Agilent M9536A AXIe Embedded Controller

User Guide

Agilent Technologies

Notices

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Earth Ground.

Chassis Ground.

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Direct Current (DC).

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N10149

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Documentation Map

Startup Guide

Product CD

Product web site

Access to all **DOCUMENTATION** noted below

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.
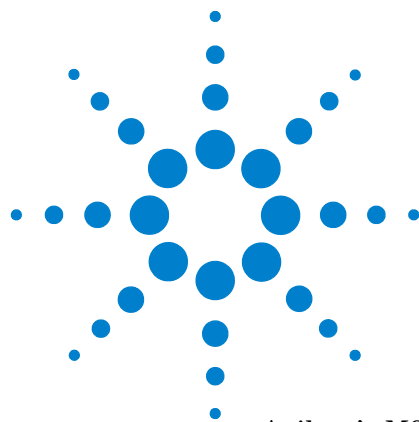
1

Introduction

Agilent's M9536A is a one-slot AXIe compatible embedded PC controller providing a high-performance Gen2 PCI Express link (5.0 GT/s PCI Express) to the AXIe backplane. The M9536A provides a powerful one-slot computer that can be used to build compact AXIe systems while integrating easily with LXI instruments due to the built-in Gigabit LAN interface. Features include

- Gen2 PCI Express link (5.0 GT/s PCI Express) to the AXIe backplane.

- One Intel Xeon EP Quad Core L5518 Processor running at 2.13GHz.

- 8GB RAM standard, 16GB RAM optional (up to 24 GB RAM Maximum)[*].

- 160 GB SATA 2.5 inch, solid state hard drive (SSD).

- Front panel with three USB 2.0 ports (type A), two 10/100/1000 BASE-T LAN ports, one serial COM port, and UXGA video port (up to 1600x1200 resolution).

- Preloaded with the Agilent I/O Libraries Suite and your choice of the Microsoft Windows 7 32-bit, 64-bit, or Windows Embedded Standard 7 (WES 7) 32-bit or 64-bit Operating System.

Agilent's M9536A is AXIe 1.0 compliant. It does not provide the chassis management functions of an AXIe system module but it does provide application processing power for the chassis. Hence, the controller must be installed in slot #1 of the Agilent M9502A or M9505A AXIe chassis. Agilent's Embedded System Module is required.

Related documentation

Because the Operating System and drivers were installed at the factory and no additional drivers are required, no printed documentation other than this Startup Guide is supplied with the Controller Module.

Adobe Reader is required to view the documentation supplied on the M9536 product information CD. It is available free at: http://www.adobe.com. You should install this on your M9536A prior to attempting to open a .PDF file.

For the latest M9536A specifications, go to: www.agilent.com/find/M9536A.

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* The M9536A has three 240-pin, RDIMM sockets which support DDR3-1333 REG/ECC RAM sticks. Each socket can support memory modules up to 8GB for a total memory capacity of 24GB. The standard M9536A configuration is a single 8GB memory stick with a factory option to add a second 8GB memory stick. This leaves an empty socket for future expansion. Note: The capability of addressing more than 4GB memory is operating system dependent. A 32-bit OS system may not be able to address the full memory space. To use the full 8GB/16GB/24GB memory, a 64-bit OS must be used.

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M9536A at a Glance

The following figure shows the front panel for the M9536A. Detailed information about the module follows in this manual.

Base Fabric Channel LEDs   **Serial COM (RJ45)**   **UXGA (DB15)**   **USB 2.0 (Type A)**

Out of Service   **SSD LED**   **Reset Button (forces a reboot)**   **LAN (GbE) (RJ45)**
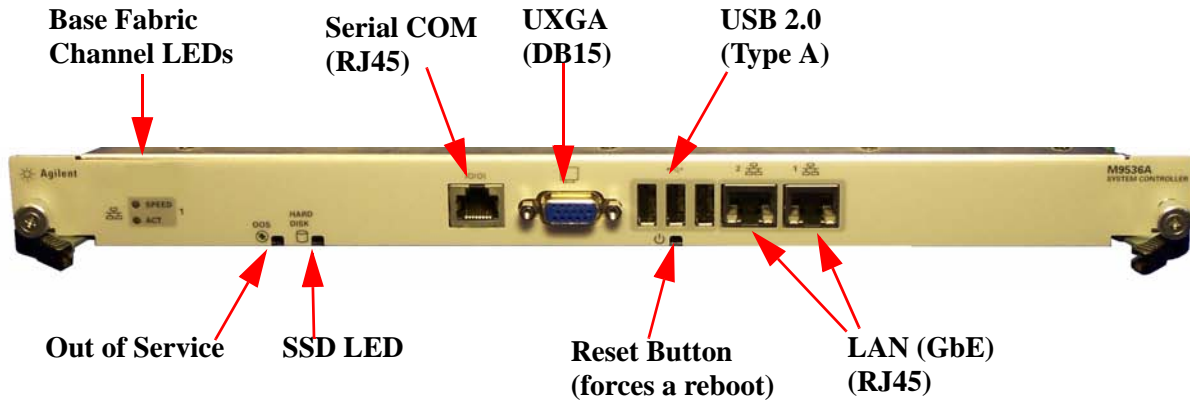
Figure 1   M9536A AXIe Embedded Controller Front Panel

Front panel LED definitions

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

Out Of Service (OOS)LED

Out of Service LED (Red)	State
Blink	During BIOS POST
Off	BIOS POST OK
On	After Operating System shutdown

SSD Drive (HDD) LED

Media LED (Green)	State
Blink/on	During access

Base fabric channel LED

BASE Channel and Fabric Channel LED	
	Base Channel1 Speed/Link 1 Gbps - Amber 100 Mbps - Green
	Base Channel1 ACT (Amber) Blinks when accessing Ethernet I/O
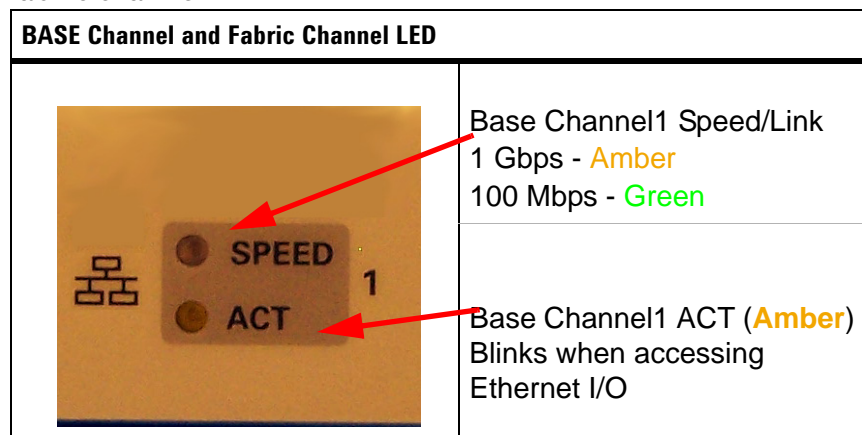
LAN / Gigabit Ethernet (GbE) connector LED

LED1: ACT
Blinking when accessing IO
1Gbps: Amber

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

RJ-45
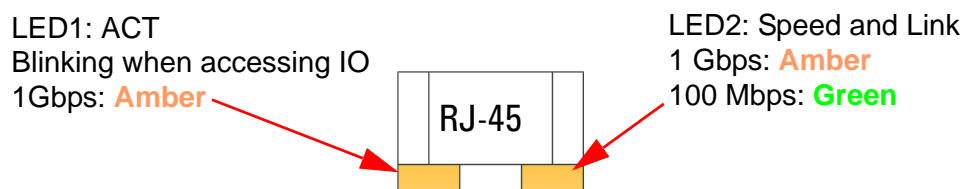
CAUTION	**IMPORTANT:** Agilent M9502A or M9505A AXIe chassis <u>**must**</u> have firmware revision 1.3.23 or later for the M9536A to identify and communicate with other chassis module. Refer to the Agilent chassis web pages for information on updating the chassis firmware.

NOTE	The drivers and Agilent's IO Libraries Suite installed on the M9536A controller are the current versions available when the module shipped from the factory. You should regularly check Agilent's web sites and download the latest drivers and software:

> **www.agilent.com/find/M9536A** for the embedded controller

> **www.agilent.com/find/iosuite** for IO Libraries

Periodically check for the latest AXIe chassis firmware:

> **www.agilent.com/find/M9502A** for the 2-slot AXIe chassis

> **www.agilent.com/find/M9505A** for the 5-slot AXIe chassis

For example, Agilent's AXIe chassis firmware version 1.3.23 (and later) provides for enhanced fan control and E-Keying that was not supported in earlier chassis firmware versions.

M9536A Functional Description
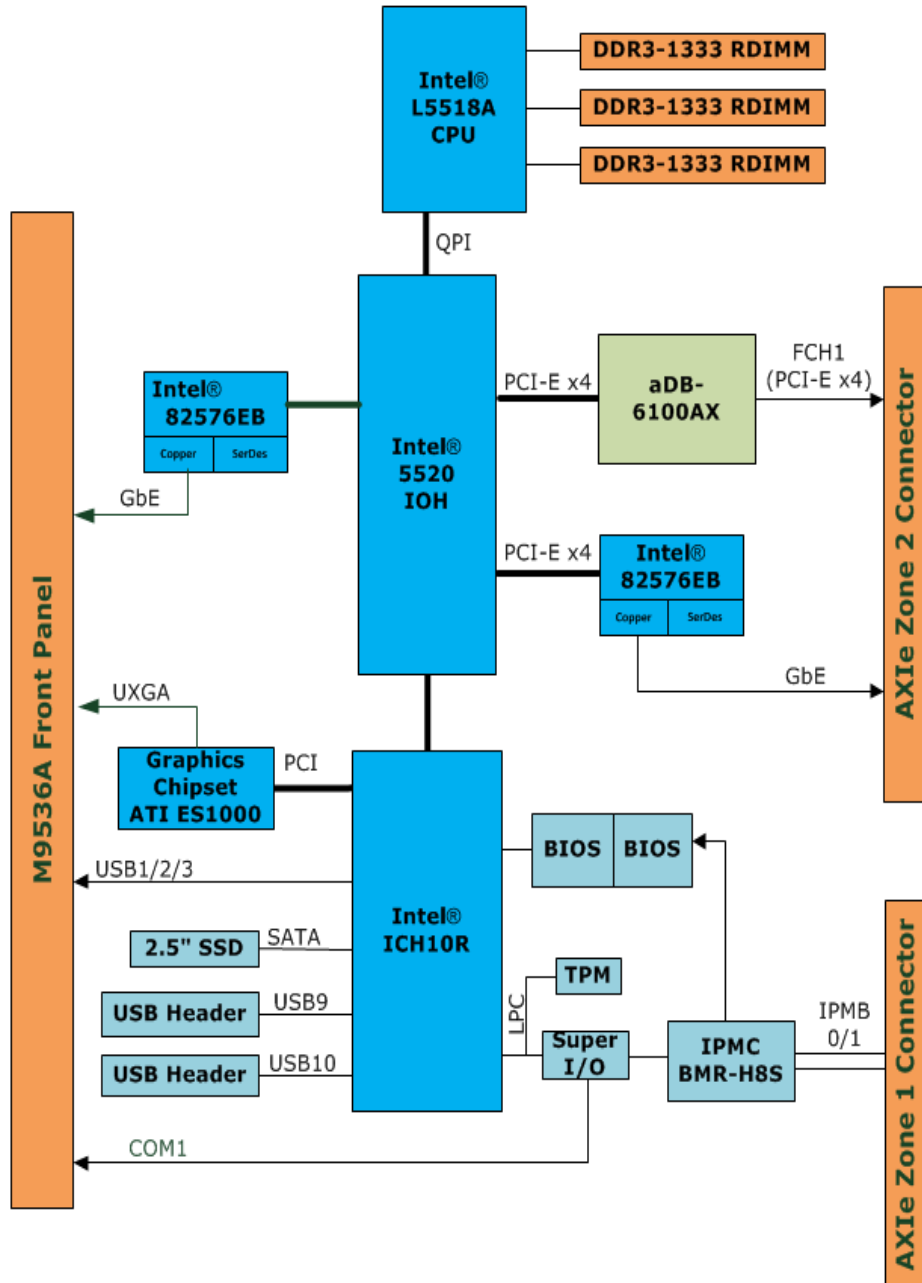
Figure 2   M9536A Functional Block Diagram

CPU, Memory and Chipset

The Intel L5518 Xeon processor is a multi-core processor based on 45 nm process technology. Processor features include two Intel QPI point-to-point links with 5.86GT/s, 8MB of shared cache, and an integrated memory controller. The processor supports all the existing Streaming SIMD Extensions 2 (SSE2), Streaming SIMD Extensions 3 (SSE3) and Streaming SIMD Extensions 4 (SEE4). Also supported are: Execute Disable Bit, Intel 64 Technology, Enhanced Intel SpeedStep Technology, Intel Virtualization Technology (Intel VT), and Intel Hyper-Threading Technology.

The Intel Xeon Processor L5518 has a maximum Thermal Design Power (TDP) of 60W and has an elevated case temperature specification. The elevated case temperatures are intended to meet the short-term thermal profile requirements of NEBS Level 3. All this makes this processor ideal for thermally constrained form factors in the AXIe embedded controller. The following table lists some of the relevant processor specifications:

	Intel L5518 Processor
L2 Cache	8MB
Clock	2.13 GHz
QPI	5.86 GT/s
Maximum Power	60 W

Memory

The M9536A has three 240-pin, RDIMM sockets which support DDR3-1333 REG/ECC RAM sticks. Each socket can support memory modules up to 8GB for a total memory capacity of 24GB. The standard M9536A configuration is a single 8GB memory stick with a factory option to add a second 8GB memory stick. This leaves an empty socket for future expansion. Refer to "Installing Additional Memory" on page 65 for information on installing additional memory. Note, the other three RDIMM slots are for a second processor which is not used.

Intel 5520/ICH10R chipset

The Intel 5520 Chipset I/O Hub (IOH) provides a connection point between various I/O components and Intel QuickPath Interconnect (Intel QPI) based processors. The Intel 5520 Chipset is combined with Intel Xeon Processor 5500 in their respective two socket platforms. The Intel Xeon 5500 Platform consists of the Intel Xeon Processor 5500 Series, the Intel 5520 Chipset I/O Hub (IOH), the I/O Controller Hub (Intel ICH10), and the I/O subsystem. The processor includes an integrated Memory Controller (IMC) that resides within the processor package. This platform is the first single processing

platform that introduces the Intel Quick- Path Interconnect. Intel QuickPath Interconnect is Intel's next generation point-to-point system interconnect interface and replaces the Front Side Bus.

<table><tr><td>**NOTE**</td><td>The term IOH refers to the Intel 5520 Chipset I/O Hub (IOH) and ICH10R refers to the Intel 82801JIR ICH10R I/O Controller Hub 10 components.</td></tr></table>

The IOH provides the interface between the processor Intel Quick- Path Interconnect and industry-standard PCI Express components. The IOH supports the following features and technologies:

- Intel QuickPath Interconnect profile
- Interface to CPU or other IOH (limited configurations) Gen2 PCI Express
- Intel I/O Accelerated Technology (Intel I/OAT) and Intel Quick Data Technology (updated DMA engine with virtualization enhancements)
- Integrated Intel Management Engine (Intel ME)

ATI ES1000 Graphics Controller   The M9536A provides an analog UXGA port on the front panel powered by an AMD ES1000 2D graphics controller. The M9536A does not support USB monitor interfaces. It supports the following features:

- 32-bit PCI bus (Rev 2.2), 3.3 V with bus mastering support
- Support for SPI Serial and Flash Memory video BIOS
- Independent DDC lines for both DACs and TMDS connections. Also full AppleSense support on DAC connection
- Static and dynamic Power Management support (APM as well as ACPI) with full VESA DPMS and Energy Star compliance
- Comprehensive testability including full internal scan, memory BIST, I/O xor tree and Iddq
- Full ACPI 1.0b, OnNow, and IAPC (Instantly Available PC) power management, including PCI power management registers
- Bus mastering of 2D display lists
- Triple 10-bit palette DAC supports pixel rates to 350MHz
- DDC1 and DDC2 for plug and play monitors
- Flexible memory support:
  - DDR1 and DDR2 SDRAM and SGRAM
  - 16-bit interface, 8MB to 256MB
- Up to 1GB/s bandwidth.
- Single chip solution in 0.13 micron process, 1.2V CMOS technology in a BGA package

Peripherals

The following standard peripherals are available on the M9536A Embedded Controller:

Timer

The M9536A is equipped with the following three timers:

- **Real-Time Clock:** The ICH10R controller hub contains a real-time clock that performs timekeeping functions and includes 256 bytes of general purpose battery-backed CMOS RAM. Features include an alarm function, programmable periodic interrupt and a 100-year calendar. All battery-backed CMOS RAM data remains stored in an additional EEPROM. This prevents data loss in case the M9536A is operated without a battery.

- **Counter/Timer:** Three 8254-style counter/timers are included on the M9536A as defined for the PC/AT (System Timer, Refresh Request, Speaker Tone Output).

- **High Precision Event Timers (HPET):** In addition to the three 8254-style counters, the ICH10R controller hub includes three High Precision Event Timers (HPET) that may be used by the operating system. They can be used in one-shot and periodic modes to generate an interrupt when the counter reaches a pre-programmed value.

Battery

The M9536A is provided with a 3.0 V "coin cell" lithium battery. This battery runs the clock circuit and retains configuration memory in CMOS RAM while the system is turned off. For instructions on replacing the battery, refer to "Battery Backup" on page 63.

Reset

The M9536A responds to any of the following conditions by initializing local peripherals:

- Power failure, +5 V supply falls below 4.1 V (typical) or +3.3 V supply falls below 2.93 V (typical)

- Front panel **RESET** push-button pressed. This causes the controller to reboot.

- IPM controller reset

SMBus and I^{2}C devices

The M9536A provides a system management bus (SMBus) hosted by the ICH10R and an I^{2}C bus hosted by the IPM controller, H8S/2168. The following table describes the function and address of the devices.

SMBus Device	Address (HEX)		I^{2}C Device	Address (HEX)
DIMM A	0XA0		PECI-to-I^{2}C	0x92
DIMM B	0XA4		LM75	0x9E
DIMM C	0XA8		PCA9555PW	0x40
Clock Gen	0XD2			
Clock Buffer	0XDC			

GPIO list

The following table summarizes GPIO usage on ICH9R IO controller hub:

ICH9R	I/O	Signal	Description
GPI[2]	Input	IOH_ERR-L	IOH Error output signals
GPI[8]	Input	QPI_TTL_CATERR-L	CPU Indicates that the system has experienced a catastrophic error and cannot continue to operate
GPI[23]	Output	USR_LED	User defined LED
GPI[27]	Output	QPI_FREQSEL0	QuickPath Interconnect Frequency Strapping Options
GPI[28]	Output	QPI_FREQSEL1	QuickPath Interconnect Frequency Strapping Options
GPI[29]	Output	FM_CPU0_LVDDR3_EN	DDR3L DIMM voltage control (DIMM A/B/C)
GPI[30]	Output	FM_CPU1_LVDDR3_EN	DDR3L DIMM voltage control (DIMM D/E/F)
GPI[32]	Output	POSTOK-L	POST OK to IPMC
GPI[52]	Output	ICH_SMBUS_MUX0	DDR SMBUS Multiplier control
GPI[53]	Output	ICH_SMBUS_MUX1	DDR SMBUS Multiplier control
GPI[56]	Output	QPI_FSEL_PWRGD-L	IOH Hard Reset Triggers a Power-Up Reset control

I/O interfaces

USB

The M9536A supports three, Type-A USB 2.0 ports on the front panel

On the USB 2.0 front panel ports, a USB cable with up to 5 meters in length can be used.

The USB 2.0 ports are high-speed, full-speed, and low-speed capable. Hi-speed USB 2.0 allows data transfers of up to 480 Mb/s, 40 times faster than a full-speed USB (USB 1.1). One USB peripheral may be connected to each port., including a powered or unpowered USB hub.

NOTE	The M9536A host interfaces can be used with maximum 500mA continuous load current as specified in the Universal Serial Bus Specification, Revision 2.0. Short circuit protection is provided. All the signal lines are EMI filtered.

UXGA Analog Interface

The DB-15 female connector on the front panel is for analog display output. The M9536A does not support USB monitor interfaces.

NOTE	Video display resolution: In the M9536A controller, the highest resolution available at 32-bit color is 1280x1024. At 16-bit color, the M9536A supports 1600x1200 resolution. Note that 1600x1200 is a 4x3 aspect ratio. When this resolution is scaled to a 16x9 or 16x10 aspect ratio monitor, the M9536A will function properly but some graphics may appear distorted.

Gigabit ethernet

The M9536A is equipped with two dual-port Intel 82576EBB Gigabit Ethernet controllers. In default configuration, one port is connected to the front panel and one port is connected to the Base Interface channel on the backplane.

Serial port

One PC-compatible serial RS-232, RJ45 port is provided on the front panel with DIP switches SWX1 and SWX2 used to set COM function to either the RS-232 mode or the IPMC debug mode. A complete set of handshaking and modem control signals are supported, with data transfer rates up to 115.2 kB/sec.

PCIe backplane interface

The M9536A PCIe interface is configured as the root complex. The following figure shows a conceptual diagram.

AXIe Chassis Backplane
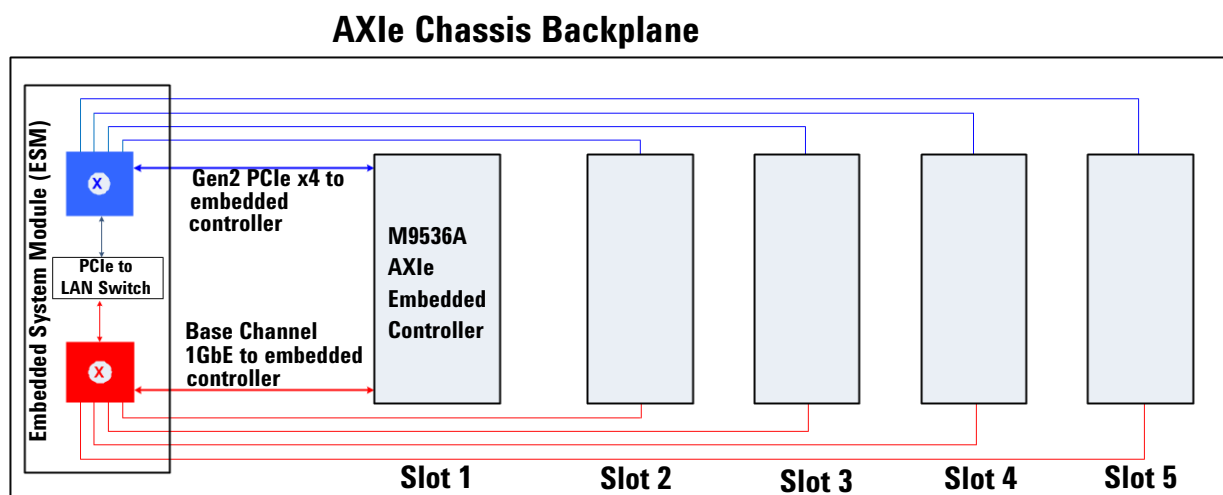
Figure 3   PCIe Backplane Interface

CAUTION	With the M9536A installed, there must be no connection to the ESM module PCIe connector.

Using the LAN Ports

If you installed the Agilent M9536A controller in an Agilent AXIe chassis (such as the M9502A or M9505A), there are a total of three LAN ports accessible on the front panels -- two on the M9536A controller and one on the Embedded System Module (ESM). Windows Device Manager shows a total of five (5) individual Network Interface Cards (NICs); one is not used and one connects to the chassis backplane. Refer to Figure 4 and Figure 5 below.

CAUTION	Changing the LAN port connection or removing the LAN cable, may cause Agilent Connection Expert to lose track of LAN-enabled instruments. Reboot the AXIe chassis to restore the complete list of LAN-enabled instruments. Read the following for details.

Figure 4   NIC ports reported for the M9536A (NIC 3 is not used)

Figure 5   Windows Device Manager showing Network Connections

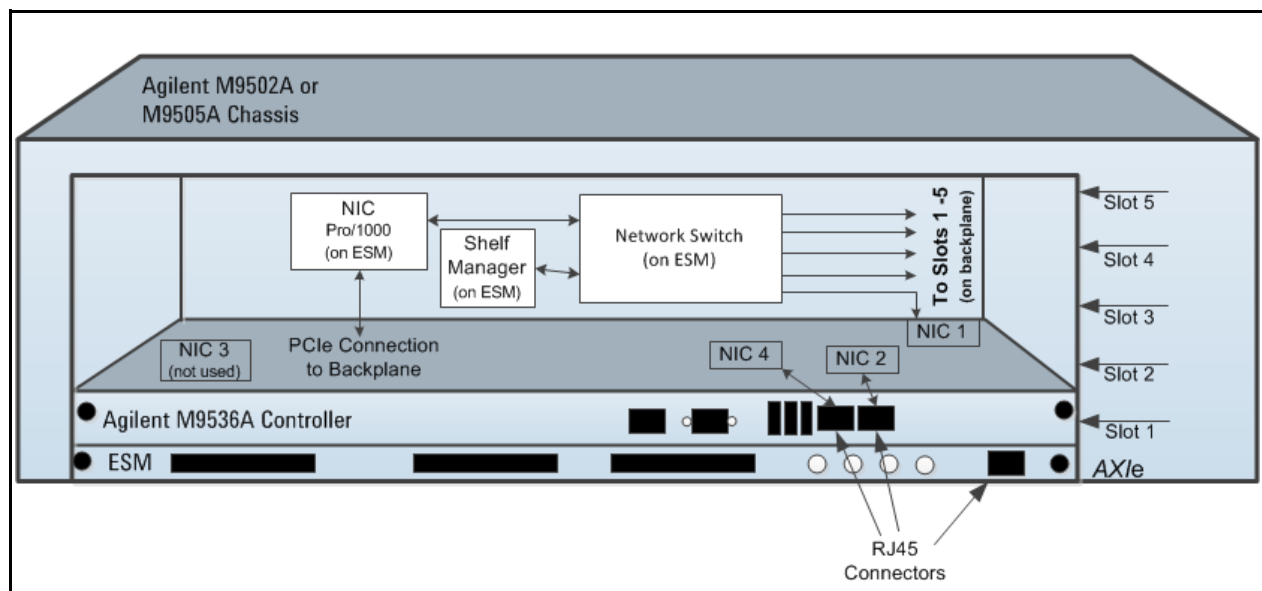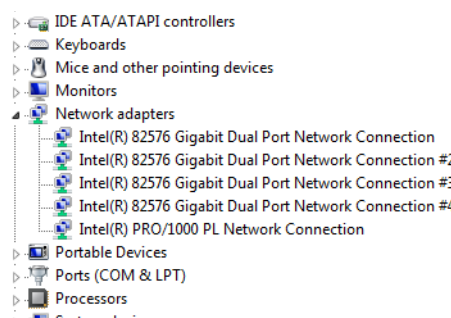This section provides overall guidance on selecting and using the M9536A LAN ports. The controller uses the Agilent IO Libraries configuration file to keep track of all instrument connections. Any change to LAN connections after running Connection Expert (adding, removing, or changing LAN cable connections) may cause a change in LAN address and therefore cause Connection Expert to lose track of instruments. If your application programs rely on a specific IP address, these programs may cease to operate if you change LAN cable connections.

If this happens, you should delete the connection in Connection Expert, power down the controller and chassis, and reboot. Rerun IO Libraries Connection Expert to obtain new addresses.

NOTE	With Agilent IO Libraries 16.2 (and later versions) Agilent Connection Expert should automatically identify the AXIe chassis. With Agilent IO Libraries version 16.1, you may need to start Connection Expert, then power down the controller and chassis and reboot them in order for Connection Expert to identify the AXIe chassis.

Recommendations

As a general rule, connect a network LAN cable to the ESM's LAN port and connect LXI instruments to the M9536A's LAN ports. While other configurations are viable, this configuration provides the fastest and most consistent reporting in Agilent Connection Expert. Refer to Figure 6.

- Where you have the network and instruments connected when the chassis and controller first power on determines how quickly Agilent 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 M9536A 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 M9536A controller LAN ports. This allows Agilent 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.

Figure 6   Recommended LAN Connections
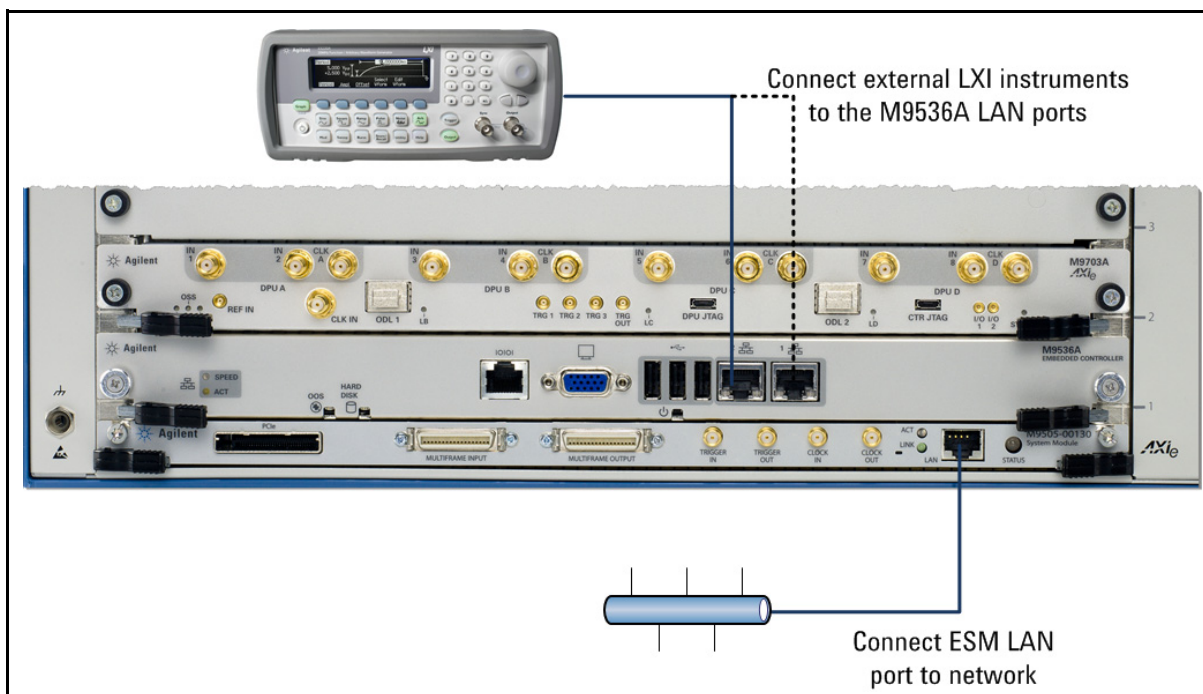
Figure 6 shows the recommended LAN connections to the AXIe chassis/ESM and the M9535A. Two other possible LAN connections are shown in Figure 7. Note that you may need to manually add instrument IPO addresses to Agilent Connection Expert.
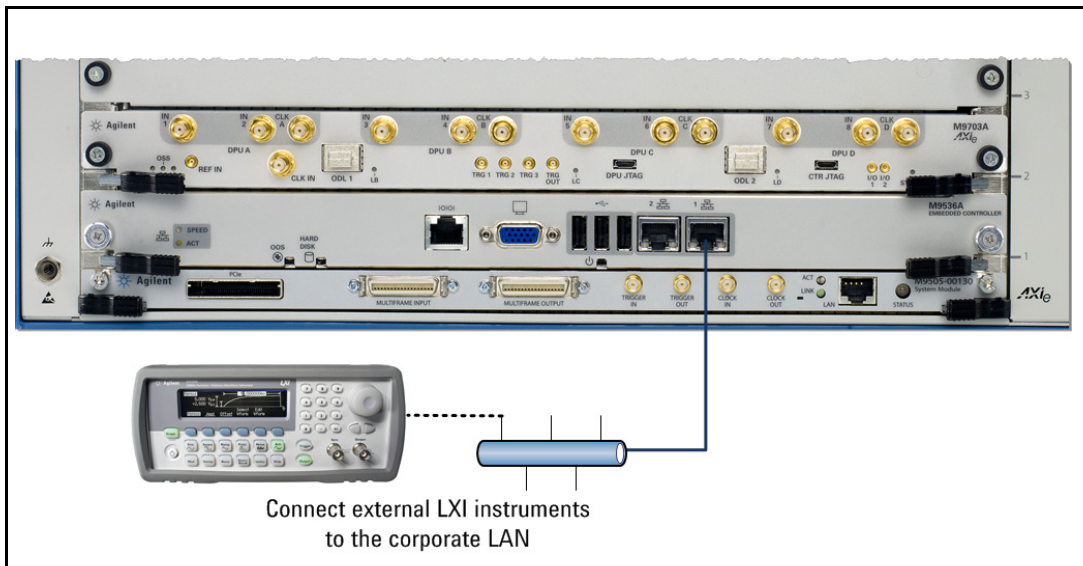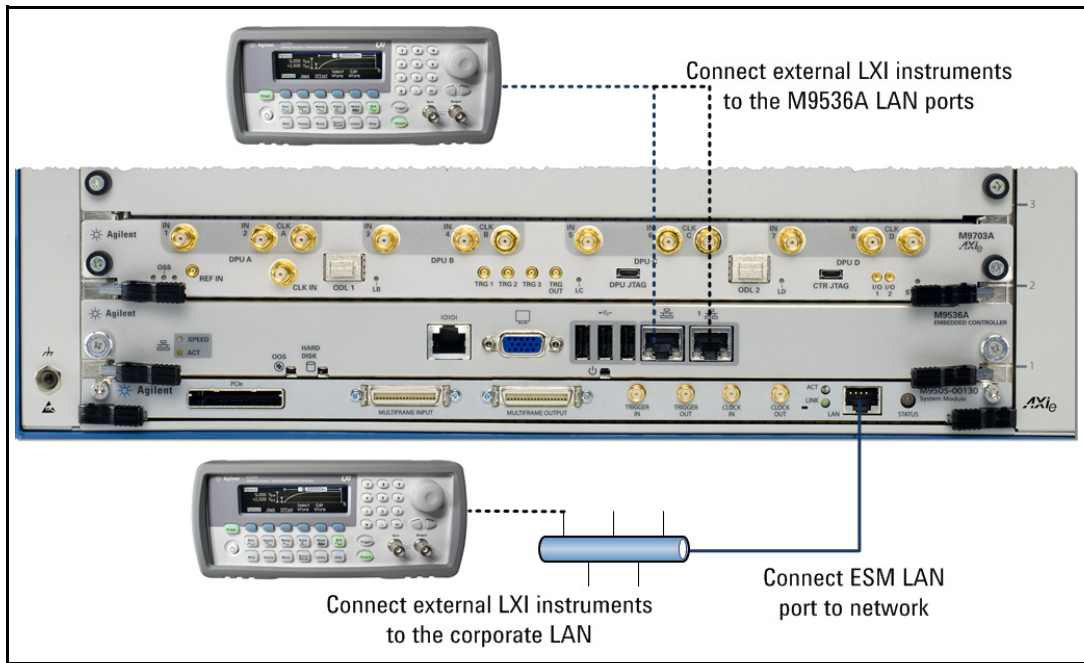
Figure 7   Possible Alternate LAN Connections. You may need to manually add instrument IP addresses to Agilent Connection Expert. (see text)

2

Controller Operating System

Your M9536A comes with the Microsoft Windows 7 (32-bit or 64-bit), or WES 7 (32-bit or 64-bit) operating system preinstalled along with Agilent's IO Libraries Suite. This chapter provides general system configuration and preventative maintenance procedures that you, the customer, are responsible for. In general, the M9536A operates as any other PC.

The M9536A controller supports USB CD-ROM drive, USB flash disk, or a USB external hard drive as the first boot device. Please refer to "Starting the BIOS" on page 37 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.

Read any release notes and installation documentation provided by the operating system vendor. Be sure to read all the README files or documents provided by the vendor, as these typically note documentation discrepancies or compatibility problems.

Activating Microsoft Windows

Agilent ensures that Windows 7 and WES 7 operating systems are activated at the time they ship from the factory. However, the first time you install and turn on the M9536A and *Windows 7* starts, you must accept the End User License Agreement (EULA). For information about Windows 7 EULA, go to www.microsoft.com.

How to verify Windows Activation?

To verify Windows Activation, do the following:

1 Open the System by clicking the Windows **Start** button. Click **Control Panel**, then **System and Security** (Category view only), and then click **System**.

2 Scroll down to the bottom of the screen. Under **Windows Activation**, you can view the activation status.

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CAUTION	By Agilent's agreement with Microsoft, Windows Automatic Update is turned off at installation. You may choose to turn Windows Automatic Update on after starting the operating system. However, Agilent cannot be held responsible for changes to the system caused by the automatic update process. It is possible for automatic updates to cause unexpected behavior in the system.

Controller Startup

After installing the M9536A controller in an AXIe chassis, press the chassis' power on button. After a few moments, the controller will beep indicating it passed its POST self tests. The following screen will display for a few moments:
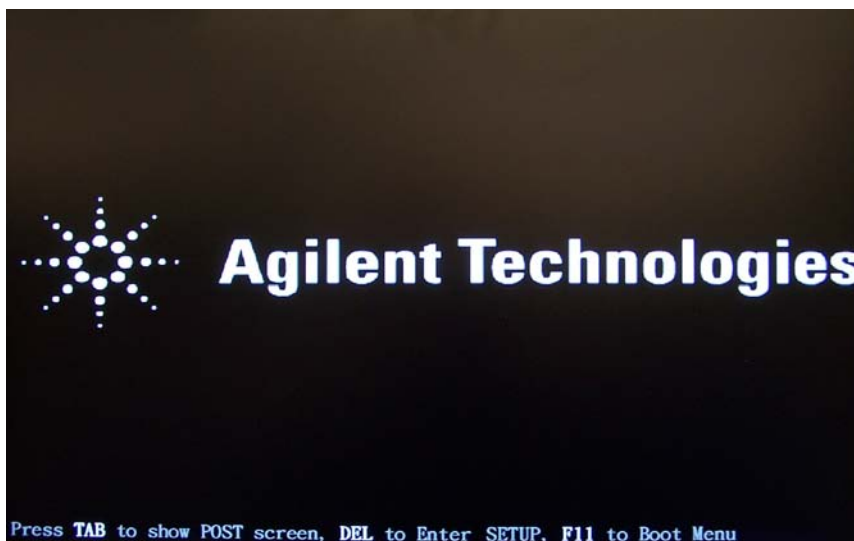
Figure 8   M9536A Startup Screen

Normally, you should simply 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 Utility** (see Chapter 3, "BIOS Setup").

You may see the following screen. If so, either press the Enter key or simply ignore it and the Windows OS will start normally. Either one allows the Windows 7 operating system to start normally:
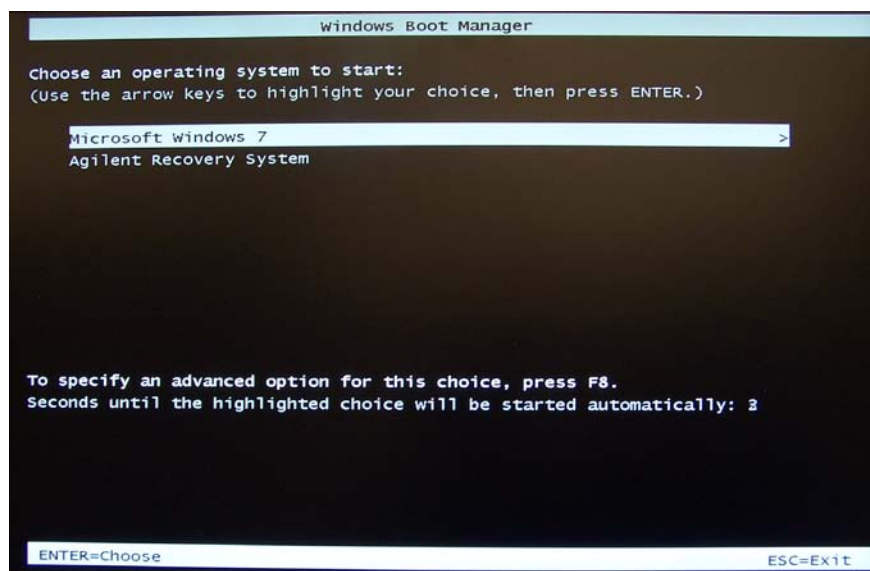
Figure 9   Windows Boot Manager

After a few moments, Microsoft Windows 7 starts. See Figure 10 on the next page.

NOTE	Microsoft Windows 7 is the only operating system installed on your M9536A. There is a small system partition for the Agilent Recovery System. If you select this option, the Windows Boot Manager opens a menu with five selections: 1) Run ChkDisk 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.

Figure 10 Microsoft Windows 7 running on the Agilent M9536A

Using Agilent Connection Expert

1 From the Windows Start button, select **All Programs**. Scroll down to the Agilent IO Libraries Suite folder then select **Agilent Connection Expert**. Alternately, you can double-click the IO control icon ( ) in the lower right Windows Notification area to run Agilent Connection Expert.
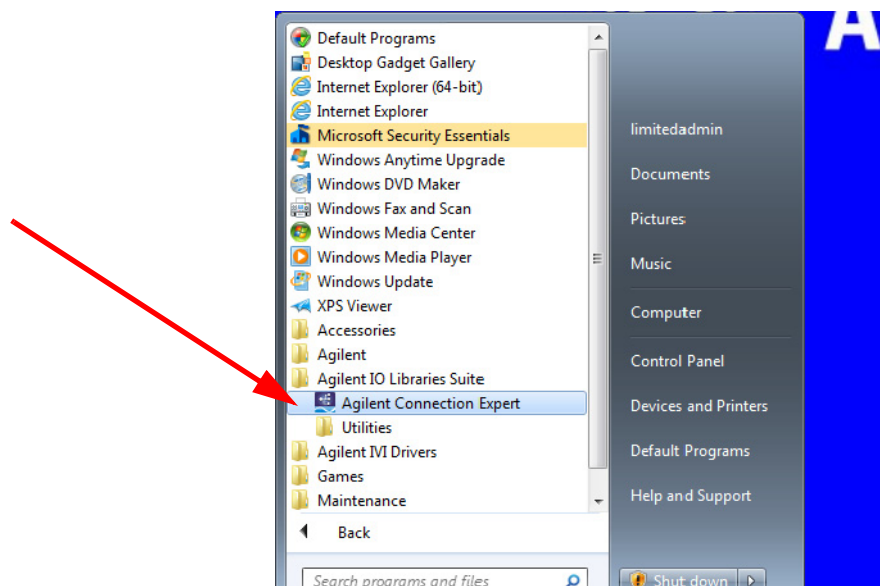
Figure 11 Starting Agilent Connection Expert

2   Figure 12 below shows Agilent Connection Expert (with the M9536A Embedded Controller listed as the PC). The **Instrument I/O on this PC** pane shows instrument connections available to your controller and shows how an AXIe chassis appears under the PXI0 tree. Refer to the Agilent IO Libraries documentation for information on using Connection Expert.

Controller name   AXIe Chassis
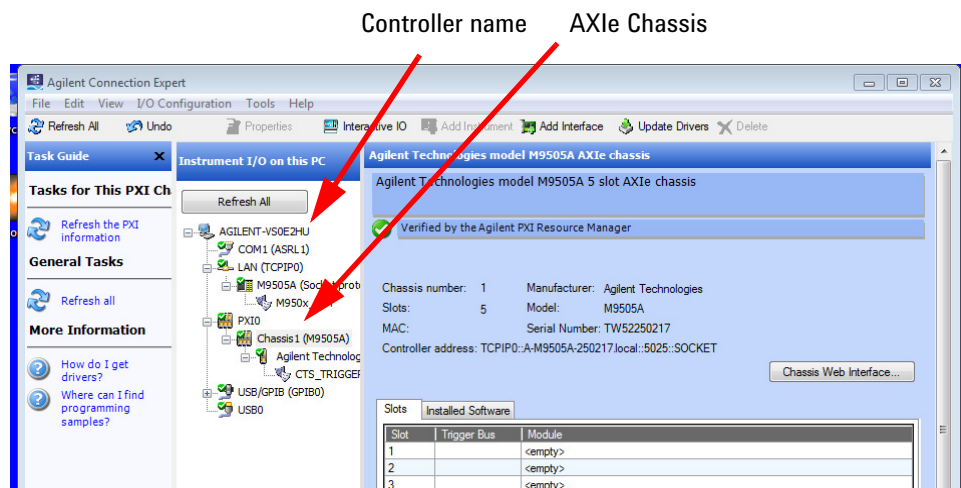
Figure 12 Agilent Connection Expert for an AXIe Embedded Controller

NOTE	With Agilent IO Libraries 16.2 (and later versions) Agilent Connection Expert should automatically identify the AXIe chassis. With Agilent IO Libraries version 16.1, you may need to start Connection Expert, then power down the controller and chassis and reboot them in order for Connection Expert to identify the AXIe chassis.

3 To add an instrument, in the Connection Expert **Task Guide** pane at left click `Add an Instrument`. Alternately, you can click on the `Add Instrument` button at the top of the page.

For example, the **Add LAN Instruments** shows the available LAN instruments (see Figure 13).
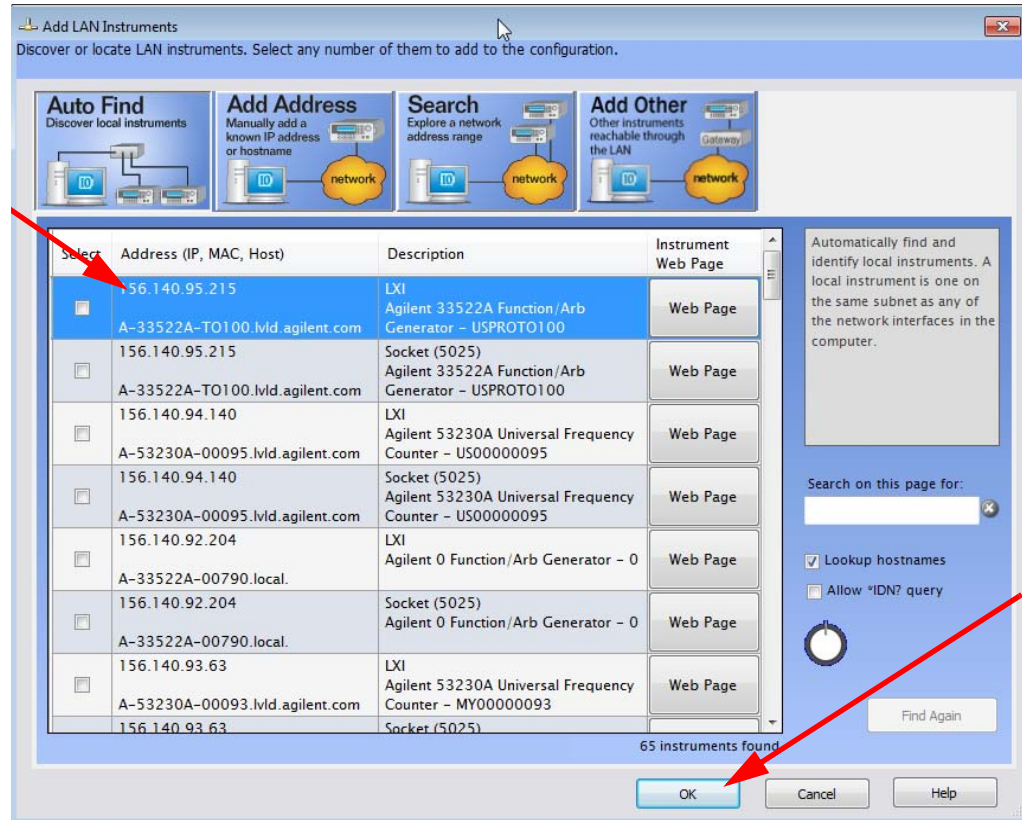
Figure 13 Agilent Connection Expert Auto Find the Chassis and Other Instruments

Your system may have many instruments connected and listed in the display.

Check the box next to the instrument to select it then, and click the **OK** button.

AXIe Chassis Web Page

The AXIe chassis appears in the Connection Expert Explorer Pane (**Instrument I\O on this PC**). In this example, we are showing the Agilent M9505A chassis.
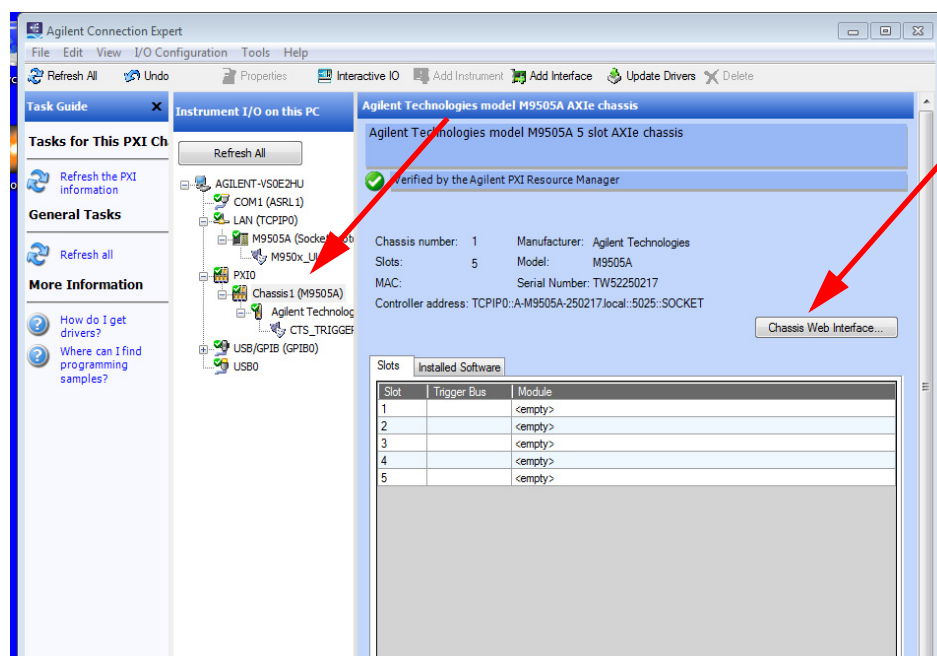
Figure 14 Connection Expert listing the Agilent M9505A Chassis

Click the Instrument Web Interface button to launch the chassis Web Interface. The chassis Web Home page loads in a new window (see).

For detailed information on the AXIe chassis web page, refer to the Agilent M9502A/M9505A AXIe Chassis User Guide.

Home Page Button

Module Configuration Page Button

Chassis Health Page Button

Figure 15 Typical Chassis Web Page

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 left side of the page are six buttons: The Home Page button, The LAN Configuration Page button, the Module Configuration Page, the Trigger Routing Page, the Chassis Health Page, and the Help Page. Of these six buttons, only two are relevant to the M9536A Controller:

Module Configuration Page - This button allows you to view basic product and model information for instrument modules loaded -- such as the M9536A -- 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 Page** button. This opens the Module Configuration Page (Figure 16) which provides the module's serial number and revision.

Figure 16 Chassis Module Configuration Page

2 Click on the **Chassis Health Page** button. This opens the Chassis Health page (Figure 17) that provides backplane rail voltages and operating temperatures in the M9536A Controller.

Chassis Health
Page Button

M9536A
Information
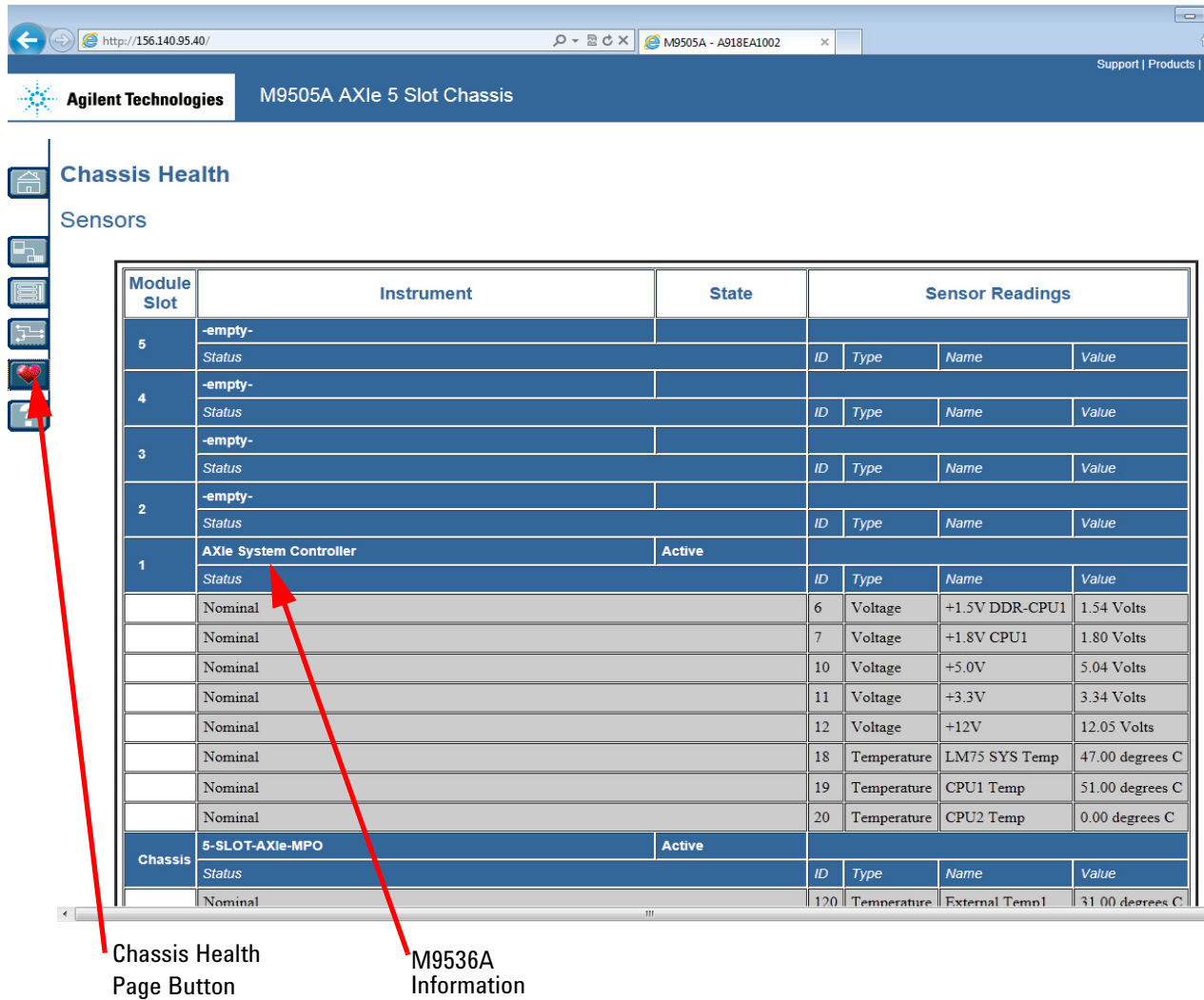
Figure 17 Chassis Health Page

AXIe Chassis Soft Front Panel

To view and use the chassis Soft Front Panel (SFP) software in your M9536A (only applies to the Agilent M9502A and M9505A AXIe chassis), click the `Installed Software` tab in Connection Expert. Then click the Start SSP button.
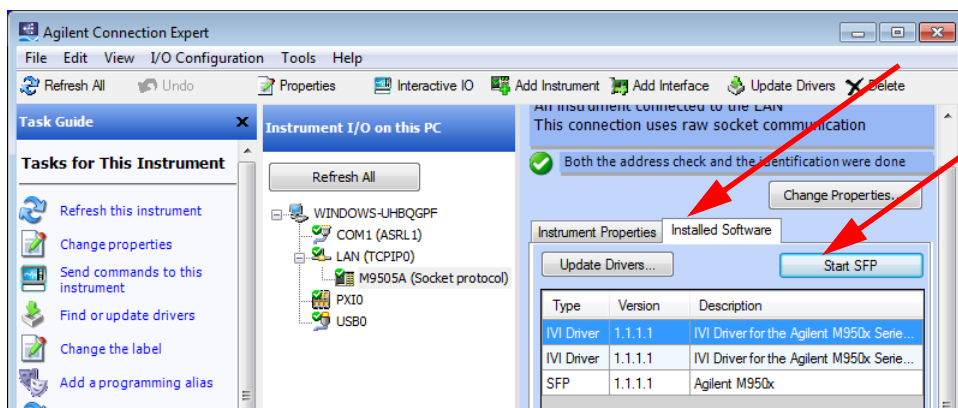
Figure 18 Installed Software Tab in Agilent Connection Expert

This opens the SFP software. Refer to Figure 19 below. For instructions on using the SFP, refer to the SFP help file.
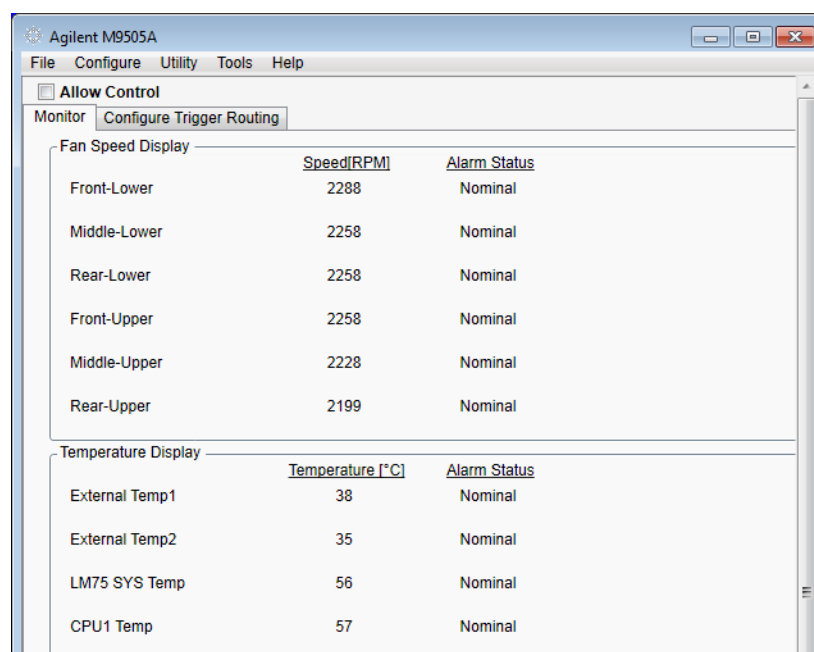
Figure 19 Soft Front Panel for the Agilent M9502A and M9505A AXIe Chassis

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 firewall

• Get the latest Windows updates

• Install and use up-to-date antivirus software.

To check the status of, or make changes to, the security settings for your controller, open the Windows Security Center (`Start > Control Panel > Security Center`).

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 antivirus or spyware software included with your controller. Antivirus application software is the customer's responsibility. Having antivirus software installed my have a slight impact on system performance if your system uses intensive network data transfer.

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 should be done just prior to sending the controller back to Agilent for service if that is ever necessary.

The Windows operating system supplied with your M9536A is licensed for use on the SSD mounted to the controller. If the SSD is replaced, you may be responsible to purchase or relicense the operating system.

System backup and recovery

After activating Windows 7, you should create a System Repair Disk and a System Image as a backup in case you ever need to reinstall the operating system. By definition, a system image is an exact copy of the computer hard drive. A system image includes the Windows 7 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 7 is the only operating system installed on your M9536A. There is a small system partition for the Agilent Recovery System on the SSD. During the boot process, you are given the choice to boot to Windows 7 normally or boot from the recovery partition. However, you should create a System Repair Disc (also known as a recovery disc) for use if the SSD fails and the M9536A will not boot. See "Create a System Repair disc" on page 28.

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

Use the recovery methods

As mentioned before, during the boot process, you are given the choice to boot to Windows 7 normally or boot from the recovery partition. If you select to boot from the recovery partition, the Windows Boot Manager opens a menu with five selections:

```
1) Run ChkDisk 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** | Selection number 2 restores Agilent's original factory system image. All data and system applications are lost. |

However, if you are unable to boot from the recovery partition, you will need to use a Windows 7 System Repair disc. You must manually create this System Repair Disc, see "Create a System Repair disc" later on this page.

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 Agilent startup screen appears (immediately after the POST test beeps) press the **<F7>** key repeatedly. This opens the M9536A boot menu.

5 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**.

6 If prompted, press any key to start the computer from the 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 the **Windows 7 Repair Disk 32-bit** or **Windows 7 Repair Disk 64-bit** (as appropriate) and store it in a safe place.

For more detailed informaiton, refer to the Microsoft Windows documentation for Backup and Recovery.

Create a System Image

You should regularly create a system image of the SSD on the M9536A. The following procedure explains how to create an initial system image after activating Windows. For additional and/or specific information regarding Windows backups, system image, system restore, etc., refer to the Microsoft WIndows Help system.

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 M9536A. 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 Agilent backup partition. If this happens, the Agilent Recovery System will not work. follow the instructions provided on the following pages carefully.

1 Unhide the Agilent 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 Agilent\Scripts.** Press **Enter**.

   f Type: **HideUnhideRecoveryPartition.vbs unhide**

   g Press **Enter**

   h The Agilent 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 M9536A. 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 M9536A.

| 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 M9536A.

2   Insert the System <u>Repair</u> disc into the CD/DVD ROM drive. Note, this is <u>not</u> the System <u>Image</u> disk.

3   Connect the external hard drive, LAN cable, etc. for wherever your stored the previously created system image.

4   Turn on the chassis.

NOTE	You may need to select a boot option:

1   When the Agilent startup screen appears (immediately after the POST test beeps) press the **<F7>** key repeatedly. This opens the M9536A 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 CD/DVD drive and the system image hard drive. Allow the M9536A to restart.

14 Optionally, you can re-hide the Agilent 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 Agilent\Scripts.** Press **Enter**.

   e   Type: **Run HideUnhideRecoveryPartition.vbs hide**

   f   Press **Enter**

   g   The Agilent 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.

Chassis Shutdown

As with any PC, Windows-based instruments should not be shutdown 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 on an M9502A or M9505A chassis immediately removes power from the controller. This may cause loss of data or damage to the controller.

Power down modes

Agilent's M9536A 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.

NOTE	You should not enable the Microsoft Windows sleep or hibernate modes. It is possible that the M9536A 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.
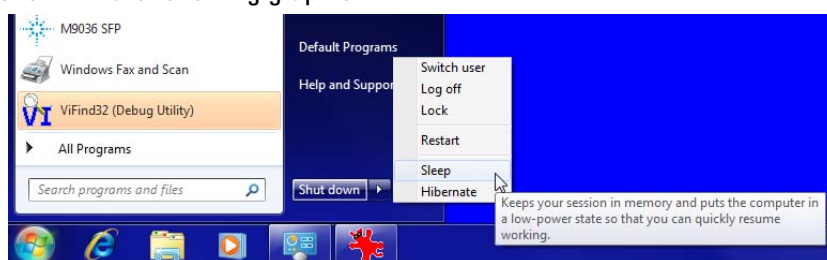
Things not to do

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.

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 Agilent, even using the `Add or Remove Program` utility, unless you are instructed by Agilent 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 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" Agilent software licenses at any time on the Agilent Software Licensing system (ASL) web site at http://www.agilent.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

The Windows operating system supplied with your M9536A is licensed for use on the SSD mounted to the controller. If the SSD is replaced, you may be responsible to purchase or relicense the operating system.
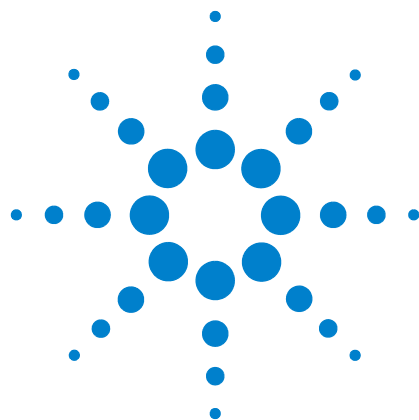
3
BIOS Setup

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 contain code for various advanced features applied to the M9536A controller. The BIOS setup program includes menus for configuring settings and enabling M9536A controller features.

NOTE	In general, you will never need to update the BIOS on your M9536A. Any BIOS update for the M9536A will be available on the Agilent web site: www.agilent.com/find/M9536A
	The BIOS is custom designed specifically for the M9536A. 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, press SW7 (see "SW7 - Clear CMOS" on page 61) to clear the CMOS memory and restore the default BIOS settings.
	Do not change a BIOS setting unless you are absolutely certain of what it does.

Starting the BIOS

To enter the BIOS setup screen, follow these steps:

1 Power on the chassis with the embedded controller

2 Press the `<Delete>` key when you see the following screen:

Figure 20 M9536A Startup Screen

3   After you press the **<Delete>** key, the main BIOS setup menu displays.
    You can access the other setup screens from the main BIOS setup menu,
    such as the Boot and Security menus.
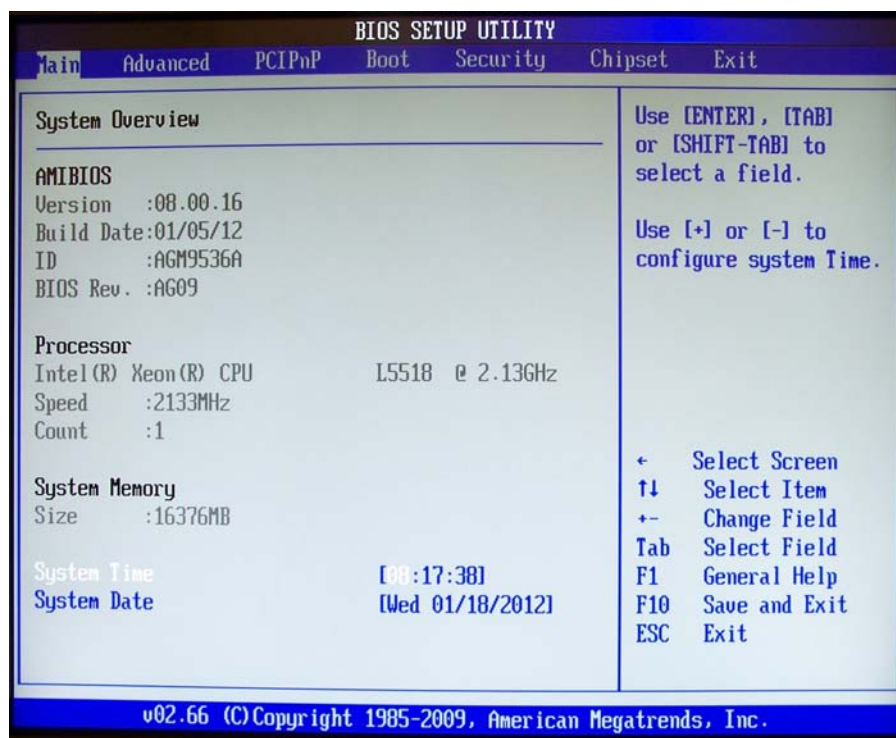
Figure 21 Main BIOS Start Screen

NOTE	In most cases, the **<Delete>** key is used to invoke the setup screen. There are several cases that use other keys, such as **<F1>, <F2>**, and so on.

BIOS setup utility

The Main BIOS setup menu is the first screen that you can navigate. Each Main BIOS setup menu option is described in this user guide.

Each of the BIOS setup menu screens has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

Navigation

The BIOS setup/utility uses a keyboard-based navigation system. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.

These keys include **<F1>**, **<F8>, <F10>**, **<Enter>**, **<ESC>**, etc.

NOTE	There is a hot key legend located in the right frame on most setup screens.

Hot key descriptions:

F1   Press the **<F1>** key to open the General Help screen.

F8   The **<F8>** key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the **<F8>** key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

F10   The **<F10>** key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes.

Press the <Enter> key to save the configuration and exit. You can also use the **<Arrow>** key to select Cancel and then press the **<Enter>** key to abort this function and return to the previous screen.

ESC   The ⟨**Esc**⟩ key allows you to discard any changes you have made and exit the Setup. Press the **<Esc>** key to exit the setup without saving your changes. Press the **<Enter>** key to discard changes and exit. You can also use the **<Arrow>** keys to select Cancel and then press the **<Enter>** key to abort this function and return to the previous screen.

Enter   The ⟨**Enter**⟩ key allows you to display or change the setup option listed for a particular setup item. The **<Enter>** key can also allow you to display the setup sub-screens.

Main Menu

When you first enter the BIOS Setup Utility, you will see the **Main** menu screen. You can return to the **Main** menu screen at any time by selecting the **Main** tab. The Main BIOS Setup screen is shown below; the only fields you can change are the System Time and System Date.
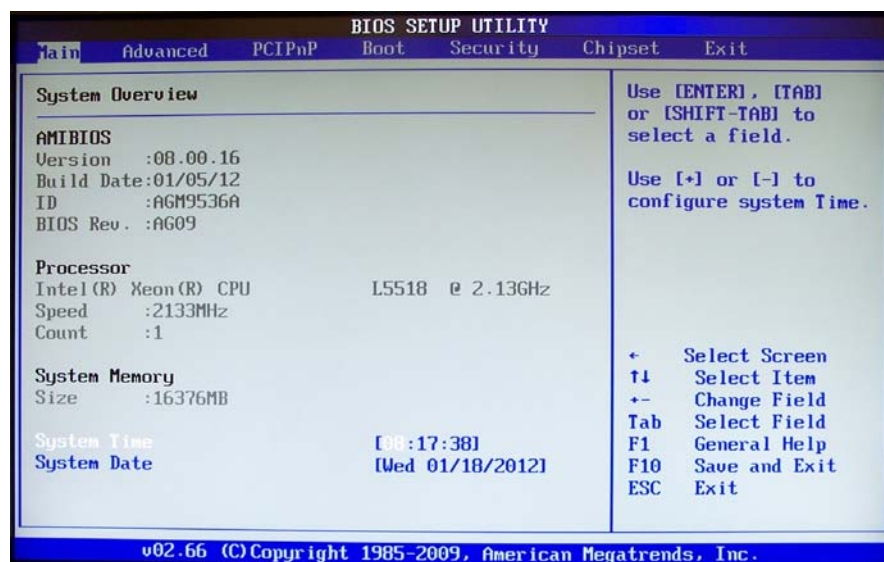
Figure 22 Main BIOS Setup Utility Screen

System time/system date

These options allow you to change the system time and date. Highlight either System Time or System Date using the **<Arrow>** keys. Enter new values using the keyboard. Press the **<Tab>** key or the **<Arrow>** keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

| NOTE | The default time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00. |

Advanced Menu

Select the **Advanced** tab from the setup screen. You can select any of the items in the left frame of the screen, such as `SuperIO Configuration`, to go to the sub menu for that item. You can display an **Advanced BIOS Setup** option by highlighting it using the `<Arrow>` keys. The **Advanced BIOS Setup** screen is shown below.
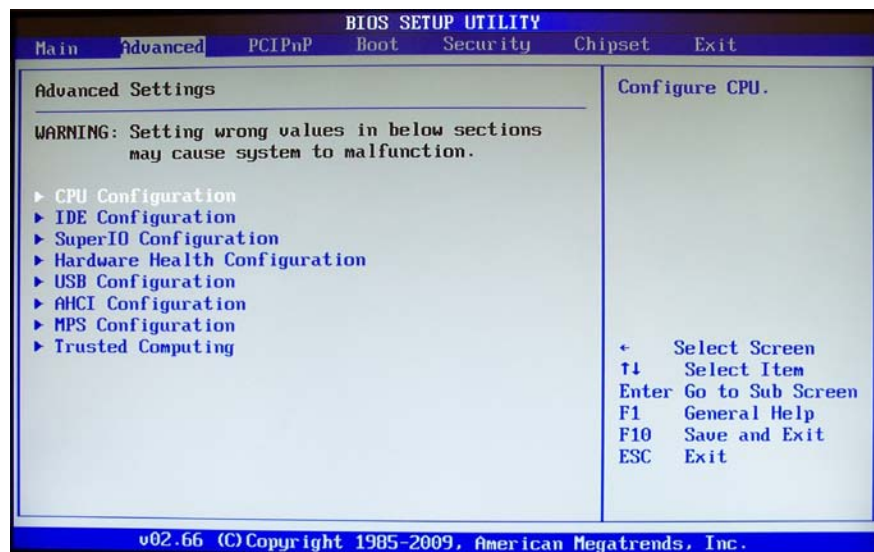

Figure 23 Advanced Settings Menus

The sub menus are described on the following pages.

CPU configuration

You can use this screen to select options for the CPU Configuration Settings. Use the up and down `<Arrow>` keys to select an item. Use the `<+>` and `<->` keys to change the value of the selected option. A description of the selected item appears on the right side of the screen.

Hardware Prefetcher: This is used for reducing the waiting time of DRAM. The hardware prefetcher looks for streams of data and tries to predict what data will be needed next by the processor and proactively tries to fetch these data. Default is Enabled.

Adjacent Cache Line Prefetch: This is used to choose the optimal use of sequential memory access for performance purpose. Disable this setting for applications that require high use of random memory access. Default is Enabled.

Execute-Disable Bit Capability: Intel's Execute Disable Bit is an hardware-based security feature that can help reduce system exposure to viruses and malicious code. It allows the processor to classify areas in memory where application code can or cannot execute. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage and worm propagation. To use Execute Disable bit you must have a PC or server with a processor with Execute Disable Bit capability and a supporting operating system. Default is Enabled.

Intel HT Technology: Hyper-Threading Technology is used to improve parallelization of computations performed on PC microprocessors. A processor with hyper-threading enabled is treated by the operating system as two processors instead of one. Default is Enabled.

Intel Speedstep™ Technology: Intel SpeedStep™ technology allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production. Default is Enabled.

Intel C-State Technology: This function controls the availability of the CPU C-state power saving technology. Default is Enabled.

IDE Configuration

When entering the PC setup, the BIOS auto detects the presence of IDE devices. This menu screen shows the status of each of those devices. SATA (or Serial Advanced Technology Attachment) is a PC bus interface for connecting host bus adapters to mass storage devices such as the SSD (hard drive).

Super IO configuration

You can use this screen to specify the Win627UHG Super IO Chipset settings.

`UART1 to Front Panel` is the only option.

Hardware health configuration

This option displays the current status of all of the monitored hardware devices/components such as voltages and temperatures. In a power management state, the BIOS can adjust (or throttle) the CPU clock speed to reduce power consumption. for example, a Throttle ratio of 50% means the clock is turned off half of its normal operation time. The optimal and fail-safe setting is 50%.

USB configuration

You can use this screen to select options for the USB Configuration. Use the up and down **<Arrow>** keys to select an item. Use the **<+>** and **<−>** keys to change the value of the selected option. The settings are described on the following pages.

Legacy USB Support   Legacy USB Support refers to USB mouse and keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there are no USB drivers loaded on the system. Set this value to enable or disable the Legacy USB Support.

  • Disabled: Set this value to prevent the use of any USB device in DOS or during system boot.

  • Enabled: Set this value to allow the use of USB devices during boot and while using DOS.

  • Auto: This option auto detects USB Keyboards or Mice and if found, allows them to be utilized during boot and while using DOS.

Port 64/60 Emulation   This option uses USB to receive the IO port 64/60 trap to emulate the legacy keyboard controller.

USB 2.0 Controller Mode   The USB 2.0 Controller Mode configures the data rate of the USB port. The options are FullSpeed (12 Mbps) and HiSpeed (480 Mbps).

BIOS EHCI hand-off   This option provides a workaround for operating systems without ECHI hand-off support. The EHCI ownership change should be claimed by the EHCI driver.

Legacy USB1.1 HC Support   Legacy USB support refers to the USB mouse and keyboard support. If this option is disabled, any attached USB keyboard and mouse will not become available until a USB compatible Operating System is fully booted with all USB drivers installed. If the option is enabled, any attached USB keyboard and mouse can control the system even if USB drivers are not installed.

AHCI configuration

This menu item allows you to enable/disable AHCI BIOS support. When enabled, BIOS will detect the presence of AHCI disks and show which port they are on.

MPS Configuration

Displays the MultiProcessor Specification (MPS) revision number.

Trusted Computing

Indicates the Trusted Computing Group (TCG) and Trusted Platform Module (TPM) support from the BIOS.

PCI/PnP Menu

Select the PCI/PnP tab from the setup screen to enter the **Plug and Play BIOS Setup** screen. You can display a **Plug and Play BIOS Setup** option by highlighting it using the **<Arrow>** keys. The **Plug and Play BIOS Setup** screen is shown below.
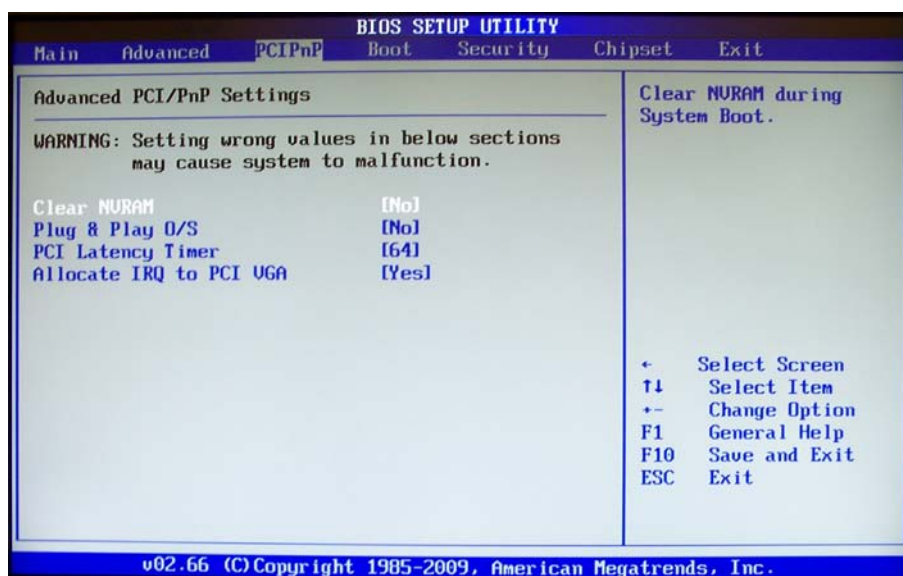

Figure 24 BIOS Setup: Advanced PCI/PnP Settings

Clear NVRAM

Set this to enable/disable Clear NVRAM during system boot. NVRAM content like ESCD will be cleared and updated at next boot.

Plug & Play O/S

- **No**: Let the BIOS configure all the devices in the system.
- **Yes**: Let the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.

PCI latency timer

Set this value to allow the PCI Latency Timer to be adjusted. This option sets the latency of all PCI devices on the PCI bus.

Allocate IRQ to PCI VGA

This value allows (or prohibits) the system from giving the VGA chipset an interrupt address.

Boot Menu

Select the Boot tab from the setup screen to enter the **Boot BIOS Setup** screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display a **Boot BIOS Setup** option by highlighting it using the **<Arrow>** keys. The Boot Settings screen is shown below:
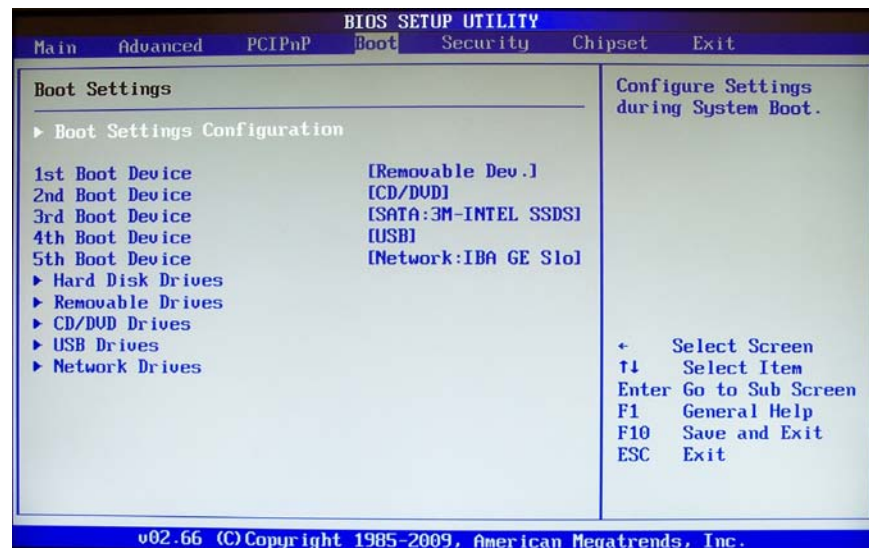

Figure 25 BIOS Setup: Boot Settings

Boot settings configuration

Use this screen to select options for the Boot Settings Configuration. Use the up and down **<Arrow>** keys to select an item. Use the **<+>** and **<−>** keys to change the value of the selected option.

Quick Boot:

Disabled – Set this value to allow the BIOS to perform all POST tests.

Enabled – Set this value to allow the BIOS to skip certain POST tests to boot faster.

Quiet Boot:

Disabled – Set this value to allow the computer system to display the POST messages.

Enabled – Set this value to allow the computer system to display the OEM logo.

Bootup Num-Lock: Set this value to allow the Number Lock setting to be modified during boot up.

- **Off** – This option does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard will light up when the Number Lock is engaged.

- **On** – Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is booted up. This allows the immediate use of 10-keys numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard will be lit.

Interrupt 19 Capture: When enabled, allows option ROMs to trap interrupt 19.

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

Security menu

The Security Settings menu allows you to install or change the Supervisor and User passwords.
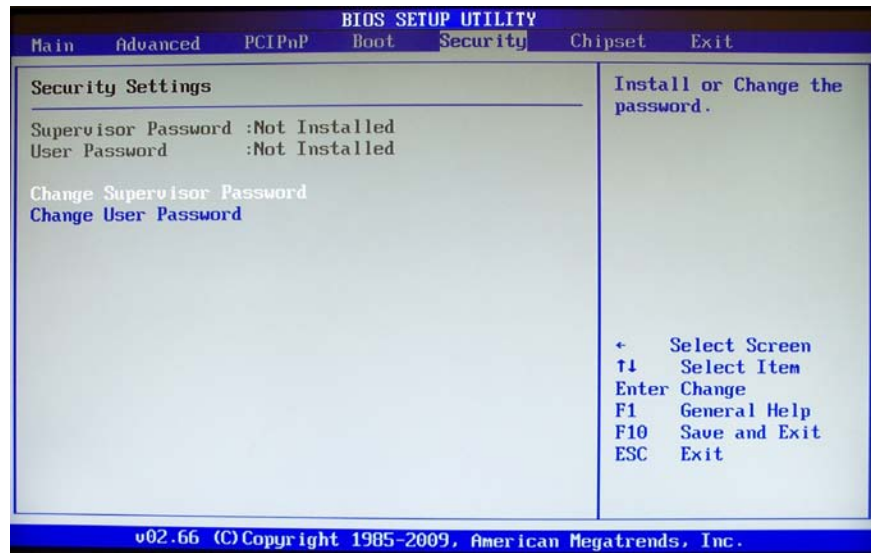

Figure 26 BIOS Setup: Security Settings

Password support

The system can be configured so that all users must enter a password every time the system boots or when Setup is executed, using either or either the Supervisor password or User password. Password Protection provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and re-configure (see "Clear NVRAM" on page 45.

The screen shown in Figure 26 changes as you set User and/or Supervisor passwords,

Record the Password: Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM.

To access the sub menu for the following items, select the item and press **<Enter>**:

- Change Supervisor Password
- Change User Password
- Clear User Password

Supervisor Password: Indicates whether a supervisor password has been set.

User Password: Indicates whether a user password has been set.

Clear User Password: Select this option and press **<Enter>** to access the sub menu. You can use the sub menu to clear the user password.

Change supervisor password

Select Change Supervisor Password from the Security Setup menu and press <Enter> to access the sub menu.

> **Enter New Password:**

Type the password and press **<Enter>**. The screen does not display the characters entered. Retype the password as prompted and press **<Enter>**. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

Change user password

Select Change User Password from the Security Setup menu and press **<Enter>** to access the sub menu.

> **Enter New Password:**

Type the password and press **<Enter>**. The screen does not display the characters entered. Retype the password as prompted and press **<Enter>**. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

Chipset Menu

Select the Chipset tab from the setup screen to enter the Chipset BIOS Setup screen. You can select any of the items in the left frame of the screen to go to the sub menu for that item. The Chipset BIOS Setup screen is shown below.
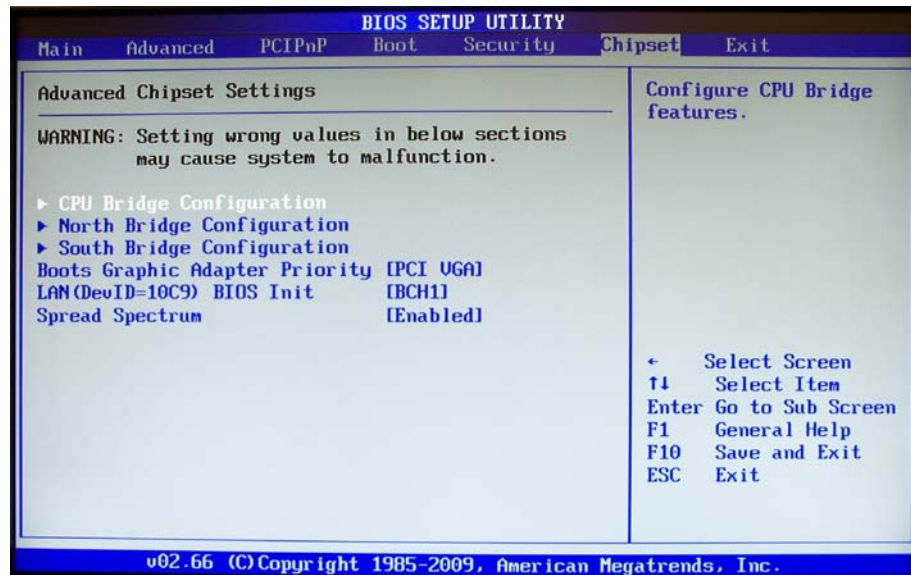

Figure 27 BIOS Setup: Chipset Setup

CPU bridge configuration

The CPU Bridge configuration displays the information and setting of QPI (Quick Path Interface) and memory.

QPI Links Speed: Set to Full-speed for normal operation. Slow-mode is used for debugging.

QPI Frequency: Auto: Let BIOS decide the frequency that the CPU can support (strongly recommend).

Memory Frequency: Auto: Let BIOS decide the frequency that all memory DIMMs can support (strongly recommend).

North bridge configuration

The North Bridge Chipset Configuration screen displays information about the IOH.

South bridge configuration

The South Bridge Chipset Configuration screen displays information and settings for the ICH10R.

USB Functions: Set this value to allow the system to disable, enable, and select a set number of onboard USB ports.

USB Port Configure: The ICH10R contains 2 EHCI controllers which support a total of 12 USB ports. Each EHCI connects 6 ports by default (6x6 USB Ports). Set this option to "8x4 USB Ports" to move ports 11 and 12 from EHCI2 to ECHI1.

USB 2.0 Controller: This option takes effect only when USB Functions are enabled. Enabling will allow USB 2.0 functionality to all USB ports.

SMBUS Controller: Set this value to enable/disable the SMBUS Controller.

Boots Graphic Adapter Priority

Set this value to decide which BUS, PCI or PCIE, get first VGA boot priority.

LAN BIOS Init

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

Spread Spectrum

Clock Spread Spectrum - Enables/disables the clock spread spectrum. Enabled may reduce EMI generated by the system.

Exit Menu

Select the Exit tab from the setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the `<Arrow>` keys. The Exit BIOS Setup screen is shown below.
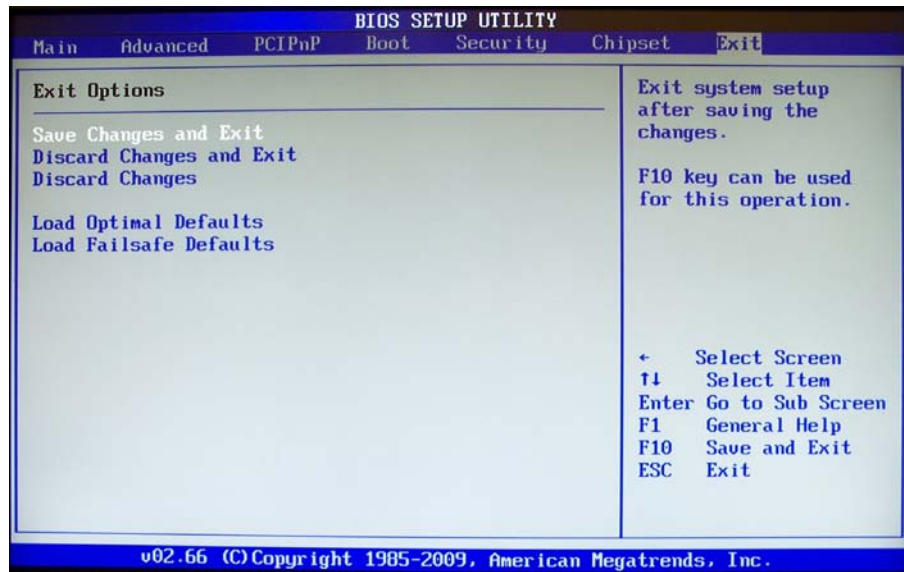
Figure 28 BIOS Setup: Exit

Save changes and exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect.

> **Save Configuration Changes and Exit Now?**
>
> **[Ok] [Cancel]**

appears in the window. Select **<Ok>** to save changes and exit.

Discard changes and exit

Select this option to quit Setup without making any permanent changes to the system configuration.

> **Discard Changes and Exit Setup Now?**
>
> **[Ok] [Cancel]**

appears in the window. Select **<Ok>** to discard changes and exit.

Discard changes

Select Discard Changes from the Exit menu and press **<Enter>**.

Select **<Ok>** to discard changes.

Load optimal defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems.

Select Load Optimal Defaults from the Exit menu and press **<Enter>**.

Select **<Ok>** to load optimal defaults.

Load fail-safe defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press **<Enter>**.

```
Load FailSafe Defaults?

[Ok] [Cancel]
```

appears in the window. Select **<Ok>** to load Fail-Safe defaults.
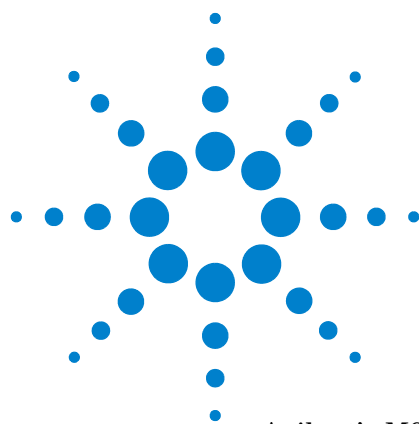
4

Service

Agilent's M9536A AXIe Embedded Controller has some user serviceable parts. In general, you should not need to change switch settings. Always observe Electrostatic Discharge precautions.

NOTE	Periodically check for the latest AXIe chassis firmware: www.agilent.com/find/M9502A or www.agilent.com/find/M9505A
	For example, Agilent's AXIe chassis firmware version 1.3.23 (and later) provides for enhanced fan control and E-Keying that was not supported in earlier chassis firmware versions.

Troubleshooting

What if my M9536A controller does not boot?

There are several possibilities; here are some things to try:

- Make certain the chassis is plugged in to a working source of AC power.
- Check the circuit breaker on the back of the chassis.
- Make certain the controller module is firmly installed and seated in the AXIe chassis.
- Remove all other modules and nonessential cables from the chassis then power it on again.
- Try the M9536A in a different chassis (if available).
- Press the reset button on the controller front panel.
- Do any of the controller LEDs come on? The SSD LED should flash or stay on as the controller boots.
- Does the boot process stop at some point? Does the boot process get to the POST code beeps? Refer to Chapter 2, "Controller Operating System" on page 15 for the display sequence during boot.
- Does anything appear on the video display? If nothing appears on the monitor, try a different monitor. does the monitor work on a different PC?
- As a last effort, clear the CMOS ("SW7 - Clear CMOS" on page 61).
- If none of the above tips help, return the controller to Agilent. Refer to "If you need to return the module for service" on page 56.

<figure>Agilent Technologies</figure>

Booting in Safe Mode

You may need to reboot the computer into Windows Safe Mode. Booting in Safe Mode prevents extraneous services and programs - including most malware - from loading at startup:

Reboot the controller. During the boot process, repeatedly tap the F8 key which should bring up the "**Windows Advanced Options Menu**." Use the arrow keys to move to "Safe Mode" and press the Enter key.

The controller appears to boot but MS Windows is not working

When booting, the monitor displays the normal BIOS startup screens but the display is not working for MS Windows. This may include a garbled display, black or white screen, or an out of synch message on the monitor. This is typically caused by the video output set to a higher resolution than the monitor can display. Reboot the computer in Safe Mode and reset the video driver to a lower setting, such as 800x600 and a refresh rate of 60 Hz. Reboot the controller again. Allow it to run normally and start Windows. Now you should be able to increase the screen resolution by selecting: **Windows Start button** > **Control Panel** > **Display** > **Change display settings**.

If you need to return the module for service

Should it become necessary to return the module for repair or service:

1 Review the warranty information shipped with your product.

2 Contact Agilent to obtain a return authorization and return address. If you need assistance finding Agilent contact information go to www.agilent.com/find/assist (worldwide contact information for repair and service) or refer to the **Support** information on the product web page at: *www.agilent.com/find/M9536A*.

3 Write the following information on a tag and attach it to the controller.

  • Name and address of owner. A Post Office box is not acceptable as a return address.

  • Product model number (for example, M9536A)

  • Product serial number (for example, TWxxxxxxxx).

  • A description of failure or service required.

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

5 On the shipping label, write ATTENTION REPAIR DEPARTMENT and the service order number (if known).

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

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.
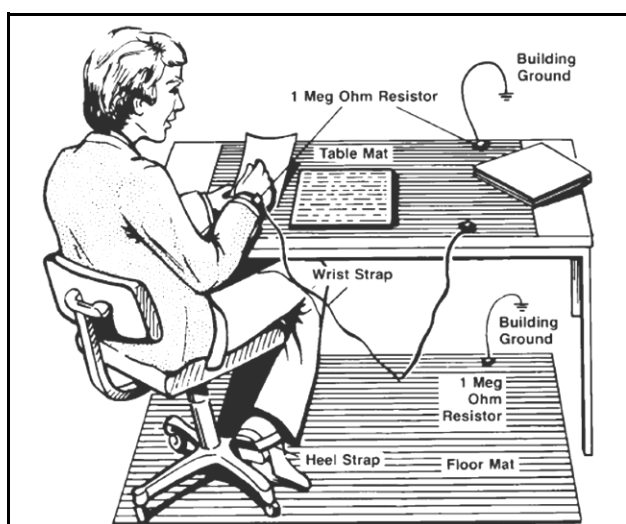
Both methods, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 MΩ of isolation from ground.

Switch Settings

Serial port switch settings

One PC-compatible serial RS-232, RJ45 port is provided on the front panel with DIP switches SWX1 and SWX2 used to set COM function to either the RS-232 mode or the IPMC debug mode. A complete set of handshaking and modem control signals are supported, with data transfer rates up to 115.2 kB/sec. The front panel RJ45 COM connector CN14 pin-assignment and DIP switch settings are listed below.

Pin #	Signal	Function
1	DCD#	Data Carrier Detect
2	RTS#	Request to Send
3	DSR#	Data Set Ready
4	TXD	Transmit Data
5	RXD	Receive Data
6	GND	Ground
7	CTS#	Clear to Send
8	DTR#	Data Terminal Ready

COM mode switch settings (SWX1 and SWX2)

Mode	Switch	Pin 1	Pin 2	Pin 3	Pin 4
RS-232 (default)	SWX1	On	On	Off	Off
	SWX2	On	Off	N/A	
IPMC debug port	SWX1	Off	Off	On	On
	SWX2	Off	On	N/A	

Refer to Figure 29 for SWX1 switch location. You must remove the memory module cover to gain access to SWX1.

SWX1

Memory
Modules
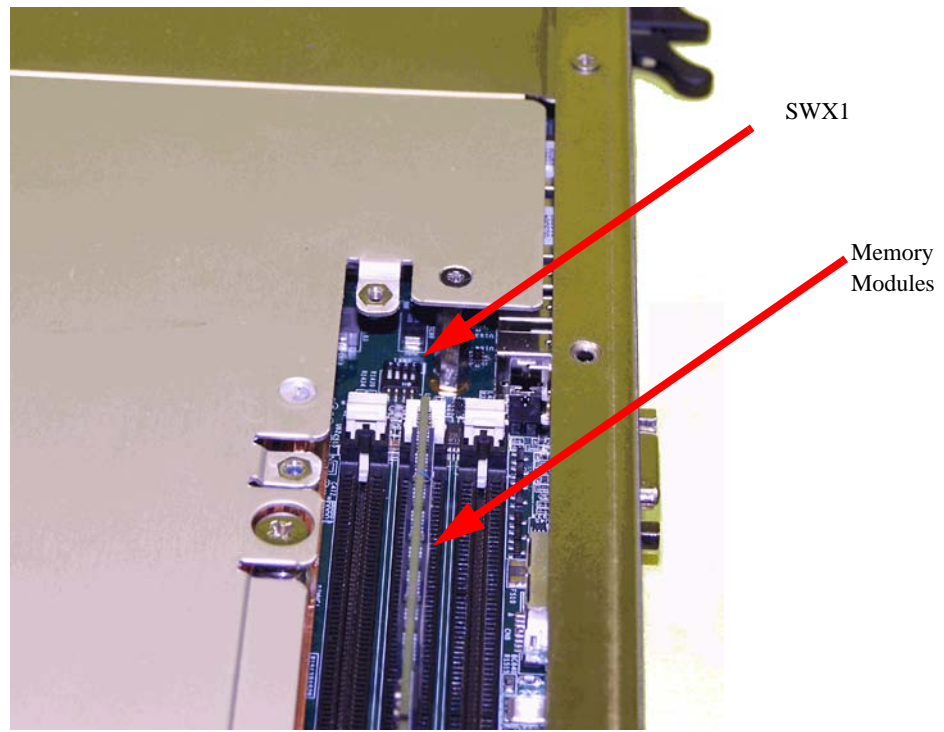
Figure 29 SWX1 Switch Location (cover has been removed)

Figure 30 shows the location for switch SWX2. You do not need to remove any cover to gain access to the switch. The SSD cover is shown removed for clarity.

SW2   SW1   SWX2   SSD Drive   SW3   SW7
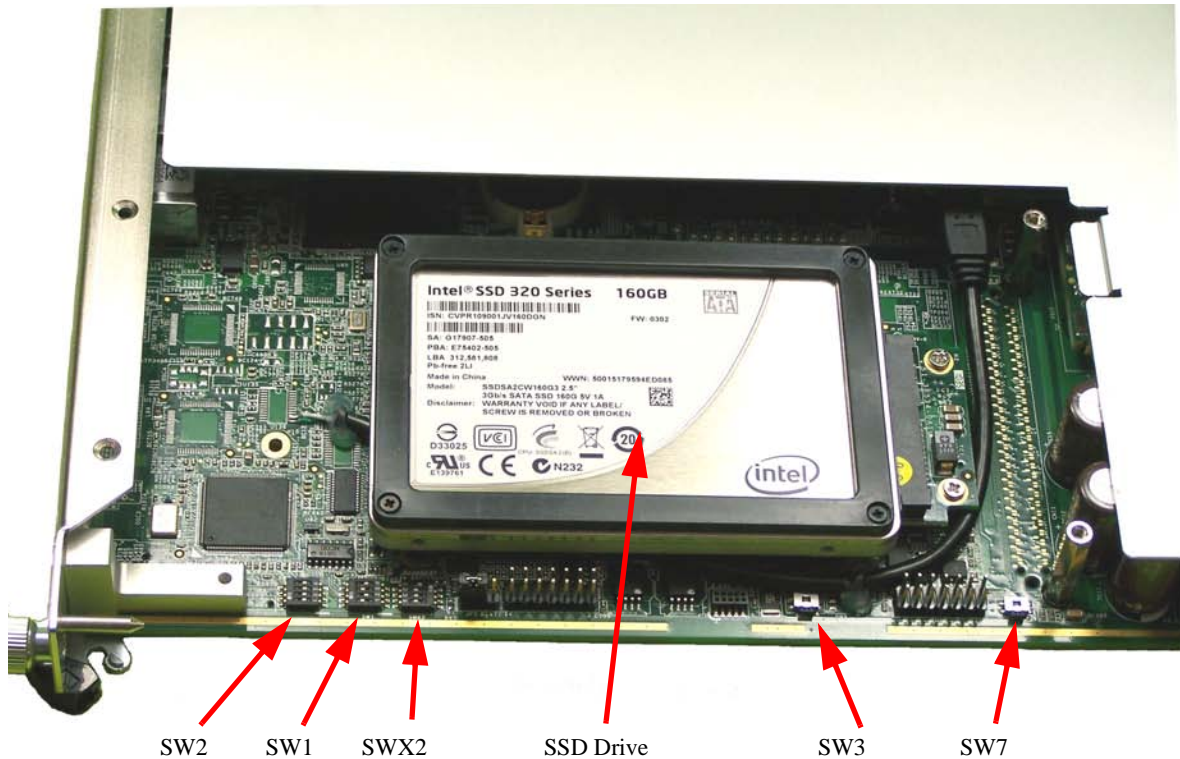
Figure 30 Switch Locations (cover has been removed)

When the switch SWX2 is set to IPMC debug port, the pin assignment of the RJ45 connector is as listed in the following table.

Pin #	Signal	Function
1	NC	Not connected
2	NC	Not connected
3	NC	Not connected
4	DBG_TX	IPMC Transmit Data
5	DBG_RX	IPMC Receive Data
6	GND	Ground
7	NC	Not connected
8	NC	Not connected

Other switch settings

Refer to Figure 30 on page 60 for switch locations. Switch SW1 is for Blade Operation Mode Control and PICMG 3.1 Option Control. Switch SW2 is for debugging purposes. For normal operation, leave the switches in their default settings.

SW1 - Blade Operation Mode Control   Normal operation requires a shelf manager for the blade to boot. Standalone mode allows the blade to boot without a shelf manager.

Options	Switch 1	Switch 2
Normal mode (default)	On	Off
Standalone mode	Off	On

SW1 - PICMG 3.1 Option Control

Options	Switch 3	Switch 4
PICMG 3.1 Opt. 1	Off	Off
PICMG 3.1 Opt. 9 (default)	On	Off

SW2 - Debug use only   Do not change the position of these switches.

SW2	Switch 1	Switch2	Switch 3	Switch 4
Default Setting	Off	Off	Off	Off

- Switch 1: On for FWE pin protection; Off for Normal operation
- Switch 2: On for Slave SPI; Off for Master SPI

IPMC Mode Select:

- Switch 3: On for Program mode; Off for Normal operation
- Switch 4: On for Program Mode; Off for Normal operation

SW3 - Factory use only   SW3 is a momentary contact switch used for factory testing. Do not depress this switch.

SW7 - Clear CMOS   SW7 is a momentary contact switch and is provided to clear the CMOS memory and reset the BIOS values to default. Remove the M9536A from the chassis to press the switch. During reboot, the CMOS settings and date/time will show an error; press the F2 key to restore defaults.

Removing the Top Cover

Although you should never need to remove the top cover, it is important to understand that 14 mounting screws must be removed. Nine of the mounting screws are metal. Five of the mounting screws are nylon and a shield is underneath the top cover to prevent it from touching the processor heat sink. Refer to Figure 31. The shield is permanently adhered to the top cover.

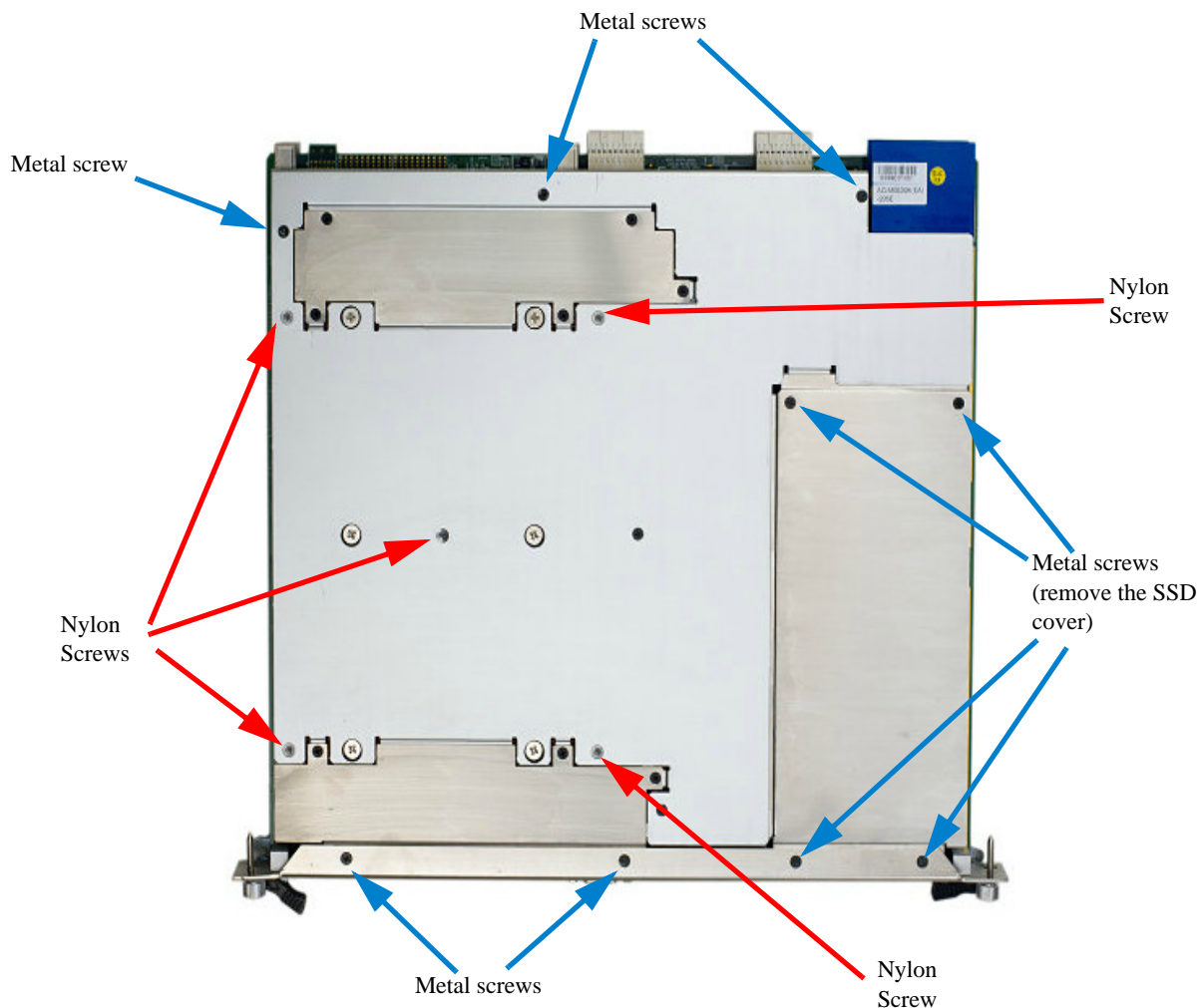**Figure 31** Top Cover Screws. Use a #1 Phillips screwdriver to remove and replace screws.

CAUTION	To avoid damage to the M9536A module, the nylon screws must never be replaced with metal screws. Use only the screws supplied with the module.

Battery Backup

The M9536A is provided with a 3.0 V "coin cell" lithium battery. To replace the battery, proceed as follows:

CAUTION	Always observe ESD precautions. See *"Electrostatic Discharge"* on page 57.

1. Turn off the AXIe Chassis and remove the power cord.
2. Remove the M9536A Embedded Controller from the AXIe chassis. Observe all anti-static precautions.

NOTE	Replacing the battery is easiest if you remove the SSD first. for instructions on removing the SSD, refer to *"Replacing the SSD"* on page 68.

3. Remove the SSD cover from the M9536A as shown in Figure 32

Remove these four screws to remove cover
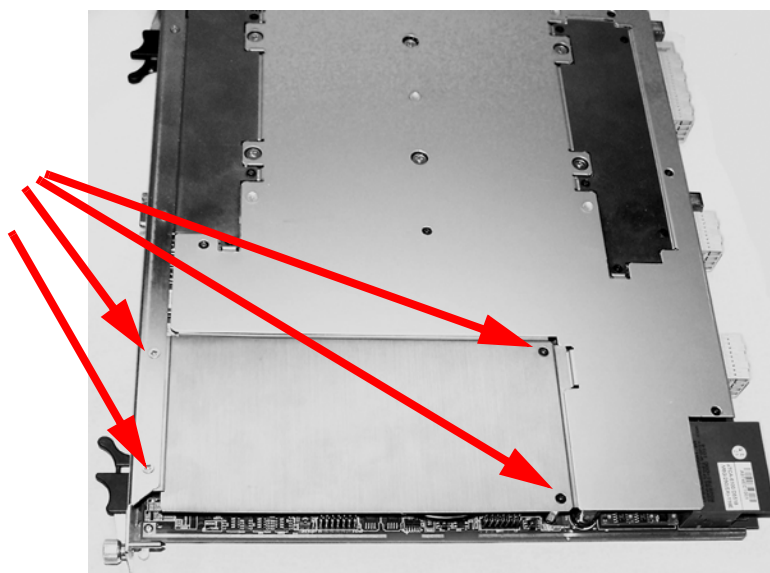
Figure 32 Remove the covers as indicated. Use a #1 Phillips screwdriver.

4. (Optional step) Remove the SSD. Instructions for removing the SSD are found in *"Replacing the SSD"* on page 68.
5. Remove the battery (see Figure 33 below). Press the battery release latch (1). The battery should pop out (2).
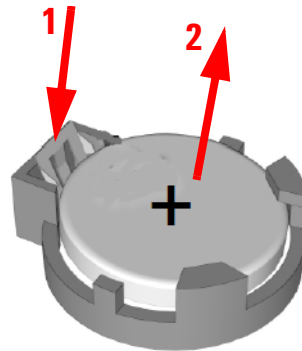
Figure 33 Replacing the Battery

6 Place the new battery in the socket. Make sure that you correctly orient the battery for installation. The positive pole (**+**) <u>must</u> 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 SSD and the cover.

8 Install the embedded controller back in the AXIe chassis and apply power.

NOTE	The battery's operational temperature range is less than that of the M9536A'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 (CR2032or 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.

9 During reboot, the CMOS settings and date/time will show an error; press the F2 key to restore defaults.

Installing Additional Memory

The M9536A has three 240-pin, RDIMM sockets[*] which support DDR3-1333 REG/ECC RAM sticks. Each socket can support memory modules up to 8GB for a total memory capacity of 24GB. The standard M9536A configuration is a single 8GB memory stick with a factory option to add a second 8GB memory stick. This leaves an empty socket for future expansion. Memory modules larger than 8GB are not supported.

To change or add additional memory, perform the following steps:

CAUTION	Always observe ESD precautions. See *"Electrostatic Discharge"* on page 57.

1 Power off the AXIe chassis. Remove the ac power cord from the back of the chassis.

2 Remove the M9536A controller from the AXIe chassis.

3 Position the controller, top side up on the workbench. Remove the four screws and panel as indicated in Figure 34.

Remove these five screws to remove cover
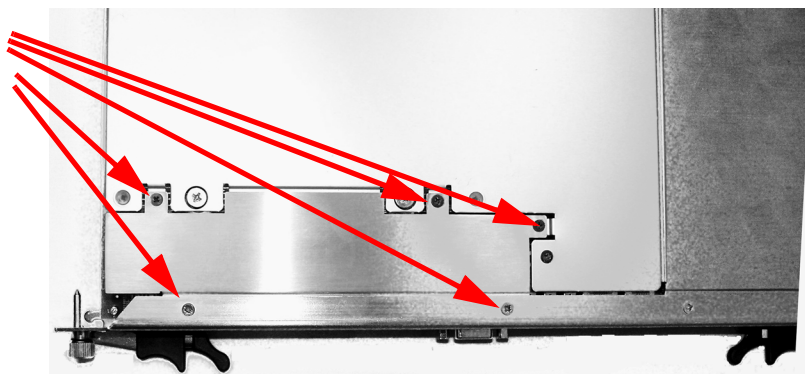
Figure 34 M9536A Disassembly for adding memory. Use a #1 Phillips screwdriver to remove and replace screws.

There are three memory sockets on the motherboard. Figure 35 shows the default and possible arrangements of memory modules in the three sockets.

---

[*] Actually, there are six memory sockets installed on the PC board. The back three are for a second processor which is not supported on the M9536A.

Default, 8GB configuration, one 8GB DIMM memory stick

Optional, 16GB configuration, two 8GB DIMM memory sticks

User installed, 24GB configuration, three 8GB DIMM memory sticks
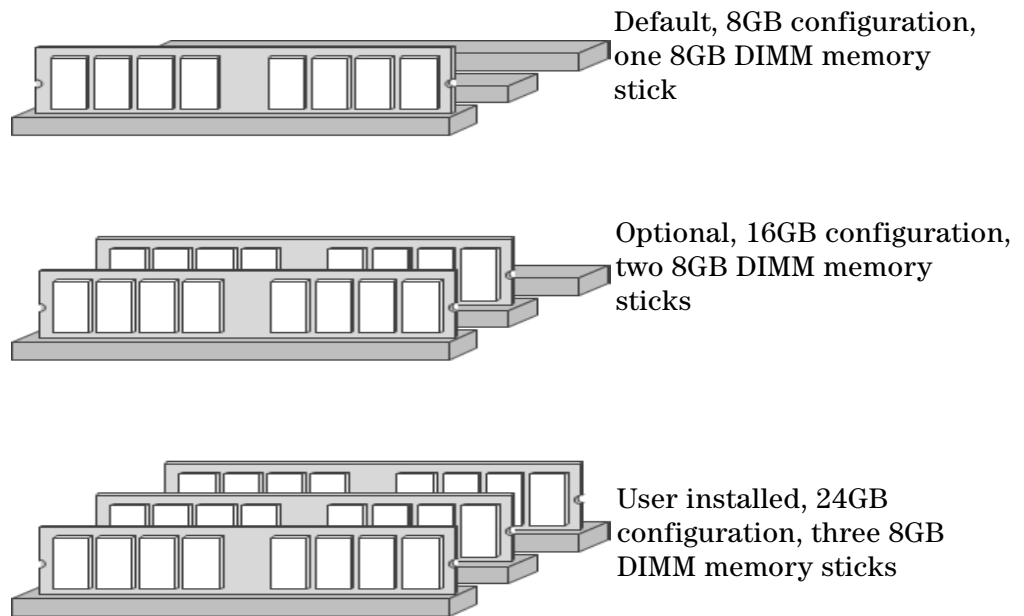
Figure 35 DIMM Module Configurations

To remove memory modules:

- Press down on the module locks on each side of the memory socket. This releases the memory cards from their sockets. Pull out the memory card and set it aside on an anti static container.

To install new memory DIMM modules:

1 The DDR DIMM memory has only one notch on the center of the module The module will only fit with the correct orientation. Align the off-center notch with the key in the middle of the socket. Slide the new memory card in the locks and press firmly until the locks come up and lock into place. You should hear a distinctive click. Refer to the following figure.

1. Insert the DIMM memory module vertically into the socket.
   Then gently push it in.

DIMM Notch
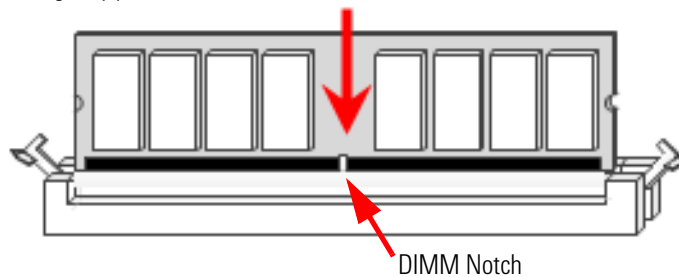
2. The plastic locks at each end of the DIM socket will automatically close.
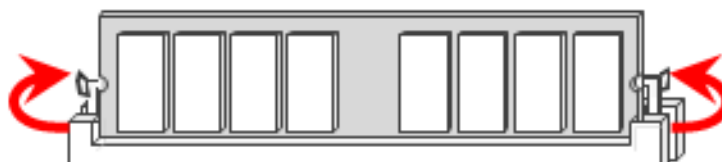
Figure 36 Installing the DIMM Modules

2 Replace the cover panel and four screws (Figure 34).

3 Replace the AXIe controller in the AXIe chassis and power on the chassis.
   You can verify the amount of memory in the controller by:

   a Locate the **Computer** icon on your monitor.

   b Right click the icon and select **Properties** from the menu.

   c Under the **System** heading, look for **Installed Memory (RAM)**.

Replacing the SSD

The Agilent M9536A Embedded controller comes with a 160 GB, 2.5" Serial ATA (SATA) II SSD drive.

Determining the Replacement Part Number for the SSD

Product may contain a custom image. First, look on the sheet metal that covers the SSD for a part number label that states "Solid State Drive Replacement Order #####-#####" to obtain the replacement part number for the SSD. If there is no Solid State Drive part number label, then look for the Option Label located near the serial number 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.

Option Label	Operating System/RAM	Order Agilent Part Number	Description
W73	Windows 7 Pro (32-bit)	M9536-55732	Replacement SSD with pre-imaged Win7 32-bit OS
W76	Windows 7 Pro (64-bit)	M9536-55764	Replacement SSD with pre-imaged Win7 64-bit OS
WE3	WES 7 (32-bit)	M9536-55532	Replacement SSD with pre-imaged WES 7 32-bit OS
WE6	WES 7 (64-bit)	M9536-55564	Replacement SSD with pre-imaged WES 7 64-bit OS

Replacement Procedure

To replace the SSD, perform the following steps:

CAUTION	**BACK UP YOUR SSD 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 SSD 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 57.

The replacement SSD <u>must</u> conform to the same dimensions and mounting as the original: 2.75" (69.85mm) wide by 0.37" (9.5mm) high by 3.9" (100.35mm) deep.

1 Power off the AXIe chassis.

2 Remove the M9536A controller from the AXIe chassis.

3 Position the controller, top side up on the workbench. With a #1 Phillips screwdriver, remove the four screws and panel indicated in Figure 37.
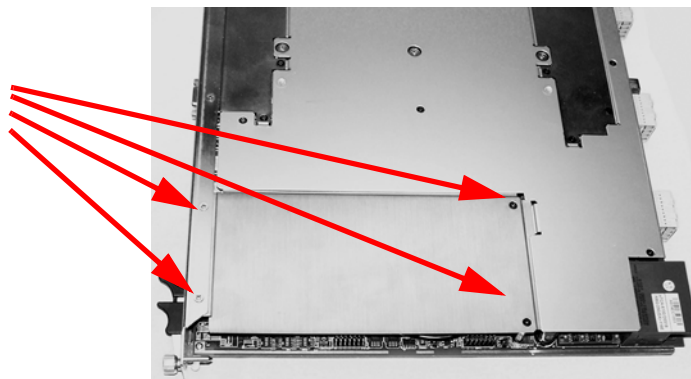
Remove these four screws to remove cover

Figure 37 Removing the top-side cover to replace the SSD.

4 Carefully, turn the controller over. Remove the four SSD screws as indicated in Figure 38. Be very careful as removing these screws releases the SSD.

Remove these four screws to release SSD
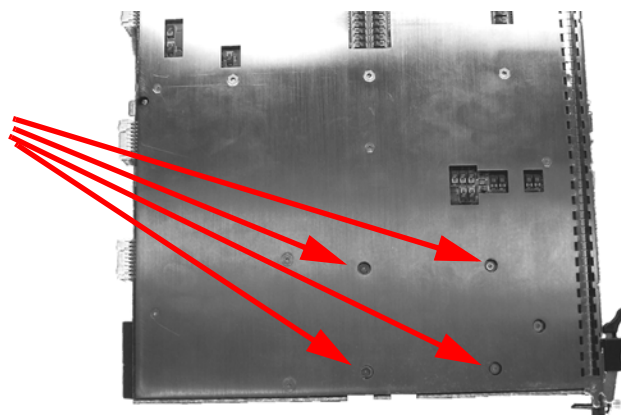
Figure 38 Removing the SSD Mounting Screws

5 Supporting the drive from below, carefully turn the controller back over. Gently lift the back end of the SSD drive and slide it out of its socket.

6 Remove the four standoffs from the old SSD drive. Install the standoffs onto the new SSD. See Figure 39.

Remove 4 standoffs and
install on new SSD
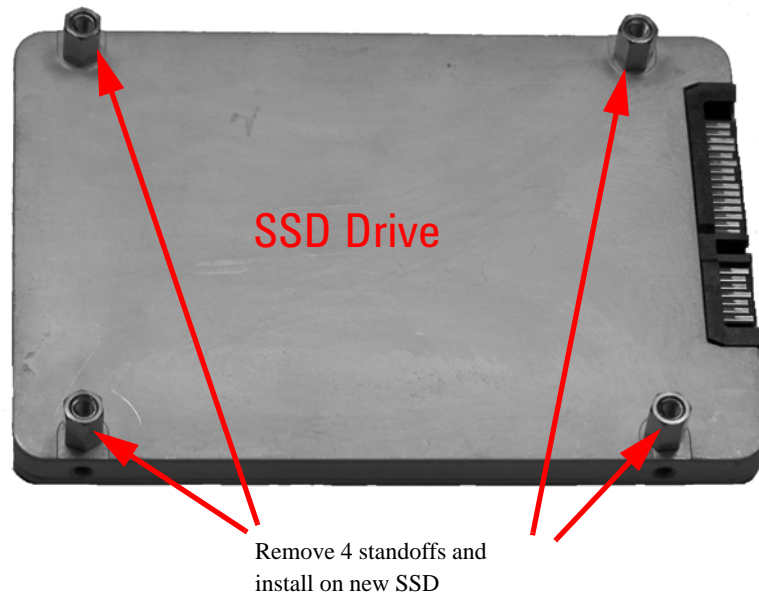
Figure 39 SSD Standoffs

7 To replace the SSD, reverse the preceding steps. Angle the new SSD and carefully slide the SSD into the empty socket.

<table><tr><td>**CAUTION**</td><td>If you feel resistance as you install the new SSD, do not force it. You may have the drive upside down. Damaging the signal pins may render the drive useless.</td></tr></table>

8 Replace the cover and install the controller in your AXIe chassis

9 When you power up the chassis, the controller BIOS should automatically detect the new SSD If you created the disk image on the new SSD, 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 SSD.

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. 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 M9536A is not able to power on, it may be declassified by removing the SSD (disk drive) from the controller. Follow the procedure "Replacing the SSD" on page 68.

For additional information, go to: **http://www.agilent.com/find/security** and enter the model number of you controller (M9536A).

Controller memory

The following table lists the types of memory used in the M9536A 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) 8GB or 16GB Std. User may install additional 8GB	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.
8Mbit 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
DDR2-533 64MB memory	Nos	No	Video RAM	Controller Video graphics only.	Motherboard	Cycle power. This is volatile memory.

SSD Removal Because it is virtually impossible to completely and selectively erase all user data on a SSD 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 SSD.

1 Turn the AXIe chassis off.

2 Remove the controller from the AXIe chassis.

3 Remove the SSD drive. For instructions on removing the SSD drive, refer to "Replacing the SSD" on page 68.
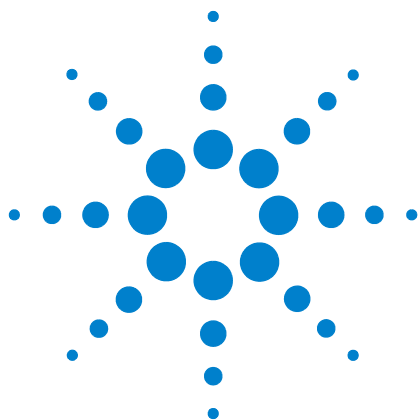
Glossary

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.

aDB-6100AX   Apple Desktop Bus (ADB) is an obsolete bit-serial computer bus for connecting low-speed devices (mouse, keyboard, etc.) to a computer.

ATCA   Advanced Telecommunication Computing Architecture (also known as AdvancedTCA) is a PCI Industrial Computing Manufacturers Group (PICMG) specification. See AXIe below.

AXIe   AdvancedTCA 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.

BMC   Baseboard Management Controller

BMR-H8S   Board Management Reference design for AdvancedTCA

ESD   Electrostatic Discharge. See "Electrostatic Discharge" on page 57

FRU   Field Replaceable Unit. A unit (such as a module or power supply) that the user can replace in the field. Many FRUs are not hot swappable.

GbE   Gigabit Ethernet. Ethernet at a rate of 1 gigabit per second.

HPM   Hardware Platform Management. PICMG specification that defines an open mechanism to upgrade the resident management software and firmware.

IPMB   Intelligent Platform Management Bus. Based on the I^2C (also known as Inter IC, IIC or I2C) bus, the IPMB interface provide communication between components on a PC chassis; it is an internal chassis bus that also connects to the external chassis through a bridge chip.

IPMC Intelligent Platform Management Interface. It is used to monitor system health and manage the computer system.

IPMI Intelligent Platform Management Interface.

KCS Keyboard Controller Style.

LPC Low Pin count. An interface specification for legacy I/O. Allows legacy I/O of motherboard components, such a Super I/O chip, to migrate from the ISA/X bus to the new LPC interface while retaining software compatibility. It runs at the PCI 33MhZ clock making LPC much faster than the older ISA running with an 8MHz clock.

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

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

PICMG PCI Industrial Computer Manufacturers Group. PICMG is a consortium of hundreds of companies that develop open specifications for high performance telecommunications and industrial computing applications.

SATA Serial ATA or Serial Advanced Technology Attachment. A computer bus interface for connecting host adapters to mass storage devices (hard drives, etc.) This standard is also known as EIDE.

SerDes Serializer/Deserializer. Two blocks used in high speed communications to compensate for limited throughput. They convert data between serial and parallel interfaces.

Super I/O A class of ICs that combines interfaces for a variety of low-bandwidth devices such as serial ports, keyboard and mouse, temperature and fan speed monitoring, etc.

TPM Trusted Platform Module. An IC designed by the Trusted Computing Group (TCG) for storing passwords, encryption keys, digital certificates, etc.

UXGA Abbreviation for Ultra eXtended Graphics Array referring to a standard monitor resolution of 1600×1200 pixels.

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