



SGI® Rackable™ C2112-4TY14
System User's Guide

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Contents

1	Introduction	1
	Overview	1
	Serverboard Features	3
	Processors	3
	Memory	3
	Onboard SAS (Option for 24-Drive Configurations)	3
	Serial ATA (SATA)	3
	PCI Expansion Slots	3
	Ethernet Ports	4
	Onboard Controllers/Ports	4
	Graphics Controller	4
	Other Features	4
	InfiniBand	4
	Server Chassis Features	6
	System Power	6
	SATA Subsystem	6
	Control Panel	6
	Rear I/O Panel	6
	Cooling System	6
	System Notes	7
	Nodes	7
	System Power	7
	SAS/SATA Backplane/Drives (24-Drive Chassis)	7
	SATA Backplane/Drives (12-Drive Chassis)	7
2	Server Installation	9
	Unpack the System	9
	Prepare for Setup	9

Choose a Setup Location	9
Warnings and Precautions	10
Rack Precautions	10
Server Precautions	11
Rack Mounting Considerations	11
Ambient Operating Temperature	11
Reduced Airflow	11
Mechanical Loading	11
Circuit Overloading	12
Reliable Ground	12
Install the System into a Rack	12
Separate the Sections of the Rack Rails	12
Outer Rack Rails.	14
Install the Outer Rails to the Rack	14
Install the Inner Rail Extension	14
Install the Inner Rails	14
Install the Server in a Rack	15
Check the Node Board Setup.	16
Access the Inside of the Chassis.	16
Check the CPUs (Processors)	17
Check the System Memory	18
Install Expansion PCIe Cards	18
Check all Cable Connections and Airflow	18
Check the Drive Bay Setup	18
Check the System Disk Drives	18
Check the Airflow	19
Supply Power to the System	19
3 System Interface.	21
Overview	21
Control Panel Buttons	22
Power	22
Unit Identifier	23
Control Panel LEDs	23

	Overheat/Fan Failure LED	23
	Network Activity	23
	Drive Carrier LEDs	24
4	System Safety	25
	Electrical Safety Precautions	25
	Serverboard Battery.	26
	DVD-ROM Laser	26
	Mainboard Replaceable Soldered-in Fuses.	26
	General Safety Precautions	27
	ESD Precautions.	27
5	System Serverboard Information	29
	Handling a Node Board	30
	ESD Precautions	30
	Unpacking	30
	Serverboard Features	30
	Serverboard I/O Ports	33
	Configuring Memory	34
	Memory DIMM Layout	36
	Memory DIMM Rules	37
	Mixing Processor and DIMM Speeds	38
	PCIe Expansion Cards	39
6	Basic Troubleshooting and Chassis Service	41
	Basic Troubleshooting Procedures	42
	If the System Does Not Power Up	42
	System Powers Up But Will Not Boot	42
	No Video After System Power Up	43
	Memory Errors	43
	Chassis Service Information.	43
	Static-Sensitive Devices	44
	Precautions	44
	Unpacking	44
	Control Panel	45

System Fans . . . . .	. 45
Fan Configuration . . . . .	. 46
System Fan Failure . . . . .	. 46
Changing a System Fan . . . . .	. 46
Hard Drive Installation/Removal. . . . .	. 47
Nodes and Associated Disk Drives . . . . .	. 47
Installing a Hard Drive in a Carrier. . . . .	. 49
Removing Hot-Swap Drives. . . . .	. 49
Air Shrouds . . . . .	. 51
Power Supply. . . . .	. 51
Power Supply Failure . . . . .	. 51
7 BIOS . . . . .	. 53
Starting BIOS Setup Utility . . . . .	. 53
How To Change the Configuration Data. . . . .	. 54
Starting the Setup Utility. . . . .	. 54
Main Menu . . . . .	. 55
Advanced Settings Screen . . . . .	. 56
BOOT Features . . . . .	. 57
Quick Boot . . . . .	. 57
Quiet Boot . . . . .	. 57
AddOn ROM Display Mode . . . . .	. 57
Bootup Num-Lock . . . . .	. 57
Wait For 'F1' If Error . . . . .	. 57
Hit 'Del' Message Display . . . . .	. 57
Interrupt 19 Capture . . . . .	. 57
Power Configuration . . . . .	. 58
Power Button Function . . . . .	. 58
Restore on AC Power Loss . . . . .	. 58
Watch Dog Timer . . . . .	. 58
Processor and Clock Options . . . . .	. 58
Ratio CMOS Setting . . . . .	. 58
C1E Support . . . . .	. 58
Hardware Prefetcher (Available when supported by the CPU) . . . . .	. 59

Adjacent Cache Line Prefetch (Available when supported by the CPU)	59
Intel Virtualization Technology (Available when supported by the CPU)	59
Execute-Disable Bit Capability (Available when supported by the OS and the CPU)	59
Simultaneous Multi-Threading (Available when supported by the CPU).	59
Active Processor Cores	59
Intel EIST Technology.	60
Intel TurboMode Technology	60
Intel TurboMode C-STATE Tech	60
C-State package limit setting	60
C1 Auto Demotion.	60
C3 Auto Demotion.	60
Clock Spread Spectrum	60
Advanced Chipset Control	61
CPU Bridge Configuration.	61
North Bridge Configuration	64
SouthBridge Configuration	64
IDE/SATA Configuration	65
SATA#1 Configuration	65
SATA#2 Configuration	66
Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master	66
PCI/PnP Configuration	69
Clear NVRAM.	69
Plug & Play OS	69
PCI Latency Timer.	69
PCI IDE BusMaster	69
Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM.	69
Super IO Device Configuration.	70
Serial Port1 Address/ Serial Port2 Address	70
Remote Access Configuration	70
Remote Access.	70
Serial Port Number.	70
Serial Port Mode	70

Flow Control . . . . .	. 70
Redirection After BIOS POST . . . . .	. 71
Terminal Type . . . . .	. 71
VT-UTF8 Combo Key Support. . . . .	. 71
Sredir Memory Display Delay . . . . .	. 71
Hardware Health Monitor . . . . .	. 71
CPU Overheat Alarm . . . . .	. 71
Fan Speed Control Monitor. . . . .	. 73
ACPI Configuration . . . . .	. 74
ACPI Version Features . . . . .	. 74
ACPI APIC Support . . . . .	. 74
APIC ACPI SCI IRQ . . . . .	. 74
Headless Mode . . . . .	. 74
High Performance Event Timer . . . . .	. 74
General WHEA Configuration . . . . .	. 75
WHEA Support . . . . .	. 75
IPMI Configuration . . . . .	. 75
View BMC System Event Log . . . . .	. 76
Set LAN Configuration . . . . .	. 76
IP Address Configuration . . . . .	. 77
MAC Address Configuration . . . . .	. 78
Subnet Mask Configuration . . . . .	. 78
Gateway Address Configuration . . . . .	. 79
DMI Event Logging . . . . .	. 79
View Event Log . . . . .	. 79
Mark all events as read . . . . .	. 79
Clear event log . . . . .	. 79
Security Settings . . . . .	. 80
Boot Configuration . . . . .	. 82
Boot Device Priority. . . . .	. 82
Hard Disk Drives . . . . .	. 83
Removable Drives . . . . .	. 83
CD/DVD Drives . . . . .	. 83

Exit Options	84
Save Changes and Exit	84
Discard Changes and Exit	85
Discard Changes	85
Load Optimal Defaults	85
Load Fail-Safe Defaults	85
BIOS Recovery	86
Boot Sector Recovery from a USB Device.	86
Boot Sector Recovery from an IDE CD-ROM.	87
Boot Sector Recovery from a Serial Port (“Serial Flash”).	87
A BIOS Error Codes	91
B System Specifications	93

Figures

Figure 1-1	12-Drive Configuration	1
Figure 1-2	Intel 5520 Chipset—System Block Diagram	5
Figure 2-1	Separating and Installing the Rack Rails.	13
Figure 2-2	Installing the Server in a Rack	15
Figure 2-3	Accessing the Inside of the System	17
Figure 3-1	Location of the Server Control Panels	21
Figure 3-2	Control Panel Buttons and LEDs.	22
Figure 4-1	Installing the Onboard Battery	26
Figure 5-1	Node Board Layout	31
Figure 5-2	Serverboard I/O Ports	33
Figure 5-3	Memory Block Diagram	34
Figure 5-4	Memory DIMM Group Locations	36
Figure 6-1	Control Panels	45
Figure 6-2	Disk Drives and Associated Nodes in the 12-Drive Configuration	48
Figure 6-3	Disk Drives and Associated Nodes in the 24-Drive Configuration	48
Figure 6-4	Mounting a Drive in a Carrier	49
Figure 6-5	Removing a Drive Carrier	50
Figure 6-6	Removing a Power Supply	52
Figure 7-1	BIOS—Advanced Settings Screen	56
Figure 7-2	BIOS—Security Settings Screen.	80
Figure 7-3	BIOS—Boot Settings Screen.	82
Figure 7-4	BIOS—Exit Options	84
Figure 7-5	BIOS—Recovery/Remote Flashing	88
Figure 7-6	BIOS—Recovery/Flash Transfer	89
Figure 7-7	BIOS—Recovery/Send File Screen	89

Tables

Table 5-1	Processors and DIMM Speeds	38
Table A-1	BIOS Error Codes	91
Table B-1	System Specifications	93

About This Guide

This guide provides an overview of the installation, architecture, general operation, and descriptions of the major components in the SGI® Rackable™ C2112-4TY14 server. It also provides basic troubleshooting and maintenance information, BIOS information, and important safety and regulatory specifications.

Audience

This guide is written for users of SGI Rackable C2112-4TY14 server systems. It is written with the assumption that the reader has a good working knowledge of computers and computer systems. This guide may be useful to installers and system administrators looking for overview information on the server.

Chapter Descriptions

The following topics are covered in this guide:

- Chapter 1, “Introduction”
Provides an overview of the server’s components.
- Chapter 2, “Server Installation”
Provides a quick setup checklist to get the server operational.
- Chapter 3, “System Interface”
Describes several buttons and LEDs on the control panel as well as others on the drive carriers that keep you constantly informed of the overall status of the system as well as the activity and health of specific components.
- Chapter 4, “System Safety”
Provides general system safety information.
- Chapter 5, “System Severboard Information”
Provides best practice procedures to work with a node board in the C2112-4TY14 chassis

and also describes how to install memory DIMMs and PCIe expansion cards.

- Chapter 6, “Basic Troubleshooting and Chassis Service”
Describes some basic steps required to troubleshoot your system. Additional sections in this chapter are intended to guide you through basic component remove and replace procedures.
- Chapter 7, “BIOS”
Describes the AMI BIOS Setup Utility for the system severboard.
- [Appendix A, “BIOS Error Codes,”](#)
Provides a brief listing of BIOS error code information.
- [Appendix B, “System Specifications,”](#)
Describes system components, including environmental and compliance specifications .

Related Publications

The following SGI and LSI documents may be relevant to the use of your server:

- *MegaRAID SAS Software User's Guide*, publication number, publication number 860-0488-00x
- *MegaRAID 1078-based SAS RAID Controllers User's Guide*, publication number 860-0489-00x
- *LSI Integrated SAS for RAID User's Guide*, publication number 860-0476-00x
- *SGI Foundation Software Start Here*, publication number (007-5641-xxx)
- *SGI Performance Suite Start Here*, publication number (007-5680-xxx)
- *SGI InfiniteStorage* series documentation
- Man pages (online)

You can obtain SGI documentation (as well as the pertinent LSI books), release notes, or man pages in the following ways:

- Refer to the SGI Technical Publications Library at <http://docs.sgi.com>. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.
- You can also view man pages by typing **man <title>** on a command line.

SGI systems include a set of Linux® man pages, formatted in the standard UNIX® “man page” style. Important system configuration files and commands are documented on man pages. These are found online on the internal system disk (or DVD-CD) and are displayed using the **man** command. For example, to display the man page for the **xscsidisktest** command, type the following on a command line:

```
man xscsidisktest
```

For additional information about displaying man pages using the **man** command, see **man (1)**.

In addition, the **apropos** command locates man pages based on keywords. For example, to display a list of man pages that describe disks, type the following on a command line:

```
apropos disk
```

For information about setting up and using **apropos**, see **apropos (1)**.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
Command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
<i>variable</i>	The italic typeface denotes variable entries and words or concepts being defined. Italic typeface is also used for book titles.
user input	This bold fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
[]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
man page(x)	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

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Introduction

Overview

The SGI Rackable C2112-4TY14 server is a 2U rackmount server. It has two main subsystems: a 2U server chassis and four serverboards. The chassis can have one of two configurations: one for 12 (3.5-inch) disk drives and one for 24 (2.5-inch) disk drives. [Figure 1-1](#) shows the 12-drive configuration.

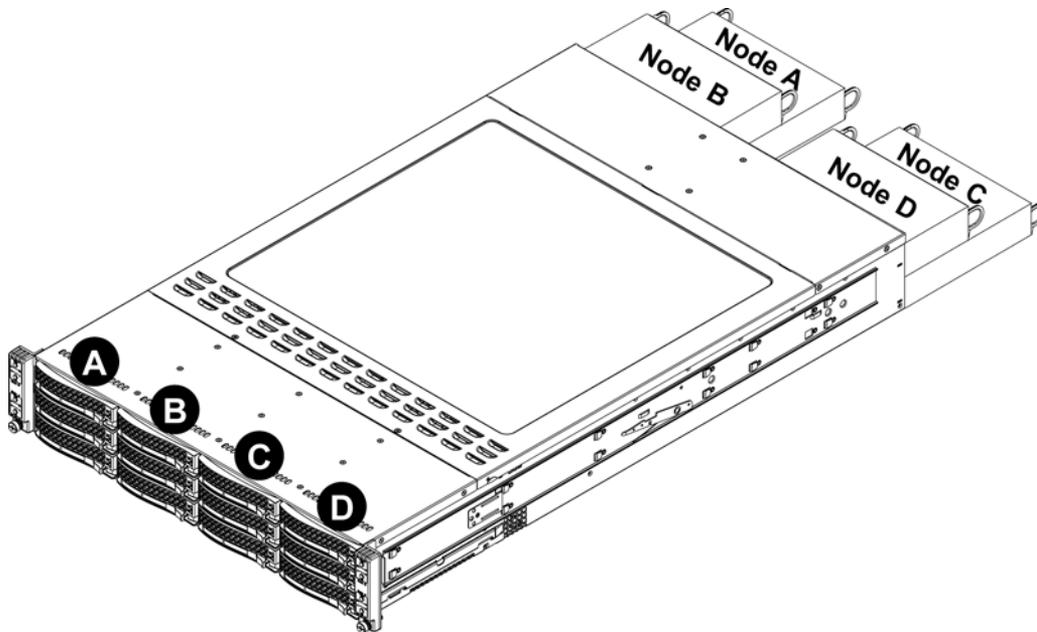


Figure 1-1 12-Drive Configuration

In addition to the serverboards and chassis, various other hardware components have been included:

- Eight passive CPU heatsinks
- Four 8-cm cooling fans
- Four air shrouds
- SAS/SATA accessories:
 - 12 (3.5-inch) or 24 (2.5-inch) hard drive carriers (three/six drives per node)
 - Four SATA/SAS daughter cards (some 24-drive configurations)
- Four PCI Express x16 riser cards
- Rackmount rails kit
- One CD containing drivers and utilities

Important: SGI Rackable server systems may sometimes require driver versions that are not included in the original operating system release. When required, SGI provides these drivers on an SGI Driver CD, which may ship with the system, or on the system disk (pre-installed in the factory). For more information on this topic check with your sales or service representative.

Serverboard Features

At the heart of the C2112-4TY14 server are four dual-processor serverboards, which are based on the Intel® 5520 + ICH10R chipset (shown in [Figure 1-2](#)). This section describes the main features of the serverboards. Note that the features on each board are quadrupled for the server, which includes four nodes.

Processors

Each serverboard supports two Intel 5600/5500 series processors.

Memory

Each serverboard has twelve DIMM sockets that can support up to 192 GB of registered ECC DDR3-1333/1066/800 SDRAM for a maximum of 768 GB for the system. See “[Configuring Memory](#)” on page 34 for details on installing memory into the system.

Onboard SAS (Option for 24-Drive Configurations)

An LSI 2108 SAS controller is integrated into an adapter board to provide six 6 Gb/s SAS ports per node. The hot-swap SAS drives are connected to a backplane that provides power, bus termination and configuration settings. RAID 0, 1, and 10 are supported.

Serial ATA (SATA)

The South Bridge (ICH10R) of the chipset includes a Serial ATA controller to support six 3 Gb/s SATA drives. The hot-swappable SATA drives are connected to a backplane that provides power, bus termination and configuration settings. RAID 0, 1, and 10 are supported.

PCI Expansion Slots

Each serverboard has a riser card that allows it to support one low-profile PCI Express 2.0 x16 expansion card—four total for the server.

Ethernet Ports

An Intel network controller is integrated into each of the serverboards to support two Gigabit LAN ports (100/1000Base-T/1000BaseTX, RJ45 output).

Onboard Controllers/Ports

Onboard I/O backpanel ports on each serverboard include one COM port, a VGA port, two USB ports, a dedicated IPMI LAN port and two Gigabit LAN (NIC) ports. Up to four USB 2.0 (Universal Serial Bus) connections (two rear USB ports and one Type A Header with two USB connections supported) are on each of the servers.

Graphics Controller

The serverboard features an integrated Matrox G200eW graphics chip, which includes 16 MB of DDR2 memory.

Other Features

Other onboard features that promote system health include voltage monitors, autoswitching voltage regulators, chassis and CPU overheat sensors, and virus protection.

InfiniBand

Optionally, the C2112-4TY14 server includes a QDR (quad data rate) InfiniBand port. InfiniBand is a scalable serial communications link intended for connecting processors with high-speed peripherals. (InfiniBand requires a QSFP connector.)

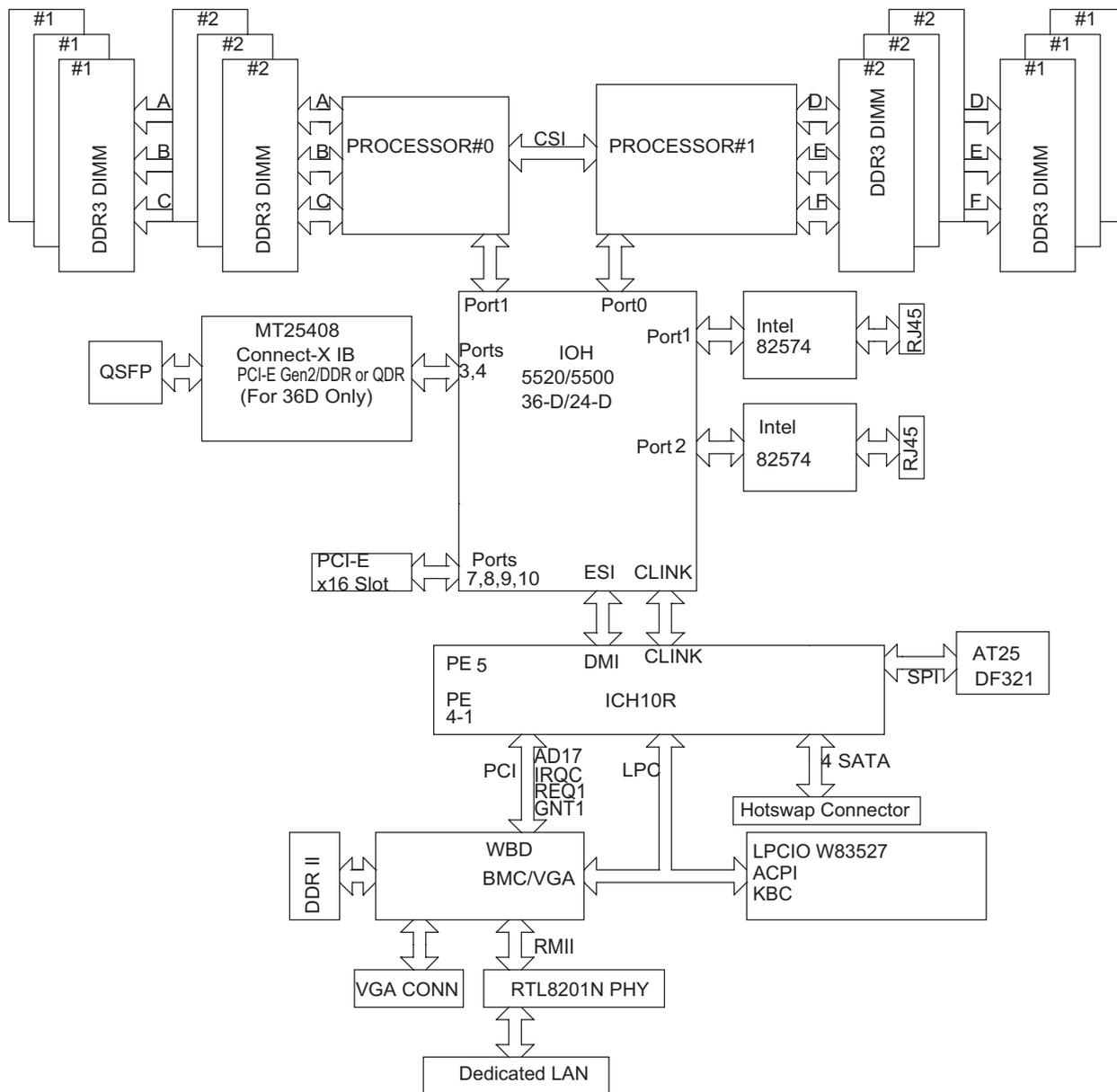


Figure 1-2 Intel 5520 Chipset—System Block Diagram

Server Chassis Features

The following is a general outline of the main features of the 2U chassis. Details on the chassis can be found in [Chapter 6, “Basic Troubleshooting and Chassis Service.”](#)

System Power

The chassis includes a redundant (dual) 1400W power supply, which provides power to all serverboards (nodes). If either power supply fails, the other will allow the system to continue to run.

SATA Subsystem

The chassis was designed to support 24 SAS/SATA hard drives or 12 SATA hard drives. The hard drives are hot-swappable units. There are three (3.5-inch) or six (2.5-inch) hard drives per node in the system.

Control Panel

The chassis features four independent control panels. Each control panel has LEDs to indicate power on, network activity, power fail, fan fail, system overheat conditions and the UID LED for its own specific node. Each control panel also includes a main power button and a UID button.

Rear I/O Panel

The chassis is a 2U rackmount chassis. Its I/O panel provides slots for four low-profile PCI Express x16 expansion cards, four COM ports, eight USB ports, four VGA ports and eight Gb Ethernet ports. See [“Control Panel” on page 45](#) for details.

Cooling System

The chassis has an innovative cooling design that features four 8-cm high-performance fans. A fan speed control setting in BIOS allows fan speed to be determined by system temperature. See [Chapter 6, “Basic Troubleshooting and Chassis Service.”](#) for details.

System Notes

The C2112-4TY14 server is a unique server system. It has four system boards incorporated into a single chassis acting as four separate nodes. This section describes several noteworthy items surrounding this uniqueness.

Nodes

Each of the four serverboards act as a separate node in the system. As independent nodes, each may be powered off and on without affecting the others. In addition, each node is a hot-swappable unit that may be removed from the rear of the chassis. The nodes are connected to the server backplane by means of an adapter board.

System Power

A single 1400W power supply module is used to provide the power for all four serverboards. Each serverboard can be shut down independently of the others with the power button on its own control panel. The server has an additional 1400W power supply module (two total) for power redundancy. If a power supply module fails the other backup module will keep the system running until it can be replaced.

SAS/SATA Backplane/Drives (24-Drive Chassis)

As a system, the C2112-4TY14 supports the use of 24 SAS or SATA drives. A single backplane works to apply system-based control for power and fan speed functions, yet at the same time logically connects a set of six drives to each serverboard. Consequently, RAID setup is limited to a six-drive scheme. RAID cannot be spread across all 24 drives. See the [“Hard Drive Installation/Removal”](#) on page 47 for the logical hard drive and node configuration.

SATA Backplane/Drives (12-Drive Chassis)

As a system, the C2112-4TY14 supports the use of 12 SATA drives. A single backplane works to apply system-based control for power and fan speed functions, yet at the same time logically connects a set of three drives to each serverboard. See the [“Hard Drive Installation/Removal”](#) on page 47 for the logical hard drive and node configuration.

Server Installation

This chapter provides a quick setup checklist to get the C2112-4TY14 operational.

Unpack the System

Inspect the shipping container that the C2112-4TY14 was shipped in and note if it was damaged in any way. If the server shows damage, file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack that supports the weight, power requirements, and environmental requirements of the C2112-4TY14 server. It should be situated in a clean, dust-free environment that is well ventilated. Avoid areas where heat, electrical noise, and electromagnetic fields are generated. Place the server rack near a grounded power outlet. Refer to [“Warnings and Precautions”](#) on page 10.

Prepare for Setup

The shipping container should include two sets of rail assemblies, two rail mounting brackets and the mounting screws that you will use to install the system into a rack.

Read this section in its entirety before you begin the installation procedure.

Choose 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.

Warnings and Precautions

Rack Precautions



Warning: The SGI Rackable C2112-4TY14 server weighs up to 85 lbs (38.6 kg). Always use proper lifting techniques when you move the server. Always get the assistance of another qualified person when you install the sever in a location above your shoulders. Failure to do so may result in serious personal injury or damage to the equipment.



Warning: Extend the leveling jacks on the bottom of the rack to the floor with the full weight of the rack resting on them. Failure to do so can result in serious injury or death.



Warning: Attach stabilizers to the rack in single rack installations. Failure to do so can result in serious injury or death.



Warning: Couple racks together in multiple rack installations. Failure to do so can result in serious injury or death.



Warning: Be sure the rack is stable before extending a component from the rack. Failure to do so can result in serious injury or death.



Warning: Extend only one component at a time. Extending two or more components simultaneously may cause the rack to tip over and result in serious injury or death.

Server Precautions

- Review the electrical and general safety precautions.
- Determine the placement of each component in the rack before you install the rails.
- Install the heaviest server components in the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges and voltage spikes and to keep your system operating in case of a power failure.
- Allow the hot-pluggable SAS/SATA 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.

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 (35° C or 95° F).

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 (for example, the use of power strips, and so on).

Install the System into a Rack

This section provides information on installing the C2112-4TY14 into a rack. If the system has already been mounted into a rack, refer to “[Check the Node Board Setup](#)” on page 16. 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.

Chassis slides are intended for square hole racks. An adapter is provided in an accessory kit for round hole racks.

Separate 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.

To separate the inner and outer rails, perform the following steps:

1. Locate the rail assembly in the chassis packaging as shown in [Figure 2-1](#).
2. Extend the rail assembly by pulling it outward.

3. Press the quick-release tab
4. Separate the inner rail from the outer rail assembly.

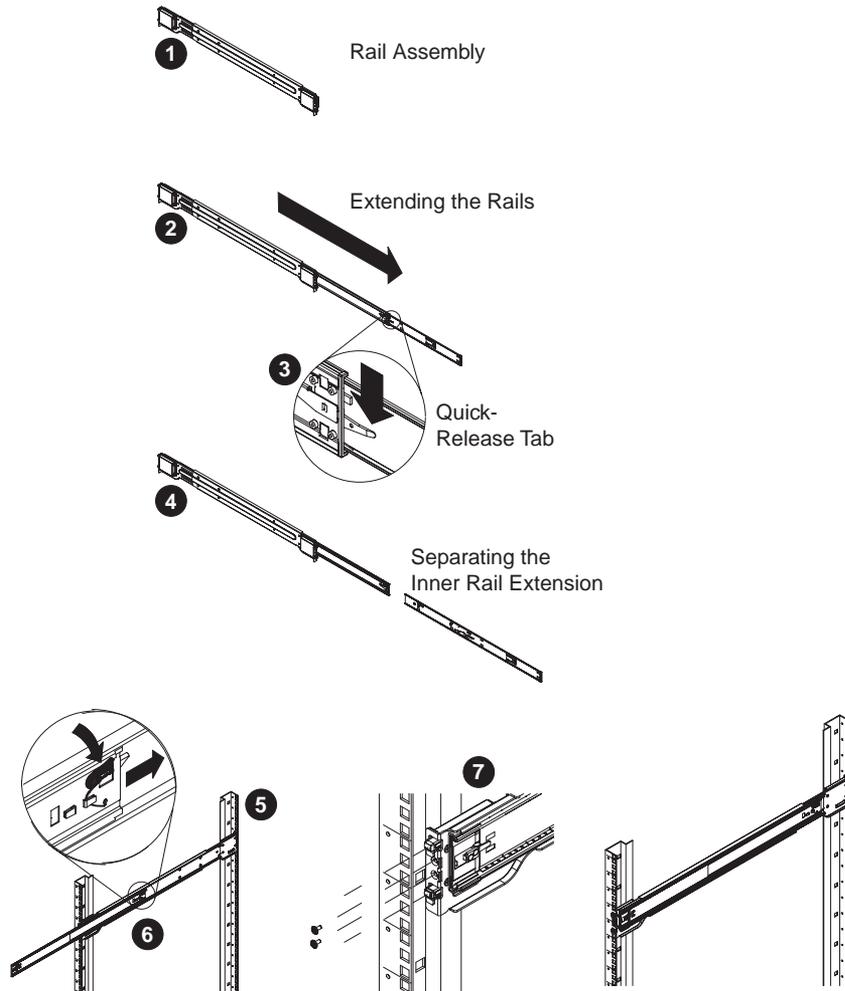


Figure 2-1 Separating and Installing the Rack Rails

Outer Rack Rails

Outer rails attach to the rack and hold the chassis in place. The outer rails for the chassis extend between 30 inches and 33 inches.

Install the Outer Rails to the Rack

1. Secure the back end of the outer rail to the rack, using the screws provided (see [Figure 2-1](#)).
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.

Install the Inner Rail Extension

The C2112-4TY14 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.

Install the Inner Rails

Perform the following steps to install the inner rails:

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.

Install the Server in a Rack



Warning: The SGI Rackable C2112-4TY14 server weighs up to 85 lbs (38.6 kg) Always use proper lifting techniques when you move the server. Always get the assistance of another qualified person when you install the sever in a location above your shoulders. Failure to do so may result in serious personal injury or damage to the equipment.

You should now have rails attached to both the server chassis and the rack unit. The next step is to install the server into the rack (refer to [Figure 2-2](#)).

1. Extend the outer rails as shown in [Figure 2-2](#).
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 are recommended to secure and hold the front of the chassis to the rack.

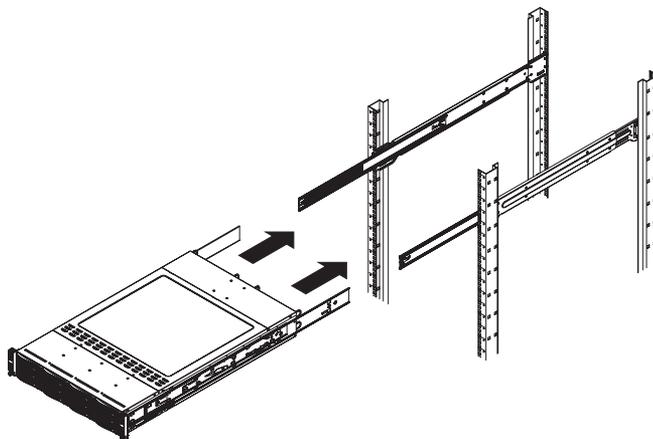


Figure 2-2 Installing the Server in a Rack

Check the Node Board Setup

Use the following sections to open the top cover and check that each node board is properly installed and all the connections have been made.

Access 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. Depress the two buttons on the top of the chassis to release the top cover as shown in [Figure 2-3](#).
3. Lift the top cover from the chassis.

Note: To remove the system from the rack completely, depress the locking tabs on the chassis rails (push the right-side tab down and the left-side tab up) to continue to pull the system out past the locked position.

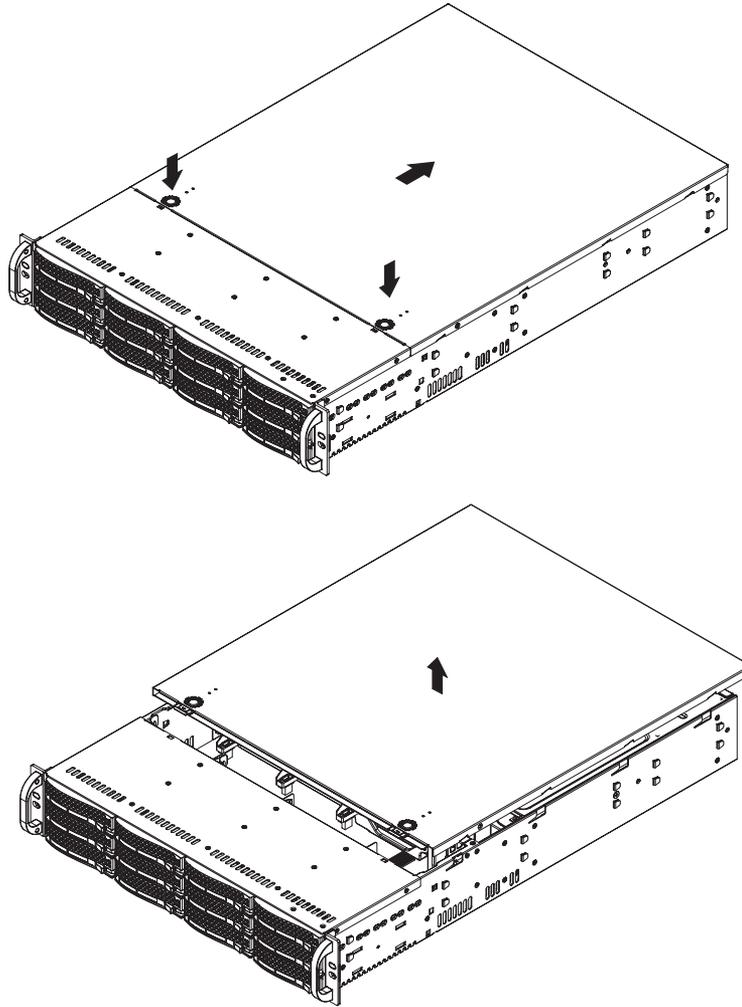


Figure 2-3 Accessing the Inside of the System

Check the CPUs (Processors)

Standard factory systems ship with four processors installed into the serverboard. Each processor needs its own heatsink.

Check the System Memory

Your server system is shipped with system memory installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to [“Configuring Memory”](#) on page 34.

Install Expansion PCIe Cards

You can install expansion PCIe cards in the system. Refer to [“PCIe Expansion Cards”](#) on page 39 for information on installing PCIe expansion cards.

Check all Cable Connections and Airflow

Make sure all power and data cables are properly connected and not blocking the chassis airflow.

Check the Drive Bay Setup

Next, you should check to make sure the system disk drives and disk drive backplane have been properly installed and all connections have been made.

Check the System Disk Drives

All drives are accessible from the front of the server. The hard drives can be installed and removed from the front of the chassis without removing the top chassis cover. Depending upon your system configuration, your system may have one or more drives installed. For detailed information about how to install disk drives, see [“Hard Drive Installation/Removal”](#) on page 47.

If you have more than 4TB of storage, you must create multiple volumes to fully utilize your RAID disks.

Check the Airflow

Airflow is provided by four 8-cm chassis cooling fans. The system component layout was carefully designed to direct sufficient cooling airflow to the components that generate the most heat.

Note: Make sure that all power and data cables have been routed in such a way that they do not block the airflow generated by the fans.

Supply Power to the System

If necessary, install the system in a rack (refer to [“Install the System into a Rack” on page 12](#)), and connect the power cords from the power supply modules into a power strip or power distribution unit (PDU). SGI also recommends that you use an optionally available uninterruptible power supply (UPS) source.

System Interface

Overview

There are LEDs on the control panels and on the hard drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. There are also two buttons on each control panel. This chapter describes all buttons and LED indicators as well as the appropriate response you may need to take.

Note: As shown in [Figure 3-1](#), the server has four control panels, one for each serverboard (node) installed in the system. This allows each node to be controlled independently of the other.

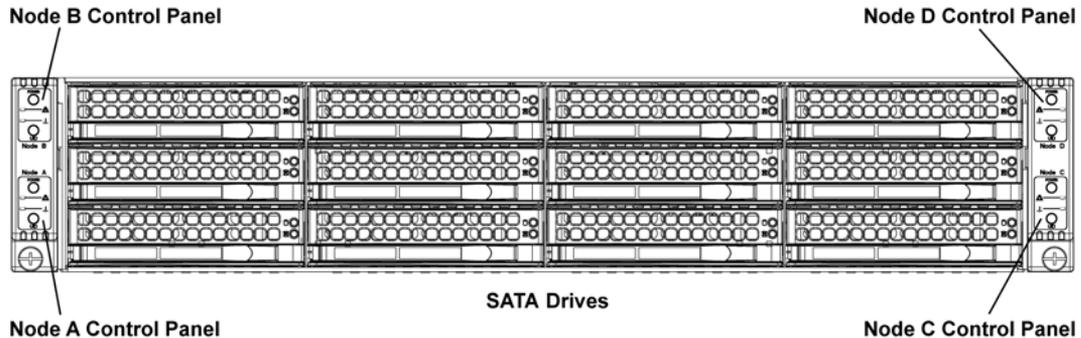


Figure 3-1 Location of the Server Control Panels

Control Panel Buttons

There are two push-buttons located on each control panel: a power on/off button and a UID button.

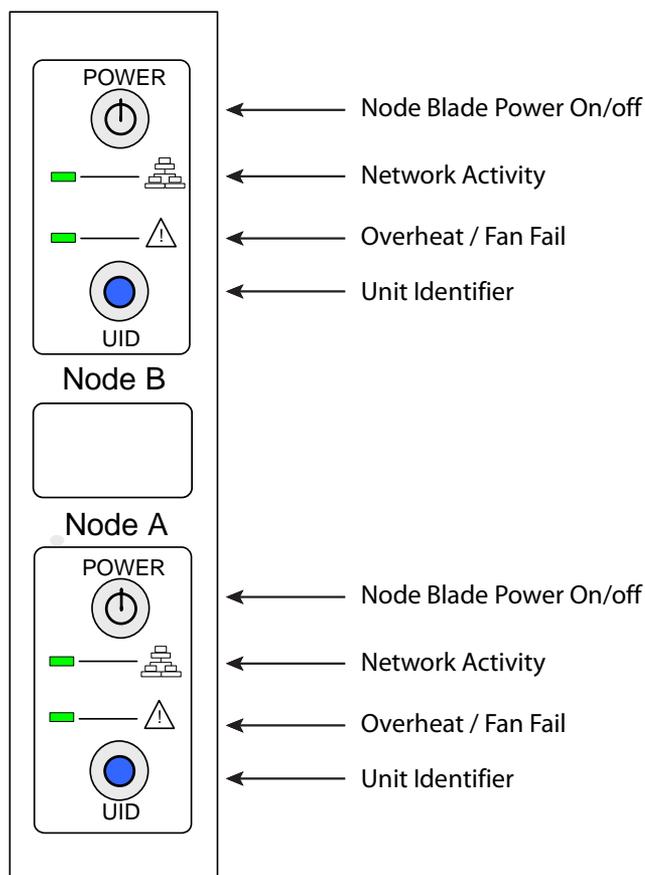


Figure 3-2 Control Panel Buttons and LEDs

Power

You use the main power button, shown in [Figure 3-2](#), to apply or turn off the main system power only to the node to which it is connected. Depressing this button removes the main power but keeps standby power supplied to the serverboard. Therefore, you must unplug the AC power cord

from any external power source before servicing. This button has a built-in LED, which will illuminate when its node is powered on.

Unit Identifier

Depressing the UID (unit identifier) button, shown in [Figure 3-2](#), illuminates an LED on both the front and rear of the chassis for easy system location in large stack configurations. The LED will remain on until the button is pushed a second time. Another UID button on the rear of the chassis serves the same function. This button has a built-in LED, which will illuminate when either the front or rear UID button is pushed.

Control Panel LEDs

In addition to the LEDs built into the power and UID buttons, each of the four control panels located on the front of the chassis has two LEDs that provide you with critical information related their own node. This section describes what each LED indicates when illuminated and any corrective action you may need to take.

Overheat/Fan Failure LED

This LED, shown in [Figure 3-2](#), is illuminated when an alert condition occurs. A solid light indicates an overheat condition in the system. A light that flashes in one second intervals indicates a fan failure. A light which flashes in four-second intervals indicates a power failure. When notified of an alert, 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 and air shrouds are installed. Finally, verify that the heatsinks are installed properly. This LED will remain on or flash as long as the temperature is too high or a fan does not function properly.

Network Activity

This LED, shown in [Figure 3-2](#), indicates network activity on any of the LAN ports when flashing.

Drive Carrier LEDs

Each drive carrier has two LEDs.

Blue: When illuminated, this blue LED (on the front of the drive carrier) indicates drive activity. A connection to the drive backplane enables this LED to blink on and off when that particular drive is being accessed.

Red: The red LED indicates a drive failure. If one of the drives fail, you should be notified by your system management software.

System Safety

This chapter describes basic safety precautions.

Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the Rackable C2112-4TY14 system from damage, as follows:

- 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 memory modules and disk drives. When disconnecting power, you should first power down the operating system and then unplug the power cords. The unit can have 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 or power distribution unit (PDUs).

Serverboard Battery



Caution: There is a danger of explosion if the onboard 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. Check with your service representative if you have any questions. Dispose of used batteries according to the manufacturer's instructions.

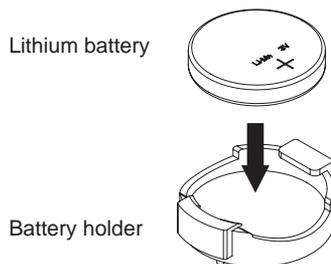


Figure 4-1 Installing the Onboard Battery

DVD-ROM Laser



Caution: This server may have come equipped with a DVD drive. To prevent direct exposure to the laser beam and hazardous radiation exposure, do not open the drive enclosure or use the unit in any unconventional way.

Mainboard Replaceable Soldered-in Fuses

Important: If your system comes with self-resetting PTC (Positive Temperature Coefficient) fuses on the serverboard, they must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact your technical support organization for details and support.

General Safety Precautions

Follow these rules to ensure general safety:

- Keep the area around the Rackable C2112-4TY14 system clean and free of clutter.
- The Rackable C2112-4TY14 system weighs approximately 85lbs (38.6 kg.) 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.

ESD Precautions



Caution: 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.

System Serverboard Information

The C2112-4TY14 server contains four serverboards (node boards). This chapter describes a node board and best practice procedures for working with such node boards. The following topics appear in this chapter:

- “Handling a Node Board” on page 30
- “Serverboard Features” on page 30
- “Serverboard I/O Ports” on page 33
- “Configuring Memory” on page 34
- “PCIe Expansion Cards” on page 39

Note: Some software products are protected with software license keys derived from the Media Access Control (MAC) Ethernet address. If your system requires the replacement of a node board, the MAC Ethernet address changes. If you are using such a product, you must request a new license key after replacing the node board. Contact your local customer support office:

<http://www.sgi.com/support/supportcenters.html>



Caution: Install the chassis cover after you have completed accessing the components inside the server to maintain proper airflow and cooling for the system.

Handling a Node Board



Caution: Electrostatic discharge (ESD) can damage electrostatic-sensitive devices inside the C2112-4TY14 server. Use the ESD precautions described below when you handle printed circuit boards or other components in the system. The following measures are generally sufficient to protect your equipment from ESD.

ESD Precautions

- Use a grounded wrist strap designed to prevent electrostatic discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle each printed circuit board (PCB) by the edges; do not touch the components, peripheral chips, memory modules, or gold contacts on the PCB.
- When handling chips or modules, avoid touching the pins.
- Place the node board, expansion PCI cards, or other boards and components into antistatic bags when not in use.
- Make sure your computer chassis provides a conductive path between the power supply, the case, the mounting fasteners, and the node board to chassis ground.

Unpacking



Caution: The node board is shipped in antistatic packaging to avoid electrostatic discharge damage. Be sure to use ESD precautions when you unpack replacement components for the C2112-4TY14 server. Failure to do so can result in damage to the equipment.

Serverboard Features

Figure 5-1 shows the layout of a node board in a C2112-4TY14 server.

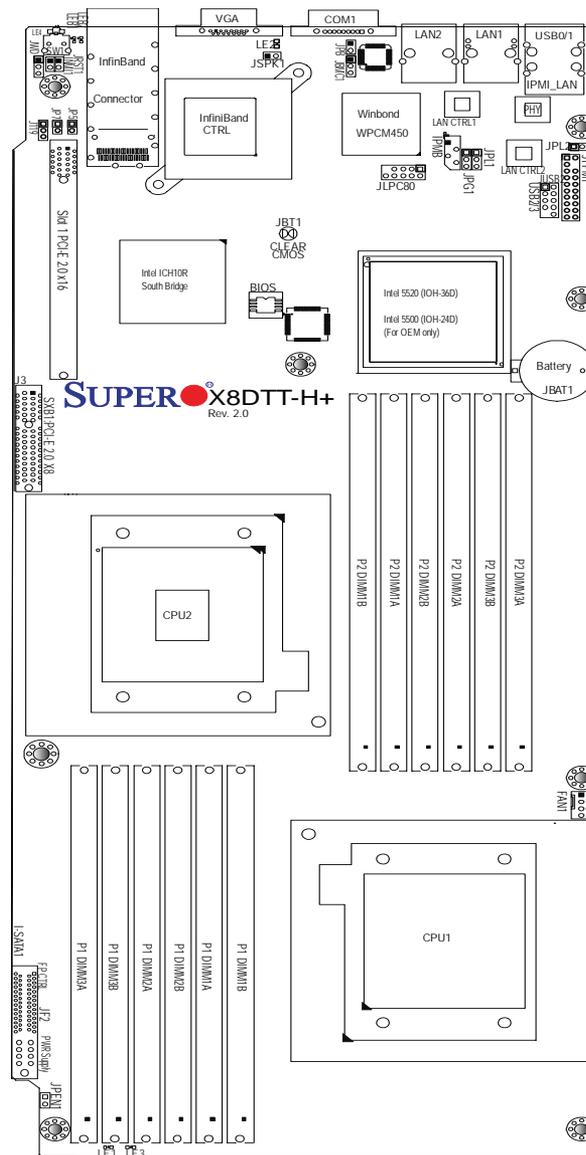


Figure 5-1 Node Board Layout

Each node board contains the following:

- CPU
 - Up to two Intel 5600/5500 series (Westmere-EP) processor sockets—100-watt (or less) processors
 - Each processor supports two full-width Intel QPI links with a total bandwidth up to 51.2 GB/s.
- Memory
 - Tylersburg Intel x58 chipset
 - 12 memory DIMM slots—192 GB ECC DDR3 1066/1333
- Chipset

Tylersburg Intel x58 chip set (Includes the ICH10R.)
- ACPI Features
 - Slow-blinking LED for suspend state indicator
 - Main switch override mechanism
 - ACPI Power Management
 - Keyboard wakeup from soft-off
- Onboard I/O
 - Optional - InfiniBand (Mellanox Connect-X 25408 4x QDR)
 - ESB2 4 SATA ports (RAID 0 and 1)
 - One low profile x16 Gen2 PCI-E slot per node board
 - Rear I/O connectors
 - One serial console port
 - One VGA graphics port (Matrox G200eW video cntrl w/8MB RAM)
 - Two Gigabit Ethernet ports (new single-port 82574L part)
 - One dedicated BMC RJ45 port
 - Two USB 2.0 ports

Serverboard I/O Ports

The I/O ports are color-coded in conformance with the PC 99 specification. [Figure 5-2](#) shows the various I/O ports.

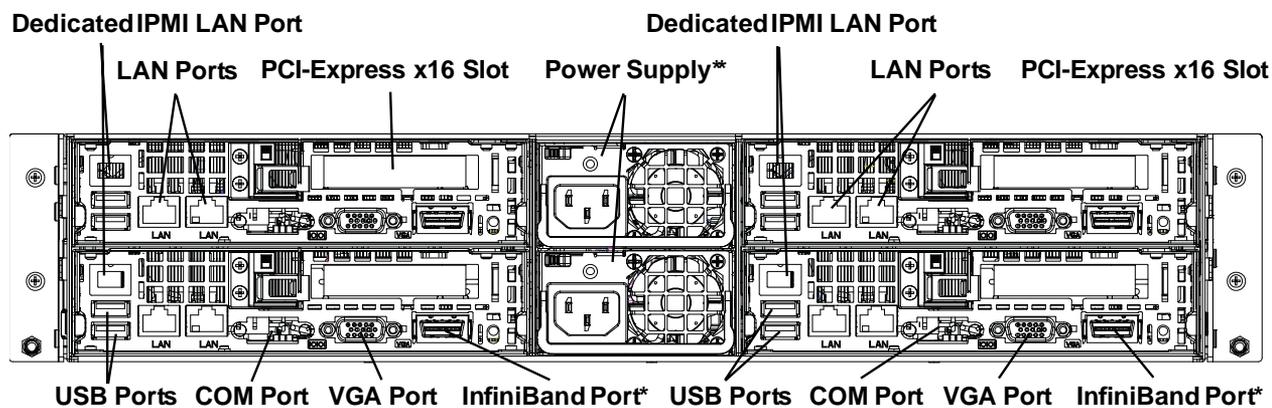


Figure 5-2 Serverboard I/O Ports

Configuring Memory

There are a maximum of twelve memory DIMMs slots on each node board. Each processor has three memory channels and maximum performance is achieved when these three channels are balanced on each processor. It is also important that both processors have the identical memory configuration.

For maximum memory performance:

- The memory DIMMs slots must be populated in groups of three or six on each processor socket.
- DIMM configuration should be identical on both processor sockets on a node board

Configuring node boards with DIMM configuration other than described above will result in degraded memory performance. See Figure 5-3 for the memory block diagram.

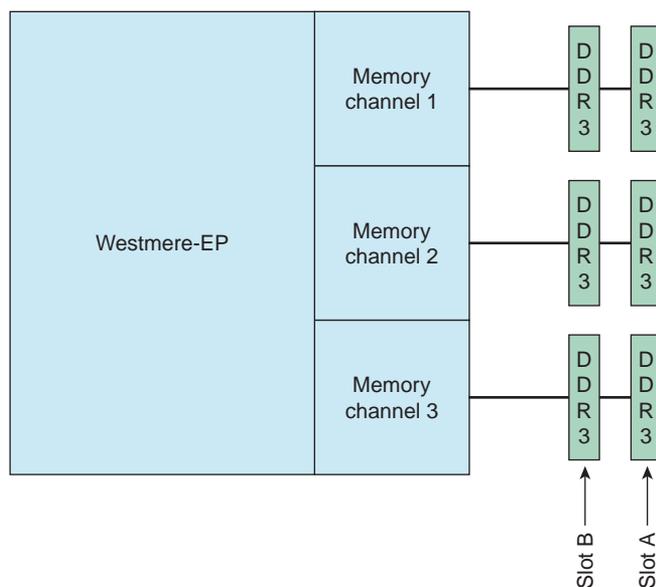


Figure 5-3 Memory Block Diagram

For blades configured with two processors, install the memory DIMMs in the following order:

- 6 DIMMs
 - P1 DIMM 1A, P1 DIMM 2A, and P1 DIMM 3A
 - P2 DIMM 1A, P2 DIMM 2A, and P2 DIMM 3A
- 12 DIMMs—Install the above six, then install the following six DIMMs:
 - P1 DIMM 1B, P1 DIMM 2B, and P1 DIMM 3B
 - P2 DIMM 1B, P2 DIMM 2B, and P2 DIMM 3B

For blades configured with one processor, install the memory DIMMs in the following order:

- 3 DIMMs:
P1 DIMM 1A, P1 DIMM 2A, and P1 DIMM 3A
- 6 DIMMs—Install the above three, then install the following three DIMMs:
P1 DIMM 1B, P1 DIMM 2B, and P1 DIMM 3B

Memory DIMM Layout

The Westmere-EP memory controller has three channels with two memory DIMM slots on each channel for a total of six memory DIMMs per processor socket.

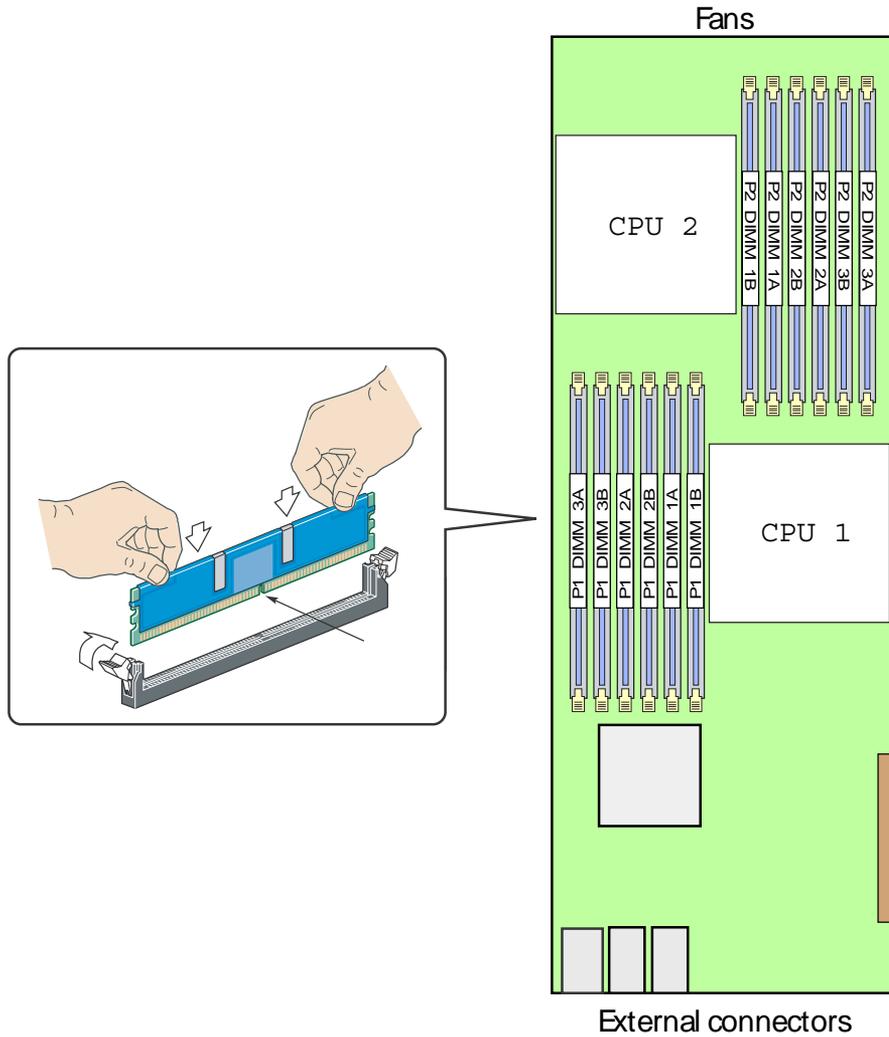


Figure 5-4 Memory DIMM Group Locations

Memory DIMM Rules

Use the following rules when installing memory DIMMs:

- **Minimum Number of DIMMs** - A minimum of one DIMM on each processor must always be installed.
- **Slot order** - For each memory channel - populate the DIMM slot that is furthest from the processor first.
- **Channel Balancing** - For best performance, populate the same number of identical DIMMs in each channel.
- **Mixing DIMM Speeds** - All DIMMs populated on all channels on both processors should be able to support the highest frequency, because the timings of the slowest DIMM will be applied to all DIMMs.
- **Mixing DIMM Sizes** - When mixing DIMMs on a channel that have a mixed number of ranks, it is recommended to have the total number of ranks on the channel be even to avoid bandwidth degradation. Example: placing a single-rank DIMM and a dual-rank DIMM on the same channel is not desirable. The total number of ranks would be three - an odd number of ranks. If mixing is unavoidable, then DIMMs with the most ranks need to be populated in the slots furthest from the processor (the “A” slots).
- **For maximum memory performance** - the DIMMs within a node must be identical in:
 - Speed (1066 or 1333 Mtransfer/sec)
 - Number of ranks (1 or 2)
- **Single-processor Node Board**
Only Processor 2 is installed in a single processor node board. Only install DIMMs in the P2 DIMM slots.
- Minimum compute blade memory size:
4GB compute blade minimum in systems running Tempo/SGI Management Center software.

Mixing Processor and DIMM Speeds

The Westmere-EP processor has a maximum DIMM speed rating. Configuring memory DIMMs that have a DIMM speed that is greater than the processor is capable of supporting will result in the memory DIMM running at the maximum speed of the processor - not the maximum speed of the DIMM. See [Table 5-1](#).

Table 5-1 Processors and DIMM Speeds

Processor	Memory DIMM	Actual Memory DIMM Speed
1066-MT/s-capable CPUs	2G, 1333 MT/s, single rank 4G, 1333 MT/s, dual rank 8G, 1333 MT/s, dual rank 16G, 1333 MT/s, dual rank 16G, 1066 MT/s, quad rank	1066 MT/s (Based on 1 or 2 DIMMs per channel)
1333-MT/s-capable CPUs	2G, 1333 MT/s, single rank 4G, 1333 MT/s, dual rank 8G, 1333 MT/s, dual rank 16G, 1333 MT/s, dual rank	1333 MT/s (Based on 1 or 2 DIMMs per channel)

Notes:

Three conditions must be met to have a memory speed of 1333 MT/s:

- The processor must be capable of supporting 1333 MT/s.
- The DIMM must be capable of running at 1333 MT/s.
- Only one DIMM is placed on each channel.

Systems configured with Westmere processor can support two DIMMs on a channel without having a speed degradation.

PCIe Expansion Cards

The C2112-4TY14 server includes four preinstalled riser cards designed specifically for use in the 2U rackmount chassis (one card for each node). These riser cards support four low-profile PCI Express x16 cards to fit inside the chassis.

A riser card has already been preinstalled into each serverboard. Perform the following steps to add a PCIe add-on card:

1. Remove the PCI slot shield on the chassis by releasing the locking tab.
2. Insert the add-on card into the riser card.
3. Secure the add-on card with the locking tab.

Basic Troubleshooting and Chassis Service

Use the procedures in the first half of this chapter to troubleshoot your system:

- “If the System Does Not Power Up” on page 42
- “System Powers Up But Will Not Boot” on page 42
- “No Video After System Power Up” on page 43
- “Memory Errors” on page 43

If you follow all of the prescribed procedures and still need assistance, check with your authorized support organization.

The sections following “Chassis Service Information” on page 43 are intended to guide you through basic component remove and replace procedures:

- “Control Panel” on page 45
- “System Fans” on page 45
- “Hard Drive Installation/Removal” on page 47
- “Air Shrouds” on page 51
- “Power Supply” on page 51

Basic Troubleshooting Procedures

Use the information in the following subsections to remedy basic problems you might encounter when working with the Rackable C2112-4TY14 server.

If the System Does Not Power Up

If the system will not power up when the front power button is pushed, use the following checklist to identify common sources for the problem:

- Make sure that both ends of each system power cable are firmly connected to the power supply and the corresponding power source(s) or power distribution unit (PDU).
- Check that the LED on each power supply is properly lit. The power supply has one status LED located on the left side of the front of the power supply. The status LED has three states as follows:
 - Dark or off—Indicates no AC power present.
 - Yellow—AC power is present. The server is not turned on (no DC power).
 - Flashes slowly (about four seconds on/off)—Power supply has failed.
 - Green—AC power is present and the server is turned on (DC power present).
- Open the system cover, remove the air shroud, and check to make sure that no obvious short circuits exist between the serverboard and chassis.

If you must replace the power supply, refer to “Power Supply” on page 51.

System Powers Up But Will Not Boot

If the system powers up but will not boot the operating system, check the following:

- Check the system order document(s) - the C2112-4TY14 server may have been ordered with no operating system. If so, check with your system administrator for OS loading information.
- Check the system disk for drive activity and confirm that it is firmly seated in the disk bay. A red light on the front of the disk indicates a functional error. Check with your service provider or local system administrator.

No Video After System Power Up

If the system powers up and appears to be booting normally but no video is present, try the following basic solutions:

- Confirm your monitor is plugged in and switched on.
- Check all video cables and ensure they are properly connected.
- If using an optional PCIe video card check the back of the card for LED activity or a fault indicator. Try opening the system, reseating the PCI card, and rebooting.

If you cannot get a video signal after trying basic solutions contact your support provider.

Memory Errors

If your system experiences memory related errors, try these basic troubleshooting steps to resolve or better identify the problem:

- Confirm that the power supply LED is not indicating an error.
- Shut the system down, remove the covers over the serverboard and make sure that all the DIMM modules are properly and fully installed.
- You should be using registered ECC DDR3 memory. Also, it is recommended that you use the same memory type and speed for all DIMMs in the system. See Chapter 5 for more memory details.
- Check for bad DIMM modules or slots by swapping modules between slots and noting the results.

Contact your administrator or support provider if the memory errors continue.

Chassis Service Information

The following sections cover the steps required to install components and perform maintenance on the C2112-4TY14 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.



Warning: Always disconnect the AC power cord(s) before adding, changing or installing any internal hardware components

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

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.

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.

Unpacking

Replacement components are usually shipped in antistatic packaging to avoid static damage. When unpacking an upgrade or replacement component, make sure the person handling it is static protected.

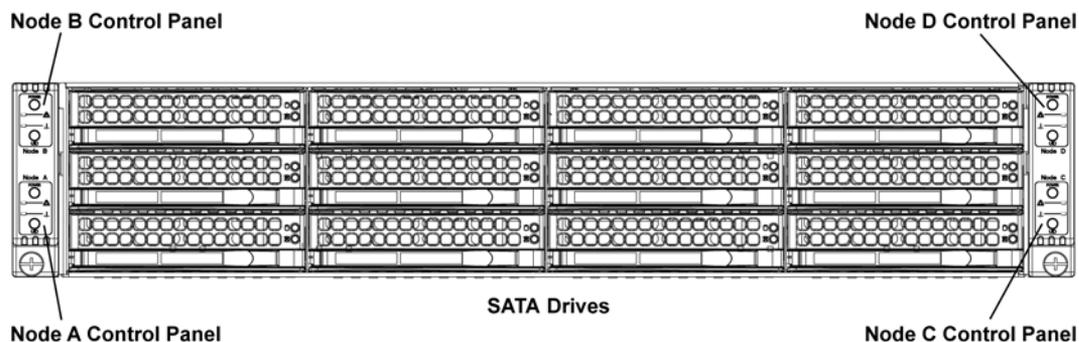


Figure 6-1 Control Panels

Control Panel

The control panel (located on the front of the chassis as shown in [Figure 6-1](#)) must be connected to the JF1 connector on its associated serverboard to provide you with system control buttons and status indicators. A ribbon cable has bundled these wires together to simplify the connection. Connect the cable from JF1 on the serverboard to the control panel printed circuit board (PCB). Make sure the red wire plugs into pin 1 on both connectors. Pull all excess cabling out of the airflow path. The LEDs on each control panel inform you of system status of its associated serverboard. For a description of the LEDs and the control panel buttons, see [Chapter 3, “System Interface.”](#)

System Fans

The system has four 8-cm high-performance fans to provide the cooling for both nodes. The fans connect directly to the backplane but receive their power from the serverboard to which they are logically connected. Fan speed may be controlled by a setting in BIOS. See [“Hardware Health Monitor”](#) on page 71.

Fan Configuration

Each node (serverboard) controls the two fans that reside on its side of the chassis. This means that two nodes will share control for two fans. If the fan speed settings in BIOS are different for these two nodes, the BIOS setting with the higher fan speed will apply. In the event that one of the serverboard drawers is removed, then the remaining node/serverboard will operate both fans.

Note: Due to this configuration, both nodes on the same side of the chassis as a failed fan must be powered down before replacing the fan.

System Fan Failure

If a fan fails, the remaining fans will ramp up to full speed (if not already so set) and the Overheat/Fan Fail LED on the control panel will blink on and off (about once per second). Replace any failed fan at your earliest convenience with the same type and model. See preceding note about powering down the nodes associated with the failed fan before replacing.

Changing a System Fan



Warning: Always disconnect the AC power cord(s) before adding, changing or installing any internal hardware components

1. If necessary, open the chassis while the power is running to determine which fan has failed. Never run the server for an extended period of time with the chassis cover open.
2. Remove power.
3. Remove the failed fan's wiring from the backplane.
4. Lift the fan up and out of the chassis.
5. Push the fan up from the bottom and out of the top of the housing.
6. Place the replacement fan into the vacant space in the housing while making sure the arrows on the top of the fan (indicating air direction) point in the same direction as the arrows on the other fans.
7. Confirm that the fan is working properly before replacing the chassis cover.

Hard Drive Installation/Removal

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

Because of their hot-swap capability, you do not need to access the inside of the chassis or power down the system to install or replace hard drives.

Note: Hot-swap capability is only provided with 24-drive configurations coupled with RAID support. There is no RAID support in 12-drive configurations.

Warning: Use caution when working around the hard drive backplane. Do not touch the backplane with any metal objects and make sure no cables touch the backplane. Also, regardless of how many drives are installed, all 12 (or 24) drive carriers must remain in the chassis to maintain proper airflow.

Nodes and Associated Disk Drives

Figure 6-2 and Figure 6-3 show the disk drives associated with the four nodes of the C2112-4TY14 server (12-drive configuration and 24-drive configuration).

Warning: Powering down a node will power down all the hard drives that are logically associated with it.

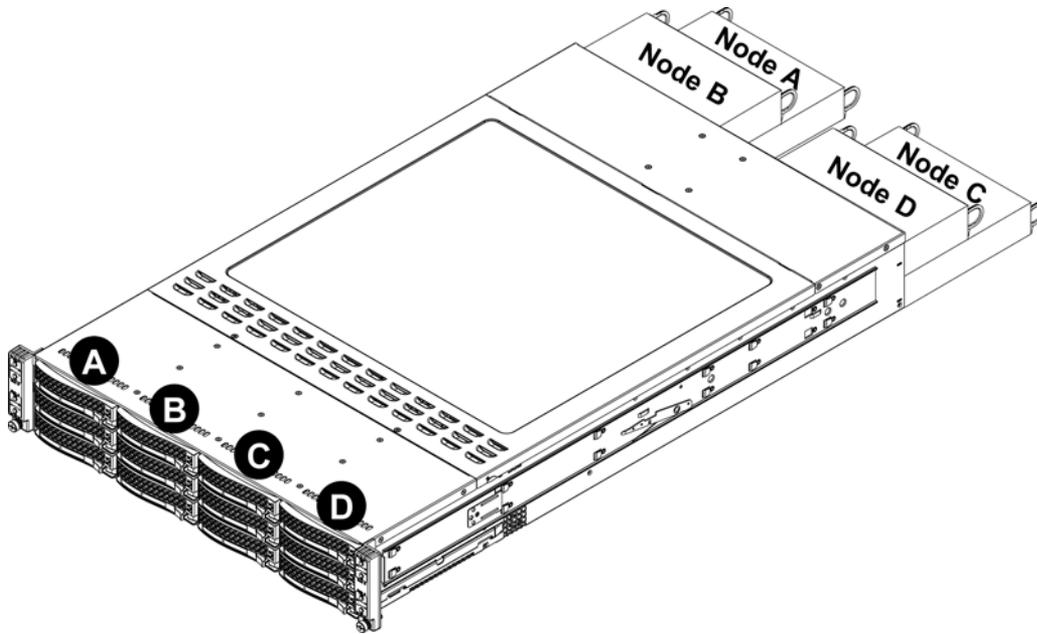


Figure 6-2 Disk Drives and Associated Nodes in the 12-Drive Configuration

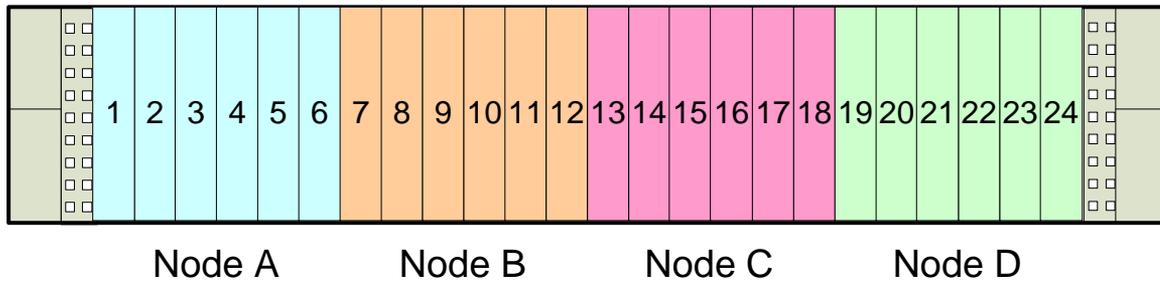


Figure 6-3 Disk Drives and Associated Nodes in the 24-Drive Configuration

Installing a Hard Drive in a Carrier

Empty drive carriers have pre-installed dummy drive trays. Remove this dummy tray before installing an actual hard drive. Do the following to mount a hard drive into a carrier:

1. 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](#).
3. Use the open handle to replace the drive carrier into the chassis. Make sure to fully close the drive carrier handle.

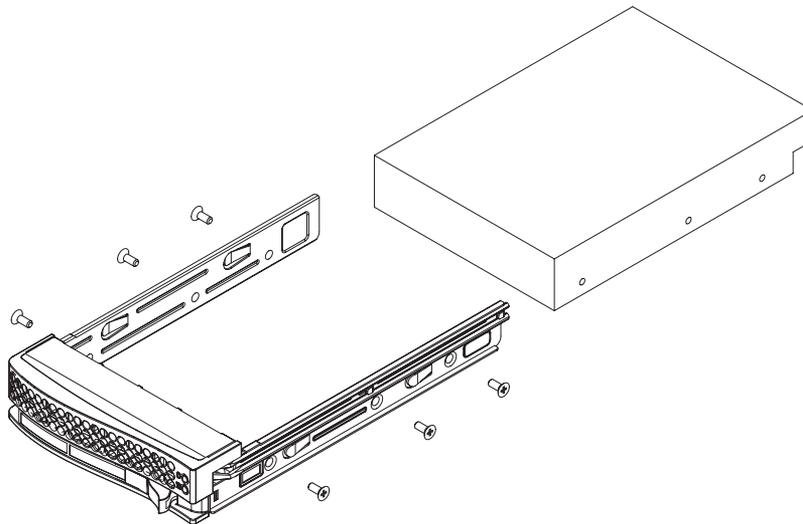


Figure 6-4 Mounting a Drive in a Carrier

Removing Hot-Swap Drives

To remove a carrier, do the following:

1. Push the release button located beside the drive LEDs.
2. Swing the handle fully out and use it to pull the unit straight out (See [Figure 6-5](#)).

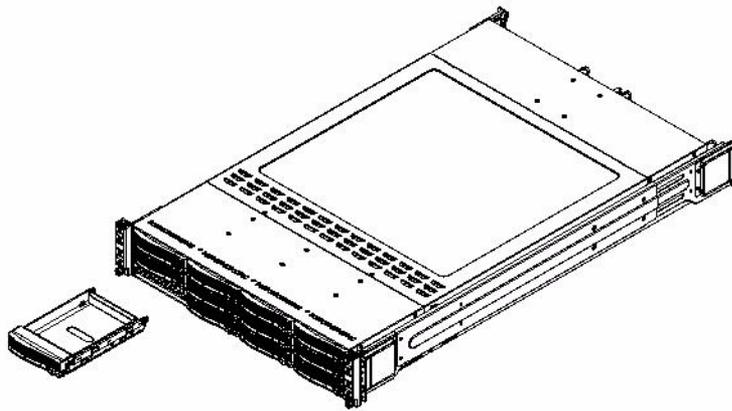


Figure 6-5 Removing a Drive Carrier

Air Shrouds

Air shrouds concentrate airflow to maximize fan efficiency. The chassis air shroud does not require screws to set up. Four identical air shrouds are required, one in each serverboard drawer. To install an air shroud, do the following:

1. Confirm that all four fans are in place and working properly.
2. Place the first air shroud into the serverboard drawer so that it sits behind the system fans and goes over the top of the serverboard and its components.
3. Repeat the procedure for the remaining serverboard drawer.

Power Supply

The C2112-4TY14 server has two 1400 watt power supply modules. The power supply module has an auto-switching capability, which enables it to automatically sense and operate at a 100V–240V input voltage. If a module fails, you can order replacement units from SGI.

Power Supply Failure

The C2112-4TY14 server has two 1400 watt power supply modules to provide redundant power for the system. 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 LED on the control panel will flash slowly (about four seconds on and four off) and remain flashing until the failed unit has been replaced.

The power supply units have a hot-swap capability; that is, you can replace the failed unit without powering down the system. Follow these steps (see [Figure 6-6](#)):

1. Disconnect the AC power cord from the failed module.
2. Push the colored release tab to the side and pull the power module out with the handle provided.
3. Replace the failed power supply module with the exact same model.
4. Carefully insert the new module into position in the chassis and push it in until fully seated.
You should see the LED on the rear of the module turn amber showing that power (from the backup module) is present.
5. Reconnect the AC power cord to the new module.

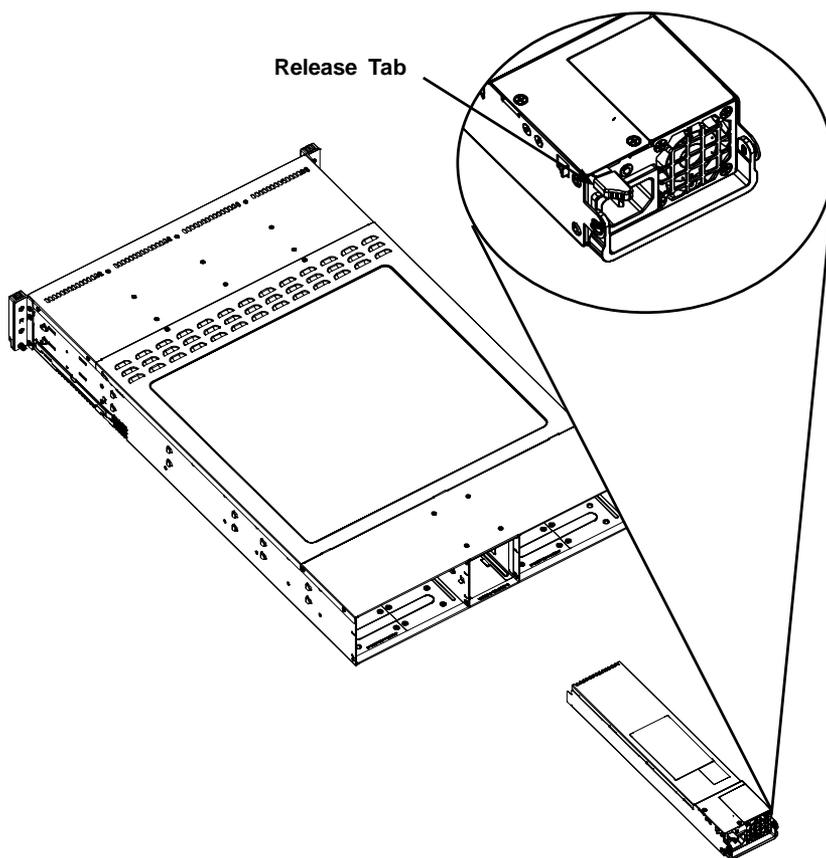


Figure 6-6 Removing a Power Supply

BIOS

This chapter describes the AMI BIOS Setup Utility for the severboard. The AMI ROM BIOS is stored in a Flash EEPROM and can be updated when needed. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not be recorded in this manual. Contact your service representative to obtain the latest BIOS release.

Starting BIOS Setup Utility

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

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, 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 a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message accompanies it.

A ">" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

Note: The AMI BIOS has default text messages built in. These text messages may be included, omitted, or changed across BIOS releases.

The AMI BIOS Setup Utility uses a key-based navigation system called "hot keys". Most of the AMI BIOS setup utility "hot keys" can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

Note: Options printed in **bold** are default settings.

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 at the appropriate time during system boot.

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 the manufacturer 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.

Main Menu

When you first enter AMI BIOS Setup Utility, you will see the Main Menu screen. You can always return to the Main Menu by selecting the **Main** tab on the top of the screen with the arrow keys. The Main Menu screen provides you with a system overview, which includes the version, built date and ID of the AMIBIOS, the type, speed and number of the processors in the system and the amount of memory installed in the system. The following BIOS information appears on the Main Menu:

- **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. Press the <Tab> key or the arrow keys 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.)
- *<system model name>*
- **BIOS Build Version**
This item displays the BIOS revision used in your system.
- **BIOS Build Date**
This item displays the date when this BIOS was completed.
- **AMI BIOS Core Version**
This item displays the revision number of the AMI BIOS Core upon which your BIOS was built.
- **Processor**
The AMI BIOS will automatically display the status of the processor used in your system:
 - **CPU Type**
This item displays the type of CPU used in the motherboard.
 - **Speed**
This item displays the speed of the CPU detected by the BIOS.
 - **Physical Count**
This item displays the number of processors installed in your system as detected by the BIOS.
 - **Logical Count**
This item displays the number of CPU Cores installed in your system as detected by the BIOS.

- **Micro_code Revision**
This item displays the revision number of the BIOS Micro_code used in your system.
- **System Memory**
This displays the size of memory available in the system:
 - **Size**
This item displays the memory size detected by the BIOS.

Advanced Settings Screen

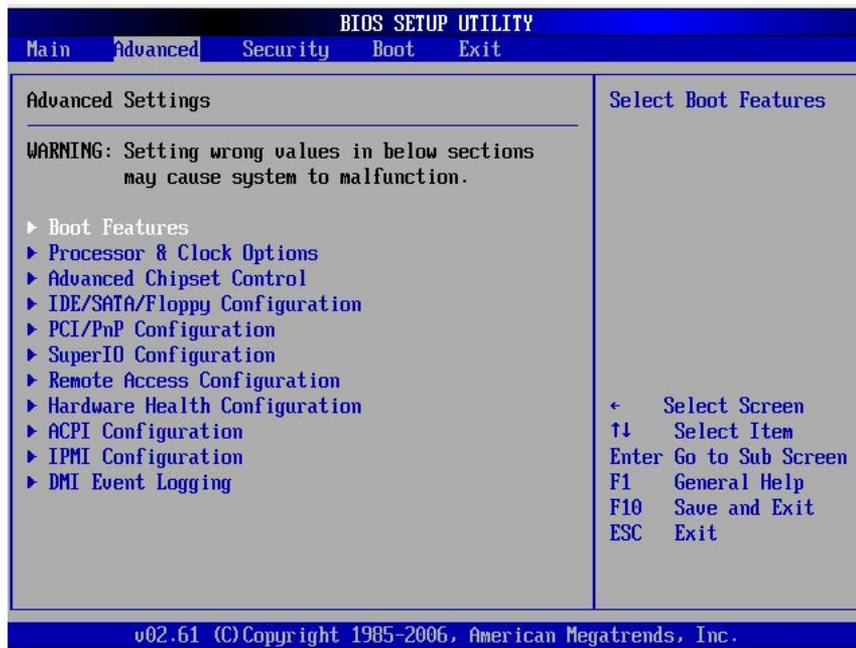


Figure 7-1 BIOS—Advanced Settings Screen

Use the arrow keys to select the desired menu item and then press <Enter> to access the submenu items. The menu items are shown in Figure 7-1.

BOOT Features

Quick Boot

If enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** and Disabled.

Quiet Boot

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are Enabled and Disabled.

AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** and Keep Current.

Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On**.

Wait For 'F1' If Error

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

Hit 'Del' Message Display

This feature displays "Press DEL to run Setup" during POST. The options are **Enabled** and Disabled.

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

Power Button Function

If set to `Instant_Off`, the system will power off immediately as soon as you hit the power button. If set to `4_Second_Override`, the system will power off when you press 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 `Power-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`, `Power-Off` and **Last State**.

Watch Dog Timer

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**.

Processor and Clock Options

This submenu allows you to configure the Processor and Clock settings.

Ratio CMOS Setting

This option allows you to set the ratio between the CPU Core Clock and the FSB Frequency. (Note: if an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state.) The default setting depends on the type of CPU installed on the motherboard. The default setting for the CPU installed in your motherboard is **[16]**. Press “+” or “-” on your keyboard to change this value.

C1E Support

Select `Enabled` to use the feature of Enhanced Halt State. C1E significantly reduces the CPU’s power consumption by reducing the CPU’s clock cycle and voltage during a “Halt State.” The options are `Disabled` and **Enabled**.

Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware pre fetcher will pre fetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled**.

Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if Enabled.

Intel Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to 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 there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to the Intel website for detailed information.

Execute-Disable Bit Capability (Available when supported by the OS and 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 the Intel and Microsoft websites for more information.)

Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Simultaneous Multi-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled**.

Active Processor Cores

Set to Enabled to use a processor’s Second Core and beyond. (Please refer to the Intel website for more information.) The options are **All**, 1 and 2.

Intel EIST Technology

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 website for detailed information. The options are Disable (Disable GV3) and **Enable (Enable GV3)**.

Intel TurboMode Technology

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** and Disabled.

Intel TurboMode C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled**.

C-State package limit setting

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto**, C1, C3, C6 and C7.

C1 Auto Demotion

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled**.

C3 Auto Demotion

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled**.

Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, 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.

Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

CPU Bridge Configuration

QPI Links Speed

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed**.

QPI Frequency

This selects the desired QPI frequency. The options are **Auto**, 4.800 GT, 5.866 GT, 6.400 GT

QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are Disabled and **Enabled**.

Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto**, Force DDR-800, Force DDR-1066, and Force DDR-1333.

Memory Mode

The options are **Independent**, Channel Mirror, Lockstep and Sparing.

- Independent—All DIMMs are available to the operating system.
- Channel Mirror—The motherboard maintains two identical copies of all data in memory for redundancy.
- Lockstep—The motherboard uses two areas of memory to run the same set of operations in parallel.
- Sparing—A preset threshold of correctable errors is used to trigger fail-over. The spare memory is put online and used as active memory in place of the failed memory.

Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled**.

Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are Enabled and **Disabled**.

NUMA Support

Select Enabled to use the feature of Non-Uniform Memory Access to improve CPU performance. The options are **Enabled** and Disabled.

Memory ECC Error Threshold

This feature allows you to set the threshold for the ECC memory errors. The default setting is **2047**.

Throttling—Closed Loop/Throttling—Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are Disabled and Enabled. If Enabled, the following items will appear:

- **Hysteresis Temperature**

Temperature Hysteresis is the temperature lag (in degrees Celsius) after the set DIMM temperature threshold is reached before Closed Loop Throttling begins. The options are Disabled, 1.5°C, 3.0°C, and 6.0°C.

- **Guardband Temperature**

This is the temperature which applies to the DIMM temperature threshold. Each step is in 0.5°C increment. The default is [006]. Press “+” or “-” on your keyboard to change this value.

- **Inlet Temperature**

This is the temperature detected at the chassis inlet. Each step is in 0.5°C increment. The default is [070]. Press “+” or “-” on your keyboard to change this value.

- **Temperature Rise**

This is the temperature rise to the DIMM thermal zone. Each step is in 0.5°C increment. The default is [020]. Press “+” or “-” on your keyboard to change this value.

- **Air Flow**

This is the air flow speed to the DIMM modules. Each step is one mm/ sec. The default is [1500]. Press “+” or “-” on your keyboard to change this value.

- **Altitude**

This feature defines how many meters above or below sea level the system is located. The options are **Sea Level or Below**, 1~300, 301~600, 601~900, 901~1200, 1201~1500, 1501~1800, 1801~2100, 2101~2400, 2401~2700, 2701~3000.

- **DIMM Pitch**

This is the physical space between each DIMM module. Each step is in 1/1000 of an inch. The default is [400]. Press “+” or “-” on your keyboard to change this value.

North Bridge Configuration

This feature allows you to configure the settings for the Intel IOH chip.

Crystal Beach/DMA (Direct Memory Access)

This feature works with the Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. (Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card.) When this feature is set to Enabled, it will enhance overall system performance by providing direct memory access for data transferring. The options are Enabled and **Disabled**.

Intel VT-d

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

IOH PCIE Max Payload Size

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128 MB; while others, with a payload size of 256 MB which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are 256 MB and **128MB**.

PCI-E Port 1 Link Select

This feature allows you to configure the IOH link settings for the PCI-E Port 1. The options are X4X4X4X4, X4X4X8, X8X4X4, X8X8, and **X16**.

SouthBridge Configuration

This feature allows you to configure the settings for the Intel ICH South Bridge chipset.

USB Functions

This feature allows you to decide the number of onboard USB ports to be enabled. The Options are: Disabled, 2 USB ports, 4 USB ports, 6 USB ports, 8 Ports, 10 Ports and **12 USB ports**.

Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vice versa. The settings are Disabled, and **Enabled**.

USB 2.0 Controller

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** and Disabled.

USB 2.0 Controller Mode

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps)** and Full Speed (12 Mbps).

BIOS EHCI Hand-Off

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled**.

IDE/SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the items in this section.

SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, **Compatible** and Enhanced.

Configure SATA#1 as

This feature allows you to select the drive type for SATA#1. The options are IDE, RAID and AHCI. (When the option RAID is selected, the item ICH RAID Code Base will appear. When the option AHCI is selected, the item SATA AHCI will be available.)

ICH RAID Code Base (This feature is available when the option-RAID is selected.)

Select Intel to enable Intel's SATA RAID firmware to configure Intel's SATA RAID settings. Select Adaptec to enable Adaptec's SATA RAID firmware to configure Adaptec's SATA RAID settings. The options are Intel and Adaptec.

SATA AHCI (This feature is available when the option-AHCI is selected.)

Select Enable to enable the function of Serial ATA Advanced Host Interface. (Take caution when using this function. This feature is for advanced programmers only.) The options are Enabled and **Disabled**. If Enabled is selected, the Hot Plug item will display.

Hot Plug (This feature is available when the option-Enabled is selected.)

Select Enable to enable the hot plug function for the SATA devices. The options are **Enabled** and Disabled.

SATA#2 Configuration

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced**.

Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow you to set the parameters of Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

Type

Select the type of device connected to the system. The options are Not Installed, **Auto**, CD/DVD and ARMD.

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto**.

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE disk drive support cannot be determined.

Select 0 to allow the AMI BIOS to use PIO mode 0. It has a data transfer rate of 3.3 MBs.

Select 1 to allow the AMI BIOS to use PIO mode 1. It has a data transfer rate of 5.2 MBs.

Select 2 to allow the AMI BIOS to use PIO mode 2. It has a data transfer rate of 8.3 MBs.

Select 3 to allow the AMI BIOS to use PIO mode 3. It has a data transfer rate of 11.1 MBs.

Select 4 to allow the AMI BIOS to use PIO mode 4. It has a data transfer bandwidth of 32-Bits. Select Enabled to enable 32-Bit data transfer.

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE disk drive support cannot be determined.

Select SWDMA0 to allow the BIOS to use Single Word DMA mode 0. It has a data transfer rate of 2.1 MBs.

Select SWDMA1 to allow the BIOS to use Single Word DMA mode 1. It has a data transfer rate of 4.2 MBs.

Select SWDMA2 to allow the BIOS to use Single Word DMA mode 2. It has a data transfer rate of 8.3 MBs.

Select MWDMA0 to allow the BIOS to use Multi Word DMA mode 0. It has a data transfer rate of 4.2 MBs.

Select MWDMA1 to allow the BIOS to use Multi Word DMA mode 1. It has a data transfer rate of 13.3 MBs.

Select MWDMA2 to allow the BIOS to use Multi-Word DMA mode 2. It has a data transfer rate of 16.6 MBs.

Select UDMA0 to allow the BIOS to use Ultra DMA mode 0. It has a data transfer rate of 16.6 MBs. It has the same transfer rate as PIO mode 4 and Multi Word DMA mode 2.

Select UDMA1 to allow the BIOS to use Ultra DMA mode 1. It has a data transfer rate of 25 MBs.

Select UDMA2 to allow the BIOS to use Ultra DMA mode 2. It has a data transfer rate of 33.3 MBs.

Select UDMA3 to allow the BIOS to use Ultra DMA mode 3. It has a data transfer rate of 66.6 MBs.

Select UDMA4 to allow the BIOS to use Ultra DMA mode 4. It has a data transfer rate of 100 MBs.

Select UDMA5 to allow the BIOS to use Ultra DMA mode 5. It has a data transfer rate of 133 MBs.

Select UDMA6 to allow the BIOS to use Ultra DMA mode 6. It has a data transfer rate of 133 MBs. The options are **Auto**, SWDMAn, MWDMAAn, and UDMAAn.

S.M.A.R.T. For Hard disk drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect hard disk drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto**.

32Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** and Disabled.

IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35**.

PCI/PnP Configuration**Clear NVRAM**

This feature clears the NVRAM during system boot. The options are **No** and Yes.

Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow the AMI BIOS to configure all devices in the system.

PCI Latency Timer

This feature sets 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.

PCI IDE BusMaster

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled**.

Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM

Select Enabled to enable the onboard LAN1 or LAN2 Option ROM. This is to boot computer using a network interface. The options are Enabled and **Disabled**.

Super IO Device Configuration

Serial Port1 Address/ Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4**, 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3**, 3E8/IRQ4, and 2E8/IRQ3.

Remote Access Configuration

Remote Access

This allows you to enable the Remote Access feature. The options are Disabled and **Enabled**.

If Remote Access is set to Enabled, the following items will display:

Serial Port Number

This feature allows you to decide which serial port to be used for Console Redirection. The options are COM 1 and **COM 2**.

Serial Port Mode

This feature allows you to set the serial port mode for Console Redirection. The options are **115200 8, n 1**; 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows you to set the flow control for Console Redirection. The options are **None**, Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST. (Note: This setting may not be supported by some operating systems.) Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always**.

Terminal Type

This feature allows you to select the target terminal type for Console Redirection. The options are ANSI, VT100, and VT-UTF8.

VT-UTF8 Combo Key Support

A terminal keyboard definition that provides a way to send commands from a remote console. The options are **Enabled** and Disabled.

Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay**, Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

Hardware Health Monitor

This feature allows you to monitor system health and review the status of each item as displayed.

CPU Overheat Alarm

This option allows you to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Warning: Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed. To avoid possible system overheating, please be sure to provide adequate airflow to your system. The options The Early Alarm and The Default Alarm are available.

- **The Early Alarm**
Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- **The Default Alarm**
Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5°C above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. For both alarms above, take immediate action as described in the following items.

CPU Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU Temperature

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This *temperature threshold* or *temperature tolerance* has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (that is, by increasing CPU fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different temperature tolerances, the installed CPU can now send the temperature tolerance information to the motherboard and not the other way around. This results in better CPU thermal management.

SGI has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for you to understand the CPU temperature status, rather than by just simply seeing a temperature reading (that is, 25°C). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

- **Low**—This level is considered as the normal operating state. The CPU temperature is well below the CPU temperature tolerance. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control).

User intervention: No action required.

- **Medium**—The processor is running warmer. This is a precautionary level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU temperature tolerance. The motherboard fans and

CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings.

User intervention: No action is required. However, consider checking the CPU fans and the chassis ventilation for blockage.

- **High**—The processor is running hot. This is a caution level since the CPU temperature tolerance has been reached (or has been exceeded) and may activate an overheat alarm.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

Notes:

- The system may shut down if it continues for a long period to prevent damage to the CPU.
- The information provided above is for your reference only. For more information on thermal management, please refer to the Intel website.

System Temperature

The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

Fan Speed Control Monitor

This feature allows you to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a server. Select Disabled, (Full Speed @ 12V) to disable the fan speed control function and allow the onboard fans to constantly run at the full speed (12V). The options are: 1. **Disabled (Full Speed)**, 2. Server Mode, 3. Workstation Mode.

Fan1 ~ Fan 4 Reading

This feature displays the fan speed readings from fan interfaces Fan1 through Fan5. CPU1 Vcore, CPU2 Vcore, +5Vin, +12Vcc (V), VP1 DIMM, VP2 DIMM, 3.3Vcc (V), and Battery Voltage.

ACPI Configuration

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

ACPI Version Features

The options are **ACPI v1.0**, ACPI v2.0 and ACPI v3.0. Please refer to the ACPI website (<http://www.acpi.info/>) for further explanation.

ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** and Disabled.

APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled**.

Headless Mode

This feature is used to enable system to function without a keyboard, monitor or mouse attached. The options are Enabled and **Disabled**.

High Performance Event Timer

Select Enabled to activate the High Performance 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 and 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**.

General WHEA Configuration

WHEA Support

Select Enabled to enable Windows Hardware Error Architecture (WHEA) support which will provide a common infrastructure for handling hardware errors on Windows platforms in order to reduce system crashes due to hardware errors and improvesystem recovery and health monitoring. The default setting is **Enabled**.

IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel website at www.intel.com.

Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

IPMI Firmware Revision

This item indicates the revision number of the current IPMI Firmware.

View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events. To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen.

- Total Number of Entries
- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Timestamp
- Generator ID
- Event Message Format User
- Event Sensor Type
- Event Sensor Number

Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address:

- **Channel Number**—Enter the channel number for the SET LAN Config command. This is initially set to [1]. Press “+” or “-” on your keyboard to change the Channel Number.
- **Channel Number Status**—his feature returns the channel status for the Channel Number selected above: “Channel Number is OK” or “Wrong Channel Number”.

IP Address Configuration

Enter the IP address for this machine. This should be in decimal and in dotted quad form (for example, 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255.

Parameter Selector

Use this feature to select the parameter of your IP Address configuration.

IP Address Source

Select the source of this machine's IP address. If Static is selected, you will need to know and enter manually the IP address of this machine below. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network it is attached to, and request the next available IP address. The options are **DHCP** and Static.

The following items are assigned IP addresses automatically if DHCP is selected under IP Address Source above:

IP Address

The BIOS will automatically enter the IP address of this machine; however, it may be overridden. IP addresses are 6 two-digit hexadecimal numbers separated by dots.

Current IP Address in BMC

This item displays the current IP address used for your IPMI connection.

MAC Address Configuration

Enter the Mac address for this machine. This should be in decimal and in dotted quad form (for example, 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255.

Parameter Selector

Use this feature to select the parameter of your Mac Address configuration.

Mac Address

The BIOS will automatically enter the Mac address of this machine; however, it may be overridden. Mac addresses are 6 two-digit hexadecimal numbers separated by dots.

Current Mac Address in BMC

This item displays the current Mac address used for your IPMI connection.

Subnet Mask Configuration

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255.

Parameter Selector

Use this feature to select the parameter of your Subnet Masks configuration.

Subnet Mask

This item displays the current subnet mask setting for your IPMI connection.

Current Subnet Mask in BMC

This item displays the current subnet mask used for your IPMI connection.

Gateway Address Configuration

Enter the gateway address for this machine. This should be in decimal and in dotted quad form (for example, 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255.

Parameter Selector

Use this feature to select the parameter of your Gateway Address settings.

Gateway Address

The BIOS will automatically enter the Gateway address of this machine; however, it may be overridden. Gateway addresses are 6 two-digit hexadecimal numbers separated by dots.

Current Gateway Address in BMC

This item displays the current Gateway address used for your IPMI connection

DMI Event Logging

View Event Log

Use this option to view the System Event Log.

Mark all events as read

This option marks all events as read. The options are OK and Cancel.

Clear event log

This option clears the Event Log memory of all messages. The options are OK and Cancel.

Security Settings

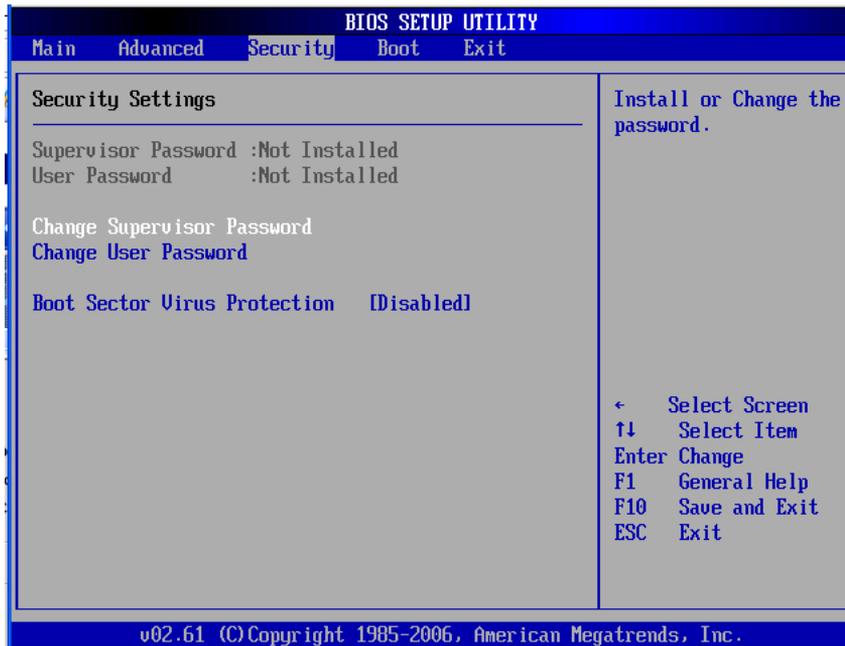


Figure 7-2 BIOS—Security Settings Screen

The AMI BIOS provides a Supervisor and a User password. As shown in Figure 7-2, the Security Settings Screen allow you to manage these passwords. If you use both passwords, the Supervisor password must be set first.

Supervisor Password

This item indicates if a Supervisor password has been entered for the system. “Not Installed” means a Supervisor password has not been used.

User Password

This item indicates if a user password has been entered for the system. “Not Installed” means that a user password has not been used.

Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then type in a new Supervisor Password.

User Access Level (Available when Supervisor Password is set as above.)

Available options:

- **Full Access**—Grants user full read and write access to the Setup Utility.
- **View Only**—Allows access to the Setup Utility but the fields cannot be changed.
- **Limited**—Allows only limited fields to be changed such as Date and Time.
- **No Access**—Prevents user access to the Setup Utility.

Change User Password

Select this feature and press <Enter> to access the submenu , and then type in a new User Password.

Clear User Password (Available only when User Password has been set.)

This item allows you to clear a user password after it has been entered.

Password Check

This item allows you to check a password after it has been entered. The options are **Setup** and **Always**.

Boot Sector Virus Protection

When Enabled, the AMI BOIS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled**.

Boot Configuration

As shown in Figure 7-3, you can configure boot settings by selecting the Boot option.

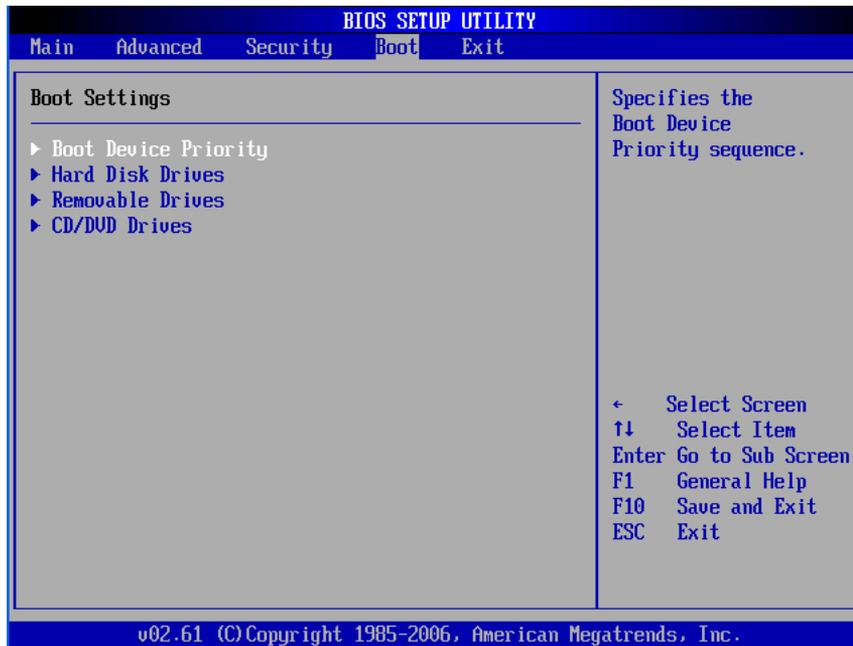


Figure 7-3 BIOS—Boot Settings Screen

Boot Device Priority

This feature allows you to specify the sequence of priority for the Boot Device. The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device and Disabled.

1st Boot Device - [USB: XXXXXXXXXXXX]

2nd Boot Device - [CD/DVD: XXXXXXXXXXXX]

Hard Disk Drives

This feature allows you to specify the boot sequence from all available hard disk drives. The settings are Disabled and a list of all hard disk drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

1st Drive - [SATA: XXXXXXXXXXXX]

Removable Drives

This feature allows you to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

1st Drive - [USB: XXXXXXXXXXXX]

2nd Drive

CD/DVD Drives

This feature allows you to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen, shown in Figure 7-4.

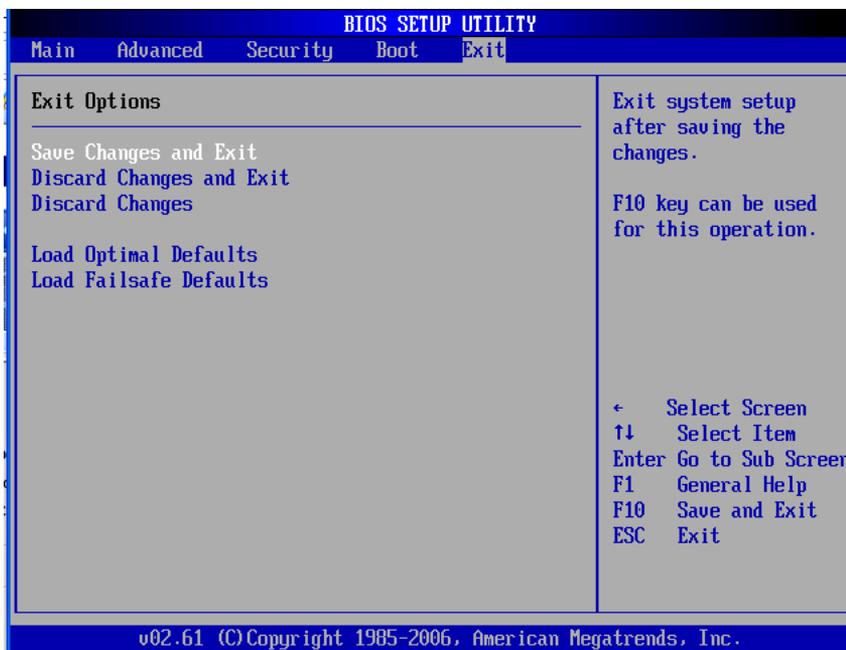


Figure 7-4 BIOS—Exit Options

Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

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 from the Exit menu and press <Enter>.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

BIOS Recovery

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 Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

An AMIBIOS flash chip consists of a boot sector block, and a main BIOS code block (a main BIOS image). The boot sector block contains critical BIOS code, including memory detection and recovery code to be used to flash a new BIOS image if the original BIOS Image is corrupted. When the system is powered on, the boot sector code executes first. Once it is completed, the main BIOS code will continue with system initialization and complete the bootup process.

Note: Note: BIOS Recovery described below is used when the main BIOS block crashes. However, when the BIOS Boot sector crashes, you will need to send the motherboard back to Supermicro for RMA repairs.

Boot Sector Recovery from a USB Device

This feature allows you to recover a BIOS image using a USB device without additional utilities needed. You can download the BIOS image into a USB flash device, and name the file “SUPER.ROM” for the recovery process to load the file. A USB flash device such as a USB Flash Drive, a USB CDRW or a USB CDRW device can be used for this purpose,

1. Insert the USB device that contains the new BIOS image (the ROM files) saved in a root directory into your USB drive.
2. While turning the power on, press and hold <Ctrl> and <Home> at the same time until the USB Access LED Indicator comes on. This might take a few seconds.
3. Once the USB drive LED is on, release the <Ctrl> and <Home> keys. AMIBIOS will issue beep codes to indicate that the BIOS ROM file is being updated.
4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

Boot Sector Recovery from an IDE CD-ROM

This process is almost identical to the process of Boot Sector Recovery from a USB device, except that the BIOS image file is loaded from a CD-ROM. Use a CD-R or CD-RW drive to burn a CD with the BIOS image file in it, and name the file “SUPER.ROM” for the recovery process to load the file.

Boot Sector Recovery from a Serial Port (“Serial Flash”)

This process, also known as “Serial Flash,” allows you to use a serial port to load a BIOS image for Boot Sector recovery. This feature is usually used for embedded systems that rely on a serial port for remote access and debugging.

In order to use Serial Flash for Boot Sector Recovery, you will need to meet the following requirements:

- The “Target system,” the system that needs BIOS updates, must have a serial port and “Serial Flash” support embedded in the BIOS image file.
- The “Host system” should also have a serial port and a terminal program that supports XModem Transfer protocol (Hyper Terminal for the Windows operating systems, and minicom for Linux/FreeSBD, etc.).
- A Null_modem serial cable

The following steps describe how to use Serial Flash for Boot Sector Recovery:

1. Connect a Null_modem serial cable between the target system and the host system that runs the terminal program.
2. Make sure that the new BIOS Image file is accessible for the host system.
3. Start the terminal program on the host system and create a new connection. Use the following communication parameters for the new connection.
 - Bits per second: 115200 bits/sec.
 - Data Bits: 8
 - Parity: None
 - Stop Bit: 1
 - Flow Control: None

4. Power on your system and click the <Connect> button in the Hyper Terminal.

The terminal screen will display instructions.

```
Press <SpaceBar> to update BIOS.  
Confirm update BIOS? (y/n) y  
Begin remote BIOS flash? (y/n) y  
Starting remote flash.  
Upload new BIOS file using Xmodem protocol.
```

5. Follow the instructions given on the screen to update the BIOS.

These instructions are also shown below.

- a. At the prompt, press the <space bar> to update the BIOS.
- b. When asked to confirm BIOS updating, press <y> to confirm BIOS updates.
- c. Press <y> again to begin flashing BIOS remotely.

Note: Be sure to complete Steps a–c above quickly because you have a second or less to do so.

Once you have completed the instructions given, a screen will display to indicate that remote flashing is starting and the new BIOS file is being uploaded. See [Figure 7-5](#).

```
Starting FLASH Recovery.  
NVRAM data will be destroyed.  
CMOS data will be preserved.  
.....  
Ending FLASH Recovery.  
FLASH Update completed successfully.  
Rebooting...
```

Figure 7-5 BIOS—Recovery/Remote Flashing

6. To use Hyper Terminal to transfer the file, use the following steps:
 - a. Select **Transfer** → **Send File ...** as shown in Figure 7-6.

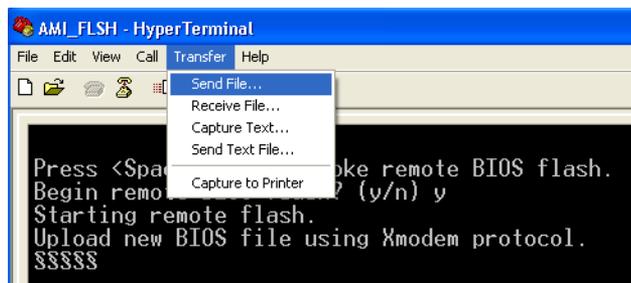


Figure 7-6 BIOS—Recovery/Flash Transfer

- b. Specify the location of the ROM file and select the proper protocol (XModem).
 - c. Select **Send** to start ROM File extraction as shown in Figure 7-7.

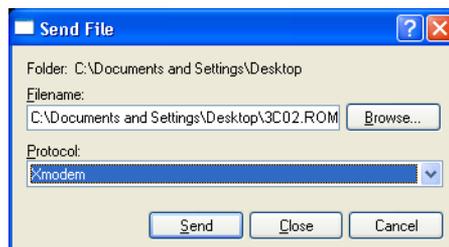


Figure 7-7 BIOS—Recovery/Send File Screen

Once the ROM file extraction is completed, the message: “New BIOS received OK” will display. Once remote BIOS flash is completed, the system will reboot.

AMIBIOS Serial Flash will work with any terminal communications program that supports VT-100 and XModem protocols, including protocols designed for GNU/LINUX & BSD operating systems such as minicom. It is recommended that the terminal program be configured to use the ‘CR/ LF’ style of line termination.

BIOS Error Codes

During Power-On Self-Test (POST) 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 (see [Table A-1](#)) correspond to the number of beeps for the corresponding error.

Table A-1 BIOS Error Codes

Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset.(Ready to power up)
5 short beeps + 1 long beep	Memory error	No memory detected in the system
8 beeps	Display error or memory read/write error	Video error - adapter missing or with faulty memory
1 continuous beep with the front panel overheat LED on	System overheat	Probable problem with system fans/system airflow

System Specifications

Table B-1 lists general system specifications, including environmental operating requirements and regulatory information for the server.

Table B-1 System Specifications

Attribute	Specification
Processors	Eight Intel 5500/5600 Series processors in LGA1366 sockets
Chipset	Intel 5520/ICH10R
BIOS	32 Mb AMI SPI Flash ROM (each serverboard)
Memory Capacity (each serverboard)	Twelve 240-pin DIMM sockets that can support up to 192 GB of registered ECC DDR3-1333/1066/800 SDRAM, or 48 GB of Unbuffered ECC/Non-ECC 1333/1066/800 MHz Memory (with max. 4 GB of Registered ECC and 2 GB of Unbuffered memory per DIMM slot.)
Serial ATA Controller	Intel ICH10R on-chip controller to support six 3 Gb/s Serial ATA (RAID 0, 1)
SAS Controller (24-drive configuration)	LSI-2108 for 6 Gb/s SAS drives (RAID 0, 1, and 10 support)
SAS/SATA Drive Bays	Either 12 or 24 hot-swap drive bays to house standard SATA drives (three/six per node)
PCI Expansion	Four low-profile PCI Express x16 slots (with pre-installed riser cards)
Serverboard	X8DTT series Dimensions (all): 16.64" (L) x 6.80" (W) (422.66 mm x 172.72 mm)
Chassis	2U rackmount Dimensions: (WxHxD) 17.2 x 3.5 x 28.5 in. (437 x 89 x 724 mm)
Weight	Gross Weight: 85 lbs. (38.6 kg.)
System Cooling	Four 8-cm PWM (Pulse Width Modulated) fans

Table B-1 System Specifications **(continued)**

Attribute	Specification
Input Requirements	AC Input Voltage: 100 - 240V AC auto-range Rated Input Current: 11.5 - 5.5A max Rated Input Frequency: 50 to 60 Hz
Power Supply	Rated Output Power: 1400W (Part# PWS-1K41P-1R) 80 Plus Gold Certified Rated Output Voltages: +12V (91A @ 110V, 116A @ 180~240V), +5Vsb (4A @ 240V, 4A @ 100V) Note: Some servers come with a redundant power supply.
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 .