7]) as a destination.
- **TriggerRouting.Enabled** returns “true” if and only if the trigger routing subsystem is enabled.
- Use **TriggerRouting.RouteConfiguration** to determine the current routing configuration.
- **TriggerRouting.ResetRoute** opens all trigger routing paths and disables the trigger routing subsystem. ResetRoute does not alter the state of the SoftwareRouteTriggerState property. However, the Reset method of the IVI driver resets the state to the power-on default of True (3.3V).

Software generated trigger to selected backplane trigger bus and front panel SMB trigger connector

Trigger Source: Software Generated
Trigger Destination: One of the eight PXI backplane trigger lines and the front panel SMB trigger connector



IVI Driver Syntax (C#):

```
TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteSoftwareToTriggerBusAndExternal,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
)
```

To set the software trigger level use the property:

```
TriggerRouting.SoftwareRouteTriggerState
```

For example, to create a negative-going edge (\neg):

```
TriggerRouting.SoftwareRouteTriggerState = true;
TriggerRouting.SetRoute (
    AgM9036TriggerRouteEnum.AgM9036TriggerRouteSoftwareToTriggerBusAndExternal,
    AgM9036PxiTrigEnum.AgM9036PxiTrig[0:7]
);
TriggerRouting.SoftwareRouteTriggerState = false;
```

Notes:

- A “software trigger” does not generate a trigger pulse. The **SoftwareRouteTriggerState** property in the IVI driver defines a voltage level: True = 3.3V (asserted) and False = 0.0V (not asserted). To generate a pulse, you must toggle the state of the **SoftwareRouteTriggerState** property; that is, set the property to one state, wait for the desired length of pulse, and then set the property to the opposite state.
- You must select one of the eight PXI backplane trigger bus lines (TTL TRIG[0:7]). The software-generated trigger signal will be active on the selected backplane trigger bus line and thus available to any PXI module installed in the chassis. You cannot select only the front panel SMB trigger connector as a trigger destination without selecting one of the PXI backplane trigger bus lines.
- **TriggerRouting.Enabled** returns “true” if and only if the trigger routing subsystem is enabled.
- Use **TriggerRouting.RouteConfiguration** to determine the current routing configuration.
- **TriggerRouting.ResetRoute** opens all trigger routing paths and disables the trigger routing subsystem. ResetRoute does not alter the state of the SoftwareRouteTriggerState property. However, the Reset method of the IVI driver resets the state to the power-on default of True (3.3V).

Trigger bus routing A formal PXI trigger bus specification does not yet exist. Consequently, trigger bus routing across PXI_TRIG segments may not work on all non-Keysight PXI chassis. Of course, the PXI_TRIG routing of all Keysight chassis works with any controller due to the open nature of the drivers. Keysight is working with PXISA to define a standard chassis trigger routing driver.

ExpressCard 34

The M9036A controller is equipped with an ExpressCard 34 slot on the front panel, which provides I/O expansion. An ExpressCard module is a small, modular add-in. ExpressCard 34 refers to one of two standard module sizes (34 mm wide, the other size is 54 mm wide). The standard was developed by PCMCIA member companies from all parts of the PC card industry. ExpressCard video (VGA) adapters will not work in the M9036A.

Installing an ExpressCard You can install an ExpressCard while the Keysight M9036 is operating. Keysight's M9036A will automatically recognize the ExpressCard. Always insert the ExpressCard until it is firmly seated in the connector.

NOTE

Some third-party ExpressCard modules may require additional drivers not supplied with the M9036A. Contact the ExpressCard vendor for driver information.

Removing an ExpressCard The ExpressCard connector has an automatic eject mechanism. To remove an ExpressCard, simply push in the module and then release. It should eject automatically.

CAUTION

To prevent potential data loss when removing an ExpressCard, always stop all communication with the module before removing it from the M9036A. In Microsoft Windows, you can use the Safely Remove Hardware utility.

SATA port

The M9036A provides a SATA 2.0 port and is shipped with a pre-installed 2.5" 160GB SATA 2.5 inch solid state drive (SSD).

2 Using the Controller

Your M9036A comes with the Windows Operating System of your choice (Microsoft WES 7 32-bit or 64-bit, or Windows 10 Enterprise LTSB 2016 64-bit) preinstalled 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 M9036A operates as any other Windows PC.

The M9036A controller supports USB CD-ROM drive, USB flash disk, or a USB external hard drive as the first boot device. Please refer to [“Accessing the BIOS setup utility”](#) on page 42 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.

Controller Startup

CAUTION

Possible Operating System Damage: DO NOT interrupt or power-down the controller during the FIRST boot of the operating system. Interrupting this FIRST boot will damage the operating system image. Be sure to wait until the boot is complete and the Windows operating system start window is displayed, and then perform one orderly Restart of Windows (this will ensure all configuration files have been saved). Subsequent boots will then be ready for normal operation.

After installing the M9036A controller in a PXIe chassis, press the chassis' power on button. After a few moments, the controller will beep indicating it passed its POST self tests. The controller then displays a splash screen for a few moments.

Typically, you would allow the controller to run through it's normal startup routine. However, at this screen, you can press the **DEL** key to enter the BIOS setup or press F7 for the boot order menu. Refer to [Chapter 3, "BIOS Setup"](#).

NOTE

Depending on the system configuration, the BIOS may take up to 90 second (or longer) to boot. During this time, the Keysight splash screen is present and it may appear that nothing is happening. This is generally caused by the inclusion of certain devices in the switch fabric (such as RAID controller) that require a longer time for PCI enumeration.

Either press the **Enter** key or simply ignore it and, after about five seconds, the Windows operating system starts normally:

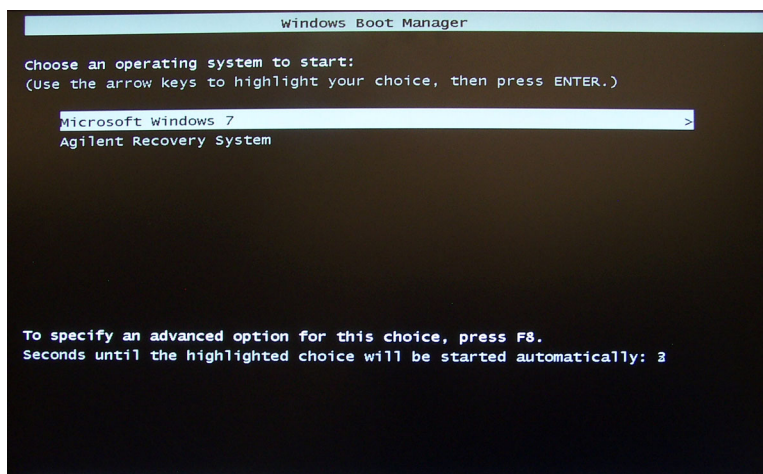


Figure 3 Windows 7 Boot Manager

After a few moments, the Microsoft Windows operating system starts.

NOTE

There is a small system partition for the Keysight Recovery System on the SSD. If you select this option, the Windows Boot Manager opens a menu with five selections:

- 1) Run Check Disk on the system drive
- 2) Recover the original factory system image
- 3) View troubleshooting documentation
- 4) Repair the system drive
- 5) Exit and restart the instrument.

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


NOTE

Entering Safe Mode: You can enter safe mode by pressing F8 while the Windows Boot Manager display (see [Figure 3](#)) is presented (after the Keysight splash screen is presented but before Windows starts to boot).

Changing and Restoring the PCIe Link Configuration

- PCIe link configuration refers to how the PXle chassis (such as the M9018A) PCIe Switch Fabric is configured to connect PCI Express signals between slot 1, the system controller slot, and the other chassis slots. For a review of the supported PCIe link configurations, please refer to the PXle Chassis User Guide available from the Windows Start button, select All Programs > Keysight > PXle Chassis Family. To change the link configurations PCIe Switch Fabric Configurator found in the same location.

Using Keysight Connection Expert

- 1** To run Keysight Connection Expert either click Start > Keysight Connection Expert or double-click the IO control icon () in the lower right Windows Notification area to run Keysight Connection Expert.
- 2** Keysight's Connection Expert shows the GPIB interface as a VISA resource connected to an Keysight 34420A DMM (VISA address is **GPIB0::22::INSTR**). Refer to the IO Libraries Suite documentation for information on using Connection Expert and general VISA programming information or your specific GPIB instrument documentation for specific VISA programming information.
- 3** The Instrument I/O on this PC pane shows instrument connections on your controller. From here you can interact with the instruments in the chassis.

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.

To check the status of, or make changes to, the security settings for your controller, open the Windows Security Center (**Start > Control Panel > System and Security > Windows Update > Change Settings**).

Windows updates

The default system setting is Windows Automatic Updates is turned off. You need to manually update Windows OS by accessing Internet Explorer and from the **Tools** menu, select **Windows Update**.

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 anti virus or anti-spy ware 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 if your system uses intensive network data transfer.

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 Windows operating system supplied with your M9036A is licensed for use on the Solid State Drive (SSD) mounted to the controller. If the SSD is replaced, you may be responsible to purchase or relicense the operating system.

Recovery Partition

There is a small system partition for the Keysight Recovery System on the SSD. This recovery partition allows you to recover the factory operating system image.

During the Windows boot process, you are given the choice to boot to Windows normally or boot from the recovery partition.

If you select to boot from the recovery partition, you are prompted to review the Keysight Technologies Software License Agreement. Click **YES** to review the agreement, click **NO** to proceed. You must then accept the agreement in order to proceed. The Windows Boot Manager opens a menu with five selections:

- 1) Run Check Disk on the system drive**
- 2) Recover the original factory system image**
- 3) View troubleshooting documentation**
- 4) Repair the system drive**
- 5) Exit and restart the instrument.**

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

CAUTION

Selection number 2 restores Keysight's original factory operating system image. Changes that have been made to C:\ including data and applications will be lost.

System Backup and Recovery for Windows 7

You should create a System Repair Disk and regularly create a System Image as a backup in case the SSD fails completely. For additional and/or specific information regarding Windows backups, system image, system restore, etc., refer to the Microsoft Windows Help system.

Windows system repair disk

If the M9036A controller will not boot, you will need to use a Windows System Repair Disc. You must manually create this System Repair Disc.

Create a system repair disc

NOTE

You will need a separate USB CD/DVD ROM drive to create and use the repair disc.

- 1 Open the Windows **Backup and Recovery** by clicking the **Start** button. Type **Backup** in the **Search programs and files** text box and then select the **Backup and Restore** program.
- 2 In the left pane, select **Create a system repair disc**. Follow the instructions provided on the screen. If you are prompted for an administrator password, type the password. Select the drive letter for the CD/DVD drive and click **Create Disc**.
- 3 The entire process may take several minutes.
- 4 When it is finished, click the **Close** button, then click the **OK** button.
- 5 When finished, label this disc as the operating system recover disc and store it in a safe place.

Booting from the repair disk

To boot from the System Repair Disk, perform the following steps:

- 1 Connect a USB CD/DVD ROM drive to the controller.
- 2 Insert the system repair disc into the CD/DVD ROM drive.
- 3 Turn on the chassis power button.
- 4 When the Keysight startup screen appears (immediately after the POST test beeps) press the <**F7**> key repeatedly. This opens the M9036A boot menu.
- 5 Use Up/Down arrow keys to select your external USB CD/DVD drive (it will probably have a name such as **HL-DT-STCVRAM**) and press **Enter**.
- 6 If prompted, press any key to start the computer from the System Repair disc.

System Image

You should regularly create a system image of the SSD on the M9036A. 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 (external USB) 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.

Several tools exist to help create and maintain a system image. The following procedure explains one method to create a system image.

NOTE

If you purchase a replacement SSD drive (or hard disc drive), it must be the same size or larger than the original (160 GB) SSD in your M9036A. 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 System Image of the SSD, perform the following steps:

- 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 an external USB hard drive to the M9036A. 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 M9036A.

NOTE

The external drive must be formatted NTFS.

- 3** To start the system image backup wizard, click on the Windows Start button, then type “**Back Up**” in the **Search programs and files** text box.
- 4** Select the “**Backup your Computer**” link.
- 5** Click on the “**Create a system image**” link.
- 6** This opens the **Create a system image** window. The system automatically searches for available drives to create the system image.
- 7** Select the destination for your system image (a hard disk, one or more DVDs, a network location, etc.).
- 8** Click **Next**.
- 9** In the next screen, make certain that both **SystemDrive (C:) (System)** and **Recovery Partition (D:)** are selected (checked).
- 10** Click **Next**.
- 11** Click the **Start Backup** button.
- 12** When the System Image has been created, you will be prompted to create a System Repair Disk. Click **No** if you created a System Repair Disk earlier. If you

have not created one earlier, you should create one now; click **Yes** and follow all of the prompts if you need to create a System Repair Disk now.

13 Click **Close**.

This completes the creation of a system image. Mark the disk appropriately and store it in a safe place.

For additional information, refer to the Microsoft Windows Backup and Restore help.

Restoring a System Image

Remember, 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.

To restore the image from a system image backup, perform the following steps:

- 1 Connect a USB CD/DVD ROM drive to the M9036A.
- 2 Insert the System Repair disc into the CD/DVD ROM drive. Note, this is not the System Image disk.
- 3 Connect the external hard drive, LAN cable, etc. for wherever you stored the previously created system image.
- 4 Turn on the chassis.

NOTE

You may need to select a boot option:

- 1 When the Keysight startup screen appears (immediately after the POST test beeps) press the **<F7>** key repeatedly. This opens the M9036A boot menu.
 - 2 Use Up/Down arrow keys to select your CD/DVD drive (it will probably have a name such as **HL-DT-STCVRAM**) and press **Enter**.
-
- 3 If prompted, press any key to start the computer from the system repair disc.
 - 4 Select the **Keyboard entry method** (language).
 - 5 Click **Next**.
 - 6 During the boot process, the computer will ask if you want to use the system recovery tools to help fix Windows problems or restore a previously saved system image. Select **Restore your computer using system image that you created earlier**.
 - 7 Click **Next**.
 - 8 In the next screen, select the CD/DVD drive, and the specific image (date and time saved) that you want to restore.

9 Click **Next**.

10 In the next screen, select the **Format and Repartition Disks** option.

11 Click **Next**.

12 Verify the information on the screen and click **Finish**.

13 Click **Yes**.

Note that it may take several minutes up to a few hours to restore the system image.

When the system image restore is complete, remove the USB CD/DVD drive (or the system image hard drive). Allow the M9036A to restart.

14 Optionally, 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 Keysight\Scripts**. Press **Enter**.
- e** Type: **Run HideUnhideRecoveryPartition.vbs hide**
- f** Press **Enter**
- g** The Keysight Recovery Partition is now hidden and should not appear in the Windows File Explorer.
- h** Close the DOS Command window.

The system is now ready for use.

System Backup and Recovery for WES 7

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 M9036A. 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.

Chassis 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 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 M9036A controller then turns off the chassis.

Pressing and holding the chassis power switch will also power-down the M9036A controller safely.

Power down modes

Keysight's M9036A 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:

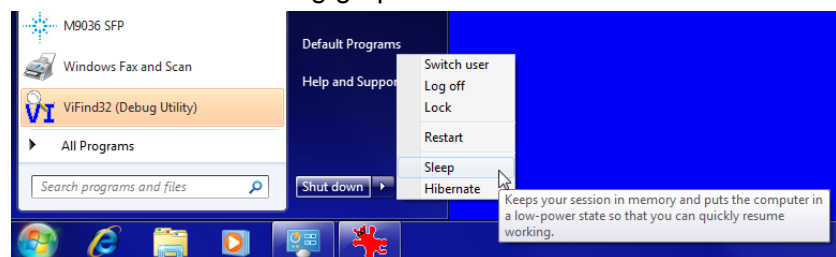
- S0—Power on and fully operational
- S1—Standby (sleep), CPU clock stopped, CPU/RAM powered on.
- S2—Low Power (sleep), CPU powered off, context cache lost.
- S3—Suspend to RAM (sleep), all context lost, system memory retained.
- S4—Suspend to Disk (hibernation), context data written to SSD.
- S5—Power 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 M9036A 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.

Do not use the Sleep or Hibernate modes from the Startup Button as shown in the following graphic.



If you install the M9036A controller in a chassis other than the Keysight M9018A, 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 (asleep, hibernating, or turned off but still has power applied) to be turned on by a network message. Keysight's M9036A supports WoL when the chassis and controller are powered down but AC power is still applied to the chassis.

On the M9036A, WoL is supported only on LAN Port #2 (the top LAN port) on the controller. This port is powered from the auxiliary power supply in the M9018A even if the power is turned off (as long as AC power is still connected to the chassis). Note that Windows Device Manager may indicate that WoL is supported on LAN Port #1, however the hardware does not support it. The chassis INHIBIT switch must be in the DEFault position.

To configure the M9036A for WoL from power down:

- 1** Wake on LAN must be enabled in the BIOS. This is the default setting and should not be changed. Refer to the Chipset Southbridge menu, "**Chipset Setup Menu**" on page 45.
- 2** From the Windows Start button, select **Control Panel > Device Manager > Network Adapters**.
- 3** Double click on the **Intel(R) 82574_Gigabit Network Connection#2**. This opens the Properties dialog box for the Port #2 NIC. See **Figure 4**.
- 4** Select the **Power Management** tab.
- 5** Select both the **Wake on Magic Packet from power off state** and **Wake on Link** check boxes.

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

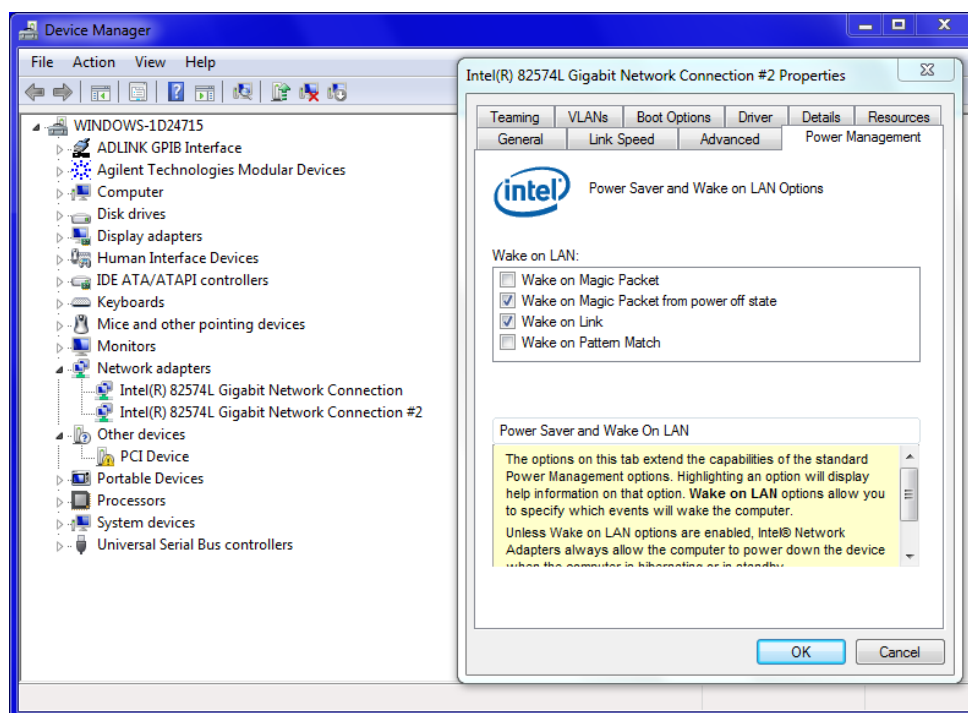


Figure 4 Set the Wake on LAN feature

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

Notes: **Wake on Magic Packet*** This mode is not supported.

Wake on Magic Packet* from power off This mode wakes the M9036A from a power off state (S5) when it receives a Magic Packet*.

Wake on Link If this is the only mode selected, it requires the controller to be in sleep or hibernate mode. This mode is not supported. However, when checked along with **Wake on Magic Packet from power off**, the M9036A will power on when plugging a LAN cable into the Port 2 connector.

Wake on Pattern Match This mode is not supported.

* The Magic Packet is a broadcast (UDP) frame targeted to the controller. It contains 6 bytes of all 255 (FFFFFFFF 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.

Chassis and INHIBIT switch

The Keysight chassis has an INHIBIT switch on the rear panel. It controls whether the M9036A 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 M9036A controller to control chassis power.

For more information, refer to the chassis documentation.

Default Position

If the INHIBIT switch is set to the DEFault position and the chassis is powered up, momentarily pressing the chassis front panel ON button will cause a clean shut down of the M9036A followed by the chassis powering down. The next press of the chassis ON button initiates the standard power up process.

Pressing the ON button for greater than 5 seconds causes a forced 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 M9036A 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 M9036A 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 M9036A are powered up, momentarily pressing the ON button causes an orderly shutdown of the M9036A, but the chassis remains powered and the M9036A System Status LED HS (Blue) remains on. At this point, you have two options:

- Momentarily press the ON button again to turn on the M9036A 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 M9036A are powered up, pressing the 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 if the M9036A is turned on 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.

Display Settings

Do not change any of the settings on Settings tab of the Display settings window.

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 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 web site at <http://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 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.

Updating Drivers and Firmware

All of the current M9036A Controller and Chassis drivers were installed on your controller at the factory. However, you should periodically check the product web pages for updated drivers and chassis firmware. Instructions for updating are on the web.

NOTE

You should always install or update to the latest chassis and controller firmware, drivers and BIOS as a group in order to take advantage of refinements and added features as they become available. If the driver, firmware, or controller BIOS version in your controller or chassis does not match the most recent version available on the product Web site, you should update as soon as possible.

It is possible that application programs developed on a newer versions of firmware or drivers may not work on systems with older versions of firmware or drivers.

NOTE

To update or reinstall the controller BIOS or these drivers, you must login as a user with Administrator privileges. Set the User Account Control to the default position.

M9036A IVI Drivers

For the IVI driver, help file, program examples, etc. go to the following SSD folder:

C:\Program Files\IVI Foundation\IVI\Drivers\AgM9036

For the Soft Front Panel interface: from the Window's Start menu, select:

Start > All Programs > Keysight > M9036 PXIe Embedded Controller > M9036 SFP

GPIB, Trigger, and SMBus Drivers

Refer to the Release Notes (part of the downloaded driver package) to determine if you need to update your GPIB, Trigger, or SMBus drivers. Always update all three drivers as a group; do not update the drivers individually. Do not downgrade to an earlier version of the drivers.

To update or reinstall the M9036A drivers:

- 1 Go to www.Keysight.com/find/M9036A to obtain the latest driver package. Select **Visit Technical Support** then click on the **Drivers, Update, and Examples** tab.
- 2 Run the driver installation setup program. Follow the instructions on the screen.

NOTE

IMPORTANT: Review the driver Release Notes provided on the web. If the GPIB, PXI Trigger, or SMBus drivers were updated in the installation package it will be noted in the Release Notes. If the drivers were not updated, you do not need to reinstall them as described in the following steps.

You can determine the version of the drivers installed on your controller by viewing the Programs and Features (see Step 1 below).

-
- 1 If instructed in the driver release notes, uninstall the old GPIB, PXI Trigger, and SMBus drivers. Click the Windows Start button, then select **Control Panel > Programs and Features**, then uninstall the following driver(s):
 - ADLINK GPIB driver vx.xx**
 - ADLINK PXI Trigger I/O Driver Ver. X.x.x**
 - AgSMDuKerServ Ver. x.x.x** (the SMBus driver)
 - 2 After uninstalling the driver(s), navigate to **C:/Program Files(x86)/Agilent/M9036/bin**
 - 3 Run (execute) the appropriate installer program(s) to install the latest GPIB, PXI Trigger, and SMBus drivers: (respectively).
 - AdlinkGpib_setup.exe**
 - AdlinkTrig_setup.exe**
 - AgSMBuKerSrv_setup.exe** (the SMBus driver)

Controlling Multiple PXIe Chassis with the M9036A

Keysight's M9036A controller can manage the instruments in multiple PXIe or AXIe chassis.

Configuration Guidelines

- Keysight IO Libraries version 16.3 update1 (or later) is required.
- You must turn on the subordinate chassis and wait for the chassis status light to turn solid green before turning on the Master chassis with the M9036A controller.
- If controlling no more than two chassis (a master chassis and one subordinate chassis), the M9036A should have BIOS version AG20 (or later).
- If controlling more than two chassis, the M9036A must have BIOS version AG20-M. See “[BIOS Main Setup Menu](#)” on page 43 to determine the current BIOS version.

Multiple chassis configurations

- For detailed multi-chassis support and information, refer to Keysight's Multiple PXIe and AXIe Chassis Configuration tool. This tool is available online at: www.Keysight.com/find/pxie-multichassis.

To support three or four chassis, the following restrictions apply:

- The M9036A must have BIOS AG20-M (or later).
- Only WES 7 64-Bit and Windows 10 64-bit operating systems are supported. 8 GB of memory should be installed in the M9036A.

3 BIOS Setup

Starting the BIOS Setup Screen

The Basic Input/Output System (BIOS) is a program that provides a basic level of communication between the processor and peripherals. In addition, the BIOS also contains code for various advanced features applied to the M9036A controller. The BIOS setup program includes menus for configuring settings and enabling M9036A controller features.

NOTE

Depending on your application, you may never need to update the BIOS on your M9036A. However, you should always upgrade to the latest Keysight BIOS.

- If you are using the M9036 to control three or four chassis, you must have Keysight BIOS AG20-M (or later) installed.
- Refer to “[Updating the M9036A BIOS](#)” on page 51 for detailed information. Any BIOS update for the M9036A will be available on the Keysight web site: www.keysight.com/find/M9036A.

The BIOS is custom designed specifically for the M9036A. 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 in “[Clear CMOS \(JP1\)](#)” on page 55 to clear CMOS and then restore the default settings. Do not change a BIOS setting unless you are absolutely certain of what it does.

Accessing the BIOS setup utility

To start the BIOS setup program:

- 1** Power on or reboot your M9036A 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, [Figure 5](#), 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.

NOTE

You should always use the latest BIOS available from Keysight. The screens on later BIOS versions may be slightly different than shown in this manual; some fields may no longer be used or other fields may be added.

BIOS Main Setup Menu

The Main setup menu reports some basic information of controller:

Current BIOS
Version

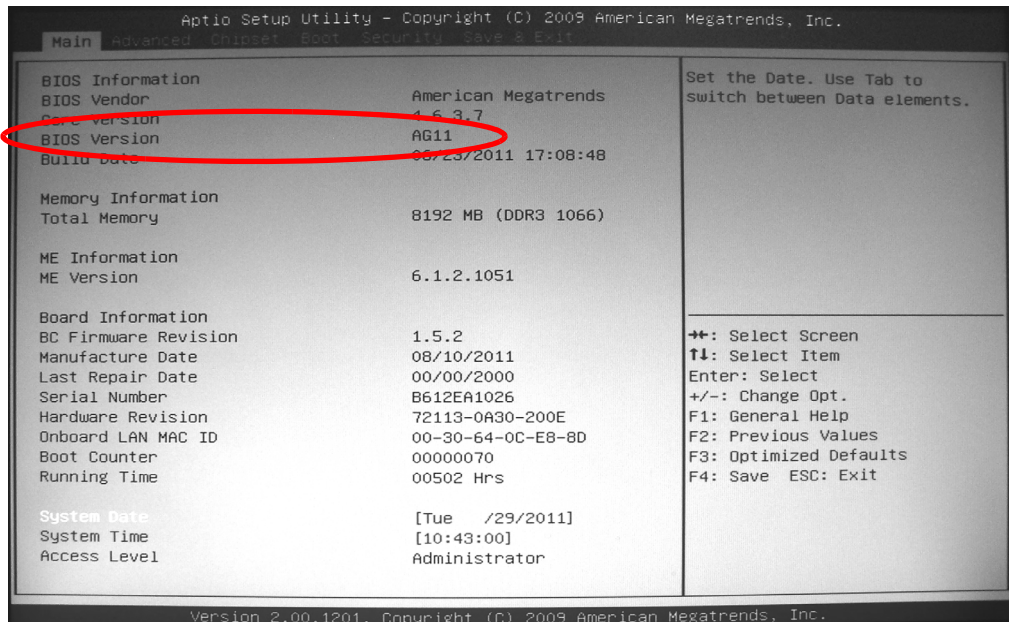


Figure 5 Main BIOS Setup Menu

- BIOS Information - This item includes the BIOS version and the date when the BIOS was built.
- Memory Information - This item shows the M9036A'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.

Advanced Setup Menu

Select the Advanced Setup Menu to obtain information such as processor configuration, SATA configuration, PCI subsystem settings, etc. You should not need to alter the configuration. Many items have submenus.

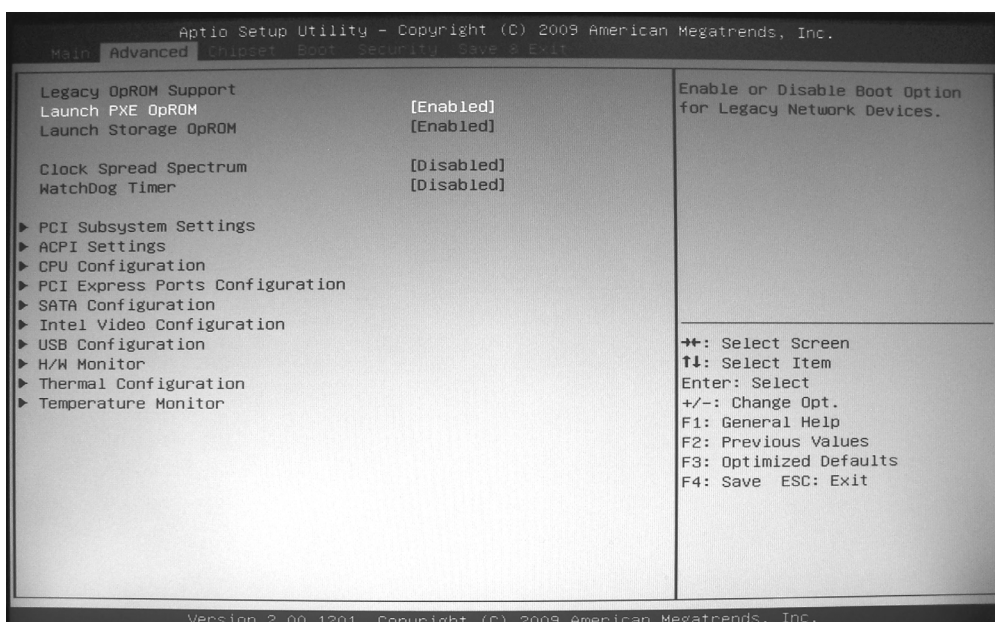


Figure 6 Advanced BIOS Setup Menu

- Launch PXE OpROM - enables or disable the Legacy Network Device
- Launch Storage OpROM - Enables/disables the option for Legacy Mass Storage Devices with option ROM.
- Clock Spread Spectrum - Enables/disables the clock spread spectrum. Enabled may reduce EMI generated by the system.
- Watchdog Timer - Enables/disables the Watchdog Timer.
- PCI Subsystem Settings - View and configure the PCI Subsystem settings.
- ACPI Settings - View and configure the system ACPI auto configuration.
- CPU Configuration - View processor type, speed, system bus speed, etc.
- PCI Express Ports Configuration - Enables/disables PCIe ports on chipset.
- SATA Configuration - View and configure the SATA configuration settings.
- Intel Video Configuration - Provides graphics control.
- USB Configuration - Provides USB support and lists the devices attached to the USB port (keyboard, mouse, and one hub).
- H/W Monitor - Displays the voltages on the backplane connector (+3.3V, +5.0V, +12V, 5VSB, and Vbat).

- Thermal Configuration - Provides Platform Thermal Configuration and Intelligent Power Sharing control.
- Temperature Monitor - View the current operating temperature inside the controller (system temperature and CPU temperature).

Chipset Setup Menu

The setup menu includes some functions related with the North and South Bridge:

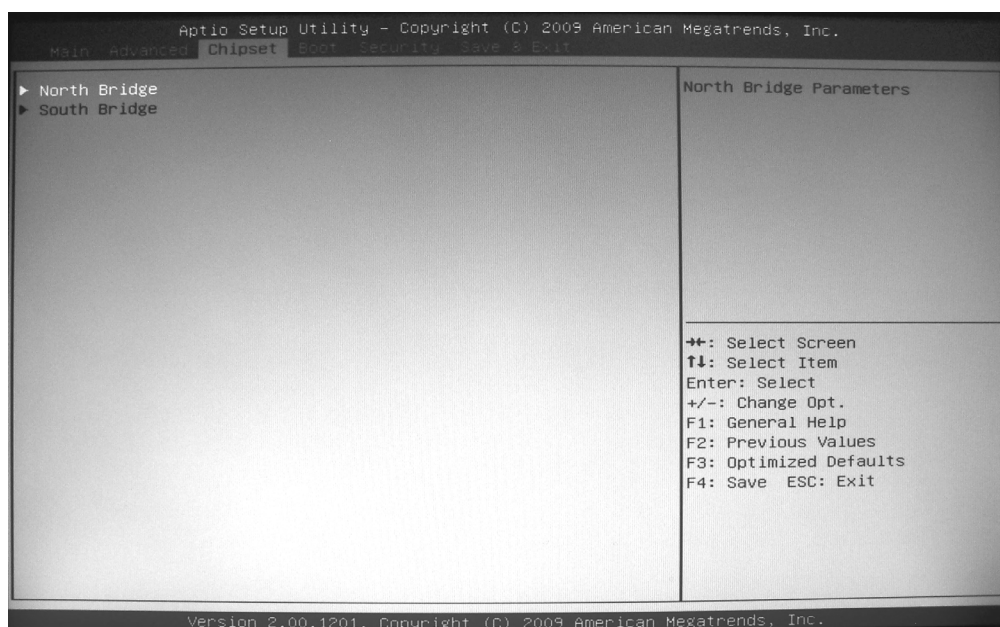


Figure 7 Chipset Setup Menu

- The North Bridge Configuration provides memory and PCIe compliance information. See [Figure 8](#) on the next page.
- The South Bridge Configuration provides SMBus, GbE Controller, Wake on LAN, Audio, USB Configuration, and PCIe Ports Configuration information. See [Figure 9](#) on the next page.
 - SMBus Controller - User can enable/disable the SMBus controller.
 - PXIe Backplane Wake# - This setting enables or disables a PXIe peripheral module's ability to wake a powered-off system. The default value is Disabled.
 - Restore AC Power Loss setting

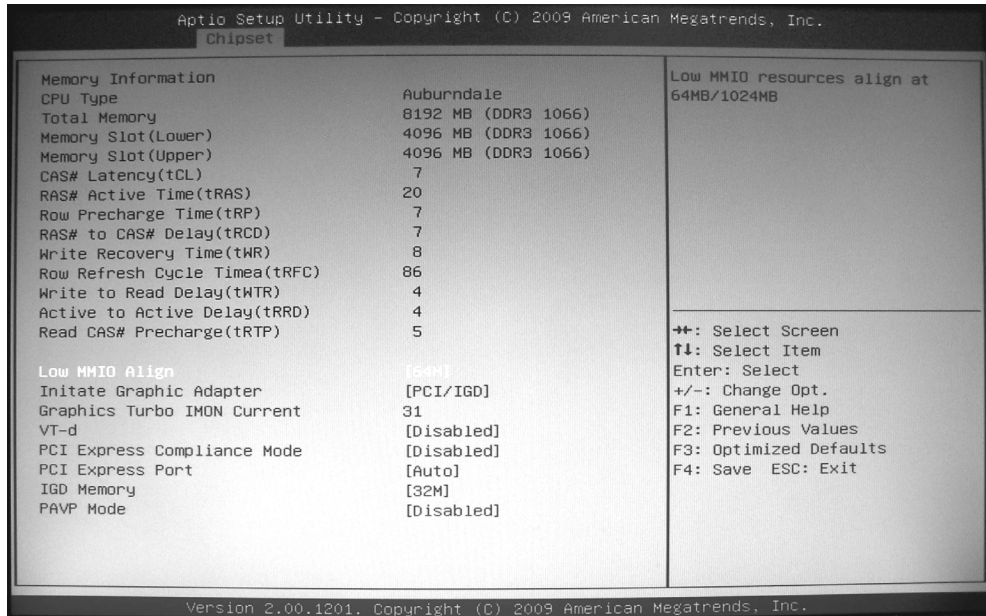


Figure 8 BIOS Chipset North Bridge Menu

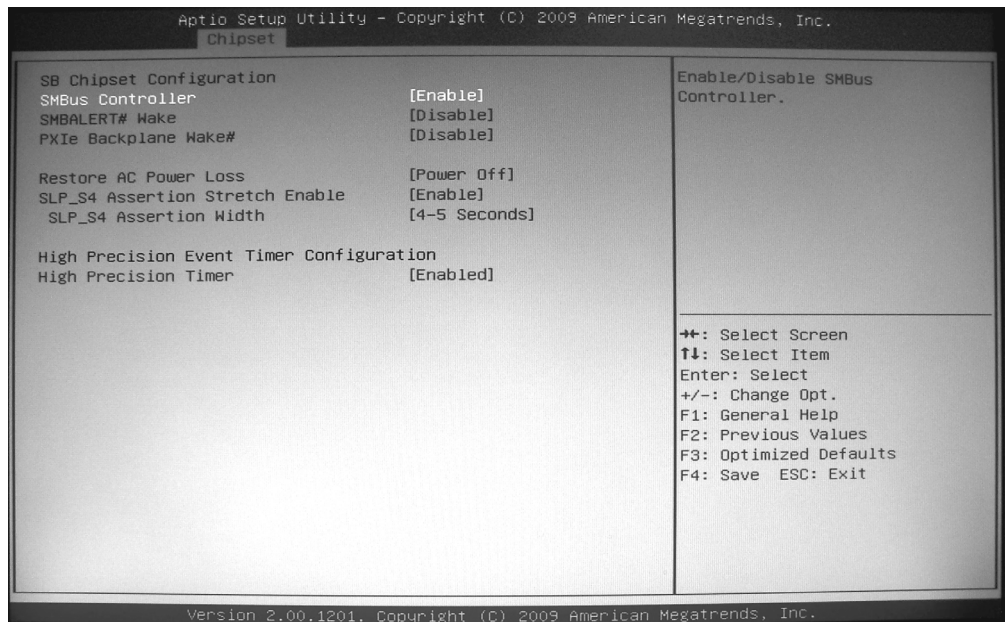


Figure 9 BIOS Chipset South Bridge Menu

NOTE

Some 3rd-party PXI modules and chassis may not enumerate properly because they need additional time to come out of PCI Reset. The M9036 BIOS has a Holdoff Timer feature that can provide this additional time if needed.

To set the holdoff timer, enter the BIOS Setup utility, enter the Chipset menu and select “North Bridge”, and then change the “Holdoff timer” value to 1 sec (0 sec is default).

Boot Setup Menu

Boot setup allows you to configure your system boot settings. For example, you can select SATA or USB device as the boot device in BIOS from this menu. In [Figure 10](#) below, Option 1 refers to the SSD and Option 2 refers to the LAN connection.

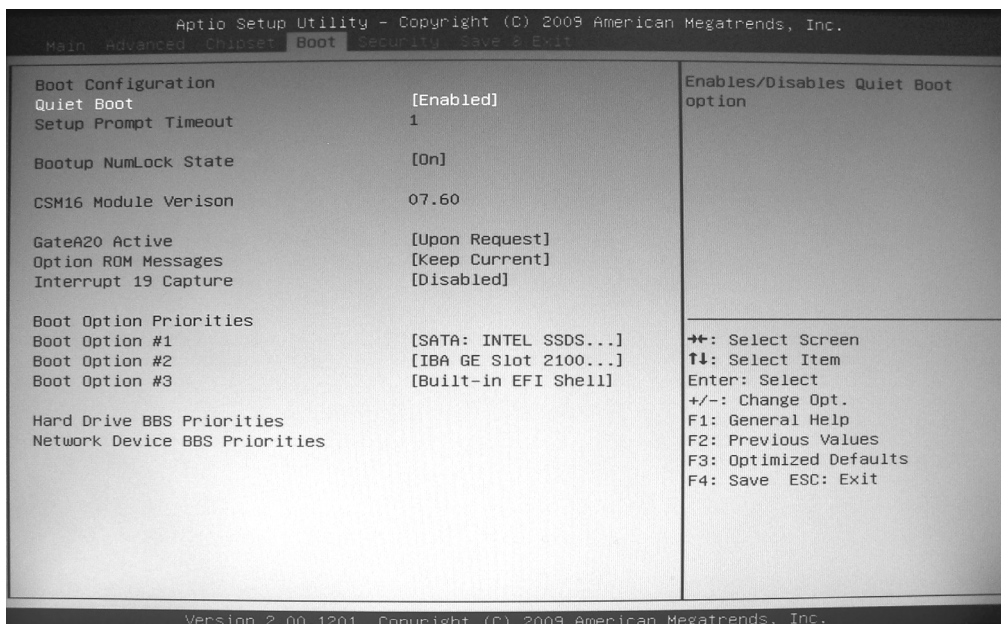


Figure 10 Boot Setup Menu

- Quiet Boot - Disable to view POST messages.
- Boot Option #1,#2,#3 - This option allows you to select the priority of boot options.

Using this BIOS setup screen, you can select network booting and booting into the built-in EFI shell (Options 2 and 3). These options are not described in this manual and Keysight Technical Support does not support using these options. Refer to the Microsoft TechNet library for information on installing Windows to an EFI-based computer.

NOTE

If the SSD is removed from the M9036A, do not insert the controller into a chassis and power it up. Always install the SSD before applying power to the M9036A. If you do not, then the SATA selection is eliminated from the boot option list. If the SSD is then reinstalled, then at boot the SATA selection will not be the first option to boot from. The boot order should be changed so that SATA is the first option.

Security Setup Menu

This option allows you to specify both Administrator and User Passwords. If you use both passwords, the Administrator password must be set first. The system can be configured so that all users must enter a password (either Administrator or User) every time the system boots or when Setup is executed. Administrators and User passwords activate different levels of security.

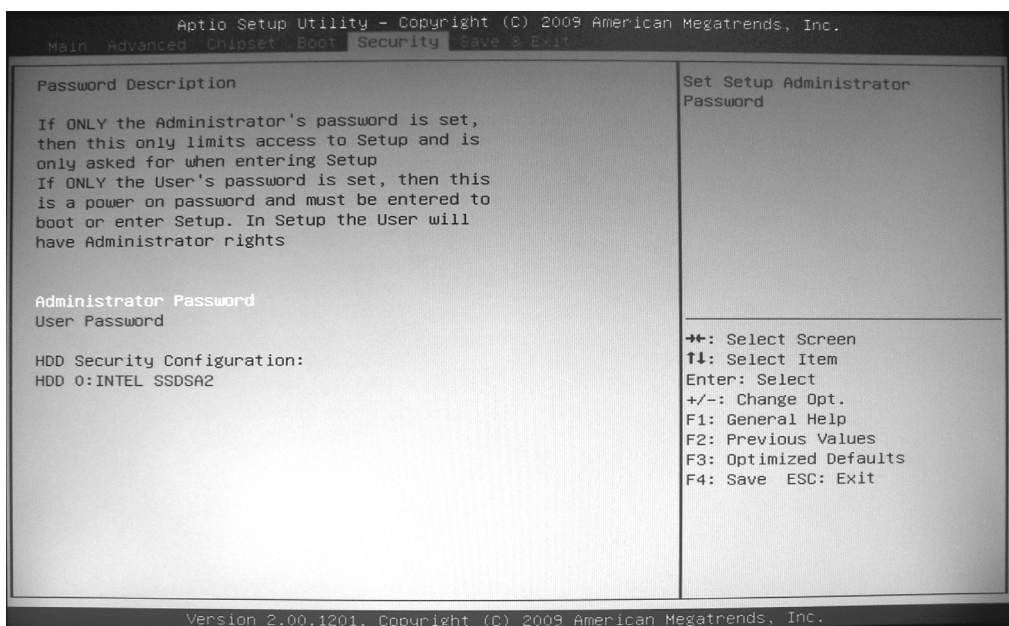


Figure 11 Security Setup Menu

- If you use the passwords, you will be prompted for a three to twenty character password. As you type the password, it is not displayed on the screen.

NOTE

Make certain that you record the passwords. Passwords are not recoverable. If you lose the passwords, you must erase the NVRAM and reconfigure.

- User Passwords sets a user level password for the BIOS.
- Administrators Passwords sets an administrative level password for the BIOS.

Save and Exit Setup Menu

This option allows you to:

- Save your changes to the BIOS configuration and then exit to Windows 7
- Discard changes and exit to Windows 7
- Save changes and Reset (reboot) the system
- Discard changes and Reset (reboot) the system
- Save Options saves any changes made so far to the setup options.
- Save changes and continue BIOS configuration
- Discard changes and continue BIOS configuration
- Restore the default vales for all setup options (see Note below)
- Save the current configuration as your user default
- Restore to your last saved user default
- Boot override allows you to bypass the configuration and boot immediately from the selected device.

NOTE

The “Restore the default values for all setup options” selection does not restore the original boot priority sequence. You must use the Boot Setup Menu (see “[Boot Setup Menu](#)” on page 47) to manually restore the boot priority sequence.

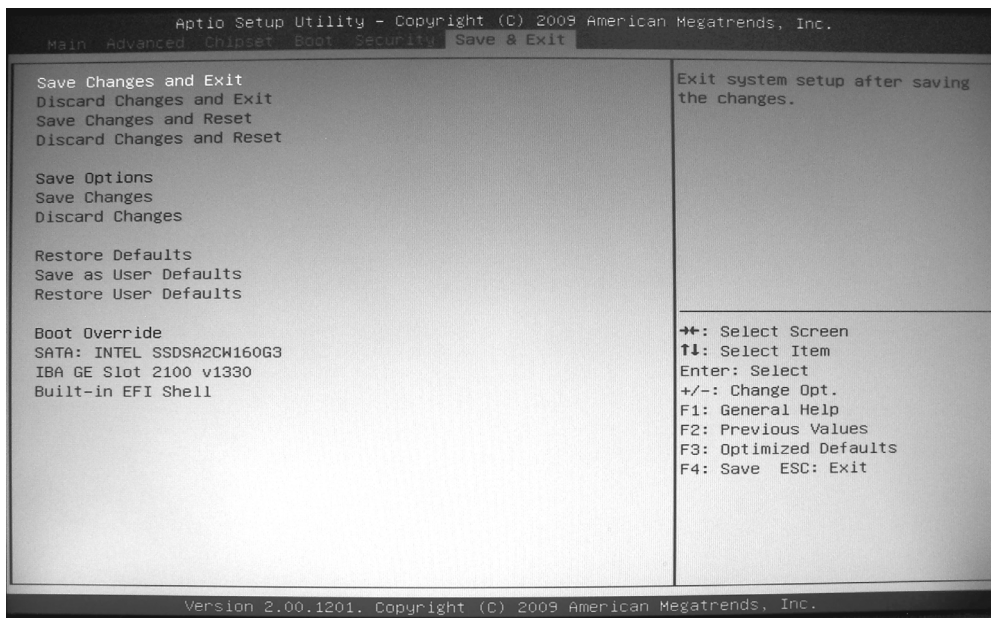


Figure 12 Save and Exit Setup Menu

Updating the M9036A BIOS

Depending on your application, you may never need to update the BIOS on your M9036A. However, you should always upgrade to the latest Keysight BIOS. Keysight's AGxx or AGxx-M BIOS are custom designed specifically for the M9036A. Do not attempt to replace it with a generic BIOS.

The AGxx BIOS versions are appropriate for the M9036A in single or dual chassis configurations. However, if you are using the M9036A to manage and control three or four AXIe or PXIe chassis, you must have Keysight BIOS version AGxx-M installed.

NOTE

Because the AGxx-M BIOS consumes extra resources, it can only be installed on 64-bit operating systems. Furthermore, this BIOS should only be installed when you need to support three or more chassis. On 32-bit operating systems or to support one or two chassis on 64-bit operating systems, the AGxx BIOS should be used.

Any BIOS update for the M9036A will be available on the Keysight web site: www.Keysight.com/find/M9036A. Click on **Technical Support**, then the **Drivers, Firmware, and Software** tab. Scroll down and click on the **M9036A 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 M9036A PXIe Embedded Controller.

NOTE

To update or reinstall the controller BIOS or these drivers, you must login as a user with Administrator privileges. Set the User Account Control to the default position.

NOTE

When updating the BIOS from Keysight AG19 to version AG20 or AG20-M (or later), you must install Microsoft Windows Fix it 50470 before updating to AG20 or AG20-M. Refer to the BIOS updating utility instruction sheet for detailed information.

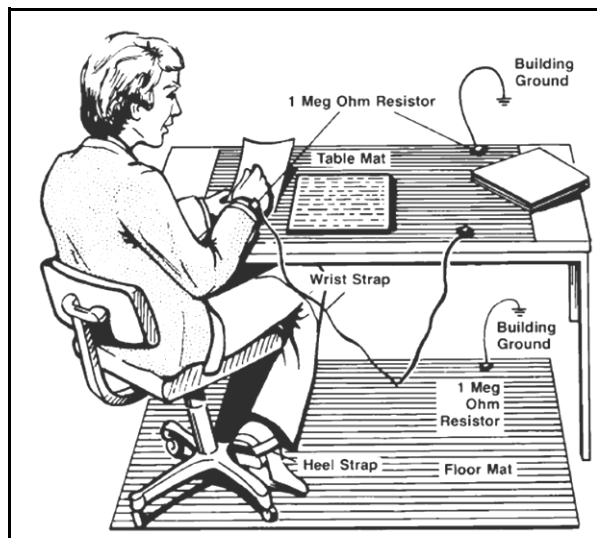
4 Service

Keysight's M9036A PXIe Embedded Controller has some user serviceable parts. In general, you should not need to change switch settings. Always observe Electrostatic Discharge precautions.

Electrostatic Discharge

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 methods, 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 M Ω of isolation from ground.

Viewing Revision Codes

Use the M9036A Soft Front Panel (SFP) to identify the controller's serial number, driver and hardware revision codes. For example, if the Hardware Revision Code is:

3.3.2-1.0-C0050_E2050_10010

- 3.3.2 refers to the trigger fundamental driver version
- 1.00 refers to the Trigger CPLD image revision
- C0050 refers to the baseboard hardware version

Controller Switch Settings

There are no user-accessible switches on the M9036A controller.

Clear CMOS (JP1)

If you encounter an abnormal condition that causes M9036A to halt or fail to boot, clear the CMOS and restore the controller BIOS to its default settings. To clear the CMOS:

- 1 Shut down the controller operating system (see “Chassis shutdown” on page 30). Do not unplug the chassis.
- 2 Remove the M9036A Embedded Controller from the chassis. Observe all anti-static precautions.
- 3 Locate the JP1 jumper on the board. Move the jumper from Normal to Clear (short pin#2 and pin#3). Refer to Figure 13 below.
- 4 Install the controller back into the PXIe chassis.
- 5 Power on the chassis and watch the green PWR and amber SD LEDs. After both LEDs light, immediately depress the Reset button on the controller front panel (after the LEDs turn on but before the controller beeps, before the monitor displays anything). The green PW LED should flash once.
- 6 After the operating system starts, shut down the controller by pressing the chassis front panel button.
- 7 Once again, remove the M9036A Embedded Controller from the chassis.
- 8 Restore jumper JP1 to the Normal position (short pin#1 and pin#2).
- 9 Reinstall the controller in the PXIe chassis and power it up.

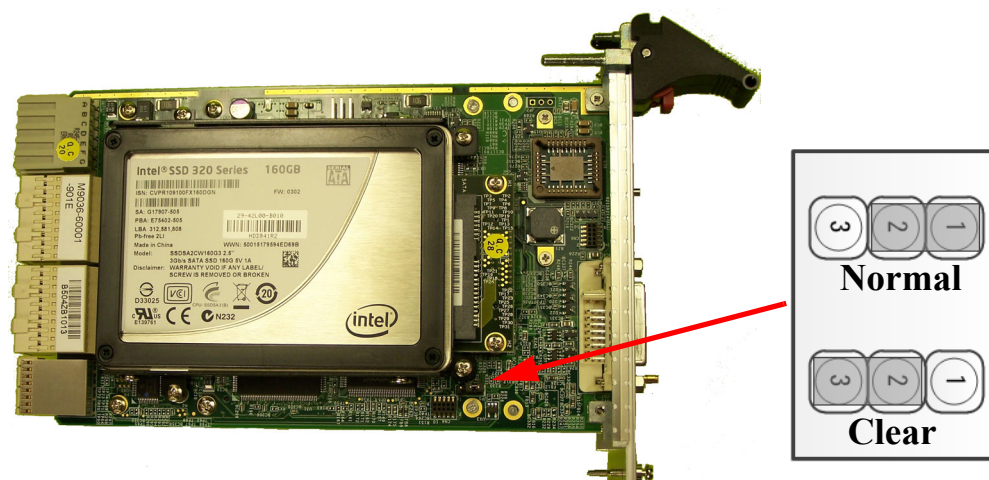


Figure 13 Clear CMOS Jumper JP1

- 10** Clearing the CMOS in this way resets the BIOS to its default settings including resetting the real time clock (RTC). To set the RTC to the current time and date:
- a** Power on or reboot your M9036A controller.
 - b** 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. Refer to “Starting the BIOS Setup Screen” on page 41.
 - c** The Main setup menu reports some basic information of controller. Refer to “BIOS Main Setup Menu” on page 43 for more information.
 - d** Use the down arrow key (↓) to select the System Date and System Time.
 - e** Set these to the correct current date and time.
 - f** Press the <F4> key to save the settings and then the <ESC> key to exit the BIOS setup.

CMOS Battery Backup

The M9036A 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 “[Electrostatic Discharge](#)” on page 53.

- 1 Turn off the PXIe Chassis.
- 2 Remove the M9036A Embedded Controller from the chassis. Observe all anti-static precautions.
- 3 Remove the hard drive from the M9036A as shown in Figure 14

Remove the four screws on the side of the SSD

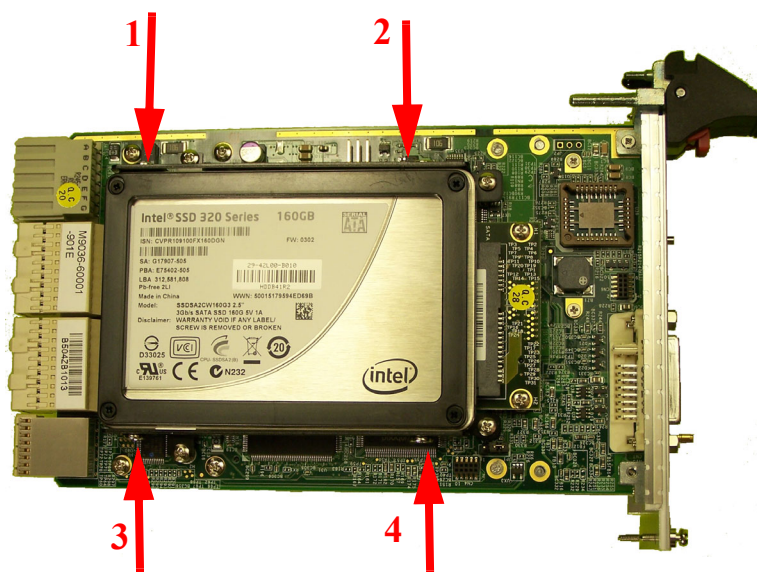


Figure 14 Remove the four side screws as indicated.

- 4 Gently push the drive toward the back of the module (toward the module’s connectors) to disengage the drive from the connector. Carefully lift out the hard drive.
- 5 Remove the battery (see Figure 15 below). Press the battery release latch (1). The battery should pop out (2).

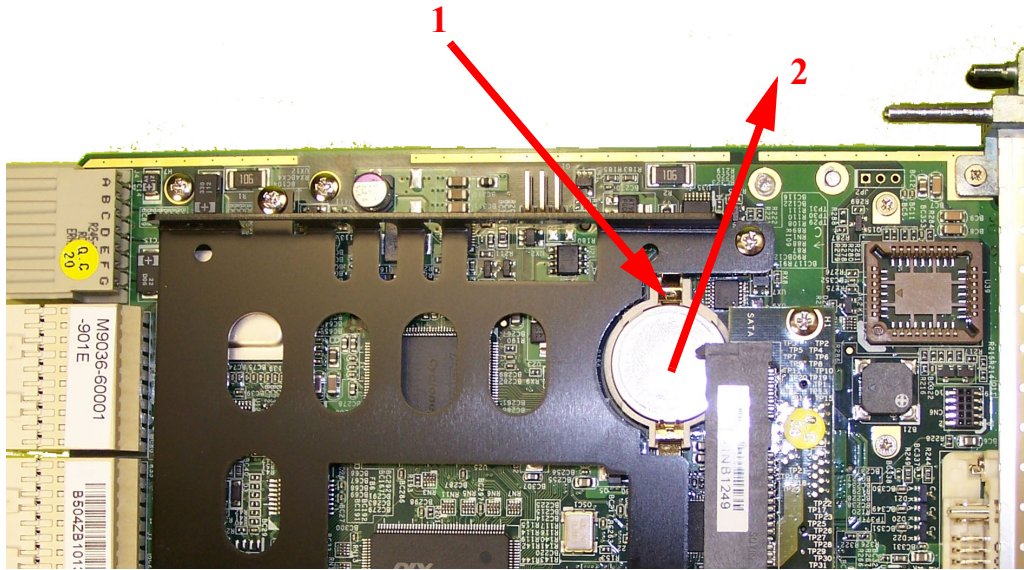


Figure 15 Replacing the Battery

- 6 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).

- 7 Replace the hard drive in its carrier.
- 8 Install the embedded controller back in the PXIe chassis and apply power.

NOTE

The battery's operational temperature range is less than that of the M9036A'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 Hard Drive

The Keysight M9036A Embedded controller comes with a 160 GB, 2.5" Serial ATA (SATA) II Solid State Drive (SSD).

Determining the Replacement Part Number for the SSD

This product may contain a custom image. First, look on the SSD for an identification label that states "Solid State Drive Replacement Order #####-#####" to obtain the replacement part number for the SSD. If there is no identification label on the SSD, then look for the Option Label located near the serial number on the inside of the front panel to determine the appropriate option. Refer to the table below to determine which part number to order based on the product's option for the replacement SSD.

Table 1

Option Label	Operating System/RAM	Order Keysight Part Number	Description
WXP	Windows XP	M9036-5563 2	Replacement SSD with pre-imaged WinXP 32-bit OS
W73	Windows 7 Pro (32-bit)	M9536-5573 2	Replacement SSD with pre-imaged Win7 32-bit OS
W76	Windows 7 Pro (64-bit)	M9536-5576 4	Replacement SSD with pre-imaged Win7 64-bit OS
WE3	WES 7 (32-bit)	M9536-5553 2	Replacement SSD with pre-imaged WES 7 32-bit OS
WE6	WES 7 (64-bit)	M9536-5556 4	Replacement SSD with pre-imaged WES 7 64-bit OS

Replacement Procedure

To replace the hard drive, perform the following steps:

CAUTION

BACK UP YOUR HARD DRIVE BEFORE PROCEEDING! There are several ways to transfer files from your old drive to the new one. One possible way of doing this is with disk-imaging software. A disk image is an exact duplicate of your existing hard drive including the operating systems, user settings, all data files and application software. The imaging software should also create an “emergency” bootable CD or USB drive.

CAUTION

Always observe ESD precautions. See [“Electrostatic Discharge”](#) on page 53.

The replacement hard drive must conform to the same dimensions and mounting as the original.

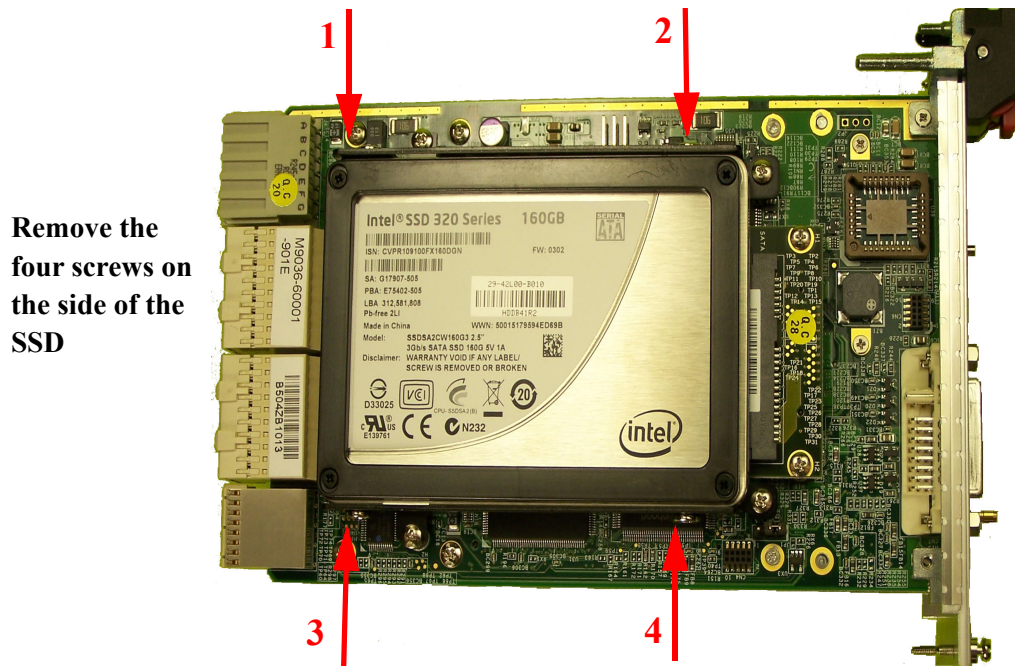
- 1 Power off the PXIe chassis.
- 2 Remove the M9036A controller from the PXIe chassis.
- 3 Position the controller, top side up on the workbench. Locate and remove the four SSD mounting screws as indicated in Figure 16.

NOTE

If you purchase a replacement hard or SSD drive, it must be the same size or larger than the original (160 GB) SSD in your M9036A. You cannot create a system image of one size of hard drive and then try to restore it to a smaller hard drive.

NOTE

Always use the latest BIOS and drivers available from Keysight. When replacing the SSD in you M9036A, you should update the BIOS and drivers. Refer to [“Updating the M9036A BIOS”](#) on page 51 for information on updating the BIOS. Refer to [“Updating Drivers and Firmware”](#) on page 37 for information on updating drivers.



Remove the four screws on the side of the SSD

Figure 16 Remove the four screws to replace the SSD

- 4 Gently push the drive toward the back of the module (toward the controller's backplane connectors) to disengage the drive from the connector. Carefully lift out the hard drive.
- 5 Remove the frame from the SSD and place it on the new drive (if necessary for spacing).



SSD Frame

Figure 17 SSD Frame, remove four screws

- 6 To replace the hard drive, reverse the preceding steps. Place the new hard drive in the carrier and carefully slide the hard drive into the empty socket.

CAUTION

If you feel resistance as you install the new hard drive, do not force it. You may have the drive upside down. Damaging the signal pins may render the drive useless.

- 7 When you power up the chassis, the controller BIOS should automatically detect the new hard drive. If you created the disk image on the new hard drive, the controller should boot normally and be ready to operate. If you created the image on an external drive, you will need to boot from the emergency CD or USB stick and then use the disk imaging software to transfer the operating system, user settings, application software, data files, etc. to the new hard drive.

NOTE

If the SSD is removed from the M9036A, do not insert the controller into a chassis and power it up. Always install the SSD before applying power to the M9036A. If you do not, then the SATA selection is eliminated from the boot option list. If the SSD is then reinstalled, then at boot the SATA selection will no be the first option to boot from. The boot order should be changed so that SATA is the first option.

Memory Modules

Keysight's M9036A has two memory connectors; one on top of the other. The module comes standard with either one 4GB memory module (installed in the bottom position) or two 2GB memory modules. Optionally, two 4GB memory modules can be installed bringing the total memory to 8GB. No more than 8GB memory may be used with the module. The controller uses DDR3 1333 SODIMM memory modules.

CAUTION

Always observe ESD precautions. See [“Electrostatic Discharge”](#) on page 53.

To remove memory modules from the controller:

- 1 Power off the PXIe chassis.
- 2 Remove the M9036A controller from the PXIe chassis.
- 3 Position the controller, top side up on the workbench as shown in Figure 18.

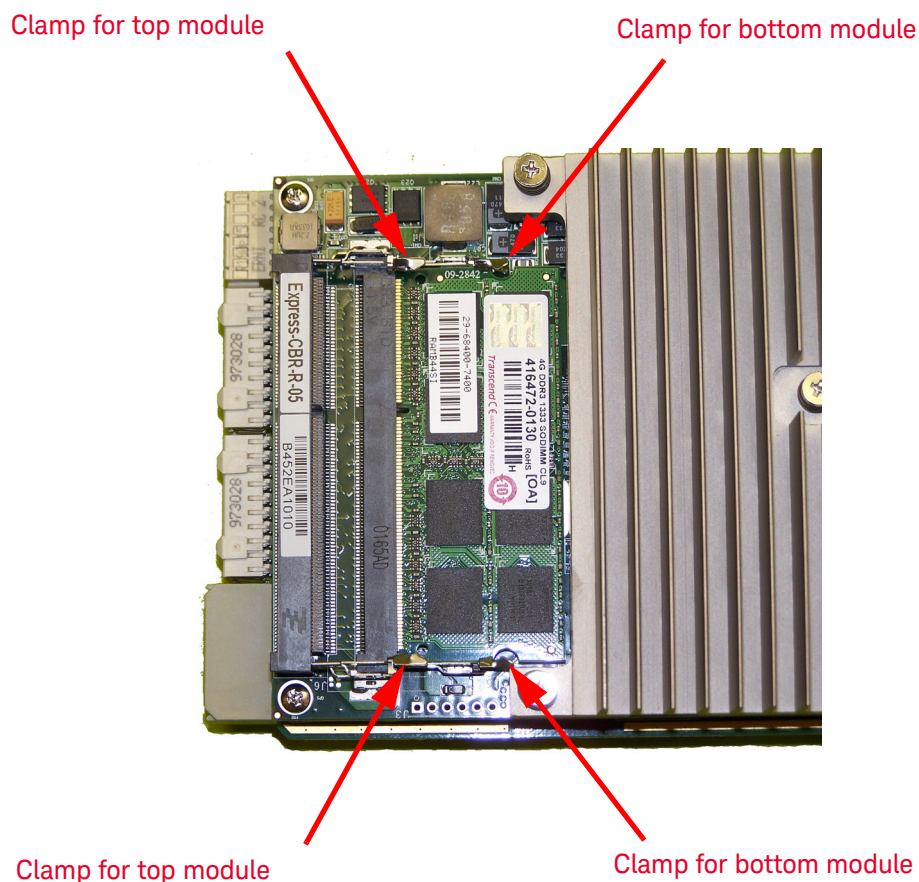


Figure 18 M9036A Memory Modules (only the bottom module shown)

- 4 Spread the two memory clamps for the module you want to replace.
- 5 The memory module should pop up. Carefully slide the memory module out of the edge connector.

To install memory modules, reverse the previous steps. Carefully place the memory module in the socket. Press the module into the clamps until they lock the module in place.

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

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

Memory Declassification

Some test equipment users have a need to “declassify” or “sanitize” their instruments for security purposes. This involves following a procedure that clears 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. Follow the procedure below to ensure that your controller no longer contains any user configurations or data.

Procedure for declassifying a faulty controller

Even if the M9036A is not able to power on, it may be declassified by removing the SSD (disk drive) from the controller. Follow the procedure “[Replacing the Hard Drive](#)” on page 60.

For additional information, go to: <http://www.Keysight.com/find/security> and enter the model number of you controller (M9036A).

Controller memory

The following table lists the types of memory used in the M9036A controller. It explains the memory size, how it is used, its location, volatility, and the sanitization procedure.

Memory type and size	Writable during normal operation?	Data retained when powered off?	Purpose/ contents	Data input method	Location in controller	Sanitization procedure
Main memory (RAM) 4GB or 8GB Std.	Yes	No	Windows Operating System memory	Operating system, user	Mother board	Cycle power. This is volatile memory.
Media Storage 160GB SSD drive	Yes	Yes	Windows Operating System boot device and user files including saved programs, data, settings, images, etc.	Operating System factory installed. Other data is user-saved.	Motherboard	Remove. See instructions below.
Flash memory for BIOS (Non-volatile memory)	No	Yes	Contains default BIOS settings for use when booting the controller. Contains no user data.	Programmed at factory (or during BIOS upgrade). Settings may be toggled by user.	Motherboard	None.

Memory type and size	Writable during normal operation?	Data retained when powered off?	Purpose/ contents	Data input method	Location in controller	Sanitization procedure
DDR2-533 memory	No	No	Video RAM	Controller Video graphics only.	Motherboard	Cycle power. This is volatile memory.

SSD Data Destruction Several commercially available software programs exist to completely destroy all data on a data storage device such as the SSD. DoD 5220.22-M is a software based data sanitization method for total data destruction. The DoD 5220.22-M sanitization method was originally defined by the U.S. National Industrial Security Program (NISP) in the National Industrial Security Program Operating Manual (NISPOM). The process involves overwriting existing information on the SSD (or other data storage device). Typically, this means writing a 0 (zero) to every addressable location on the device, verifying the write, writing a 1 (one) to every addressable location and verifying the write, and then writing a random character (in some cases writing a 97) to every addressable location and verifying the write. Using a DoD 5220.22-M sanitization (or a variant) prevents all software and hardware based data recovery methods from obtaining information from the SSD.

SSD Removal Because it is virtually impossible to completely and selectively erase all user data on a hard drive without also destroying the operating system, the best method for maintaining security when the controller must be removed from a secure area is to remove or replace the hard drive.

- 1 Turn the PXIe chassis off.
- 2 Remove the controller from the PXIe chassis.
- 3 Remove the SSD drive. For instructions on removing the SSD drive, refer to [“Replacing the Hard Drive”](#) on page 60.

Chassis Power Inhibit Functionality

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

- For the Keysight M9018A PXIe chassis, this may happen when the rear panel Inhibit 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 or change the rear panel Inhibit switch to the DEFault position and then power on or reboot the chassis.
- For other chassis, refer to the manufacturer's chassis documentation.

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