bullx R423-E3

Installation and User's Guide

extreme computing

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Installation and User's Guide

Hardware

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Preface

Note The Bull Support Web site may be consulted for product information, documentation, downloads, updates and service offers:
http://support.bull.com

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the R423-E3 server. Installation and maintenance should be performed by experienced technicians only.

The R423-E3 server is a high-end server based on the R423-E3 chassis and the R423-E3 serverboard dual processor serverboard.

Manual Organization

Chapter 1: Introduction

The first chapter provides a checklist of the main components included with the server system and describes the main features of the R423-E3 serverboard and the R423-E3 chassis.

Chapter 2: Server Installation

This chapter describes the steps necessary to install the R423-E3 server into a rack and check out the server configuration prior to powering up the system. If your server was ordered without processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

Chapter 3: System Interface

Refer here for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 4: System Safety

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the R423-E3 server.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the R423-E3 serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

Chapter 6: Advanced Chassis Setup

Refer to Chapter 6 for detailed information on the R423-E3 server chassis. You should follow the procedures given in this chapter when installing, removing or reconfiguring SAS/SATA or peripheral drives and when replacing system power supply units and cooling fans.

Chapter 7: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS Error Beep Codes

Appendix B: System Specifications

Chapter 1. Introduction

1.1 Overview

The R423-E3 is a high-end server comprised of two main subsystems: the R423-E3 server chassis and the R423-E3 dual processor serverboard.

In addition to the serverboard and chassis, various hardware components have been included with the R423-E3 server, as listed below:

- Two passive CPU heatsinks (SNK-P0048PS)
- Three 8-cm system fans (FAN-0126L4)
- One air shroud (MCP-310-29001-0N)
- SATA/SAS Accessories
  One SAS/SATA backplane (BPN-SAS-825TQ)
  Two 27-cm. iPass to SATA cables (CBL-0176L-02)
  Hot-swap Hard Drive Carrier (MCP-220-00075-0B)
  Fixed Hard Drive Carrier (MCP-220-82502-0B)
- Motherboard (MBD-X9DRH-7F)
- Chassis (CSE-825TQ-R740LPB)
- Mounting Rails (MCP-290-00053-0N)
- Drive Cover Black USB (MCP-220-00023-01)
- Drive Cover DVD-Rom (MCP-290-00007-01)
- Power Supply (PWS-741P-1R)
- Power Supply Distributor (PDB-PT825-8824)
- Accessory Box (MCP-420-82503-0N)
- Heatsink/Retention (SNK-P0048PS)

1.2 Serverboard Features

The R423-E3 server is built around the R423-E3 serverboard, a dual processor serverboard based on the Intel C602 chipset and designed to provide maximum performance. Below are the main features of the R423-E3 serverboard. (See Figure 1-1 for a block diagram of the chipset).

Processors

The R423-E3 serverboard supports single or dual Intel® E5-2600 Series (Socket R) processors in LGA 2011 sockets).

Memory

The R423-E3 serverboard has sixteen DIMM slots that can support up to 512 GB of ECC registered/unbuffered DDR3-1600/1066/800 memory. Please refer to Chapter 5 for details on installing memory.

SAS

An LSI 2208 hardware RAID controller provides support for eight SAS 2.0 ports, which are RAID 0, 1, 5, 6, 10, 50 and 60 capable.

SATA

A SATA controller is integrated into the C602 chipset to provide a 6+4 port SATA subsystem, which is RAID 0, 1, 10 and 5 capable. Two ports support SATA 3.0 (I-SATA0/1) and 6+2 support SATA 2.0 (I-SATA2-5).

PCI Expansion Slots

The R423-E3 serverboard has six PCI-E 3.0 x8 (in x8 slot), and one PCI-E 3.0 x16 (in x16 slot). Note that the PCI slots are controlled by the CPU so some slots may not be available when two CPUs are not installed on the board at the same time. See the serverboard layout in Chapter 5 for details.

I/O Ports

The color-coded I/O ports include one COM port, a VGA (monitor) port, four USB, two Ethernet LAN 1GB ports and a dedicated IPMI LAN port.

Graphics Controller

The R423-E3 serverboard features an integrated Matrox G200eW video controller. The G200eW is a 2D/3D/video accelerator chip with a 128-bit core.

1.3 Server Chassis Features

The R423-E3 chassis is an ATX form factor chassis designed to be used in a 2U rackmount configuration. The following is a general outline of the main features of the R423-E3 chassis.

System Power

The R423-E3 chassis features a redundant 740W power supply composed of two separate power modules. This power redundancy feature allows you to replace a failed power supply module without shutting down the system.

Hard Drive Subsystem

The R423-E3 chassis was designed to support eight hot-swap SATA or SAS hard drives.

Front Control Panel

The control panel on the R423-E3 chassis provides you with system monitoring and control. LEDs indicate system power, HDD activity, network activity, system information and power supply failure. A main power button and a system reset but- ton are also included. In addition, two USB ports have been incorporated into the control panel to provide front side USB access.

Cooling System

The R423-E3 chassis has an innovative cooling design that includes three 8-cm hot-plug system cooling fans located in the middle section of the chassis. An air shroud channels the airflow from the system fans to efficiently cool the processor area of the system. The power supply module also includes a cooling fan.

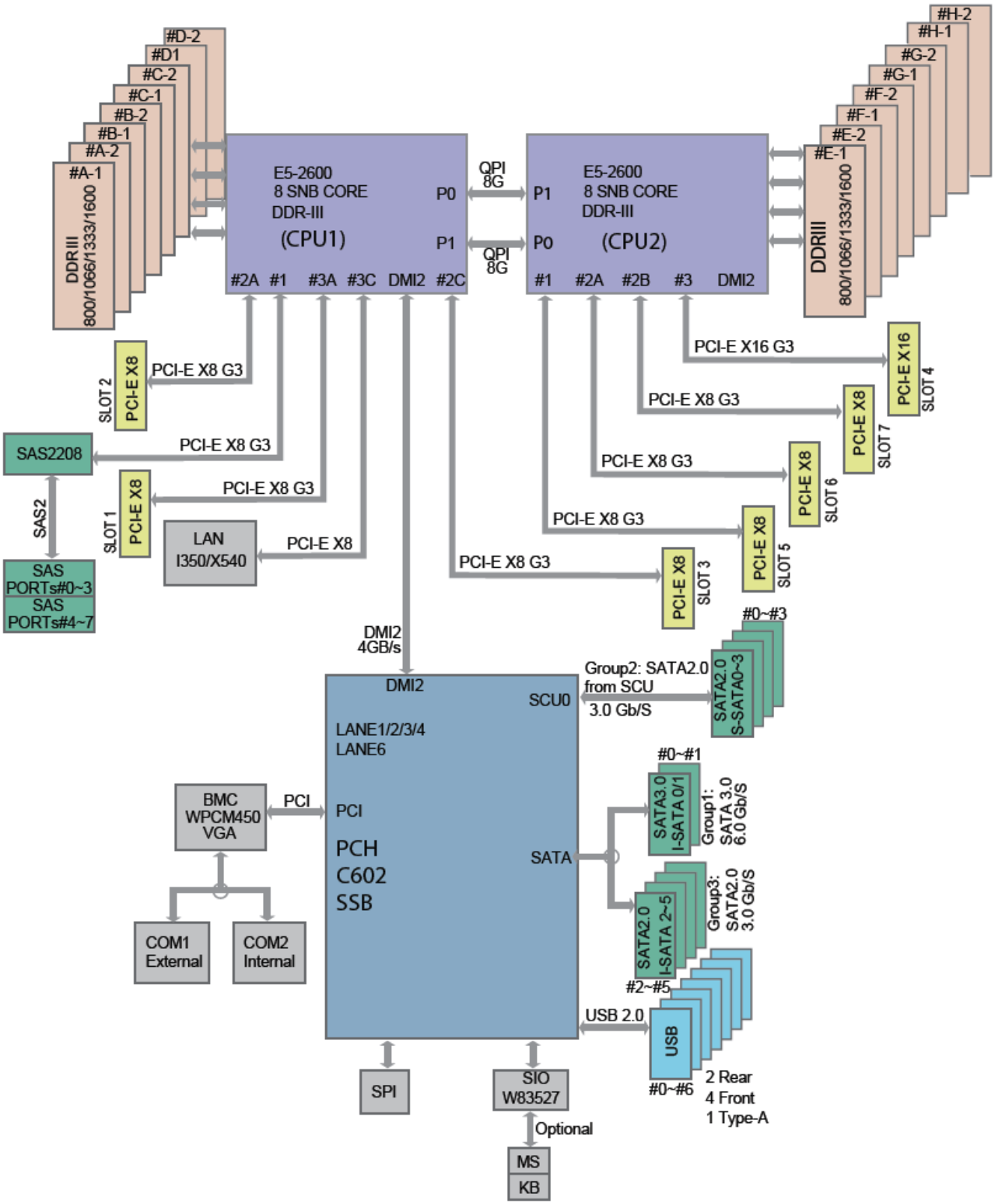


Figure 1-1. System Block Diagram

Note This is a general block diagram and may not exactly represent the features on your serverboard. See the previous pages for the actual specifications of your serverboard. This block diagram is intended for your reference only.

Chapter 2. Server Installation

2.1 Overview

This chapter provides a quick setup checklist to get your R423-E3 server up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

2.2 Unpacking the System

You should inspect the box the R423-E3 server was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the R423-E3 server. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Read the Rack and Server Precautions in the next section.

2.3 Preparing for Setup

The box the R423-E3 server was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

2.4 Cautions!

2.4.1 Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.
- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).
- This product is not suitable for use with visual display work place devices according to §2 of the German Ordinance for Work with Visual Display Units.

2.4.2 Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

2.4.3 Server Precautions

- Review the electrical and general safety precautions in Chapter 4.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.
- Allow any hot plug drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

2.4.4 Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum rated ambient temperature (Tmra).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

2.5 Installing the System into a Rack

This section provides information on installing the R423-E3 chassis into a rack unit with the quick-release rails provided. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

Note This rail will fit a rack between 26" and 33.5" deep.

2.5.1 Separating the Sections of the Rack Rails

The chassis package includes two rail assemblies in the rack mounting kit. Each assembly consists of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed rack rail that secures directly to the rack itself (Figure 2-1).

Separating the Inner and Outer Rails

1. Locate the rail assembly in the chassis packaging.
2. Extend the rail assembly by pulling it outward.
3. Press the quick-release tab.
4. Separate the inner rail extension from the outer rail assembly.

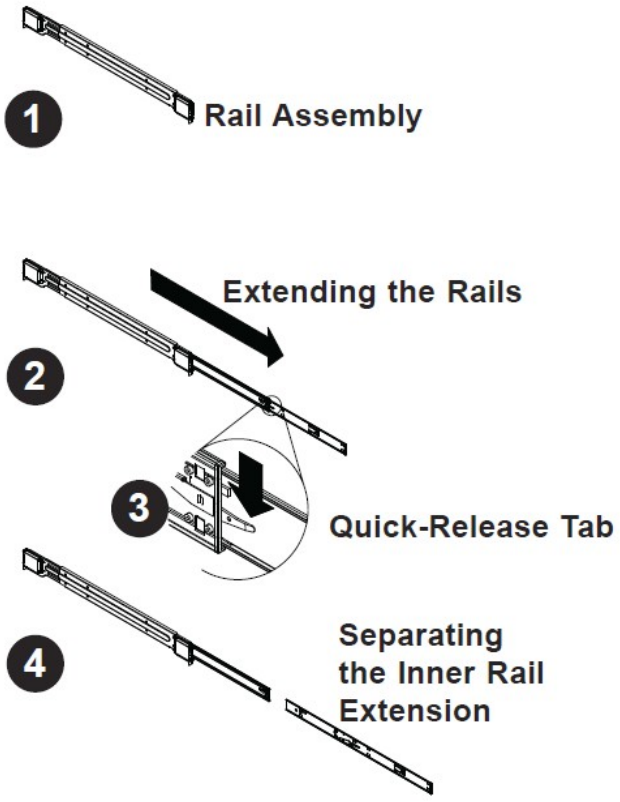


Figure 2-1. Separating the Rack Rails

2.5.2 Installing the Inner Rail Extension

The R423-E3 chassis includes a set of inner rails in two sections: inner rails and inner rail extensions. The inner rails are pre-attached to the chassis, and do not interfere with normal use of the chassis if you decide not to use a server rack. The inner rail extension is attached to the inner rail to mount the chassis in the rack.

Installing the Inner Rails (Figure 2-2)

1. Place the inner rail extensions on the side of the chassis aligning the hooks of the chassis with the rail extension holes. Make sure the extension faces "outward" just like the pre-attached inner rail.
2. Slide the extension toward the front of the chassis.
3. Secure the chassis with 2 screws as illustrated. Repeat steps for the other inner rail extension.

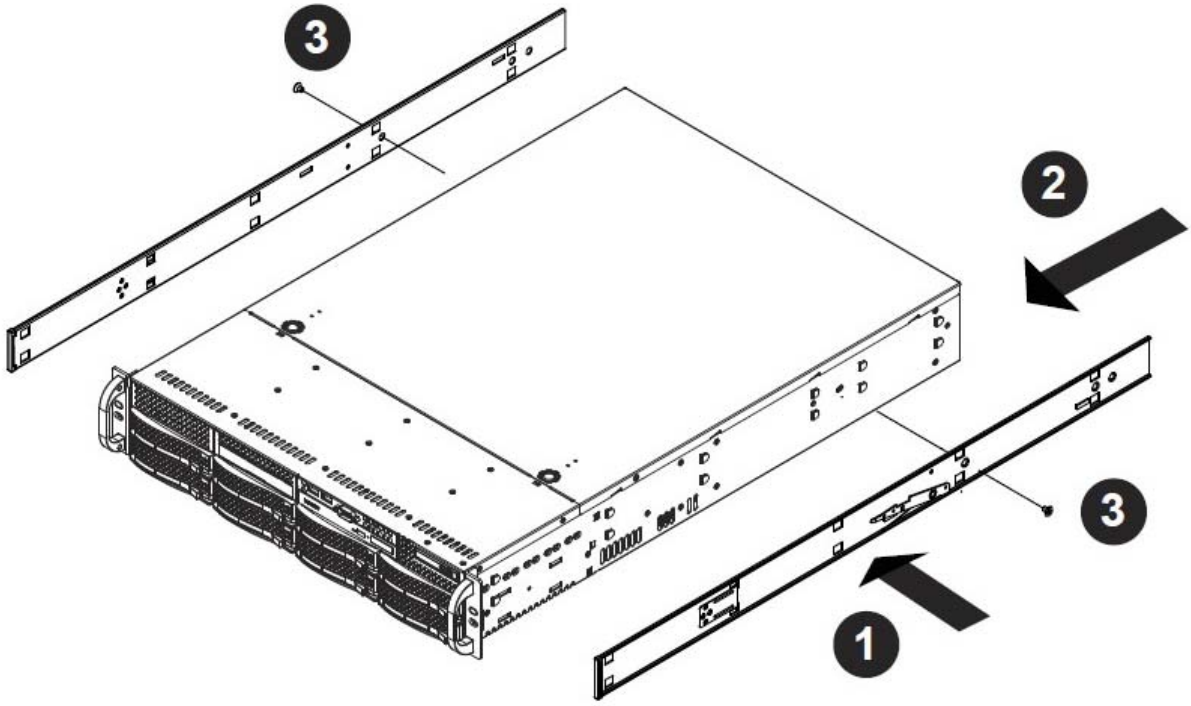


Figure 2-2. Installing the Inner Rail Extensions

2.5.3 Outer Rack Rails

R423-E3 chassis extend between 30 inches and 33 inches.

Installing the Outer Rails to the Rack (Figure 2-3)

1. Secure the back end of the outer rail to the rack, using the screws provided.
2. Press the button where the two outer rails are joined to retract the smaller outer rail.
3. Hang the hooks of the rails onto the rack holes and if desired, use screws to secure the front of the outer rail onto the rack.
4. Repeat steps 1-3 for the remaining outer rail.

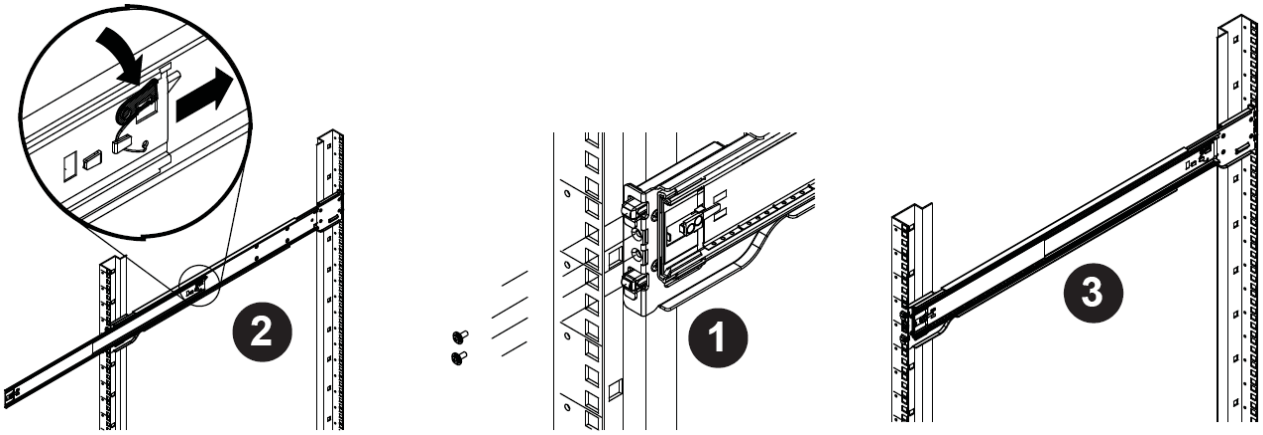


Figure 2-3. Assembling the Outer Rails

Installing the Chassis into a Rack (Figure 2-4)

1. Extend the outer rails as illustrated above.
2. Align the inner rails of the chassis with the outer rails on the rack.
3. Slide the inner rails into the outer rails, keeping the pressure even on both sides. When the chassis has been pushed completely into the rack, it should click into the locked position.
4. Optional screws may be used to secure the front of the chassis to the rack.

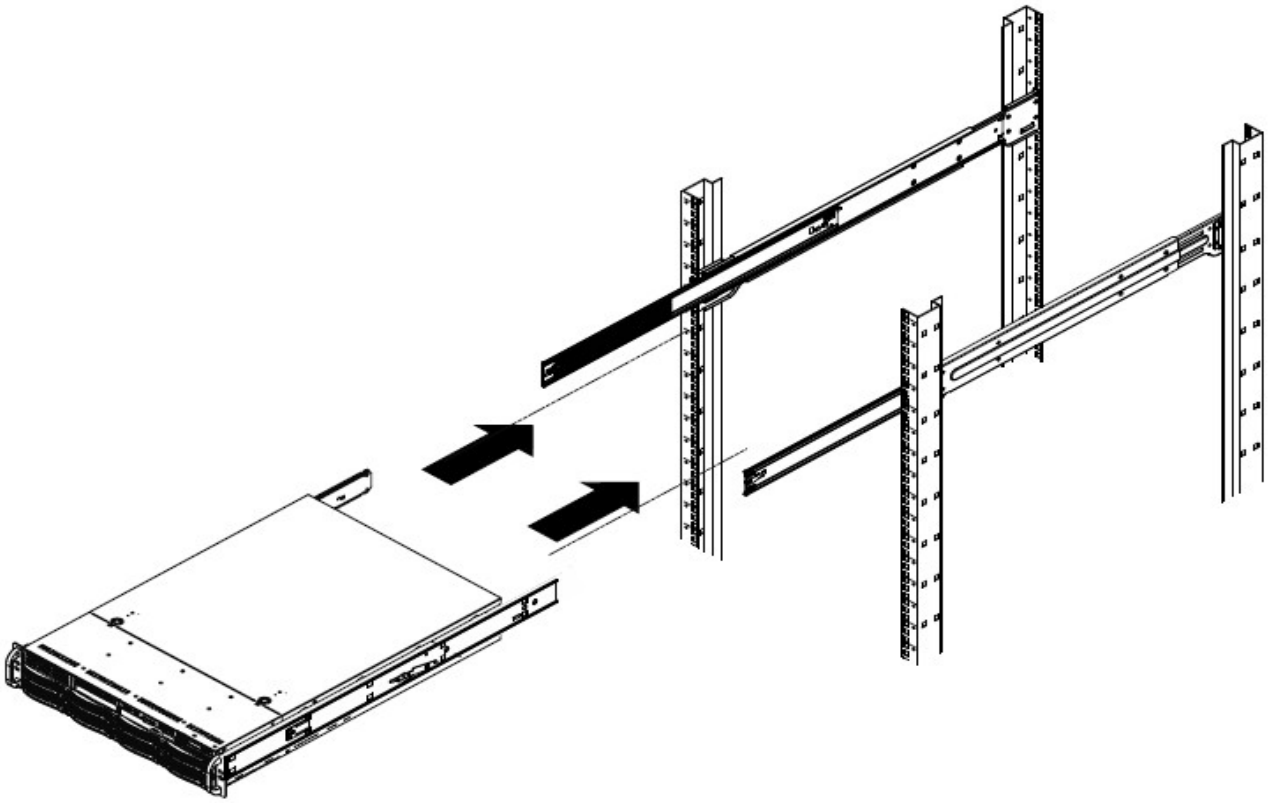


Figure 2-4. Installing the Rack rails

Note The figure above is for illustration purposes only. Always install servers to the bottom of the rack first.

Chapter 3. System Interface

3.1 Overview

There are several LEDs on the control panel as well as others on the drive carriers to keep you constantly informed of the overall status of the system and the activity and health of specific components. There are also two buttons on the chassis control panel.

3.2 Control Panel Buttons

There are two buttons located on the front of the chassis: a reset button and a power on/off button.

- **Reset**: Use the reset button to reboot the system.

- **Power**: This is the main power button, which is used to apply or turn off the main system power. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

3.3 Control Panel LEDs

The control panel located on the front of the chassis has several LEDs. These LEDs provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

- **Power Fail**: Indicates a power supply module has failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally.

- **Information LED**: This LED will be solid blue when the UID function has been activated. When this LED flashes red, it indicates a fan failure. When red continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the indicated condition exists.

- **NIC1**: Indicates network activity on the LAN1 port when flashing.

- **NIC2**: Indicates network activity on the LAN2 port when flashing.

- **HDD**: On the R423-E3 server, this LED indicates hard drive and/or DVD-ROM drive activity when flashing.

- **Power**: Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating.

3.4 Drive Carrier LEDs

Each drive carrier has two LEDs:

3.4.1 SATA Drives

- **Green**: When illuminated, the green LED on the SATA drive carrier indicates drive activity. A connection to the SATA backplane enables this LED to blink on and off when that particular drive is being accessed. Please refer to Chapter 6 for instructions on replacing failed SATA drives.
- **Red**: When this LED flashes it indicates the drive is rebuilding. When solid on it indicates a SATA drive failure. If a drive fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed drives.

3.4.2 SAS Drives

- **Green:** When illuminated, the green LED on the drive carrier indicates the SAS drive is powered on. If this LED is not lit, it means no power is being provided for the drive. Please refer to Chapter 6 for instructions on replacing failed drives.

- **Red:** When this LED flashes it indicates the drive is rebuilding. When solid on it indicates a SAS drive failure. If a drive fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed drives

Chapter 4. System Safety

4.1 Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the R423-E3 from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.
- Do not work alone when working with high voltage components.
- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and add-on cards. When disconnecting power, you should first power down the operating system first and then unplug the power cords. The unit has more than one power supply cord. Disconnect two power supply cords before servicing to avoid electrical shock.
- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power if necessary.
- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.
- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.
- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets.
- This product may be connected to an IT power system. In all cases, make sure that the unit is also reliably connected to Earth (ground).
- Serverboard Battery: CAUTION - There is a danger of explosion if the onboard CR2032 battery is installed upside down, which will reverse its polarities (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
- Mainboard replaceable soldered-in fuses: Self-resetting PTC (Positive Temperature Coefficient) fuses on the mainboard must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact technical support for details and support.

4.2 General Safety Precautions

Follow these rules to ensure general safety:

- Keep the area around the R423-E3 clean and free of clutter.
- The R423-E3 weighs approximately 85 lbs (38.6kg) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.
- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.
- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.
- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.
- DO NOT use the front side handles to carry the server. They must be used ONLY to pull or push the server on the rails when installing or removing it.

4.3 ESD Precautions

Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards. The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

4.4 Operating Precautions

WARNING
Care must be taken to assure that the chassis cover is in place when the R423-E3 is operating to assure proper cooling. Out of warranty damage to the system can occur if this practice is not strictly followed.

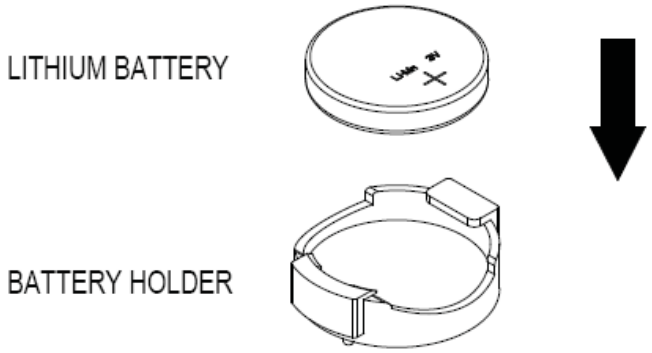


Figure 4-1. Installing the Onboard CR2032 Battery

WARNING
Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

4.5 Electronic Certification

WARNING
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Chapter 5. Advanced Serverboard Setup

This chapter covers the steps required to connect the data and power cables and install add-on cards. All serverboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

5.1 Handling the Serverboard

Electrostatic Discharge (ESD) can damage electronic components. To prevent dam- age to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge.

5.1.1 Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

5.1.2 Unpacking

The serverboard is shipped in antistatic packaging to avoid electrical static discharge. When unpacking the board, make sure the person handling it is static protected.

5.2 Connecting Cables

The cables listed below should already be connected to the serverboard. These include the data cables for the peripherals and control panel and the power cables.

5.2.1 Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the layout for connector locations.)

- SAS (SAS0 ~ SAS7) or SATA (I-SATA0 ~ 5) and SAS (S-SATA0~3) drive cables
- Control Panel cable (JF1)

Important Make sure the cables do not come into contact with the fans

5.2.2 Connecting Power Cables

The R423-E3 serverboard has a 24-pin primary power supply connector (J22) for connection to the ATX power supply. In addition, there are two 8-pin 12V processor power connectors (JPW1 and JPW2) that must be connected to your power supply. See Section 5-9 for power connector pin definitions.

5.2.3 Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators.

All JF1 wires have been bundled into a single cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis. See Chapter 5 for details and pin descriptions

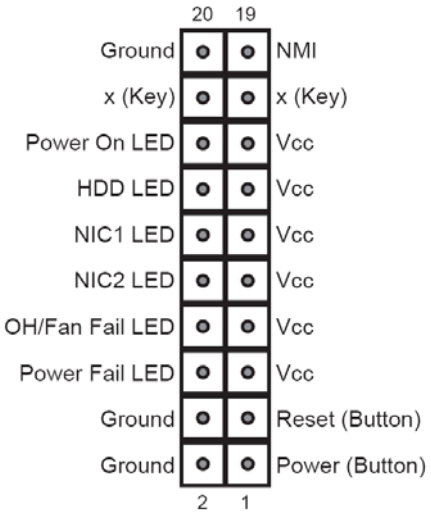
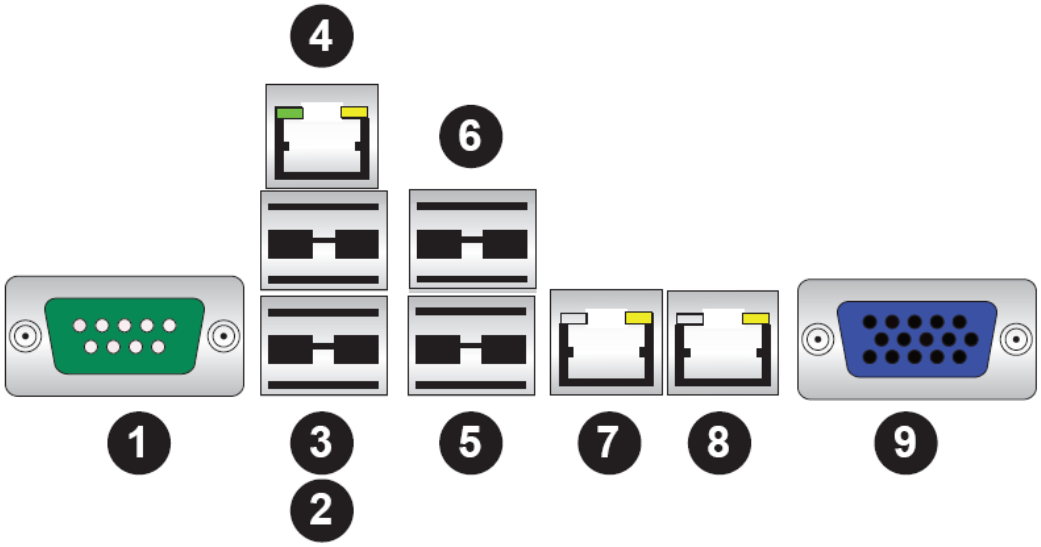


Figure 5-1. Control Panel Header Pins

5.3 I/O Ports

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 5-2 below for the colors and locations of the various I/O ports.



IO Ports			
1	COM1 Port	6	USB Port 3
2	USB Port 0	7	LAN Port 1
3	USB Port 1	8	LAN Port 2
4	IPMI LAN Port	9	VGA Port
5	USB Port 2		

Figure 5-2. Rear I/O Ports

5.4 Installing the Processor and Heatsink

CAUTION

When handling the processor package, avoid placing direct pressure on the label area.

Always connect the power cord last, and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.

CAUTION

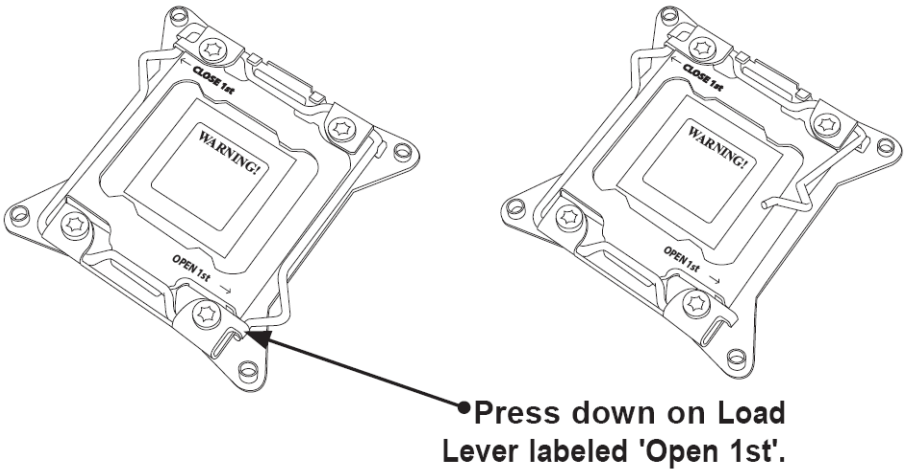
If you buy a CPU separately, make sure that you use an Intel-certified multidirectional heatsink only.

Make sure to install the system board into the chassis before you install the CPU heatsink.

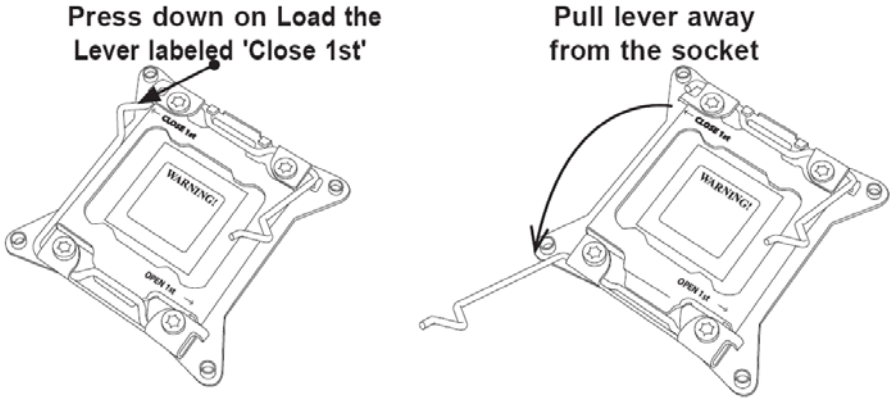
When receiving a server board without a processor pre-installed, make sure that the plastic CPU socket cap is in place and none of the socket pins are bent; otherwise, contact your retailer immediately.

5.4.1 Installing the LGA2011 Processor

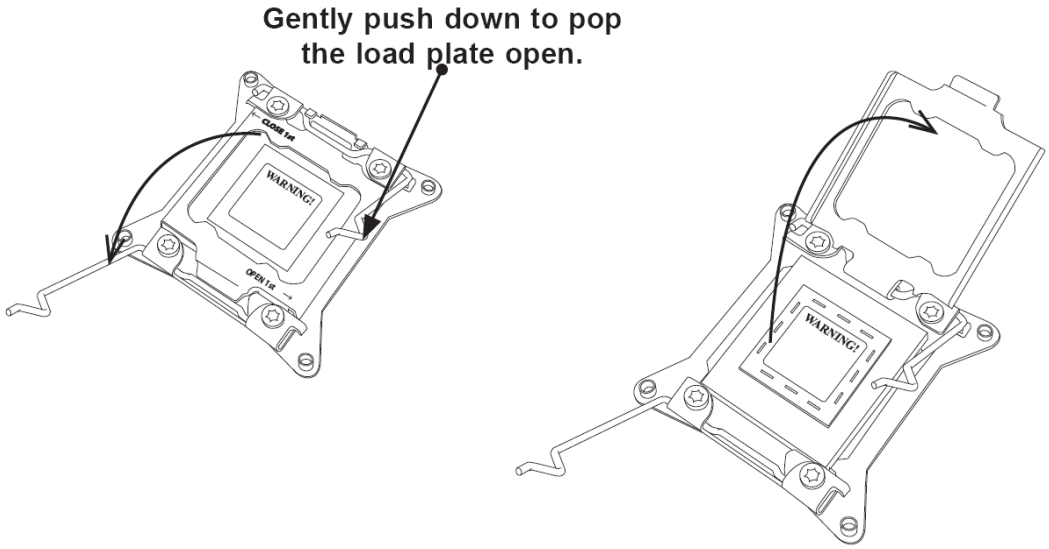
1. There are two load levers on the LGA2011 socket. To open the socket cover, first press and release the load lever labelled 'Open 1st'.



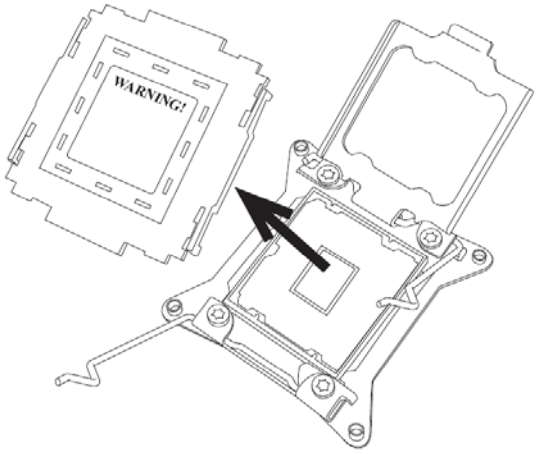
2. Press the second load lever labelled 'Close 1st' to release the load plate that covers the CPU socket from its locking position.



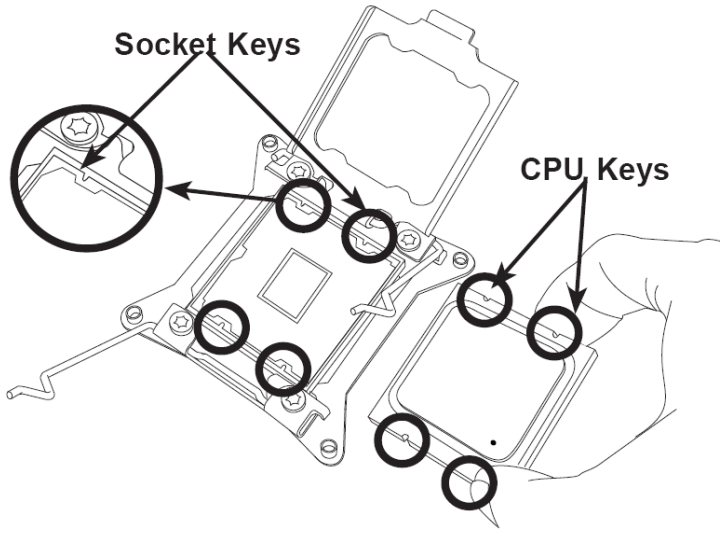
3. With the lever labelled 'Close 1st' fully retracted, gently push down on the 'Open 1st' lever to open the load plate. Lift the load plate to open it completely.



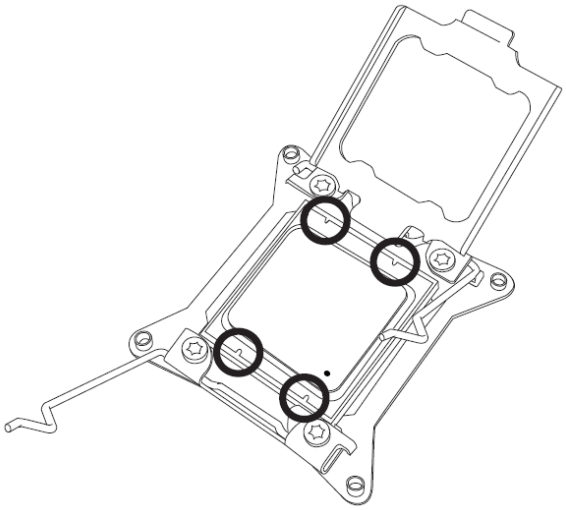
4. Using your thumb and the index finger, remove the 'WARNING' plastic cap from the socket.



5. Use your thumb and index finger to hold the CPU on its edges. Align the CPU keys, which are semi-circle cutouts, against the socket keys.



6. Once they are aligned, carefully lower the CPU straight down into the socket. (Do not drop the CPU on the socket. Do not move the CPU horizontally or vertically. Do not rub the CPU against the surface or against any pins of the socket to avoid damaging the CPU or the socket.).

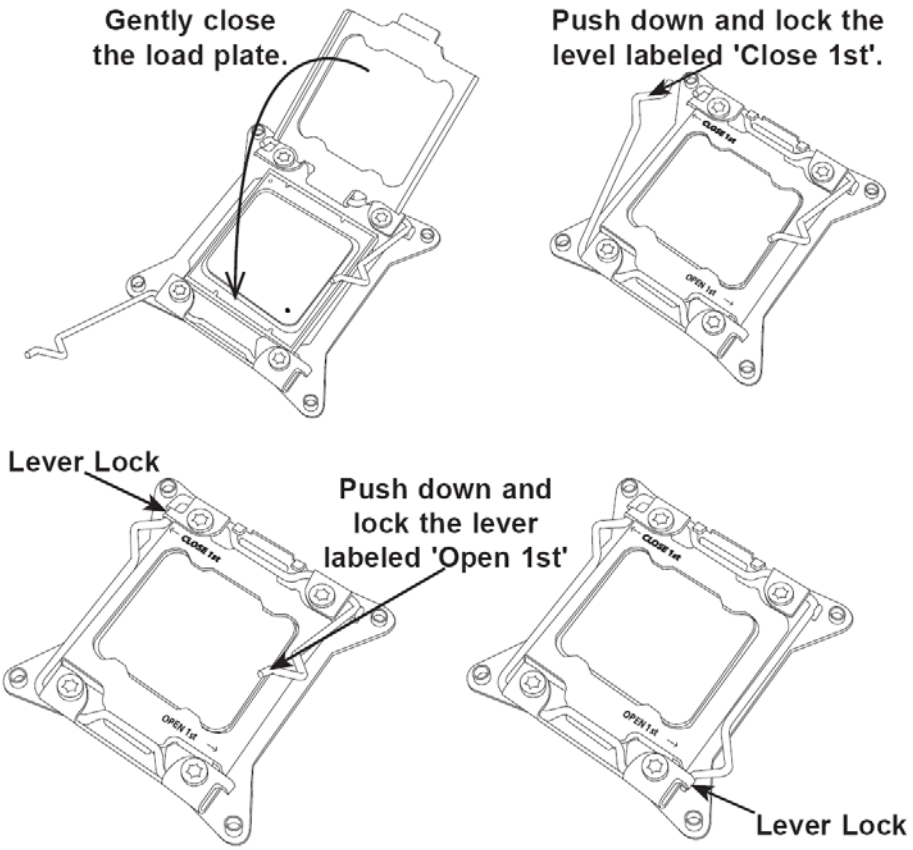


CAUTION

You can only install the CPU inside the socket in one direction. Make sure that it is properly inserted into the CPU socket before closing the load plate. If it doesn't close properly, do not force it as it may damage your CPU. Instead, open the load plate again and double-check that the CPU is aligned properly.

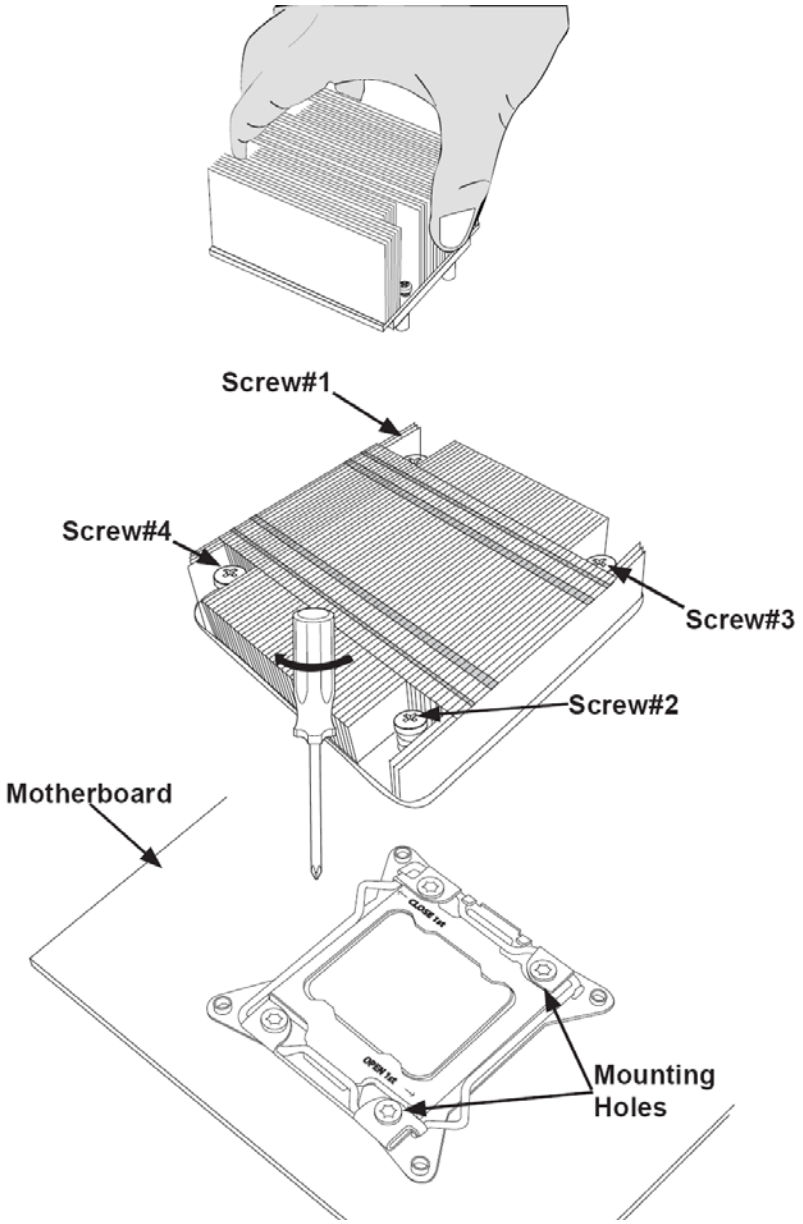
7. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed.

8. Close the load plate with the CPU inside the socket. Lock the lever labelled 'Close 1st' first, then lock the lever labelled 'Open 1st' second. Use your thumb to gently push the load levers down to the lever locks.



5.4.2 Installing a CPU Heatsink

1. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the retention mechanism.
2. Screw in two diagonal screws (i.e., the #1 and the #2 screws) until just snug (-do not over-tighten the screws to avoid possible damage to the CPU.)
3. Finish the installation by fully tightening all four screws.

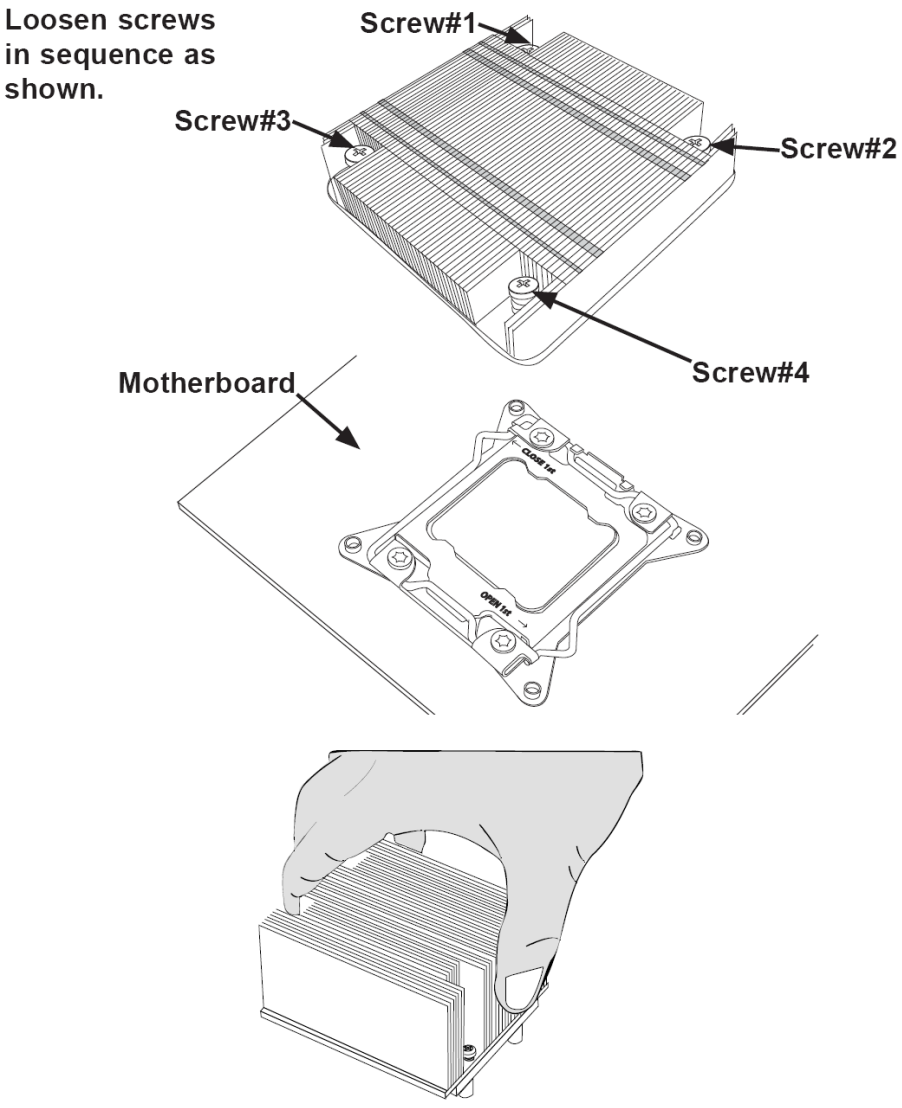


5.4.3 Removing the Heatsink

CAUTION

We DO NOT recommend that the CPU or the heatsink be removed. However, if you do need to uninstall the heatsink, please follow the instructions below to uninstall the heatsink to prevent damage done to the CPU or the CPU socket.

1. Unplug the power cord from the power supply.
2. Unscrew the heatsink screws from the serverboard in the sequence as shown in the illustration below.
3. Hold the heatsink and gently wiggle it to loosen it from the CPU. (Do not use excessive force when doing this!).
4. Once the CPU is loosened, remove the CPU from the CPU socket.
5. Remove the used thermal grease and clean the surface of the CPU and the heatsink, Reapply the proper amount of thermal grease on the surface before reinstalling the CPU and the heatsink.



5.5 Installing Memory

CAUTION

Exercise extreme care when installing or removing DIMM modules to prevent any possible damage

5.5.1 Memory Support

The R423-E3 serverboard supports up to 512 GB of DDR3-1600/1333/1066/800 RDIMM, LRDIMM ECC or UDIMM ECC/non-ECC memory. Use memory modules of the same type and speed. See the following tables for memory installation. Please refer to the Bull web site for possible updates to supported memory.

5.5.2 DIMM Installation

1. Insert the desired number of DIMMs into the memory slots starting with DIMM #P1-DIMMA1. When populating two DIMM modules within a channel, always start with Bank1 first. For optimal memory performance, please install a pair (or pairs) of memory modules of the same type and speed with a maximum of 12 modules (see the Memory Installation Table below.
2. Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to avoid installing incorrectly (see Figure 5-3).
3. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules.

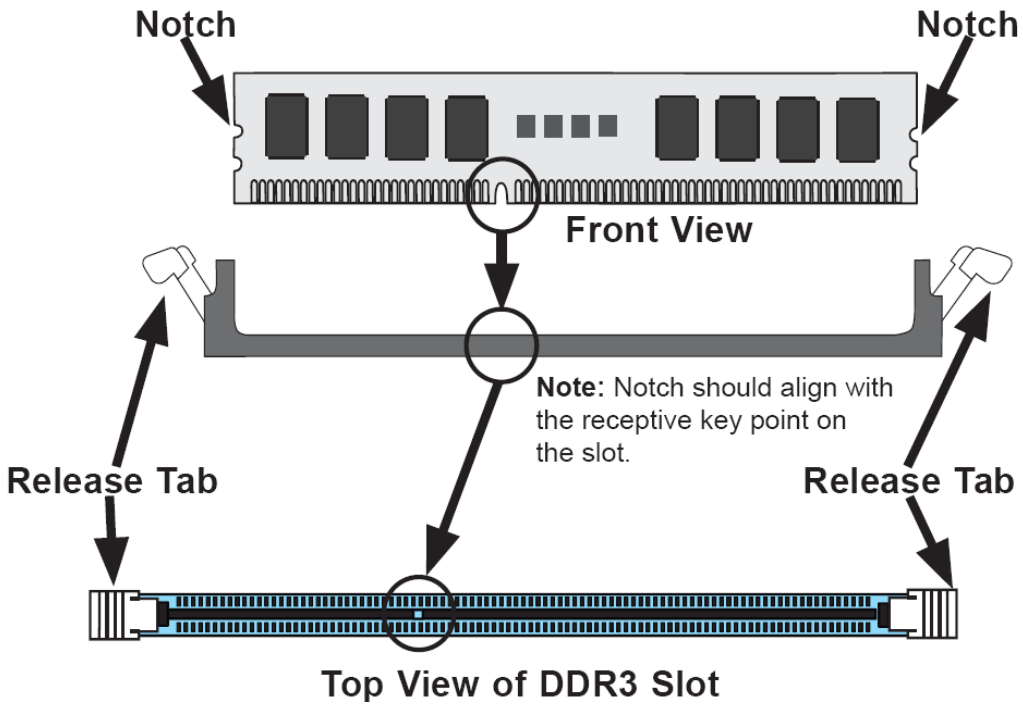


Figure 5-3. Installing DIMM into Slot

To Install: Insert module vertically and press down until it snaps into place. Pay attention to the alignment notch at the bottom.

To Remove: Use your thumbs to gently push the release tabs near both ends of the module. This should release it from the slot.

For memory to work properly, populate according to the tables below.

Processors and their Corresponding Memory Modules								
CPU#	Corresponding DIMM Modules							
CPU 1	P1-DIMMA1	P1-DIMMB1	P1-DIMMC1	P1-DIMMD1	P1-DIMMA2	P1-DIMMB2	P1-DIMMC2	P1-DIMMD2
CPU2	P2-DIMME1	P2-DIMMF1	P2-DIMMG1	P2-DIMMH1	P2-DIMME2	P2-DIMM F2	P2-DIMMG2	P2-DIMMH2

Populating Memory for Optimal Performance	
Number of CPUs+DIMMs	CPU and Memory Population Configuration Table
1 CPU & 2 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1
1 CPU & 4 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1, P1-DIMMC1/P1-DIMMD1
1 CPU & 5~8 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1, P1-DIMMC1/P1-DIMMD1 + Any memory pairs in P1-DIMMA2/P1-DIMMB2/P1-DIMMC2/P1-DIMMD2 slots
2 CPUs & 4 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1, P2-DIMME1/P2-DIMMF1
2 CPUs & 6 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1
2 CPUs & 8 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1
2 CPUs & 10~16 DIMMs	CPU1/CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1 + Any memory pairs in P1, P2 DIMM slots
2 CPUs & 16 DIMMs	CPU1/CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1,P1-DIMMA2/P1-DIMMB2/P1-DIMMC2/P1-DIMMD2, P2-DIMME2/P2-DIMMF2/P2-DIMMG2/P2-DIMMH2

UDIMM Memory Support			
Ranks Per DIMM & Data Width	Memory Capacity Per DIMM (Note 1)		
SRx8 Non-ECC	1GB	2GB	4GB
DRx8 Non-ECC	2GB	4GB	8GB
SRx16 Non-ECC	512MB	1GB	2GB
SRx8 ECC	1GB	2GB	4GB
DRx8 ECC	2GB	4GB	8GB

Note:
1Gb/2Gb/4Gb DRAMs are supported; however, only 2Gb and 4Gb DRAMs are validated.

RDIMM Memory Support			
Ranks Per DIMM & Data Width	Memory Capacity Per DIMM (Note 1)		
SRx8	1GB	2GB	4GB
DRx8	2GB	4GB	8GB
SRx4	2GB	4GB	8GB
DRx4	4GB	8GB	16GB
QRx4	8GB	16GB	32GB
QRx8	4GB	8GB	16GB

Notes:
1. 1Gb/2Gb/4Gb DRAMs are supported; however, only 2Gb and 4Gb DRAMs are validated.
2. QR RDIMMs are supported but not validated. Memory testing are limited to system level testing. Signal integrity testing in interoperability testing are not performed. The passing QR RDIMMs will be posted on the website.

LRDIMM Memory Support		
Ranks Per DIMM & Data Width (Note 1)	Memory Capacity Per DIMM (Note 2)	
QRx4 (DDP) (Note 4)	16GB	32GB
QRx8 (P) (Note 5)	8GB	16GB

Notes:
1. Physical Rank is used to calculate DIMM capacity.
2. Only 2Gb/4Gb DRAMs are supported and validated.
4. The speeds listed are estimated only and will be verified through simulation.
4. DDP is for Dual Die Package DRAM stacking.
5. "P" Means "Planer Monolithic DRAM Die."

Notes

- For optimal memory performance, please install DIMMs in pairs (with an even number of DIMMs installed).
- All channels in a system will run at the fastest common frequency.

5.6 Adding PCI Add-on Cards

The R423-E3 server can accommodate seven low-profile PCI add-on cards.

5.6.1 Installing an Add-on Card

1. Begin by removing the shield for the PCI slot you wish to populate.
2. Fully seat the card into the slot, pushing down with your thumbs evenly on both sides of the card.
3. Finish by using a screw to secure the top of the card shield to the chassis. The PCI slot shield protects the serverboard and its components from EMI and aid in proper ventilation, so make sure there is always a shield covering each unused slot.

5.7 Serverboard Details

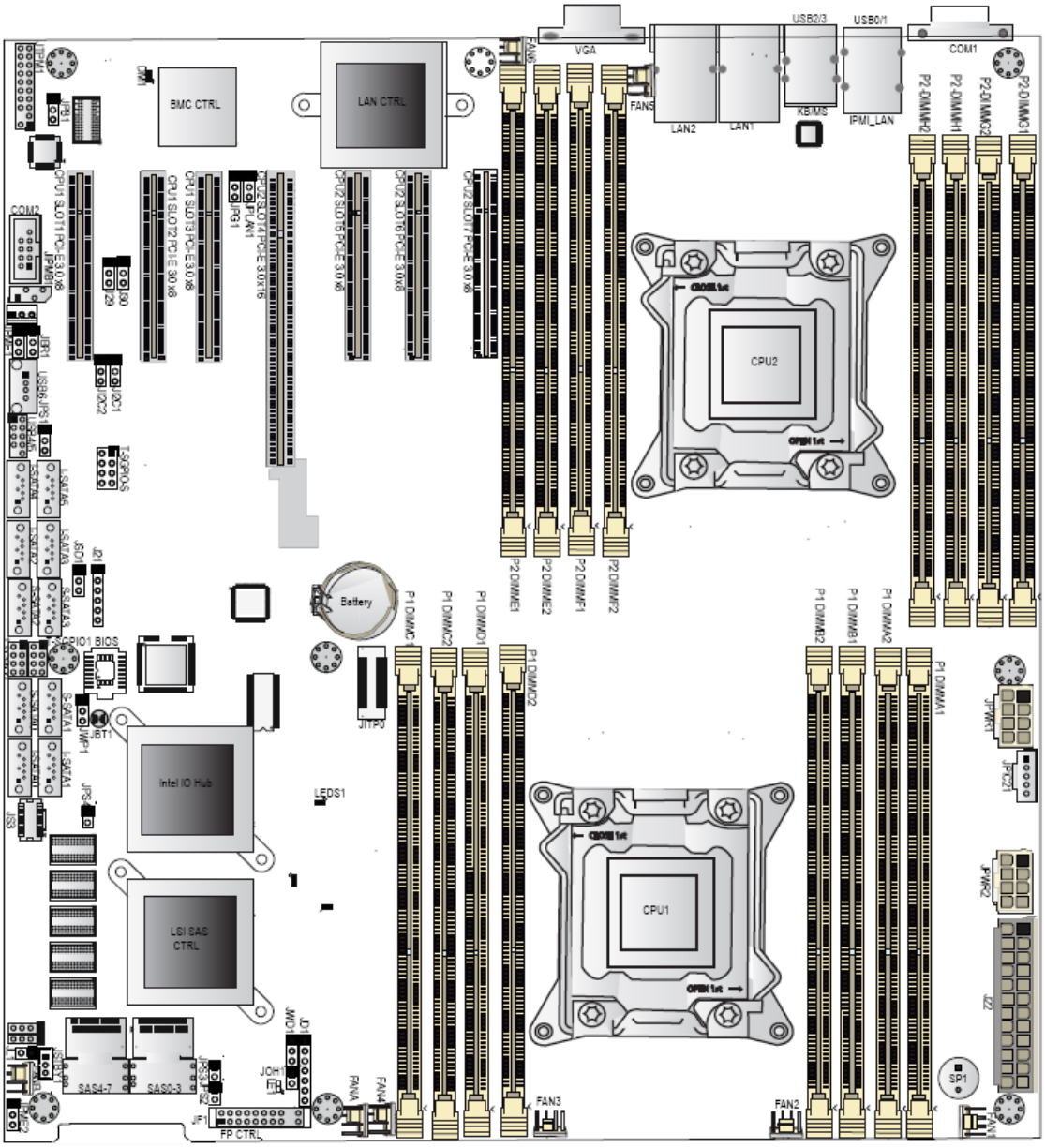


Figure 5-4. R423-E3 Serverboard Layout (not drawn to scale)

Note Jumpers not indicated are for test purposes only and should not have their settings changed.

5.7.1 Serverboard Quick Reference

Jumper	Description	Default Setting
JBT1	Clear CMOS	See Section 5-9
JI²C1/JI²C2	SMB to PCI-E Slots	Pins 2-3 (Normal)
JPB1	BMC Enable/Disable	Pins 1-2 (Enabled)
JPG1	VGA Enable/Disable	Pins 1-2 (Enabled)
JPLAN1	LAN1/LAN2 Enable/Disable	Pins 1-2 (Enabled)
JPS1	SAS Enable/Disable	Pins 1-2 (Enabled)
JWD	Watch Dog	Pins 1-2 (Reset)

Connector	Description
CPU1 Slot1~3	CPU1 Slot1/Slot2/Slot3 PCI-E 3.0 x8 Slots
CPU2 Slot4	CPU2 Slot4 PCI-E 3.0 x16 Slot
CPU2 Slot5~7	CPU2 Slot6/Slot7 PCI-E 3.0 x8 Slots
COM1/COM2	Backplane COM Port1/Front Accessible COM2 Header
FAN1~FAN6, FANA/B	CPU/System Fan Headers (Fans 1~6) & IO Slot Fan Headers (FANA/FANB)
I-SATA 0/1	SATA 3.0 Ports 0/1 (Available for RAID 0, RAID 1 only, used in conjunction with T-SPGIO1)
I-SATA 2~5	Intel SB SATA 2.0 Connectors: 2/4 (T-SGPIO1) and 4/5 (T-SGPIO2) (Available for RAID 0, 1, 5, 10)
J22	ATX 24-Pin Power Connector
JD1	Speaker/Power LED Indicator
JF1	Control Panel Header
JIPMB1	4-pin External BMC I²C Header (for an IPMI Card)
JL1	Chassis Intrusion Header
JOH1	Overheat/Fan Fail LED Header
JPI²C1	Power Supply SMBbus I²C Header
JPWR1/JPWR2	12V 8-Pin Power Connectors
JS3	SAS Battery (Optional)
JSD1	SATA DOM (Disk On Module) Power Header
JSTBY1	Standby Power
JTPM1	TPM (Trusted Platform Module)/Port 80 Header
JLAN1/2	1 Gb LAN Ports 1/2)
(IPMI) LAN	Dedicated IPMI LAN
(S-)SATA 0~3	SATA 2.0 Ports 0~3 from SCU (Available for RAID 0, 1, 5, 10 used in conjunction with T-SPGIO-S)
SAS 0~3, 4~7	SAS Ports 0~3, 4~7

SP1	Onboard Buzzer (Internal Speaker)
T-SGPIO1	Serial Link General_Purpose IO Headers (used in conjunction with I-SATA 0~3)
T-SGPIO2	Serial Link General_Purpose IO Header (used in conjunction with I-SATA 4/5)
T-SGPIO-S	Serial Link General_Purpose IO Header (used in conjunction with S-SATA 0~3)
USB 0/1, 2/3	Back Panel USB 0/1, 2/3
USB4/5	Front Panel Accessible USB 4/5 Headers
USB 6	Front Panel Type A USB 6 Port
VGA	Backpanel VGA Port

LED	Description	State	Status
DM1	BMC Heartbeat LED	Green: Blinking	Normal
LE1	Power LED	Green: On	On
LEDS1	SAS LED	Green: Blinking	Normal

5.8 Connector Definitions

Power Connectors

A 24-pin main power supply connector (J22) and two 8-pin power connectors (JPWR1/JPWR2) are provided on the serverboard. These power connectors meet the SSI EPS 12V specification. These power connectors must be connected to your power supply. See the table on the right for pin definitions.

ATX Power 24-pin Connector Pin Definitions

Pin#	Definition	Pin #	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	COM	3	COM
16	PS_ON	4	+5V
17	COM	5	COM
18	COM	6	+5V
19	COM	7	COM
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	COM	12	+3.3V

Secondary Power Connector

JPWR1 and JPWR2 must also be connected to the power supply. See the table on the right for pin definitions.

+12V 8-pin Power Pin Definitions

Pins	Definition
1 - 4	Ground
5 - 8	+12V

Required Connection

Power Button

The Power On connection is on pins 1nd 2 of JF1. These should be connected to the chassis power but- ton. See the table on the right for pin definitions.

Power Button Pin Definitions (JF1)

Pin#	Definition
1	Power Signal
2	Ground

Reset Button

The Reset Button connection is located on pins 3 and 4 of JF1 and attaches to the reset switch on the computer chassis. See the table on the right for pin definitions.

Reset Button Pin Definitions (JF1)

Pin#	Definition
3	Reset
4	Ground

Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table on the right for pin definitions.

PWR Fail LED Pin Definitions (JF1)

Pin#	Definition
5	Vcc
6	Ground

Overheat/Fan Fail LED (OH)

Connect an LED to the OH connection on pins 7 and 8 of JF1 to provide advanced warning of chassis overheating. Refer to the table on the right for pin definitions.

OH/Fan Fail LED Pin Definitions (JF1)

Pin#	Definition
7	Vcc
8	Ground

OH/Fan Fail Indicator Status

State	Definition
Off	Normal
On	Overheat
Flash-ing	Fan Fail

NIC2 (JLAN2) LED

The LED connections for JLAN2 are on pins 9 and 10 of JF1. Attach an LED cable to display network activity. See the table on the right for pin definitions.

NIC2 LED Pin Definitions (JF1)

Pin#	Definition
9	Vcc
10	Ground

NIC1 (JLAN1) LED

The LED connections for JLAN2 are on pins 9 and 10 of JF1. Attach an LED cable to display network activity. See the table on the right for pin definitions.

NIC1 LED Pin Definitions (JF1)

Pin#	Definition
11	Vcc
12	Ground

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. This LED is used to display all SAS and SATA activity. See the table on the right for pin definitions.

HDD LED Pin Definitions (JF1)

Pin#	Definition
13	Vcc
14	HD Active

Power On LED

The Power On LED connector is located on pins 15 and 16 of JF1 (use JLED for a 3-pin connector). This connection is used to provide LED indication of power being supplied to the system. See the table on the right for pin definitions.

Power LED Pin Definitions (JF1)

Pin#	Definition
15	5V Stby
16	Control

NMI Button

The non-maskable interrupt button header is located on pins 19 and 20 of JF1. Refer to the table on the right for pin definitions.

NMI Button Pin Definitions (JF1)

Pin#	Definition
19	Control
20	Ground

Fan Headers

There are six fan headers on the serverboard (Fan 1~Fan 6, Fan A/Fan B), all of which are 4-pin fans. Pins 1-3 of the fan headers are backward compatible with the traditional 3-pin fans. (Fan speed control is supported with 4-pin fans only.) See the table on the right for pin definitions. The onboard fan speeds are controlled by IPMI.

Fan Header Pin Definitions

Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PWR Modulation

T-SGPIO1/2/T-SGPIO-S Headers

Two SGPIO (Serial Link General Purpose Input/Output) headers are located at T-SGPIO1/2 to support I-SATA 0~5 ports. Additionally, T- SGPIO-S supports S-SATA 0~3 ports. These headers support a Serial Link interface for onboard SATA connections. See the table on the right for pin definitions.

T-SGPIO Pin Definitions

Pin#	Definition	Pin	Definition
1	NC	2	NC
3	Ground	4	Data
5	Load	6	Ground
7	Clock	8	NC

NC= No Connection

Chassis Intrusion

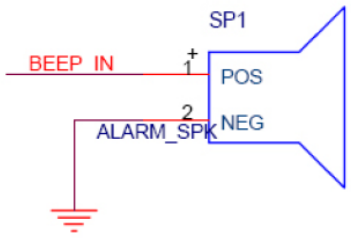
The Chassis Intrusion header is designated JL1. Attach an appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened.

Chassis Intrusion Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground

Internal Speaker

The Internal Speaker, located at SP1, can be used to provide audible indications for various beep codes. See the table on the right for pin definitions.

Internal Buzzer (SP1) Pin Definition		
Pin#		Definitions
Pin 1	Pos. (+)	Beep In
Pin 2	Neg. (-)	Alarm Speaker



Overheat/fan fail LED

The JOH1 header may be connected to an LED indicator to provide warn- ings of chassis overheating or fan failure. Refer to the table on right for pin definitions.

OH/Fan Fail LED Status	
State	Message
Solid	Overheat
Blinking	Fan Fail

TPM Header / Port 80 Header

A Trusted Platform Module/Port 80 header is located at JTPM1 to provide TPM support and Port 80 connection. Use this header to enhance system performance and data security. See the table on the right for pin definitions.

TPM/Port 80 Header Pin Definitions			
Pin #	Definition	Pin #	Definition
1	LCLK	2	GND
3	LFRAME#	4	<(KEY)>
5	LRESET#	6	+5V (X)
7	LAD 3	8	LAD 2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK4	14	SMB_DAT4
15	+3V_DUAL	16	SERIRQ
17	GND	18	CLKRUN# (X)
19	LPCPD#	20	LDRQ# (X)

Standby power

The Standby Power header is located at JSTBY1 on the serverboard. See the table on the right for pin definitions. (You must also have a cable to use this feature.)

Standby Power Pin Definitions	
Pin#	Definition
1	+5V Standby
2	Ground
3	Wake-up

Power SMB (I²C) Connector

Power System Management Bus (I²C) Connector (JPI²C1) monitors power supply, fan and system temperatures. See the table on the right for pin definitions.

PWR SMB Pin Definitions	
Pin#	Definition
1	Clock
2	Data
3	PWR Fail
4	Ground
5	+3.3V

IPMB

A System Management Bus header for IPMI 2.0 is located at JIPMB1. Connect the appropriate cable here to use the IPMB I²C connection on your system.

IPMB Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

SATA DOM Power Connector

A power connector for SATA DOM (Disk On Module) devices is located at JSD1. Connect an appropriate cable here to provide power support for your SATA DOM devices.

DOM PWR Pin Definitions	
Pin#	Definition
1	+5V
2	Ground
3	Ground

SAS Battery

A SAS battery (JS3) provides power backup support for the cached data of onboard SAS devices during power outages. Cache data can be retained for up to 48 hours.

Universal Serial Bus (USB)

Four Universal Serial Bus ports (USB 0/1, 2/3) are located on the I/O back panel. In addition, three USB headers, located close to the I-SATA ports, provide two front-accessible USB connections (USB 4/5). A Type A connector (USB 6) also supports front panel USB connections. (Cables are not included). See the tables on the right for pin definitions

Backplane USB (USB 0/1, 2/3) Pin Definitions

Pin#	Definition
1	+5V
2	PO-
3	PO+
4	Ground
5	NA

FP USB (4/5, 6) Pin Definitions

USB 4, 6 Pin #	Definition	USB 5 Pin #	Definition
1	+5V	1	+5V
2	PO-	2	PO-
3	PO+	3	PO+
4	Ground	4	Ground
5	NC	5	Key

NC= No Connection

Serial Ports

Two COM connections (COM1 & COM2) are located on the serverboard. COM1 is located on the rear I/O panel. COM2, located next to the IPMB header, is used to provide front access support. See the table on the right for pin definitions.

Serial COM) Ports Pin Definitions

Pin #	Definition	Pin #	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	N/A

Ethernet Ports

Two 1 Gigabit Ethernet ports (JLAN1/2) are located on the I/O backplane. In addition, a dedicated IPMI LAN port, located above the USB 0/1 ports on the backplane, provides KVM support for IPMI 2.0. All these ports accept RJ45 type cables.

Note: Please refer to the LED Indicator Section for LAN LED information.

LAN Ports Pin Definition

Pin#	Definition		
1	P2V5SB	10	SGND
2	TD0+	11	Act LED
3	TD0-	12	P3V3SB
4	TD1+	13	Link 100 LED (Yellow, +3V3SB)
5	TD1-	14	Link 1000 LED (Yellow, +3V3SB)
6	TD2+	15	Ground
7	TD2-	16	Ground
8	TD3+	17	Ground
9	TD3-	18	Ground

NC= No Connection

5.9 Jumper Settings

Explanation of Jumpers

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.

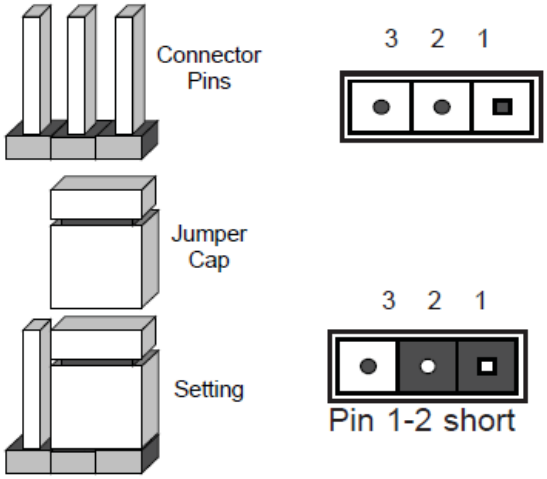


Figure 5-5. Jumper Settings

Note On a two pin jumper, "Closed" means the jumper is on both pins and "Open" means the jumper is either on only one pin or completely removed.

CMOS Clear

JBT1 is used to clear CMOS (which will also clear any passwords). Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To Clear CMOS

1. First power down the system and unplug the power cord(s).
2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.
3. Remove the screwdriver (or shorting device).
4. Reconnect the power cord(s) and power on the system.

Note Do not use the PW_ON connector to clear CMOS.

JLAN1/JLAN2 Enable/Disable

Use JPLAN1 to enable/disable LAN Ports 1/2. See the table on the right for jumper settings. The default setting is Enabled.

JLAN1/2 Enable/Disable Jumper Settings	
Jumper Setting	Definition
1-2	Enabled (default)
2-3	Disabled

Watch Dog Enable/Disable

Jumper JWD controls the Watch Dog function. Watch Dog is a system monitor that can reboot the system when a software application hangs. Jumping pins 1-2 will cause WD to reset the system if an application hangs. Jumping pins 2-3 will generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in BIOS.

Watch Dog Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Reset (default)
Pins 2-3	NMI
Open	Disabled

VGA Enable/Disable

JPG1 allows you to enable or disable the VGA port. The default position is on pins 1 and 2 to enable VGA. See the table on the right for jumper settings.

VGA Enable/Disable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

BMC Enable

Jumper JPB1 allows you to enable the embedded the Winbond BMC (Baseboard Management) Controller to provide IPMI 2.O/KVM support on the serverboard. See the table on the right for jumper settings.

BMC Enable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	BMC Enable
Pins 2-3	Normal (Default)

SAS Enable/Disable

Jumper JPS1 allows you to enable or disable the onboard SAS connections. The default setting is Enabled. See the table on the right for jumper settings.

SAS Enable/Disbale Jumper Settings	
Jumper Setting	Definition
1-2	SAS Enabled
2-3	SAS Disabled

I²C Bus to PCI-Express Slots

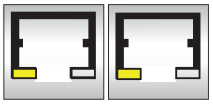
Jumpers JI²C1 and JI²C2 allow you to connect the System Management Bus (I²C) to the PCI-Express slots. The de- fault setting is Disabled. Both jumpers must be set to the same setting See the table on the right for jumper settings.

I²C to PCI-E Slots Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

5.10 Onboard Indicators

LAN LEDs

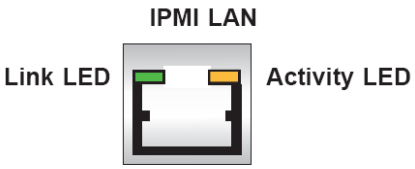
The Ethernet ports have two LEDs. On each port, the yellow LED flashes to indicate activity while the other LED may be green, amber or off to indicate the speed of the connection. See the table on the right for connection speed LED details.



JLAN1/2 LED (Connection Speed Indicator)	
LED Color	1 Gb Ports
Off	NC or 10 Mb/s
Green	100 Mb/s
Amber	1 Gb/s

IPMI Dedicated LAN LEDs

An additional IPMI Dedicated LAN is also located on the I/O backplane. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. See the table at right for more information.



IPMI LAN Link LED (Left) & Activity LED (Right)		
LED	Status	Definition
Link (Left)	Green: Solid	100 Mb/s
Activity (Right)	Amber: Blinking	Active

Onboard Power LED (LE1)

An Onboard Power LED is located at LE1. This LED Indicator is lit when the system is on. Be sure to unplug the power cable before removing or adding any components. See the table on the right for more details.

Onboard PWR LED Indicator (LE1) LED Settings	
LED Color	Status
Off	System Off (PWR cable not connected)
Green	System On
Green: Flashing Quickly	ACPI S1 State
Green: Flashing Slowly	ACPI S3 (STR) State

SAS Heartbeat LED

LEDS1 is a SAS Heartbeat LED. When LEDS1 is blinking, the SAS ports are functioning normally. See the table at right.

SAS LED Status	
Color/State	Definition
Green: Blinking	BMC: Normal

BMC Heartbeat LED

A BMC Heartbeat LED is located at DM1 on the serverboard. When DM1 is blinking, BMC is functioning normally.

BMC Heartbeat LED Status	
Color/State	Definition
Green: Blinking	BMC: Normal

5.11 SAS and SATA Ports

SATA Ports

There are ten Serial ATA Ports (I-SATA0~I-SATA 5) located on the serverboard, including eight SATA2 ports (I-SATA2~5, S-SATA0~3) and two SATA3 ports (I-SATA0~1). See the table on the right for pin definitions.

SATA Port Pin Definitions

Pin#	Definition	Pin	Definition
1	Ground	2	TXP
3	TXN	4	Ground
5	RXN	6	RXP
7	Ground		

SAS Ports

Eight Serial Attached SCSI Ports (SAS 0~3, 4~7) are provided on the R423-E3 to provide serial link connections. These ports are supported by the Intel C602 PCH. See the table on the right for pin definitions.

SAS Port Pin Definitions

Pin#	Definition	Pin	Definition
1	Ground	2	TXP
3	TXN	4	Ground
5	RXN	6	RXP
7	Ground		

Chapter 6. Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the R423-E3 chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows.

Tools Required: The only tool you will need to install components and perform maintenance is a Philips screwdriver.

6.1 Static-Sensitive Devices

Electrostatic discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally sufficient to protect your equipment from ESD damage.

6.1.1 Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

6.1.2 Unpacking

The serverboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

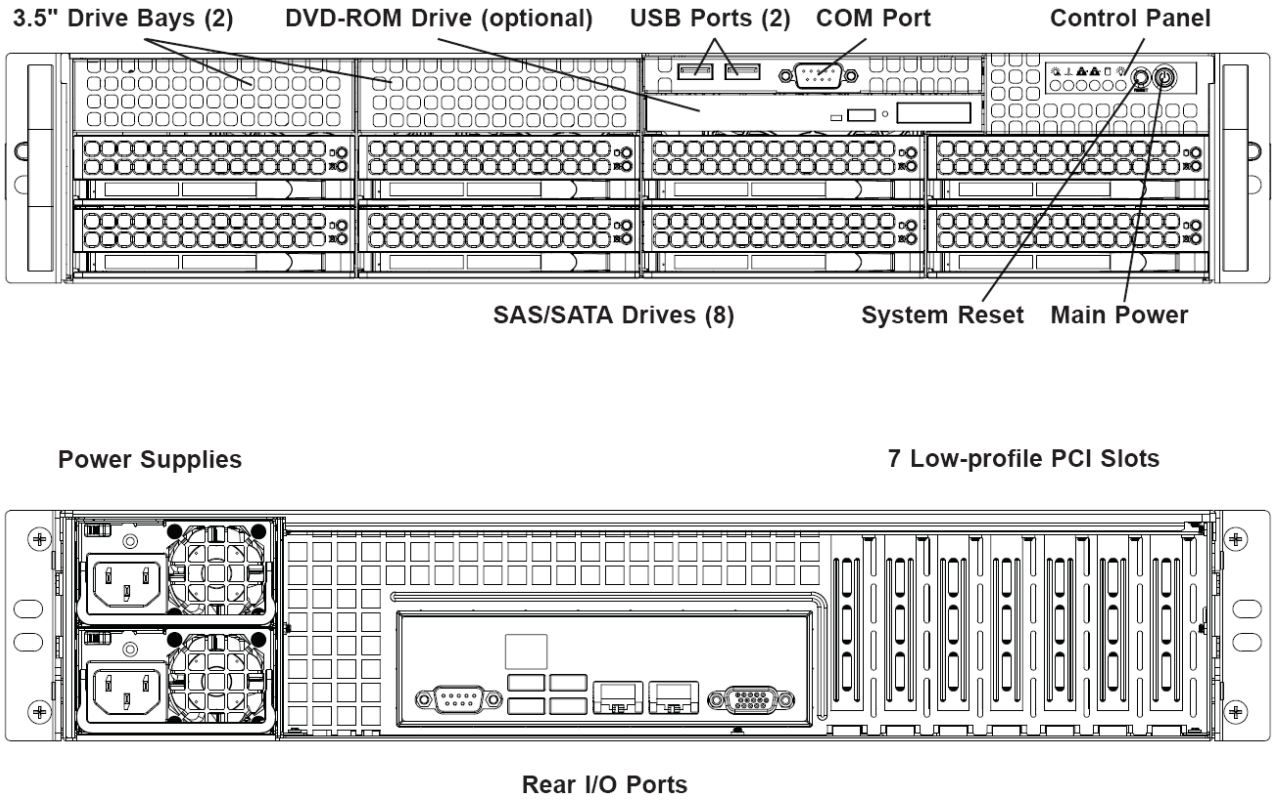


Figure 6-1. Front and Rear Chassis View

6.2 Control Panel

The control panel (located on the front of the chassis) must be connected to the JF1 connector on the serverboard to provide you with system status indications. A ribbon cable has bundled these wires together to simplify the connection. Connect the cable from JF1 on the serverboard to the Control Panel PCB (printed circuit board). Make sure the red wire plugs into pin 1 on both connectors. Pull all excess cabling out of the airflow path. The LEDs inform you of system status.

See Chapter 3 for details on the LEDs and the control panel buttons. Details on JF1 can be found in Chapter 5.

6.3 System Fans

Three 8-cm hot-swap fans provide the cooling for the system. It is very important that the chassis top cover is properly installed and making a good seal in order for the cooling air to circulate properly through the chassis and cool the components. See Figure 6-2.

System Fan Failure

Fan speed is controlled by system temperature via IPMI. If a fan fails, the remaining fans will ramp up to full speed and the overheat/fan fail LED on the control panel will turn on. Replace any failed fan at your earliest convenience with the same type and model (the system can continue to run with a failed fan). Remove the top chassis cover while the system is still running to determine which of the fans has failed.

Replacing System Fan

Removing a Fan

1. Remove the chassis cover.
2. Press the tabs on the sides of the fan to unlock and remove the fan and its housing. The fan's power connections will automatically detach.
3. System power does not need to be shut down since the fans are hot-plug-gable.

Installing a New Fan

1. Replace the failed fan with an identical 8-cm, 12 volt fan (available from Bull).
2. Position the new fan into the space vacated by the failed fan previously re- moved. A "click" can be heard when the fan is fully installed in place and the power connections are made.
3. If the system power is on, the hot-plug feature will cause the fan to start immediately upon being connected to its header on the serverboard.

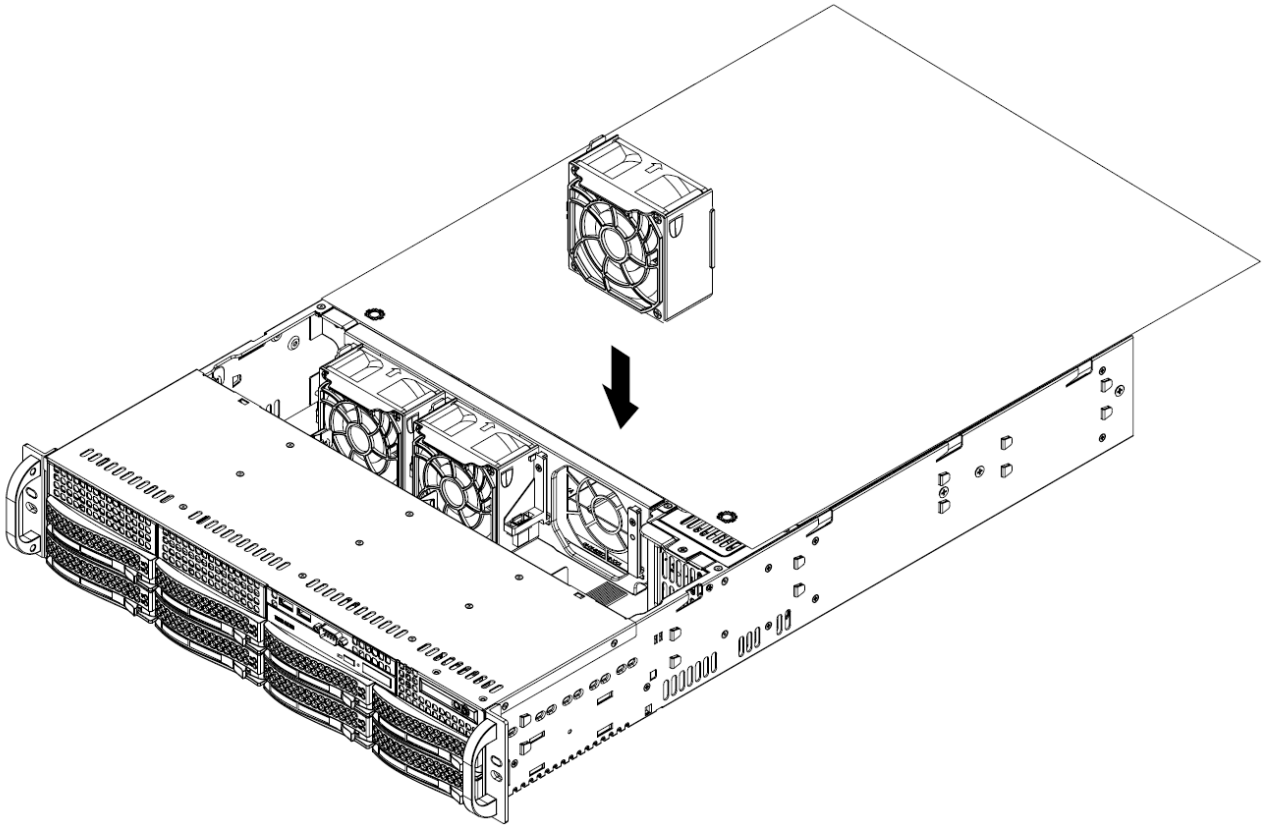


Figure 6-2. Removing System Cooling Fans

6.4 Drive Bay Installation/Removal

6.4.1 Accessing the Drive Bays

SAS/SATA Drives: You do not need to access the inside of the chassis or remove power to replace or swap SAS/SATA drives. Proceed to the next step for instructions. You must use standard 1" high, SAS/SATA drives in the system.
You must use standard 1" high, SAS/SATA drives in the system.

DVD-ROM: For installing/removing the DVD-ROM drive, you will need to gain access to the inside of the server by removing the top cover of the chassis. Proceed to the "DVD-ROM Installation" section later in this chapter for instructions.

WARNING
Enterprise level hard disk drives are recommended for use in Bull's chassis and servers.

6.4.2 SAS/SATA Drive Installation

These drives are mounted in carriers to simplify their installation and removal from the chassis. The carriers also help promote proper airflow for the drives. For this reason, even empty carriers without hard drives installed must remain in the chassis.

Removing a Drive Carrier

1. Push the release button located beside the drive's LEDs.
2. Swing the handle fully out and use it to pull the drive carrier straight out (see Figure 6-3).

Mounting a Drive in a Drive Carrier

1. To add a new SAS/SATA drive, install the drive into the carrier with the printed circuit board side facing down so that the mounting holes align with those in the carrier.
2. Secure the drive to the carrier with four screws, as shown in Figure 6-4.

Note Your operating system must have RAID support to enable the hot-plug capability of the drives.

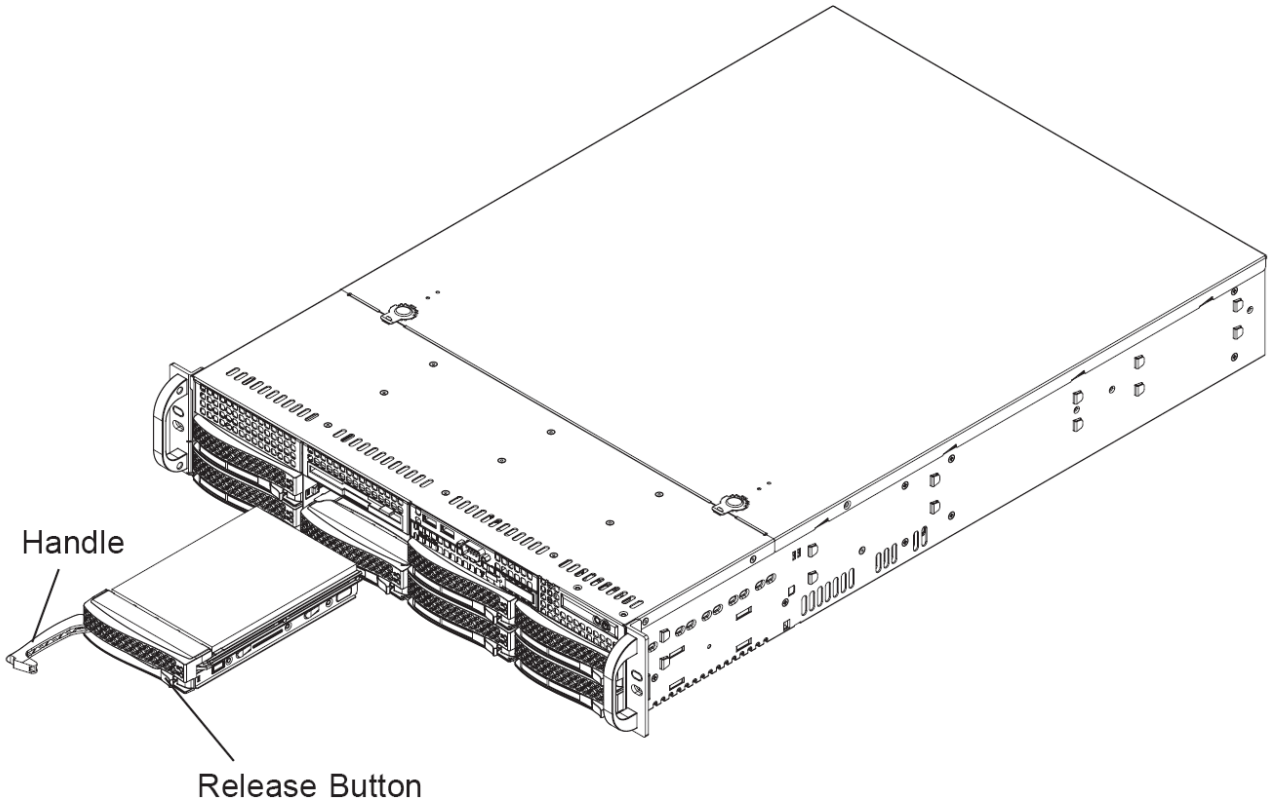


Figure 6-3. Removing a Drive Carrier

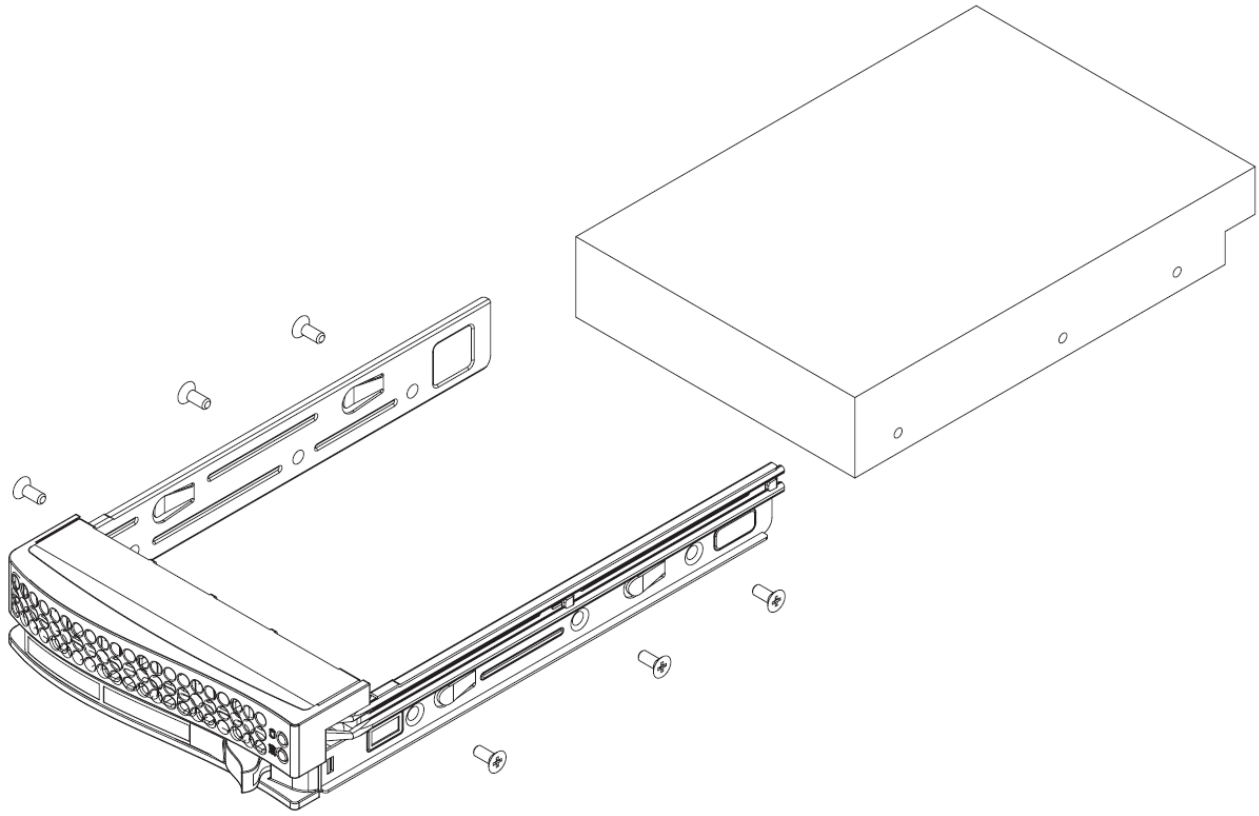


Figure 6-4. Mounting a Drive in a Carrier

WARNING

Use caution when working around the backplane. Do not touch the backplane with any metal objects and make sure no ribbon cables touch the backplane or obstruct the holes, which aid in proper airflow.

WARNING

Regardless of how many hard drives are installed, all drive carriers must remain in the drive bays to maintain proper airflow

6.4.3 Hard Drive Backplane

The hard drives plug into a backplane that provides power, drive ID and bus termination. A RAID controller can be used with the backplane to provide data security. The operating system you use must have RAID support to enable the hot-swap capability of the hard drives. The backplane is already preconfigured, so no jumper or switch configurations are required.

6.4.4 DVD-ROM Installation (Optional)

The top cover of the chassis must be opened to gain full access to the DVD-ROM drive bay. The R423-E3 server accommodates only slim type DVD-ROM drives. Side mounting brackets are typically needed to mount a slim DVD-ROM drive in the server.

Accessing the Inside of the Chassis

1. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").
2. Next, depress the two buttons on the top of the chassis to release the top cover and at the same time, push the cover away from you until it stops. You can then lift the top cover from the chassis to gain full access to the inside of the server.

6.5 Power Supply

The R423-E3 server has a 740 watt redundant power supply consisting of two power modules. Each power supply module has an auto- switching capability, which enables it to automatically sense and operate at a 100V - 240V input voltage.

6.5.1 Power Supply Failure

If either of the two power supply modules fail, the other module will take the full load and allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed unit has been replaced. Replacement units can be ordered directly from Bull (see contact information in the Preface). The power supply units have a hot-swap capability, meaning you can replace the failed unit without powering down the system.

6.5.2 Removing/Replacing the Power Supply

You do not need to shut down the system to replace a power supply module. The backup power supply module will keep the system up and running while you replace the failed hot-swap unit. Replace with the exact same model (see part number in the Appendix), which can be ordered directly from Bull.

Removing the Power Supply

1. First unplug the AC power cord from the failed power supply module.
2. Depress the locking tab on the power supply module.
3. Use the handle to pull it straight out with the rounded handle.

Installing a New Power Supply

1. Replace the failed hot-swap unit with another identical power supply unit.
2. Push the new power supply unit into the power bay until you hear a click.
3. Secure the locking tab on the unit.
4. Finish by plugging the AC power cord back into the unit.

Chapter 7. BIOS

7.1 Introduction

This chapter describes the AMI BIOS Setup utility for the R423-E3 serverboard. It also provides the instructions on how to navigate the AMI BIOS Setup utility screens. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated.

7.1.1 Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility, press the <Del> key while the system is booting-up.

Note In most cases, the <Del> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F3>, <F4>, etc

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for informational text. When an option is selected in the left frame, it is highlighted in white. Often informational text will accompany it.

Note The AMI BIOS has default informational messages built in. The manufacturer retains the option to include, omit, or change any of these messages.

The AMI BIOS Setup Utility uses a key-based navigation system called "hot keys". Most of these "hot keys" can be used at any time during the setup navigation process. These keys include <F3>, <F4>, <Enter>, <ESC>, arrow keys, etc.

Notes

- Options printed in **Bold** are default settings.
- <F3> is used to load optimal default settings. <F4> is used to save the current settings and exit the setup utility.

7.1.2 How to Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Delete> at the appropriate time during system boot.

7.1.3 Starting the Setup Utility

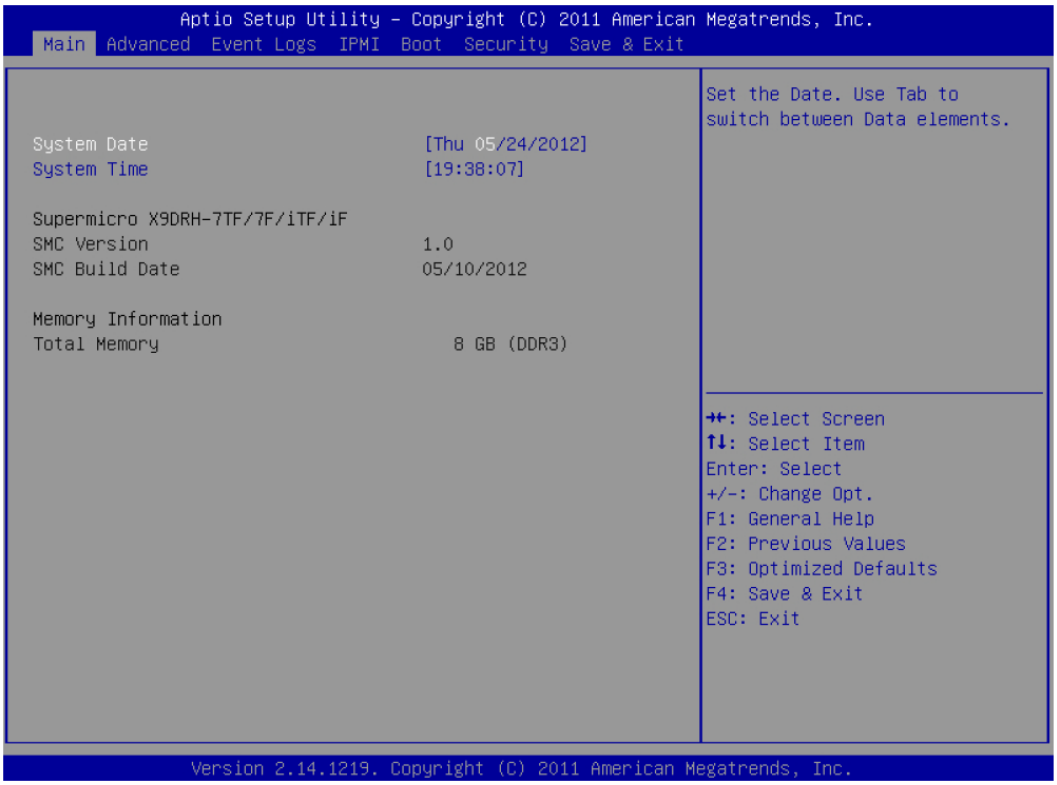
Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

WARNING

Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Bull be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

7.2 Main Setup

When you first enter the AMI BIOS Setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.



The AMI BIOS main menu displays the following information.

System Time/System Date

Use this option to change the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Enter new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format. (**Note:** The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.)

R423-E3 Serverboard

SMC Version

This item displays the SMC Version of the BIOS used in the system.

SMC Build Date

This item displays the day and time when this version of BIOS was built.

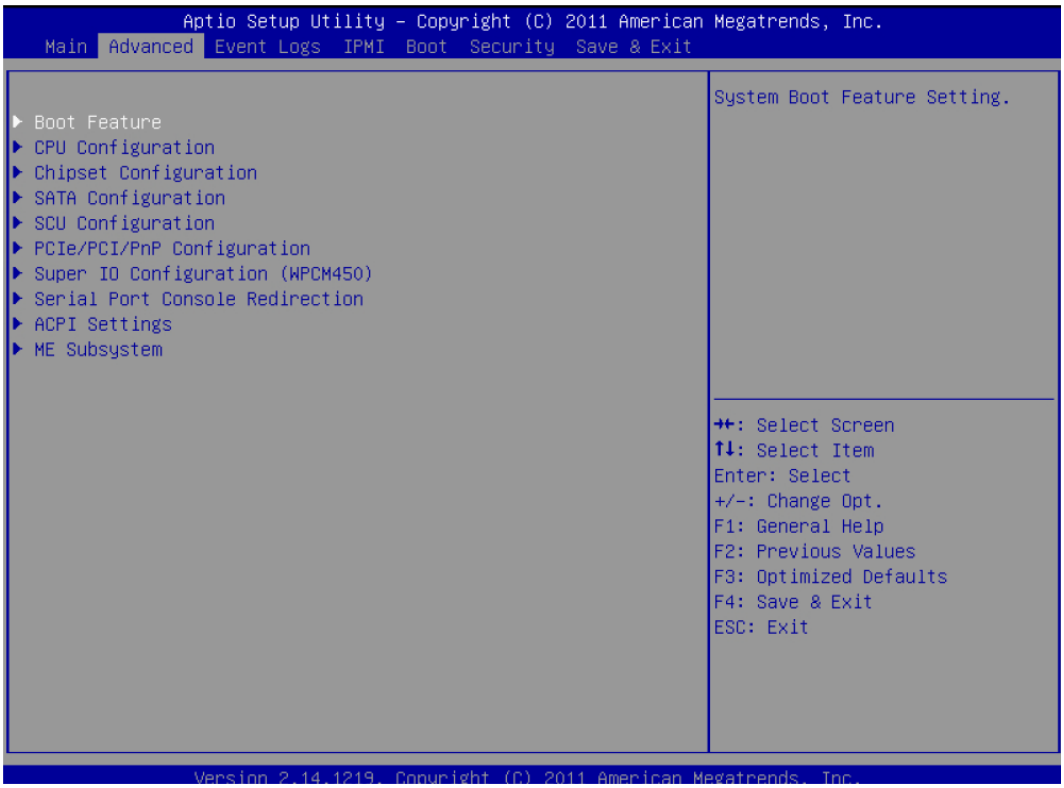
Memory Information

Total Memory

This displays the amount of memory that is available in the system.

7.3 Advanced Setup Configurations

Use the arrow keys to select Advanced and press <Enter> to access the following submenu items:



► Boot Feature

Quiet Boot

Set this value to allow the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to allow the computer system to display the POST messages. Select Enabled to allow the computer system to display the OEM logo. The default setting is **Enabled**.

AddOn ROM Display Mode

This sets the display mode for the Option ROM. Select Keep Current to use the cur- rent AddOn ROM Display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** and Keep Current.

Bootup Num-Lock

Use this feature to set the Power-on state for the Numlock key. The options are Off and **On**.

Wait For 'F1' If Error

Select Enabled to force the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** and Disabled.

Power Configuration

Watch Dog Function

If enabled, the Watch Dog timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled.**

Power Button Function

If this feature is set to Instant_Off, the system will power off immediately as soon as the user presses the power button. If this feature is set to 4_Second_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant_Off** and 4_Second_Override.

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power On, Stay Off and **Last State**.

▶ CPU Configuration

This submenu displays the information of the CPU as detected by the BIOS. It also allows the user to configure CPU settings.

Socket 0 CPU Information

This submenu displays the following information regarding the CPU installed in Socket 0.

- Type of CPU
- CPU Signature
- Microcode Patch
- CPU Stepping
- Maximum CPU Speed
- Minimum CPU Speed
- Processor Cores
- Intel HT (Hyper-Threading) Technology
- Intel VT-x (Virtualization) Technology
- L1 Data Cache
- L1 Code Cache
- L2 Cache
- L3 Cache

Socket 1 CPU Information

This item displays if a CPU is installed in Socket 1.

CPU Speed

This item displays the speed of the CPU installed in Socket 1.

64-bit

This item indicates if the CPU installed in Socket 1 supports 64-bit technology.

Hyper-threading

Select Enabled to support Intel Hyper-threading Technology to enhance CPU performance. The options are **Enabled** and Disabled.

Active Processor Cores

Set to Enabled to use a processor's second core and above. (Please refer to Intel's website for more information.) The options are **All**, 1, 2, 4, and 6.

Limit CPUID Maximum

This feature allows the user to set the maximum CPU ID value. Enable this function to boot the legacy operating systems that cannot support processors with extended CPUID functions. The options are Enabled and **Disabled** (for the Windows OS).

Execute-Disable Bit Capability (Available if supported by the OS & the CPU)

Set to Enabled to enable the Execute Disable Bit, which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled**. (Refer to Intel and Microsoft Web Sites for more information.)

Intel® AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are **Enabled** and Disabled.

DCU Streamer Prefetcher (Available when supported by the CPU)

Select Enabled to enable the DCU (Data Cache Unit) Streamer Prefetcher which will stream and prefetch data and send it to the Level 1 data cache to improve data processing and system performance. The options are Disabled and **Enabled**.

DCU IP Prefetcher

Select Enabled for DCU (Data Cache Unit) IP Prefetcher support, which will prefetch IP addresses to improve network connectivity and system performance. The options are Disabled and **Enabled**.

Intel® Virtualization Technology (Available when supported by the CPU)

Select Enabled to support Intel Virtualization Technology, which will allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are **Enabled** and Disabled.

Note If a change is made to this setting, you will need to reboot the system for the change to take effect. Refer to Intel's website for detailed information.

Clock Spread Spectrum

Select Enabled to enable Clock Spectrum support, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

▶ CPU Power Management Configuration

This submenu allows the user to configure the following CPU Power Management settings.

Power Technology

Select Energy Efficient to support power-saving mode. Select Custom to customize system power settings. Select Disabled to disable power-saving settings. The options are Disable, **Energy Efficient** and Custom. If Custom is selected, the following options become available:

EIST

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's web site for detailed information.** The options are Disabled and **Enabled**.

Turbo Mode

This feature allows processor cores to run faster than marked frequency in specific conditions. The options are Disabled and **Enabled.**

C1E Support (Available when Power Technology is set to Custom)

Select Enabled to enable Enhanced C1 Power State to boost system performance. The options are **Enabled** and Disabled.

P-STATE Coordination

This feature selects the type of coordination for the P-State of the processor. P-State is a processor operational state that reduces the processor's voltage and frequency. This makes the processor more energy efficient, resulting in further gains. The options are **HW ALL**, SW ALL and SW-ANY.

CPU C3 Report (Available when Power Technology is set to Custom)

Select Enabled to allow the BIOS to report the CPU C3 State (ACPI C2) to the operating system. During the CPU C3 State, the CPU clock generator is turned off. The options are Enabled and **Disabled.**

CPU C6 Report (Available when Power Technology is set to Custom)

Select Enabled to allow the BIOS to report the CPU C6 State (ACPI C3) to the operating system. During the CPU C6 State, the power to all cache is turned off. The options are **Enabled** and Disabled.

CPU C7 Report (Available when Power Technology is set to Custom)

Select Enabled to allow the BIOS to report the CPU C7 State (ACPI C3) to the operating system. CPU C7 State is a processor-specific low C-State. The options are Enabled and **Disabled**.

Package C State Limit

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are C0, C2, C6, C7, and **No Limit**.

Energy/Performance Bias

Use this feature to select an appropriate fan setting to achieve maximum system performance (with maximum cooling) or maximum energy efficiency with maxi- mum power saving). The fan speeds are controlled by the firmware management via IPMI 2.0. The options are Performance, **Balanced Performance**, Balanced Energy, and Energy Efficient.

Factory Long Duration Power Limit

This item displays the power limit set by the manufacturer during which long duration power is maintained.

Long Duration Power Limit

This item displays the power limit set by the manufacturer during which long duration power is maintained.

Factory Long Duration Maintained

This item displays the period of time set by the manufacturer during which long duration power is maintained.

Long Duration Maintained

This item displays the period of time during which long duration power is maintained.

Recommended Short Duration Power

This item displays the short duration power settings recommended by the manufacturer.

Short Duration Power Limit

This item displays the time period during which short duration power is maintained.

▶Chipset Configuration

▶North Bridge

This feature allows the user to configure the following North Bridge settings.

▶IOH (IO Hub) Configuration

Intel VT-d

Select Enabled to enable Intel Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to the VMM (Virtual Working Memory) through the DMAR ACPI Tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enabled** and Disabled.

Data Direct I/O

The Intel I/OAT (I/O Acceleration Technology) significantly reduces CPU overhead by leveraging CPU architectural improvements, freeing up the system resource for other tasks. The options are **Disabled** and Enabled.

DCA Support

Select Enabled to use Intel's DCA (Direct Cache Access) Technology to improve data transfer efficiency. The options are **Enabled** and Disabled.

IIO 1 PCIe Port Bifurcation Control

This submenu allows the user to configure the following IO PCIe Port Bifurcation Control settings for IIO 1 PCIe port. These settings determine how to distribute the available PCI-Express lanes to the PCI-Exp. Root Ports.

IOU1-PCIe Port

This feature allows the user to set the PCI-Exp bus speed between IOU1 and PCIe port. The options is **x8**.

LSI SAS 2208 Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for the above port. Select GEN2 to enable PCI-Exp Generation 2 support for the above port. Select GEN3 to enable PCI-Exp Generation 3 support for the above Port. The options are GEN1, GEN2, and **GEN3**.

IOU2-PCIe Port

This feature allows the user to set the PCI-Exp bus speed between IOU2 and PCIe port. The default setting is **x8x8**.

Slot 2 Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for Slot 2 Port. Select GEN2 to enable PCI-Exp Generation 2 support for Slot 2 Port. Select GEN3 to enable PCI-Exp Generation 3 support for Slot 2 Port. The options are GEN1, GEN2, and **GEN3**.

Slot 3 Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for Slot 3 Port. Select GEN2 to enable PCI-Exp Generation 2 support for Slot 2 Port. Select GEN3 to enable PCI-Exp Generation 3 support for Slot 2 Port. The options are GEN1, GEN2, and **GEN3**.

IOU3-PCIe Port

This feature allows the user to set the PCI-Exp bus speed between IOU3 and PCIe port. The default setting is **x8x8**.

Slot 1 Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for Port 3A. Select GEN2 to enable PCI-Exp Generation 2 support for Port 3A. Select GEN3 to enable PCI-Exp Generation 3 support for Port 3A. The options are GEN1, GEN2, and **GEN3**.

LAN i350/x540 Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for the above port. Select GEN2 to enable PCI-Exp Generation 2 support for the above port. Select GEN3 to enable PCI-Exp Generation 3 support for the above Port. The options are GEN1, GEN2, and **GEN3**.

IIO 2 PCIe Port Bifurcation Control

This submenu allows the user to configure the following IO PCIe Port Bifurcation Control settings for IIO 2 PCIe port. These settings determine how to distribute the available PCI-Express lanes to the PCI-Exp. Root Ports.

▶QPI Configuration

Current QPI Link Speed

This item displays the speed of the QPI Link.

Isoc

Select Enabled to enable Isochronous support to meet QoS (Quality of Service) requirements. This feature is especially important for virtualization technology. The options are Disabled and **Enabled**.

QPI (Quick Path Interconnect) Link Speed Mode

Use this feature to select data transfer speed for QPI Link connections. The options are **Fast** and Slow.

QPI Link Frequency Select

Use this feature to select the desired QPI frequency. The options are **Auto**, 6.4 GT/s, 7.2 GT/s, and 8.0 GT/s.

▶DIMM Configuration

- **Current Memory Mode**: This item displays the current memory mode
- **Current Memory Mode**: This item displays the current memory mode
- Mirroring: This item displays if memory mirroring is supported by the serverboard
- Sparing: This item displays if memory sparing can be supported by the serverboard

▶DIMM information

The status of the memory modules detected by the BIOS will be displayed.

Memory Mode

When Independent is selected, all DIMMs will be available to the operating system. When Mirroring is selected, the serverboard maintains two identical copies of all data in memory for data backup. When Lockstep is selected, the serverboard uses two areas of memory to run the same set of operations in parallel. The options are **Independent**, Mirroring, Lockstep and Sparing.

DRAM RAPL (Running Average Power Limit) Mode

RAPL which stands for Running Average Power Limit is a feature that provides mechanisms to enforce power consumption limits on supported processors The options are DRAM RAPL MODE0, **DRAM RAPL MODE1**, and Disabled.

DDR Speed

Use this feature to force a DDR3 memory module to run at a frequency other than what the system is specified in the specification. The options are **Auto**, Force DDR3 800, Force DDR3 1066, Force DDR3 1333, Force DDR3 1600 and Force SPD.

Channel Interleaving

This feature selects from the different channel interleaving methods. The options are **Auto**, 1 Way, 2 Way, 3, Way, and 4 Way.

Rank Interleaving

This feature allows the user to select a rank memory interleaving method. The options are **Auto**, 1 Way, 2 Way, 4, Way, and 8 Way.

Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected on a memory module and send the correction to the requestor (the original source). When this item is set to Enabled, the IO hub will read and write back one cache line every 16K cycles, if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the IO hub will be scrubbed every day. The options are **Enabled** and Disabled.

Demand Scrub

Demand Scrubbing is a process that allows the CPU to correct correctable memory errors found on a memory module. When the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable error, the error is corrected and sent to the requestor (the original source). Memory is updated as well. Select Enabled to use Demand Scrubbing for ECC memory correction. The options are Enabled and **Disabled**.

Data Scrambling

Select Enabled to enable data scrubbing and ensure data security and integrity. The options are Disabled and **Enabled**.

DRAM RAPL

RAPL which stands for Running Average Power Limit is a feature that provides mechanisms to enforce power consumption limits on supported processors The options are Mode 0, **MODE1**, and Disabled.

Device Tagging

Select Enabled to support device tagging. The options are **Disabled** and Enabled.

Thermal Throttling

Throttling improves reliability and reduces power consumption in the processor via automatic voltage control during processor idle states. The options are Disabled and **CLTT** (Closed Loop Thermal Throttling).

▶South Bridge Configuration

This feature allows the user to configure the settings for the Intel PCH chip.

PCH Information

This feature displays the following PCH information.

Name: This item displays the name of the PCH chip.

Stepping: This item displays the status of the PCH stepping.

USB Devices: This item displays the USB devices detected by the BIOS.

All USB Devices

This feature enables all USB ports/devices. The options are Disabled and **Enabled**. (If set to Enabled, EHCI Controller 1 and Controller 2 will appear.)

EHCI Controller 1/EHCI Controller 2

Select Enabled to enable Enhanced Host Controller Interface (EHCI) Control- ler 1 or Controller 2 to improve overall platform performance. The options are **Enabled** and Disabled.

Legacy USB Support (Available when USB Functions is not Disabled)

Select Enabled to support legacy USB devices. Select Auto to disable legacy support if USB devices are not present. Select Disable to have USB devices available for EFI (Extensive Firmware Interface) applications only. The settings are Disabled, **Enabled** and Auto.

Port 60/64 Emulation

Select Enabled to enable I/O port 60h/64h emulation support for the legacy USB keyboard so that it can be fully supported by the operating systems that does not recognize a USB device. The options are Disabled and **Enabled**.

EHCI Hand-Off

This item is for operating systems that do not support Enhanced Host Controller Interface (EHCI) hand-off. When enabled, EHCI ownership change will be claimed by the EHCI driver. The options are **Disabled** and Enabled.

▶SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of IDE or SATA devices and displays the following items.

SATA Port0~SATA Port5: The AMI BIOS displays the status of each SATA port as detected by the BIOS.

SATA Mode

Use this feature to configure SATA mode for a selected SATA port. The options are Disabled, IDE Mode, AHCI Mode and RAID Mode. The following are displayed depending on your selection:

IDE Mode

The following items are displayed when IDE Mode is selected:

Serial-ATA (SATA) Controller 0~1

Use this feature to activate or deactivate the SATA controller, and set the compatibility mode. The options for Controller 0 are Enhanced and **Compatible**. The default of SATA Controller 1 is **Enhanced**.

AHCI Mode

The following items are displayed when the AHCI Mode is selected:

Aggressive Link Power Management

When Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link in a low power mode during extended periods of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Enabled** and Disabled.

Port 0~5 Hot Plug

Select Enabled to enable hot-plug support for a particular port, which will allow the user to change a hardware component or device without shutting down the system. The options are **Enabled** and Disabled.

Staggered Spin Up

Select Enabled to enable Staggered Spin-up support to prevent excessive power consumption caused by multiple HDDs spinning-up simultaneously. The options are Enabled and **Disabled**.

RAID Mode

The following items are displayed when RAID Mode is selected:

Port 0~5 Hot Plug

Select Enabled to enable hot-plug support for the particular port. The options are **Enabled** and Disabled.

▶SCU (Storage Controller Unit) Configuration

Storage Controller Unite

Select Enabled to support a PCH storage device. The options are Disabled and **Enabled**.

Onchip SCU Option ROM

Select Enabled to support the onboard SCU Option ROM to boot up the system via a SCU device. The options are Disabled and **Enabled**.

SCU Port 0~3: The SCU devices detected by the BIOS will be displayed.

▶PCIe/PCI/PnP Configuration

This submenu allows the user to configure the following PCIe/PCI/PnP settings:

PCI ROM Priority

Use this feature to select the Option ROM to boot the system when there are multiple Option ROMs available in the system. The options are EFI Compatible ROM and **Legacy ROM.**

PCI Latency Timer

Use this feature to set the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64**, 96, 128, 160, 192, 224 and 248.

Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are Enabled and **Disabled**.

PERR# Generation

Select Enabled to allow a PCI device to generate a PERR number for a PCI Bus Signal Error Event. The options are **Enabled** and Disabled.

SERR# Generation

Select Enabled to allow a PCI device to generate an SERR number for a PCI Bus Signal Error Event. The options are Enabled and **Disabled**.

Maximum Payload

This feature selects the setting for the PCIE maximum payload size. The options are **Auto,** 128 Bytes**,** 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

Maximum Read Request

This feature selects the setting for the PCIE maximum Read Request size. The options are **Auto,** 128 Bytes**,** 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

ASPM Support

This feature allows the user to set the Active State Power Management (ASPM) level for a PCI-E device. Select Force L0s to force all PCI-E links to operate at L0s state. Select Auto to allow the system BIOS to automatically set the ASPM level for the system. Select Disabled to disable ASPM support. The options are **Disabled,** Auto, and Force L0s.

CPU1 Slot 1 PCI-E 3.0 x8 OPROM, CPU1 Slot 2 PCI-E 3.0 x8 OPROM, CPU1 Slot 3 PCI-E 3.0 x8 OPROM/, CPU2 Slot 4 PCI-E 3.0 x16 OPROM, CPU2 Slot 5 PCI-E 3.0 x8 OPROM, CPU2 Slot 6 PCI-E 3.0 x8 OPROM, CPU2 Slot 7

Select Enabled to enable Option ROM support to boot the computer using a device installed on the slots specified above. The options are **Enabled** and Disabled.

Onboard LAN Option ROM Select

This feature selects whether to load the iSCSI or PXE onboard LAN option ROM. The options are iSCSI and **PXE**.

Load Onboard LAN1 Option ROM, Load Onboard LAN2 Option ROM

Select Enabled to enable the onboard LAN1 Option ROM~LAN2 Option ROM. This is to boot the computer using a network device. The default setting for LAN1 Option ROM is **Enabled**. The default setting for LAN2 Option ROM is **Disabled**

LSI SAS 2208 OPROM

Select Enabled to use the LSI SAS Option ROM to boot the computer using a SAS device. The options are **Enabled** and Disabled.

VGA Priority

Use this feature to specify which graphics controller to be used as the primary boot device. The options are **Onboard** and Offboard (VGA).

Network Stack

Select Enabled enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are Enabled and **Disabled**.

▶Super IO Configuration

Super IO Chip: This item displays the name of the super IO chip used in the system.

▶Serial Port 1 Configuration

Serial Port

Select Enabled to enable serial port 1. The options are **Enabled** and Disabled.

Device Settings

This item displays the settings of Serial Port 1.

Change Settings

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port becomes unavailable. The options are **Auto**, IO=3F8h; IRQ=4; IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; and IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12.

Device Mode

Use this feature to select the desired mode for a serial port specified. The options are **Normal** and High Speed.

▶Serial Port 2 Configuration

Serial Port

Select Enabled to enable serial port 2. The options are **Enabled** and Disabled.

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **SOL** and COM.

Device Settings

This item displays the settings of Serial Port 2.

Change Settings

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port becomes unavailable. The options are **Auto**, IO=3F8h; IRQ=4; IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; and IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12.

Device Mode

Use this feature to select the desired mode for a serial port specified. The options are **Normal** and High Speed.

▶Serial Port Console Redirection

These submenus allow the user to configure the following Console Redirection settings for COM Port 0 or COM Port 1 as specified by the user.

COM 1, COM2

These two submenus allow the user to configure the following Console Redirection settings for a COM Port specified by the user.

Console Redirection

Select Enabled to use a COM Port selected by the user for Console Redirection. The options are **Enabled** and Disabled. The default setting for COM1 is **Disabled**, and for COM2 is **Enabled**.

▶Console Redirection Settings

This feature allows the user to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

Terminal Type

This feature allows the user to select the target terminal emulation type for Con- sole Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, **VT100+**, and VT-UTF8.

Bits Per second

This item sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600, and **115200** (bits per second).

Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 Bits and **8 Bits**.

Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0, and the number of 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a Space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark and Space.

Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 Stop Bit for standard serial data communication. Select 2 Stop Bits if slower devices are used. The options are **1** and 2.

Flow Control

This feature allows the user to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop send- ing data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are **Enabled** and Disabled.

Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

Legacy OS Redirection

Use this feature to select the number of rows and columns used in Console Redirection for legacy OS support. The options are 80x24 and **80x25**.

Putty Keypad

Use this feature to select function key and keypad setting on Putty. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

This item allows the user to configure Console Redirection settings to support Out-of-Band Serial Port management.

Console Redirection (for EMS)

Select Enabled to use a COM Port selected by the user for Console Redirection. The options are **Enabled** and Disabled.

▶Console Redirection Settings (for EMS)

This feature allows the user to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

Out-of-Band-Mgmt Port

Use this feature to select the port for out-of-band management. The options are **COM1** and COM2.

Terminal Type

This feature allows the user to select the target terminal emulation type for Con- sole Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, VT100+, and **VT-UTF8**.

Bits per Second

This item sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 57600, and **115200** (bits per second).

Flow Control

This feature allows the user to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None,** Hardware RTS/ CTS, and Software Xon/Xoff.

Data Bits, Parity, Stop Bits

The setting for each of these features is displayed.

▶ACPI Setting

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

ACPI Sleep State

Use this feature to select the ACPI State when the system is in sleep mode. Select S1 (CPU Stop Clock) to erase all CPU caches and stop executing instructions. Power to the CPU(s) and RAM is maintained, but RAM is refreshed. Select Suspend Disabled to use power-reduced mode. Power will only be supplied to limited components (such as RAMs) to maintain the most critical functions of the system. The options are **S1 (CPU Stop Clock)** and Suspend Disabled.

High Precision Event Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback, reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** and Disabled.

▶Trusted Computing (Available when a TPM device is detected by the BIOS)

Configuration

TPM Support

Select Enabled on this item and enable the TPM jumper on the serverboard to enable TPM support to improve data integrity and network security. The options are **Enabled** and Disabled.

TPM State

Select Enabled to enable TPM security settings to improve data integrity and network security. The options are Disabled and **Enabled**.

Pending Operation

Use this item to schedule an operation for the security device. The options are **None**, Enable Take Ownership, Disable Take Ownership, and TPM Clear.

Note During restart, the computer will reboot in order to execute the pending operation and change the state of the security device.

Current Status Information: This item displays the information regarding the current TPM status.

TPM Enable Status

This item displays the status of TPM Support to indicate if TPM is currently enabled or disabled.

TPM Active Status

This item displays the status of TPM Support to indicate if TPM is currently ac- tive or deactivated.

TPM Owner Status

This item displays the status of TPM Ownership.

▶ Intel TXT (LT-SX) Configuration

Intel TXT (LT-SX) Hardware Support

This feature indicates if the following hardware components support Intel TXT (Trusted Execution Technology).

CPU: TXT Feature

Chipset: TXT Feature

Intel TXT (LT-SX) Configuration

This feature displays the following TXT configuration setting.

TXT (LT-SX) Support: This item indicates if the Intel TXT support is enabled or disabled. The default setting is **Disabled**.

Intel TXT (LT-SX) Dependencies

This feature displays the features that need to be enabled for the Intel Trusted Execution Technology to work properly in the system.

VT-d Support: Intel Virtualization Technology with Direct I/O support

VT Support: Intel Virtualization Technology support

TPM Support: Trusted Platform support

TPM State: Trusted Platform state

▶ME (Management Engine) Subsystem

Intel ME Subsystem Configuration

This feature displays the following ME Subsystem Configuration settings.

ME Subsystem

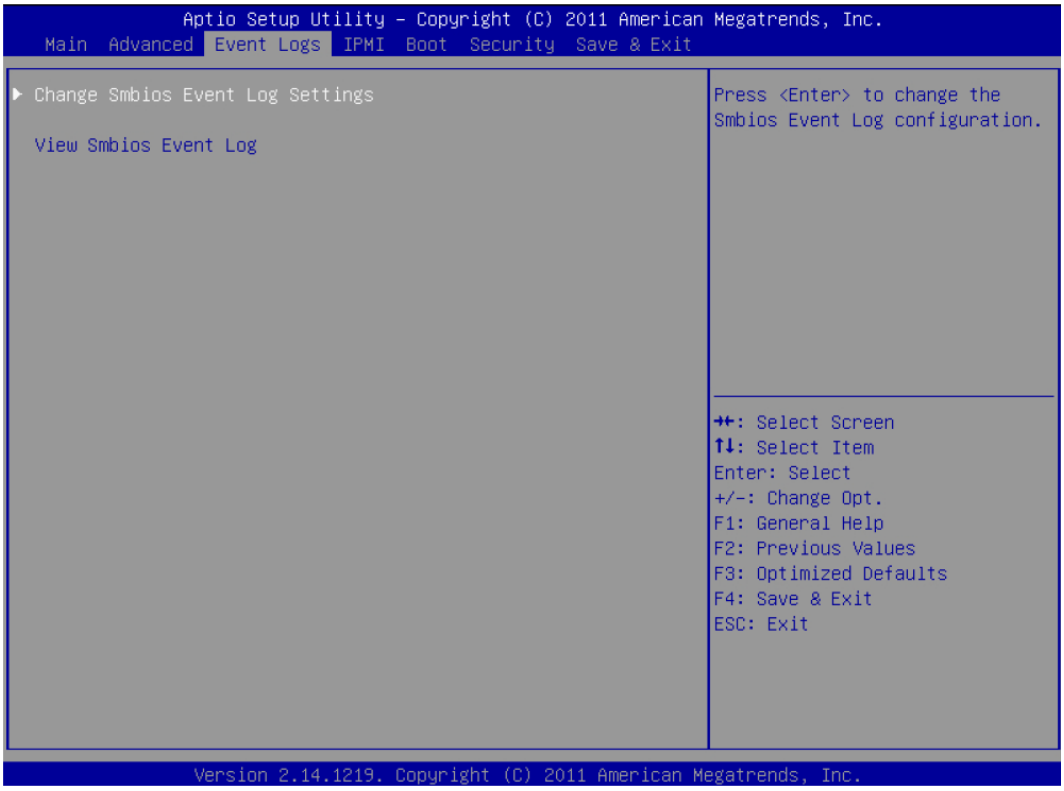
Select Enabled to support Intel Management Engine (ME) Subsystem, a small power computer subsystem that performs various tasks in the background. The options are **Enabled** and Disabled.

When ME Subsystem is enable, the following items will display:

- **ME BIOS Interface Version**
- **ME Version**

7.4 Event Logs

Use this menu to configure Event Log settings.



▶Change SMBIOS Event Log Settings

This feature allows the user to configure SMBIOS Event settings.

Enabling/Disabling Options

SMBIOS Event Log

Change this item to enable or disable all features of the Smbios Event Logging during boot. The options are **Enabled** and Disabled.

Runtime Error Logging Support

Change this item to enable or disable runtime error logging. The options are **Enabled** and Disabled.

Memory Correction Error Threshold

Change this item to define the system's memory correction error threshold. Directly enter a numeric value, **default is 10**.

PCI Error Logging Support

Change this item to enable or disable runtime error logging. The options are Enabled and **Disabled**.

Erasing Settings

Erase Event Log

Select Enabled to erase the SMBIOS (System Management BIOS) Event Log, which is completed before an event logging is initialized upon system reboot. The options are **No**, Yes Next Reset, and Yes Every Reset.

When Log is Full

This option automatically clears the Event Log memory of all messages when it is full. The options are **Do Nothing** and Erase Immediately.

Log System Boot Event

This option toggles the System Boot Event logging to enabled or disabled. The options are **Disabled** and Enabled.

MECI

The Multiple Event Count Increment (MECI) counter counts the number of occurrences a duplicate event must happen before the MECI counter is incremented. Enter a number from 1 to 255. The default setting is **1**.

METW

The Multiple Event Time Window (METW) defines the number of minutes that must pass between duplicate log events before MECI is incremented. Enter a number from 0 to 99. The default setting is **60**.

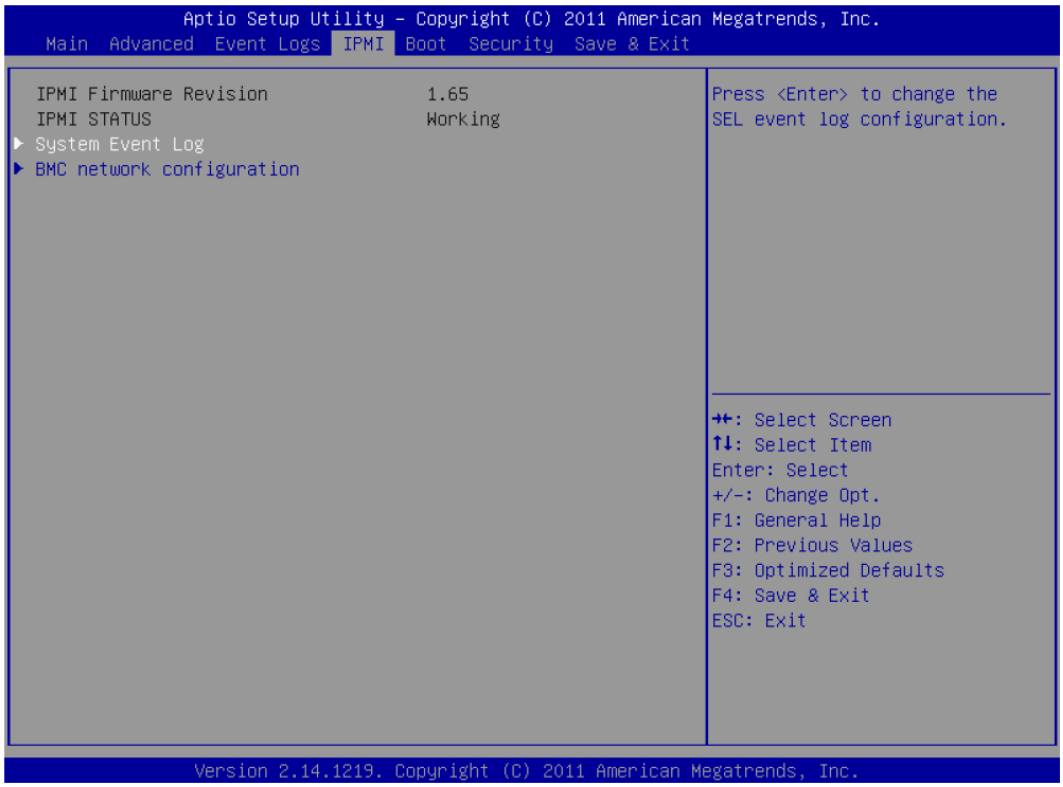
▶View SMBIOS Event Log

This item allows the user to view the event in the SMBIOS event log. Select this item and press <Enter> to view the status of an event in the log.

Date/Time/Error Code Severity

7.5 IPMI

Use this menu to configure Intelligent Platform Management Interface (IPMI) settings.



▶System Event Log

Enabling/Disabling Options

SEL Components

Select Enabled for all system event logging at bootup. The options are **Enabled** and Disabled.

Erasing Settings

Erase SEL

Select Yes, On next reset to erase all system event logs upon next system reboot. Select Yes, On every reset to erase all system event logs upon each system reboot. Select No to keep all system event logs after each system reboot. The options are **No**, Yes, On next reset, and Yes, On every reset.

When SEL is Full

This feature allows the user to decide what the BIOS should do when the system event log is full. Select Erase Immediately to erase all events in the log when the system event log is full. The options are **Do Nothing** and Erase Immediately.

Log EFI Status Codes

Select Enabled to log EFI (Extensible Firmware Interface) Status Codes, Error Codes or Progress Codes. The options are **Enabled** and Disabled.

Note	After making changes on a setting, be sure to reboot the system for the changes to take effect.

▶BMC Network Configuration

LAN Channel 1: This feature allows the user to configure the settings for LAN Channel 1.

Update IPMI LAN Configuration

This feature allows the BIOS to implement any IP/MAC address changes at the next system boot. If the option is set to Yes, any changes made to the settings below will take effect when the system is rebooted. The options are **No** and Yes.

Configuration Address Source

This feature allows the user to select the source of the IP address for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network that is attached to and request the next available IP address for this computer. The options are **DHCP** and Static.

Station IP Address

This item displays the Station IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

Subnet Mask

This item displays the sub-network that this computer belongs to. The value of each three-digit number separated by dots should not exceed 255.

Station MAC Address

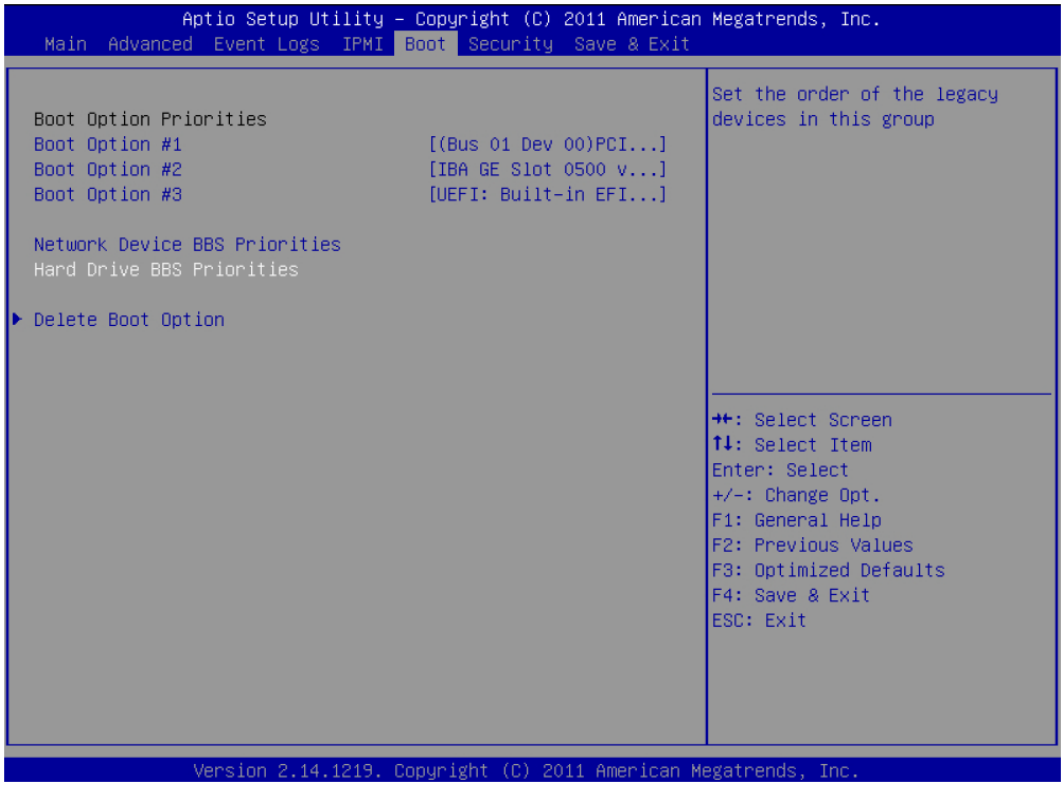
This item displays the Station MAC address of this computer. Mac addresses are 6 two-digit hexadecimal numbers.

Gateway IP Address

This item displays the Gateway IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

7.6 Boot

This menu allows the user to configure the following boot settings for the system.



Boot Option Priorities

Use this feature to specify the sequence of boot device priority.

Boot Option #1/Boot Option #2/Boot Option #3

Use this feature to specify the sequence of boot device priority.

Network Devices BBS Priorities

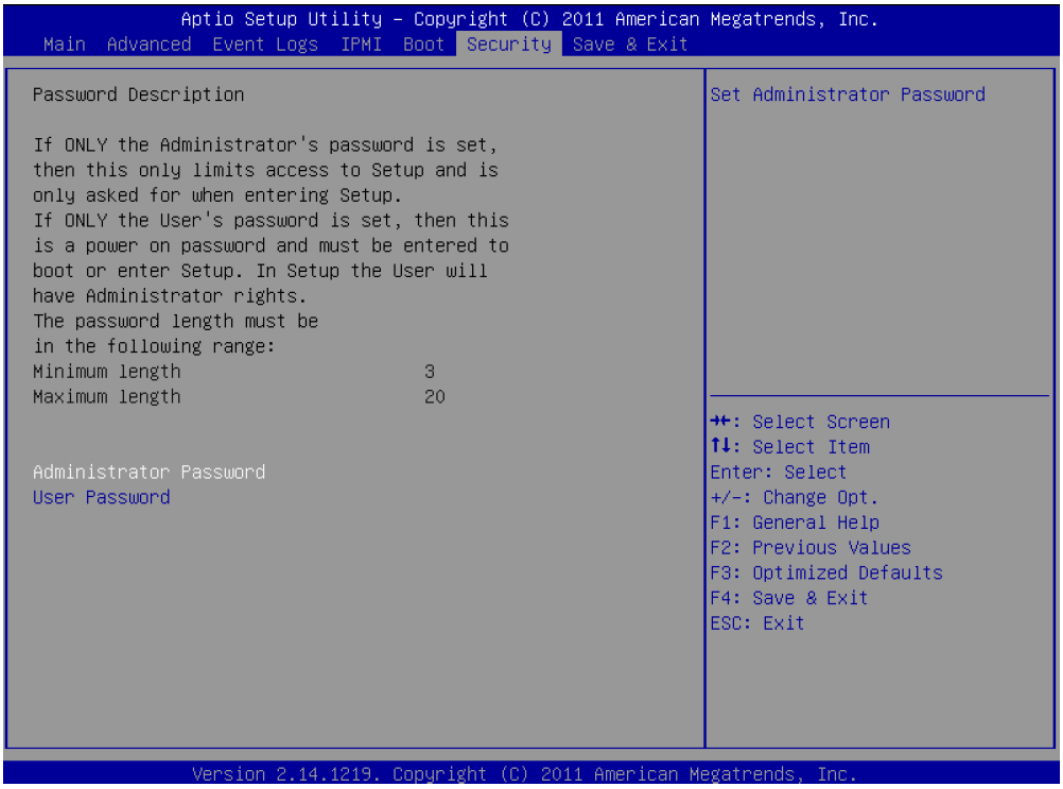
This option sets the order of the legacy network devices detected by the mother- board.

▶Delete Boot Options

This feature allows the user to delete a previously defined boot device from which the system boots during startup.

7.7 Security

This menu allows the user to configure the following security settings for the system.



Administrator Password

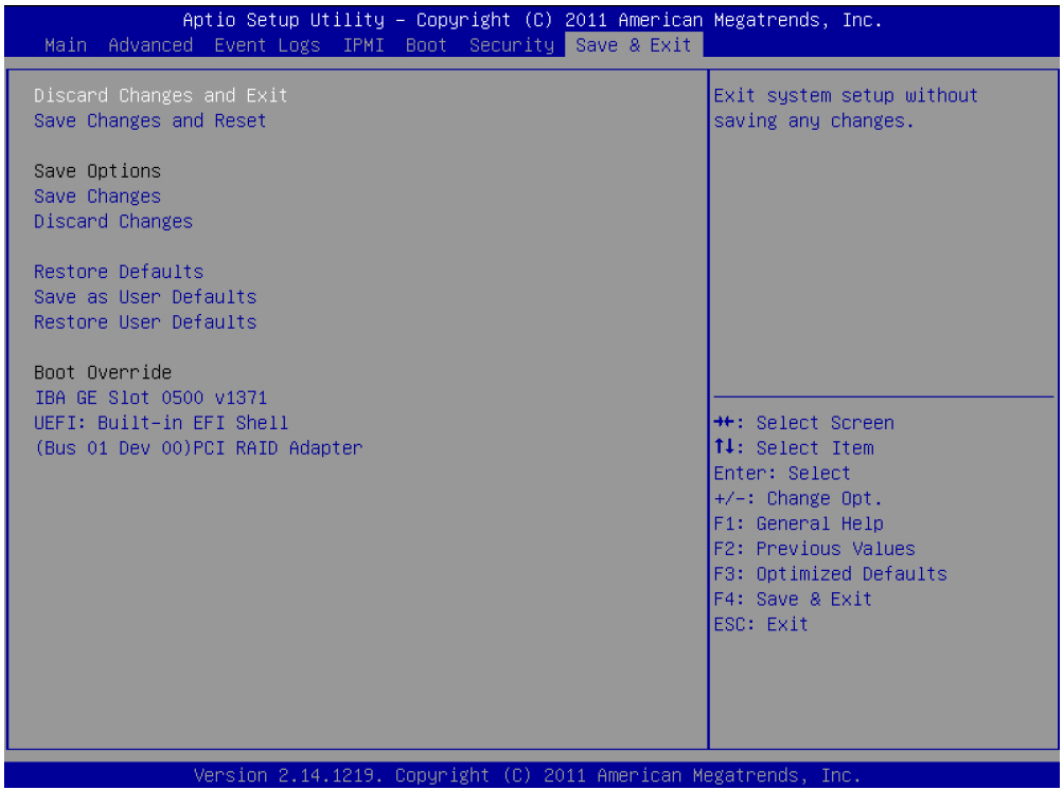
Use this feature to set the Administrator Password which is required to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

User Password

Use this feature to set a User Password which is required to log into the system and to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

7.8 Save & Exit

This menu allows the user to configure the Save and Exit settings for the system.



Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, click **Yes** to quit BIOS without saving the changes, or click No to quit the BIOS and save changes.

Save Changes and Reset

When you have completed the system configuration changes, select this option to save the changes and reboot the computer so that the new system configuration settings can take effect. Select Save Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, click **Yes** to quit BIOS without saving the changes, or click No to quit the BIOS and save changes.

Save Options

Save Changes

Select this option and press <Enter> to save all changes you've done so far and return to the AMI BIOS utility Program. When the dialog box appears, asking you if you want to save configuration, click **Yes** to save the changes, or click No to return to the BIOS without making changes.

Discard Changes

Select this feature and press <Enter> to discard all the changes and return to the BIOS setup. When the dialog box appears, asking you if you want to load previous values, click **Yes** to load the values previous saved, or click No to keep the changes you have made so far.

Restore Defaults

Select this feature and press <Enter> to load the default settings that help optimize system performance. When the dialog box appears, asking you if you want to load the defaults, click **Yes** to load the default settings, or click No to abandon optimized defaults.

Save as User Defaults

Select this feature and press <Enter> to save the current settings as the user's defaults. When the dialog box appears, asking you if you want to save values as user's defaults, click **Yes** to save the current values as user's default settings, or click No to keep the defaults previously saved as the user's defaults.

Restore User Defaults

Select this feature and press <Enter> to load the user's defaults previously saved in the system. When the dialog box appears, asking you if you want to restore user's defaults, click **Yes** to restore the user's defaults previously saved in the system, or click No to abandon the user's defaults that were previously saved.

Boot Override

This feature allows the user to override the Boot Option Priorities setting in the Boot menu, and instead immediately boot the system with one of the listed devices. This is a one-time override.

Appendix A. BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure.

If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset (Ready to power up)
5 short beeps and 1 long beep	Memory error	No memory detected in the system
5 beeps	No Con-In or Con-Out devices	Con-In includes USB or PS/2 keyboard, PCI or serial console redirection, IPMI KVM or SOL. Con-Out includes video controller, PCI or serial console redirection, IPMI SOL.
1 Continuous beep	System OH	System Overheat

Appendix B. System Specifications

Processors

Single or dual Intel® E5-2600 Series (Socket R) processors in LGA 2011 sockets (both CPUs must be of the same type)

Chipset

Intel C602 chipset

BIOS

16 Mb AMI® SPI Flash ROM

Memory Capacity

Sixteen DIMM Slots supporting up to 512 GB of ECC registered/unbuffered DDR3-1600/1066/800 memory.

Note: refer to Section 5-5 for details.

SAS Controller

LSI 2208 SAS controller for eight SAS ports

SATA Controller

Intel chipset-based SATA controller for six SATA ports

Drive Bays

Eight hot-swap drive bays to house eight SATA or SAS drives

Peripheral Drive Bays

Two 3.5" drive bays

Expansion Slots

Six PCI-E 3.0 x8 (in x16 slots) and one PCI-E 3.0 x16 slots

Serverboard

R423-E3 Serverboard

Dimensions: 12 x 13 in. (305 x 330 mm)

Chassis

R423-E3 chassis (2U rackmount)

Dimensions: (WxHxD) 16.8 x 3.5 x 25.5 in. (427 x 89 x 648 mm)

Weight

57 lbs. (25.9 kg.)

System Cooling

Three 8-cm system cooling fans

System Input Requirements

AC Input Voltage: 100-240V AC auto-range

Rated Input Current: 13 - 4A max

Rated Input Frequency: 50 to 60 Hz

Power Supply

Rated Output Power: 740W (Part# PWS-741P-1R)

Rated Output Voltages: +12V (61.7A), +5Vsb (4A)

Operating Environment

Operating Temperature: 10° to 35° C (50 to 95° F)

Non-operating Temperature: -40° to 70° C (-40° to 158° F)

Operating Relative Humidity: 20% to 95% (non-condensing)

Non-operating Relative Humidity: 5 to 95% (non-condensing)

Regulatory Compliance

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:
This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. “Perchlorate Material-special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate” for further details.

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