Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller

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User's Guide

for the AMC.1-HDD SAS Disk

Part No. 820-7175-11
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Contents

Preface

This guide describes the installation and configuration of Oracle's Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller. This guide also includes information about software, environment specifications, connectors, and certifications.

Related Documentation

The following table lists the documentation for the Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller (AMC.1-HDD SAS disk). The online documentation is available at:

`http://docs.sun.com/app/docs/prod/cp3000.pcie#hic`

Application	Title	Part Number	Format	Location
Latest information	*Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller Product Notes*	820-7174-*xx*	PDF	Online
Pointer doc	*Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller Start Here*	820-7177-*xx*	Printed	Shipping Kit and Online
Installation (this document)	*Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller User's Guide*	820-7175-*xx*	PDF	Online
Safety	*Important Safety Information for Sun Hardware Systems*	821-1590-*xx*	Printed	Shipping Kit

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Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller User's Guide, part number 820-7175-11.

CHAPTER 1

Getting Started

This chapter provides information and procedures needed to install and make the Sun Netra CP3000 AMC.1-HDD SAS disk operational. This chapter should be read before unpacking and installing the AMC.

In addition to this chapter, refer to the following safety document:

Important Safety Information for Sun Hardware Systems (816-7190)

Caution – When the system is plugged in, energy hazards are present on the midplane. Do not reach into the enclosure while the power is on.

Caution – Static electricity can damage electronic components. Wear a wrist strap grounded through one of the system's ESD ground jacks when removing and replacing hot-swappable components.

This chapter contains the following topics:

1.1 System Requirements

The following sections briefly describe the minimum system requirements and the configurable features. Links are provided to other chapters and appendixes containing more detailed information.

1.1.1 Operating Systems Compatibility

The following operating systems are compatible with the AMC.1-HDD SAS disk.

- Solaris™ 10
- Solaris x86 10
- Windows Server 2003
- Red Hat Enterprise Linux (RHEL) 5

1.1.2 Chassis Compatibility

Before using this AMC.1-HDD SAS disk, review the specifications of the chassis and backplane that will house the module to determine the presence of, and any limitations of, chassis, IPMI bus, and user-defined pin-outs. For example, some chassis backplanes route certain I/O pins to internal resources such as alarm cards and drive resources. The AMC.1-HDD SAS disk is intended for an AdvancedTCA AMC carrier card site that is AMC.1 compliant. It is your responsibility to verify system compatibility. Failure to do so could result in improper operation or equipment damage.

1.1.3 Blade Server Compatibility

The AMC.1-HDD SAS disk modules plug into ATCA carrier boards that support a combination of AMC.1 (PCI Express) and AMC.3 (SAS) storage signaling.

At the time of publication of this document, the AMC.1-HDD SAS disk is qualified and supported on the following Sun blade servers:

- Sun Netra CP3060 blade server
- Sun Netra CP3220 blade server
- Sun Netra CP3250 blade server

1.1.4 Electrical and Environmental

See Appendix B for electrical and environmental requirements.

Caution – None of the integrated chips junction temperature should exceed 125°C. The AMC requires air flow to meet this requirement. Testing should be done in the shelf to find the quantity of air flow needed. The recommended minimum air flow is 50 LFM.

1.2 Unpacking

Check the shipping carton for damage. If the shipping carton or contents are damaged, notify the carrier and Sun. Retain the shipping carton and packing material for inspection by the carrier. Obtain authorization before returning any product to Sun. Refer to the *Netra CP3000 Advanced Mezzanine Card PCIe SAS Controller and Hard Drive Getting Started Guide* (820-7177) for return instructions.

Caution – This board must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the antistatic bag shipped with the product to handle the board. Wear a wrist strap grounded through one of the system's ESD ground jacks when installing or servicing system components.

1.3 Handling AMCs

Caution – The system is sensitive to static electricity. To prevent damage to the assembly, always connect an antistatic wrist strap between you and the system.

Avoid touching areas of integrated circuitry. Static discharge can damage these circuits.

An antistatic wrist strap and a conductive foam pad is strongly recommend for handling AMCs when installing or upgrading a system. Electronic components, such as disk drives, computer boards, and memory modules can be extremely sensitive to electrostatic discharge (ESD). After removing the component from its protective wrapper or from the system, place the component flat on a grounded, static-free surface (and, in the case of a board, component side up). Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available in the shipkit and at electronics stores) that is attached to an active electrical ground. Note that a system chassis might not be grounded if it is unplugged.

Caution – Dangerous voltages, capable of causing injury or death, are present in this equipment. Use extreme caution when handling, testing, and adjusting within a system.

Caution – Do not flex the AMCs; the surface-mounted components can break if the AMC is bent.

Our suppliers take significant steps to ensure that there are no bent pins on the backplane or connector damage to the AMCs prior to leaving the factory. Bent pins caused by improper installation or by AMCs with damaged connectors could void the warranty for the backplane or boards.

To minimize the amount of AMC flexing, observe the following precautions:

- When removing an AMC from an electrostatic discharge bag, keep the AMC vertical until you place it on the electrostatic discharge mat.
- Do not place an AMC on a hard surface. Use a cushioned antistatic mat. The AMC connectors and components have very thin pins that bend easily.
- Be careful of small parts located on the component side of an AMC.

- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.
- Transport an AMC in an antistatic bag.

1.4 AMC Faceplate

The following shows the faceplate of the Sun Netra CP3000 AMC.1-HDD SAS disk.

FIGURE 1-1 AMC.1-HDD SAS Disk Faceplate

Note – The AMC is available in different capacities (in gigabytes). The illustration shows a generic faceplate. For your product's faceplate, the xxx denotes the capacity.

1.5 AMC LEDs

The following tables give status information for all of the LEDs on the AMC.

TABLE 1-1 describes the LEDs defined by ATCA to monitor board status.

TABLE 1-1 AMC Status LEDs

LED	Color	State	Description
Hot-swap	Blue	On	Management power is available to the AMC, and the AMC can safely be extracted.
		Off	The AMC is operational and is unsafe for extraction.
		Long blink	Delay before AMC is activated.
		Short blink	Delay before AMC is deactivated.
OOS	Red	Off	AMC is in service.
		On	Light is on when AMC is Out Of Service.
OK	Green	On	The AMC is booted and switching.
		Off	12V payload power is not detected.

TABLE 1-2 describes in detail the different hot-swap BLUE LED states.

TABLE 1-2 Hot-Swap BLUE LED States

Order	Visible State	State	Description
1	Solid	M1 FRU Inactive	The Intelligent Platform Management Interface (IPMI) microcontroller is booted, but the payload is not. The bottom latch is not fully closed or the activation lock bit set is keeping AMC from activating.
2	Blinking (from solid)	M2 Activation Request	The bottom latch is closed or activation lock bit has been cleared. The IPMI microcontroller has requested permission to boot the payload from the shelf management controller.
3	Off	M3-M4 Active	The IPMI microcontroller has received permission to activate the payload, and has done so. This should be the state under normal operation.
4	Blinking (from off)	M5-M6 Deactivation Request	The IPMI microcontroller has requested permission to deactivate. Opening the bottom latch or resetting the deactivation lock bit activates this state.

Note – An AMC should be hot-swapped only when the LED is solid blue.

1.6 Removing and Installing AMCs

This section describes how to remove and install AMCs.

The AMC.1-HDD SAS disk can be installed into an ATCA shelf (chassis) with sites that support AMC.1 PCI Express signaling. The site height must properly match the panel height fitted to the AMC.

At the time of publication of this document, the AMC.1-HDD SAS disk is qualified and supported on the following Sun blade servers:

- Sun Netra CP3060 blade server
- Sun Netra CP3220 blade server
- Sun Netra CP3250 blade server

1.6.1 Removing an AMC

If you want to remove only an AMC from a blade server, use the following instructions.

If you want to remove the blade server with the AMC installed, see the next section Section 1.6.2, "Removing a Blade Server and AMC" on page 1-12.

Caution – Before removing an AMC, read all cautions, warnings, and instructions presented earlier in this chapter.

1. **Shut down the payload OS.**

   Removing a board before powering down the operating system might cause an OS panic, which could corrupt data or file systems.

2. **At the front of the blade server, locate the AMC you want to remove.**

   Depending on the blade server's AMC site location, you might have to remove the blade server from the chassis. Some blade servers have compartments for AMCs that can only be accessed when the blade server is removed from the chassis.

3. **If the blade server must be removed to access the AMC, go to** Section 1.6.2, "Removing a Blade Server and AMC" on page 1-12**.**

Note – Depending on how the Shelf controls deactivation, the Shelf might not initiate deactivation when you disengage the ejector latch. If so, either configure the Shelf to allow deactivation via latch opening or deactivate by other methods.

4. **For the AMC, initiate the hot-swap deactivation sequence by pulling the injector/ejector latch out half way (**FIGURE 1-2**).**

   The Hot-Swap LED starts blinking.

5. **Wait until the Hot-Swap LED is solid blue.**

6. **When the Hot-Swap LED is solid blue, pull the injector/ejector latch out completely (**FIGURE 1-2**).**

FIGURE 1-2 Deactivating the AMC

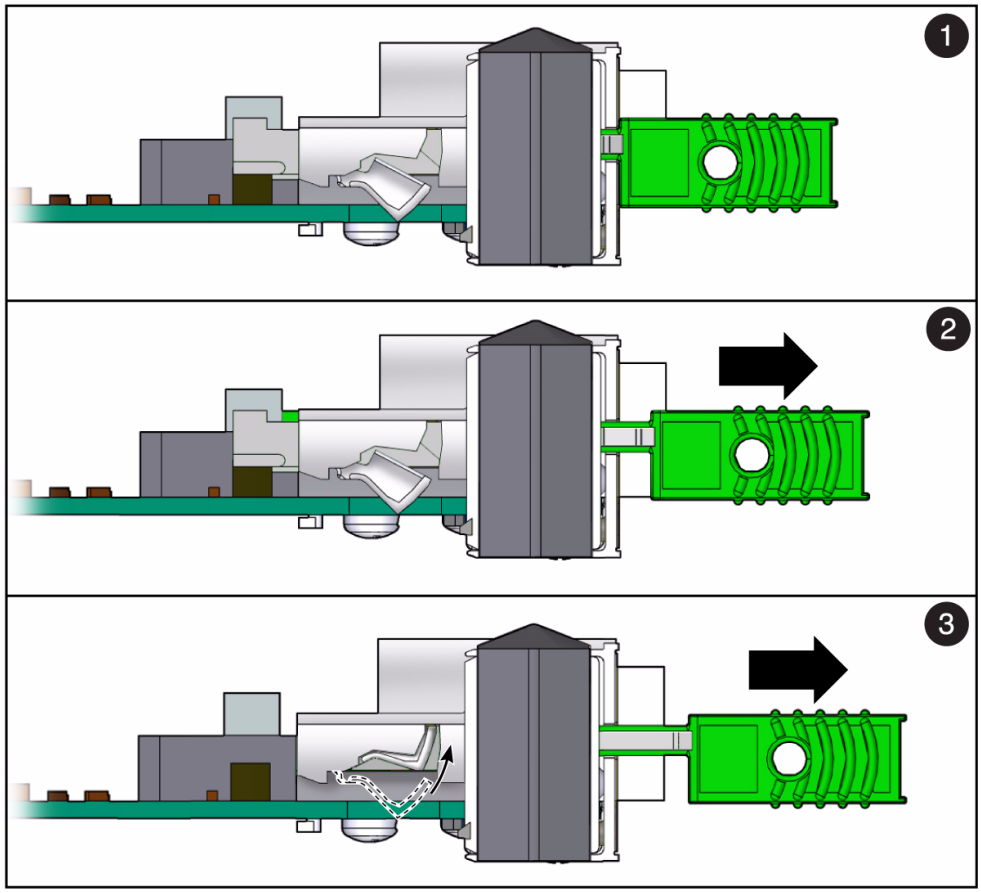
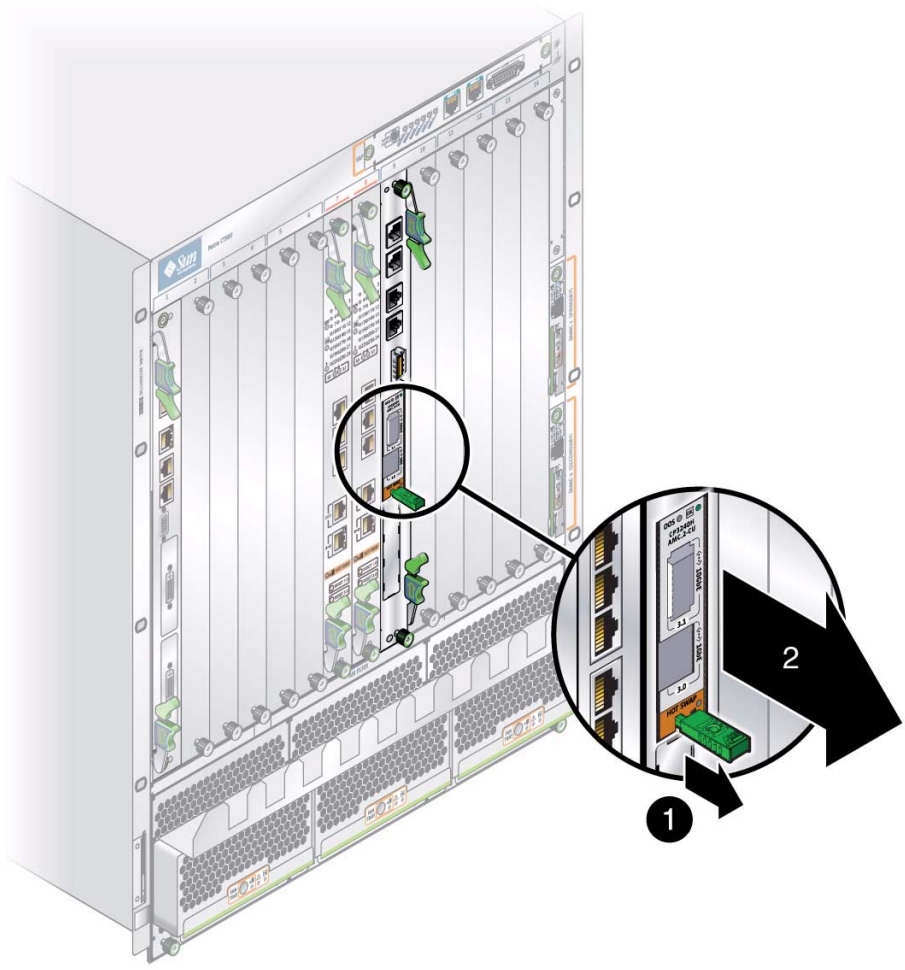


Figure Legend

1	Fully In (IN) When IN, the module communicates to the shelf manager that the module is not in the hot-swap state, and the shelf manager communicates with the MMC. This position is for normal operation.
2	Half Way (HW) When in the HW position, the hot-swap sequence is initiated. The MMC sends a hot-swap event to the shelf manager.
3	Out (OUT) When OUT, the latching mechanism is released and the module can be extracted. Wait for the Hot-Swap LED to stop blinking before pulling the latch all the way out.

7. Remove the AMC.

FIGURE 1-3 Removing the AMC



8. Replace the AMC with another AMC (FIGURE 1-7) or install a filler panel.

Note – Be sure to follow handling instructions. See Section 1.3, "Handling AMCs" on page 1-4.

Caution – Failure to fill all slots with AMCs or cover with filler panels can negatively impact the cooling of the system.

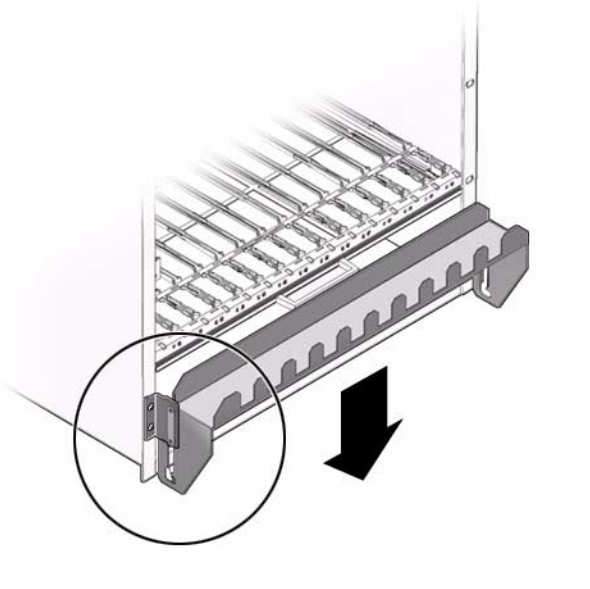
1.6.2 Removing a Blade Server and AMC

Following are the instructions for removing a blade server and installed AMC. For additional information, refer to your blade server documentation.

Caution – Before removing a blade server and AMC, read all cautions, warnings, and instructions presented earlier in this chapter.

1. **Move the front cable management bracket to the lower position (**FIGURE 1-4**).**

FIGURE 1-4 Front Cable Management Bracket in Lower Position



2. **Disengage the injector/ejector mechanisms at the top and bottom of the blade server to notify software that the board is about to be removed. Wait for the Hot-Swap LED to light.**

Note – Depending on how the Shelf controls deactivation, the Shelf might not initiate deactivation when you disengage the ejector latch. If so, either configure the Shelf to allow deactivation via latch opening or deactivate by other methods.

3. **Disconnect all cables connected to the switch.**
4. **Loosen the two board retention screws that fasten the board to the enclosure.**
5. **Open the ejectors fully, rotating the handles outward until the board disengages from the midplane.**
6. **Slide the board evenly out of the enclosure.**
7. **Determine if you are going to replace the blade server.**

- If you are going to replace the blade server, refer to your blade server documentation for procedures.
- If you are not going to replace the blade server, install a filler panel to maintain the enclosures shielding and cooling performance.

Caution – Failure to cover all open slots with filler panels can negatively impact the cooling of the system.

1.6.3 Installing an AMC

Following are the instructions for installing an AMC.

Caution – Before installing an AMC, read all cautions, warnings, and instructions presented earlier in this chapter.

1. **At the blade server, locate the AMC site where you want to install the AMC.**

   Depending on the blade server's AMC site location, you might have to remove the blade server from the chassis. Some blade servers have compartments for AMCs that can only be accessed when the blade server is removed from the chassis.

   Prevent possible damage to module components by verifying the proper site usage for your configuration. In most cases, electronic keying (e-Keying) prevents power on of a board into an incompatible site. However, as an extra precaution, know the site purpose.

2. **Remove the filler panel, if necessary.**
3. **Obtain the AMC card from the ship kit.**

Note – Be sure to follow unpacking and handling instructions. See Section 1.2, "Unpacking" on page 1-3 and Section 1.3, "Handling AMCs" on page 1-4.

FIGURE 1-5 Sample Top View

Note – The illustration shows a sample of the top view for a 146GB AMC. If your AMC has a different capacity, the label shows it.

4. **Perform any card-specific hardware procedures, if necessary.**
5. **Prepare the AMC by fully opening its injector/ejector latches to the OUT position.**

FIGURE 1-6 Opening the Injector/Ejector Latch

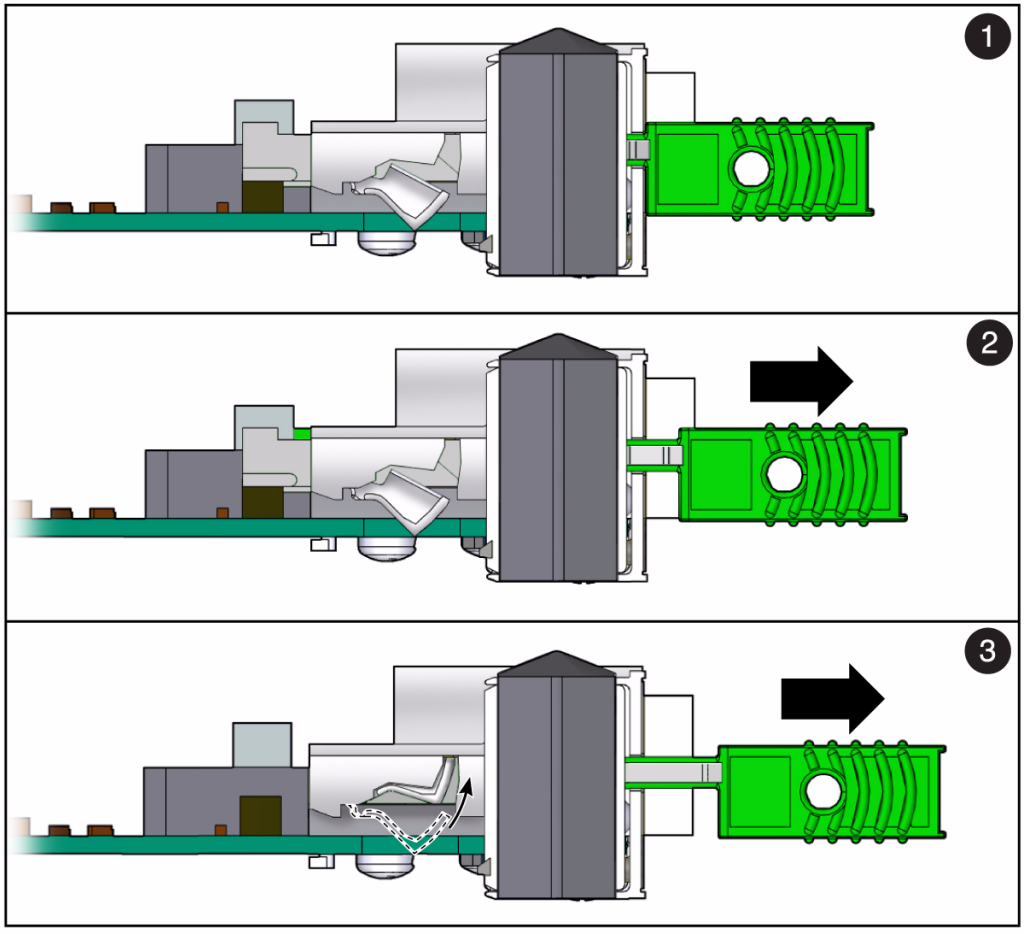


Figure Legend

1	Fully In (IN) When IN, the module communicates to the shelf manager that the module is not in the hot-swap state, and the shelf manager communicates with the MMC. This position is for normal operation.
2	Half Way (HW) When in the HW position, the hot-swap sequence is initiated. The MMC sends a hot-swap event to the shelf manager.
3	Out (OUT) When OUT, the latching mechanism is released and the module can be extracted. Wait for the Hot-Swap LED to stop blinking before pulling the latch all the way out.

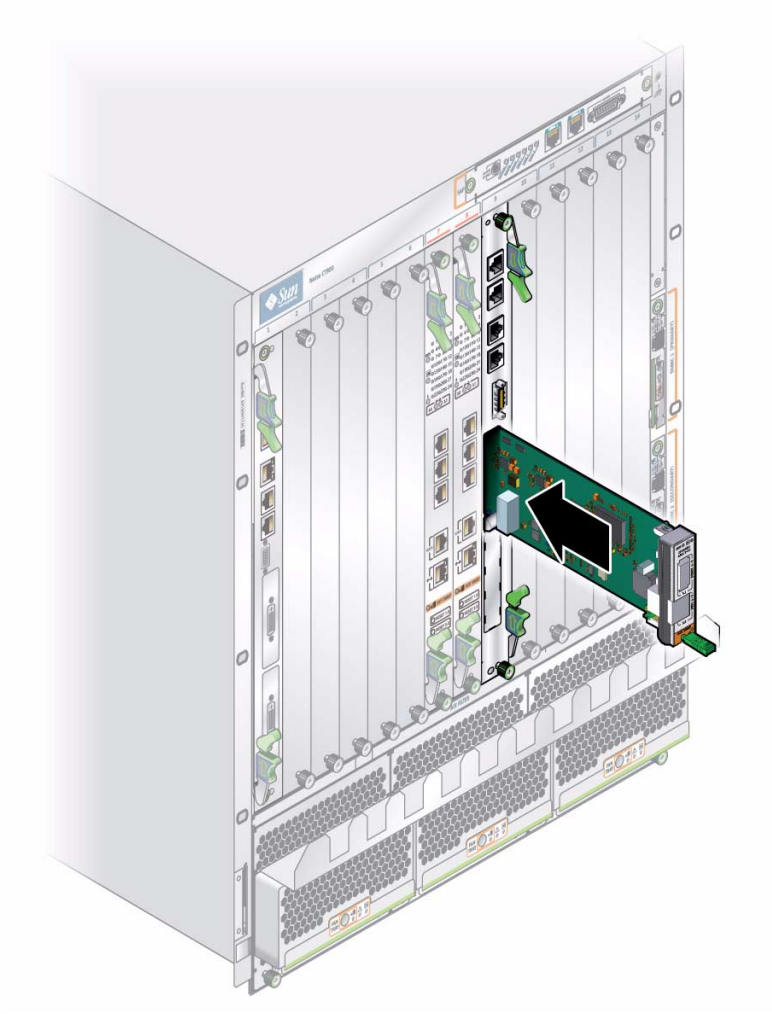
6. **Carefully align the edges of the AMC with the guides in the appropriate site.**

   It might be helpful to look into the enclosure to verify correct alignment of the rails in the guides.

Caution – Do not force the AMC into the site. If it does not fit properly, check to ensure that you have the correct matching AMC for the switch.

7. **Keeping the AMC aligned in the guides, slide it in by pressing on the AMC faceplate until the AMC faceplate is flush with the blade server faceplate.**

FIGURE 1-7 Inserting the AMC Into a Blade Server



8. **Push the ejector latch in fully.**

   If system power is on and AMC is installed properly, the AMC board Hot-Swap LED lights up. The Hot-Swap LED blinks for several seconds, then goes off.

   If the Hot-Swap LED does not go off after several seconds, push firmly on the injector/ejector handles to ensure that they are pushed in all the way.

Caution – Failure to fill all slots with AMCs or cover with filler panels can negatively impact the cooling of the system.

9. Power on the system, if necessary.

Refer to your system manual for instructions on correctly powering on the system. After power is applied to the chassis, the internal MMC controller runs a self-test that runs for approximately 10 seconds. Upon a successful power up self-test, the blue Hot-Swap LED will blink and then turn off, indicating that the module has been placed in operation.

1.7 Enabling and Disabling SAS Ports

As shipped from the factory, the AMC.1-HDD SAS disk *will not* drive AMC channel ports, unless specifically enabled. You can individually enable or disable the ports using `lsiutil`, a command-line utility supplied by LSI Corporation, and distributed as part of the software driver distribution. Changes are stored in 32K x 8-bit NVSRAM, located on the module.

▼ To Enable AMC Port 2 (Driven by Port 1 of SAS Controller)

```
lsiutil -p 1 -a 13,,,,1,1,,,,,,,,,0,0
```

▼ To Enable AMC Port 3 (Driven by Port 2 of SAS Controller)

```
lsiutil -p 1 -a 13,,,,2,1,,,,,,,,,0,0
```

The “-p 1” selects the controller chip. If the AMC.1-HDD SAS disk is the only LSI controller chip present in the system then the default is controller 1. If there are other LSI controller chips present in the system, then the user has to determine the proper controller number.

Note – This utility has many other uses and adjustable values. Parameter adjustments are permanently committed to flash memory, and affect future behavior of the AMC. Only advanced users who fully understand the technical implications should modify parameters. A full description of parameters and functions is in *LSIUtil Configuration Utility User's Guide*, published by LSI.

▼ To Disable AMC Port 2 (Driven by Port 1 of SAS Controller)

```
lsiutil -p 1 -a 13,,,,1,0,,,,,,,,,0,0
```

▼ To Disable AMC Port 3 (Driven by Port 2 of SAS Controller)

```
lsiutil -p 1 -a 13,,,,2,0,,,,,,,,,0,0
```

CHAPTER 2

Overview

This chapter introduces the key features of the AMC. This chapter includes a product definition, a list of product features, and functional block diagrams with brief descriptions. This chapter can be used to compare the features of the AMC against the needs of a specific application.

This chapter contains the following topics:

2.1 Features

Part of Sun's ATCA platform, the Sun Netra CP3000 AMC.1-HDD SAS disk complies with PICMG 3.0 AdvancedTCA Specification R2.0 ECN002 and the following specifications:

- PICMG AMC.0 Rev. 2.0
- AMC.1 Revision 1, PCI Express option
- AMC.3 Revision 1, storage signaling option

The AMC.1-HDD SAS disk is an Advanced Mezzanine Card (AMC) that integrates both an SAS hard drive disk and a x4 PCIe SAS controller. Occupying only one AMC site, the highly integrated combination provides embedded systems designers the ability to add an Enterprise SAS Hard Disk Drive (HDD) to a system that does not have native SAS connectivity. The AMC.1-HDD SAS disk is offered as a single-width AMC, with options for mid- or full-height panels. The hard drive is Form-Factor 2.5" to provide the greatest spindle density for ATCA applications.

The AMC.1-HDD SAS disk plugs into ATCA carrier blades that support a combination of AMC.1 (PCI Express) and AMC.3 (SAS) storage signaling.

The AMC.1-HDD SAS disk includes a modular management controller (MMC).

This AMC is designed for use in a wide variety of next-generation and wireless-networking equipment. Designed for high performance and reliability, the AMC.1-HDD SAS disk is ideal for telecommunications equipment manufacturers (TEMs) and OEMs. TEMs can add SAS connectivity to networking equipment that uses the ATCA platform specification. OEMs can design to the MicroTCA specification for high-performance embedded systems.

The following briefly outlines the features of the AMC.1-HDD SAS disk:

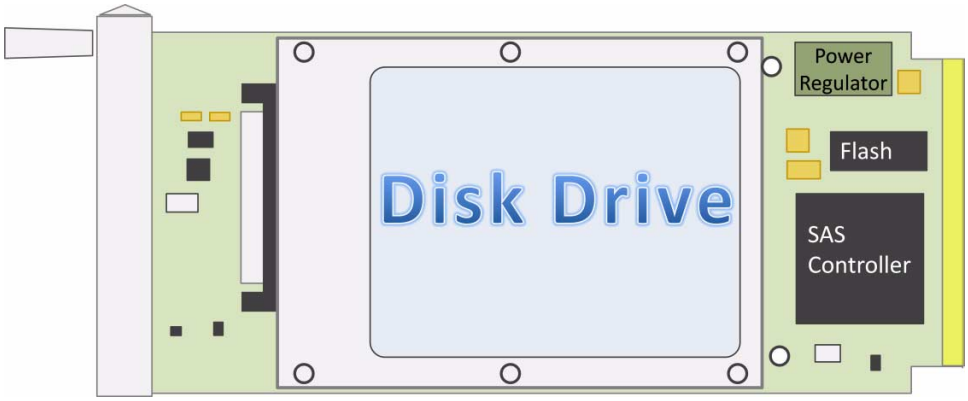
- Advanced Mezzanine Card (single-width, mid- or full-height); PICMG AMC.0 compliant
- Hot-swappable
- PCI Express interface (auto configure x1 or x4 lanes at 2.5 Gigabits per second
- One Integrated 2.5" SAS hard drive (primary port)
- Additional disk via AMC.3 storage signaling (drives adjacent site AMC port 2)
- Additional disk via AMC.3 storage signaling (drives adjacent site AMC port 3)
- All SAS links at 3 Gigabits per second maximum
- Support for SSP, STP, and SMP, as defined in the Serial Attached SCSI (SAS) Specification, version 1.0
- Drive over-current protection

- Support for SATA, as defined in the Serial ATA Specification, version 1.0a.

2.2 Key Components

The following figure and sections describe key components of the Sun Netra CP3000 AMC.1-HDD SAS disk.

FIGURE 2-1 Top-Level AMC Layout



2.2.1 Hard Drive Disk

The Sun Netra CP3000 AMC.1-HDD SAS disk provides a single SAS hard drive, with various capacity options available. When you order the product, choose the part number corresponding to the capacity (in gigabytes) that you want.

2.2.2 Power Regulator

The power regulator is the part of the module that generates the required power from the payload power (+12V) that is delivered to the module through the AMC connector. This power is current-limited by the onboard regulator.

2.2.3 SAS Controller

The AMC.1-HDD SAS disk incorporates a PCIe-to-SAS host controller manufactured by LSI Corporation, device model LSI-SAS1064E. The controller provides host access to SAS and SATA disks. The controller features four lanes of PCI Express (2.5 gigabits per second each), and four lanes of SAS (3.0 gigabits per second each).

The SAS firmware for the LSI SAS supports the following:

- 3 gigabits per second SAS and SATA transfers
- Device discovery
- Both 3.0 gigabit and 1.5 gigabit SATA devices
- x1 or x4 PCI Express bus
- Mixed SAS and SATA disk operation
- SATA tape drive
- SAS expander compatibility

2.2.4 Flash

A flash device is preloaded with firmware that manages the protocols necessary to communicate with SAS and SATA target devices. The flash device contains BIOS and F-code to support boot from disk operations.

2.2.5 Module Management Controller (MMC)

The IPMI subsystem provides management control for the board, based on an Atmel microcontroller. The MMC is the first system component to be brought up and must negotiate with the carrier board over IPMI before the card payload is enabled.

The MMC monitors board voltages and temperature, controls the hot-swap and failures status LEDs, controls e-Keying, and stores FRU information. For more information about the MMC and management functions, see Chapter 3.

The MMC provides an Intelligent Platform Management Interface (IPMI) that communicates with AdvancedTCA shelf managers. This MMC controls and monitors the following:

- Hot-swap communication with the shelf manager
- Inlet air temperature
- Voltage monitoring

- e-Keying as described in the AMC.0 specification
- FRU information
- LED indicators for hot-swap and OOS (out of service)

2.2.6 Port Connectors

The AMC includes connectors to communicate with the host board and take its interfaces outside the ATCA chassis. Refer to Appendix A for complete connector descriptions and pin-outs.

2.2.7 LEDs

The AMC.1-HDD SAS disk has three LEDs. See the next section for a detailed description of the LEDs.

2.3 Faceplate and LEDs

The faceplate of the AMC.1-HDD SAS disk has three LED indicators, which are described in the table following the faceplate illustration.

Note – The AMC is available in different capacities (in gigabytes). The illustration shows a generic faceplate. For your product's faceplate, the xxx denotes the capacity.

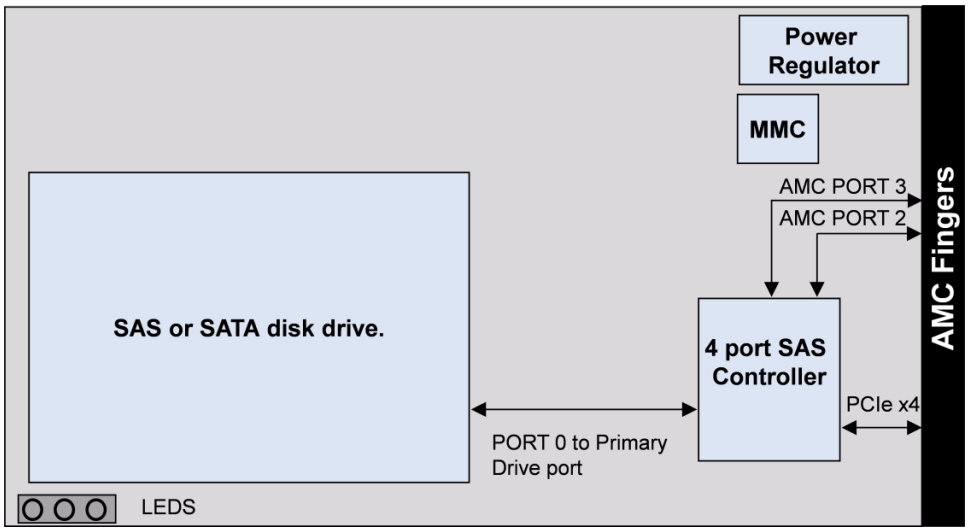
FIGURE 2-2 Faceplate

Figure Legend

	Indicator	Color	State	Description and Function
1	OOS	Red	On	Out of Service: fault set by shelf manager, or 12V payload power not detected.
			Off	No module fault. 12V payload power is being supplied to board.
2	OK	Green	On	Module in service. 12V payload power is being supplied to board.
			Off	12V payload power is not detected.
3	Hot Swap	Blue	On	Management power available to the module; AMC can be safely extracted.
			Off	The module is operational and is unsafe for extraction.
			Long blink	Delay before module is activated.
			Short blink	Delay before module is deactivated.

2.4 Functional Diagram

FIGURE 2-3 AMC SAS-HDD Functional Block Diagram



2.5 Technical Support and Warranty

If you have any technical questions or support issues that are not addressed in the Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller documentation set or on the web site, contact your local Sun Services representative. This hardware carries a one-year return-to-depot warranty.

For customers in the US or Canada, call 1-800-USA-4SUN (1-800-872-4786).

For customers in the rest of the world, find the World Wide Solution Center nearest you by visiting our web site:

http://www.sun.com/service/contacting/solution.html

When you call Sun Services, indicate if the Sun Netra CP3000 AMC.1-HDD SAS disk was purchased separately and is not associated with a system. Have the proper AMC identification information ready. Be prepared to give the representative the AMC part number, serial number, and date code (FIGURE 2-4).

2.6 Part Number, Serial Number, and Revision Number Identification

The Sun Netra CP3000 AMC.1-HDD SAS disk part number, serial number, and revision can be found on labels located on the card (FIGURE 2-4). The Sun barcode labels provide the following information:

- `SunSN` – Sun serial number (for example, 1005LCB-0626WM001M)
- `SunPN` – Sun part number and dash number (for example, 501-7658-01), -01 is the dash number
- `Rev` – Revision number of the part (for example, Rev 06)

The Media Access Control (MAC) address label contains the MAC address for the blade server in printed and barcode form.

FIGURE 2-4 Sun Netra CP3000 AMC.1-HDD SAS disk Barcode Labeling

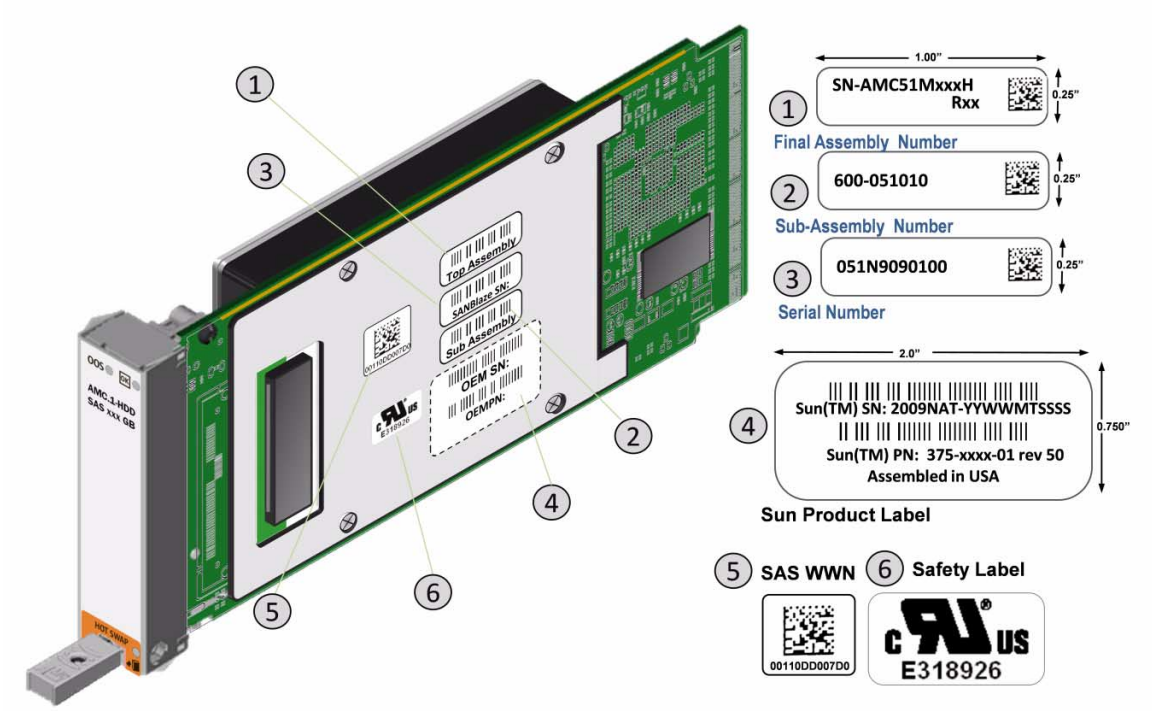


Figure Legend

1 Final Assembly Number:
- Assembly process label, where *xxx* denotes disk drive capacity
- Rzz = Assembly Revision (Refer to Bill Of Material) where zz is a numeric revision

2 Sub-Assembly Number:
- P/N = sub assembly Part Number 600-05101x

3 Serial Number:
- S/N Format:AAA = Assembly Number (051)
- L =Location of manufacturer (S)
- Y = Calendar year of manufacturer (2008 = 8)
- MM = Calendar month of manufacturer (March = 03)
- SSSS = Sequence number (reset each month) (1234)

Figure Legend

4	Sun Product Label: • SUN S/N Format • Sun Part Number
5	SAS WWN = SAS World Wide Name
6	Safety label

2.7 Disposal

The AMC might contain materials that require regulation upon disposal. Please dispose of this product in accordance with local rules and regulations. For disposal or recycling information, please contact your local authorities or the Electronic Industries Alliance at http://www.eiae.org/.

CHAPTER 3

Managing the AMC

This chapter describes the AMC management software.

The Sun Netra CP3000 AMC.1-HDD SAS disk includes an IPMI-based Module Management Controller (MMC) that meets all requirements set out in the PICMG AMC.0 specification. The MMC allows detection of the module by the carrier board and manages communication between the AMC.1-HDD SAS disk and management controllers on the carrier board and system level. Board voltages, temperature, and hot-swap handle status are all monitored by the MMC.

This chapter contains the following topics:

3.1 Monitoring and Control Functions

The MMC is responsible for communicating module status information to the carrier board, and also has some control at the module level. The 10GbE local PHY is held in reset until the AMC Carrier IPMI uses e-Keying to turn on the interface (to ensure that the interface is compatible). The MMC has the ability to reset the PHY through the `IPMI FRU Control` command.

3.2 IPMI Controller

The IPMI controller consists of a 16-bit microcontroller, flash, and SRAM. The microcontroller uses I2C interface (IPMB-L) to collect data from various sensors located on the AMC. The host ATCA blade server might read data collected by the IPMI controller, and transmit it to the shelf management controller (ShMC) through the IPMB-0.

The IPMB is routed through the AMC connector to the host carrier blade and backplane. The IPMB allows the AMC MMC to be discovered by and communicate with the carrier blade and system-level management. It is always active.

The MMC communicates with the carrier controller through the local IPMB-L bus of the carrier and responds to all mandatory commands for AMC MMC (as defined in the AMC Specification), as well as some optional commands.

TABLE 3-1 Supported IPMI Commands

Command	IPMI/PICMG/AMC Specification	NetFn	CMD	MMC Req
IPM Device Global Commands				
`Get Device ID`	17.1	App	01h	Mandatory
`Broadcast Get Device ID`	17.9	App	01h	Mandatory
Messaging Commands				
`Send Message`	18.7	App	34h	Optional
Event Commands				
`Platform Event`	23.3	S/E	02h	Mandatory
Sensor Device Commands				
`Get Device SDR Info`	29.2	S/E	20h	Mandatory

TABLE 3-1 Supported IPMI Commands *(Continued)*

Get Device SDR	29.3	S/E	21h	Mandatory
Reserve Device SDR Repository	29.4	S/E	22h	Mandatory
Get Sensor Reading Factors	29.5	S/E	23h	Optional
Set Sensor Hysteresis	29.6	S/E	24h	Optional
Get Sensor Hysteresis	29.7	S/E	25h	Optional
Set Sensor Threshold	29.8	S/E	26h	Optional
Get Sensor Threshold	29.9	S/E	27h	Optional
Set Sensor Event Enable	29.10	S/E	28h	Optional
Get Sensor Event Enable	29.11	S/E	29h	Optional
Rearm Sensor Events	29.12	S/E	2Ah	Optional
Get Sensor Event Status	29.13	S/E	2Bh	Optional
Get Sensor Reading	29.14	S/E	2Dh	Mandatory
FRU Device Commands				
Get FRU Inventory Area Info	28.1	Storage	10h	Mandatory
Read FRU Data	28.2	Storage	11h	Mandatory
Write FRU Data	28.3	Storage	12h	Mandatory
AdvancedTCA™ Commands				
Get PICMG Properties	3-9	PICMG	00h	Mandatory
FRU Control	3-22	PICMG	04h	Mandatory
Get FRU LED Properties	3-24	PICMG	05h	Mandatory
Get LED Color Capabilities	3-25	PICMG	06h	Mandatory
Set FRU LED State	3-26	PICMG	07h	Mandatory
Get FRU LED State	3-27	PICMG	08h	Mandatory
Get Device Locator Record ID	3-29	PICMG	0Dh	Mandatory
AMC® Commands				
Set AMC Port State	3-27	PICMG	19h	Mandatory
Get AMC Port State	3-28	PICMG	1Ah	Mandatory

3.3 FRU Information

Board information such as serial number, date of manufacture, OEM name, part number, and so on is retrievable from the FRU EEPROM integrated into the MMC. FRU information stored onboard the AMC.1-HDD SAS disk complies with the PICMG 2.9 specification.

The AMC.1-HDD SAS disk includes the standard FRU data records per the IPMI Platform Management FRU Information Storage Definition, Board Info Area. The AMC.1-HDD SAS disk includes additional FRU records as defined in the PICMG 2.9 specification.

TABLE 3-2 Standard FRU Data Records

Product Information	AMC.1-HDD SAS Disk
Version	1
Language Code	0 (EN-English)
MFG date.time	See note 1
Manufacturer Name	Sun Microsystems, Inc.
Product Name	SAS AMC.1 *xxx*GB disk, where *xxx* denotes disk capacity
Product Serial Number	2009NAT-YYWWNTSSSS (See note 2)
Product Part / Model#	375-mmmm-01 or 376-mmmm-01, where *mmmm* denotes product model based on disk capacity
Product Version	50

1 Manufacturing time is defined as 'minutes since January 1, 1996 in the IPMI FRU specification.

2 Serial Number format:
2009NAT = vendor and factory code
YY = year (4 = 2004, 0 = 2010)
NT = multiuse code
WW = work week
SSSS = sequence number (0-9999)

3.4 Sensors

The AMC.1-HDD SAS disk module management is connected to sensors monitoring key board voltages and temperatures. Data records from the following sensors are accessible using IPMI commands:

- Hot-swap
- +12V payload power
- +3.3V management power
- Board and inlet temperature
- +1.2V onboard voltage (generated from payload)
- +3.3V onboard voltage (generated from payload)

Note – The sensor index number is dynamically created by the shelf manager and might not always start at index zero (0).

TABLE 3-3 Threshold Sensors

Sensor	Name	Type	Description	Units	Lower Thresholds Minor	Critical	Non-recoverable	Upper Thresholds Minor	Critical	Non-recoverable
0	Hot-swap	Hot-swap	Hot-swap sensor	M states	N/A	N/A	N/A	N/A	N/A	N/A
1	+3.3V STBY	Voltage	Voltage	Volts	3.162	3.105	3.005	3.462	3.505	3.605
2	+1.2V	Voltage	Voltage	Volts	1.118	1.088	1.059	1.294	1.324	1.353
3	+12V	Voltage	Voltage	Volts	10.853	10.248	10.027	13.218	13.822	14.043
4	Board temp	Temp	Temp	Celsius	N/A	N/A	N/A	65.450	76.440	85.860
5	Inlet temp	Temp	Temp	Celsius	N/A	N/A	N/A	65	75	85

3.5 Firmware and Software Upgrades

For up-to-date instructions on upgrading the firmware and software, refer to the following documentation:

- *Sun Netra CP3000 Advanced Mezzanine Card PCIe Hard Drive and SAS Controller Product Notes* (820-7174)
- README files within the download package

CHAPTER 4

Configuring the AMC

This chapter describes how to configure the AMC using the SAS Boot BIOS Configuration Utility, the OpenBoot™ BIOS, and the Extensible Firmware Interface (EFI) Boot Services Driver.

This chapter contains the following topics:

4.1 Configuration Tools

The configuration tools are preloaded on a flash ROM device embedded on the AMC. A MicroTCA or host carrier CPU can read the code to facilitate booting from SAS drives. The BIOS contains an embedded configuration manager, which you use to configure RAID or other adapter options prior to OS boot. The BIOS integrates with a standard system BIOS, extending the standard disk-service routine provided through INT13h.

Three types of BIOS are available for the AMC.1-HDD SAS disk:

- Boot BIOS for Intel- and AMD-based platforms
- OpenBoot BIOS for Solaris SPARC® platforms.
- Extensible Firmware Interface (EFI) BIOS for EFI-compliant systems

All of these BIOS images are stored on the flash device located on the AMC.

4.2 Boot BIOS Utility

The Boot BIOS utility allows you to change the default (factory) configuration of the AMC. The utility is stored in a flash device located on the AMC module. The sections that follow provide a summary of the BIOS configuration capabilities. A full description of capabilities is published in *User's Guide, Integrated RAID for SAS*, available from LSI Corporation, which writes the BIOS used on the AMC.

Note – The Boot BIOS utility is disabled by default on all AMCs. To use it, enable the utility per the instructions in this chapter.

When Boot is enabled, the Boot BIOS scans for SAS hard drive disks (HDDs) connected to the AMC. It sorts which HDDs might be participating in RAID volume definitions. All discovered disks and RAID volumes are enumerated with drive letters and appended to a master list of devices discovered on the host. Upon scan completion, the host serially inspects the master list of devices beginning with drive letter A, and attempts to boot from the first device it finds with a boot record.

4.2.1 Features and Configurations

The Boot BIOS supports the following:

- Using multiple AMC.1 SAS modules
- Applying global properties stored in flash
- Selecting and configure up to 256 adapters
- Automatic INT13 drive mapping for SAS drives
- SAS topology discovery, including expander traversal
- Applying PHY transceiver properties

4.2.2 Launching the Boot BIOS Utility

Note – Not all devices detected by the utility can be controlled by the BIOS. Devices such as tape drives and scanners require loading a device driver specific to that peripheral device.

---

1. **Initiate loading of the BIOS, and watch for the following message.**

   `Press Ctrl-C to start LSI Configuration Utility...`

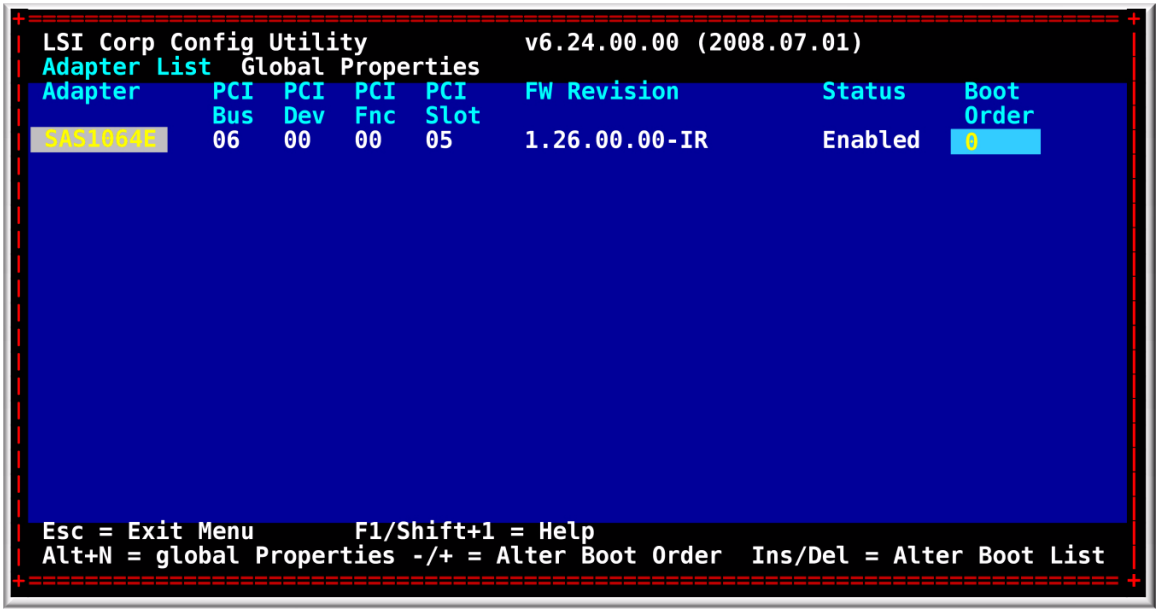
   This message remains on your screen for about five seconds, giving you time to start the utility.

2. **Press CTRL C.**

   `Please wait, invoking LSI Configuration Utility...`

   After a brief pause, the Boot BIOS Main menu is displayed, as shown in the following figure.

FIGURE 4-1 Boot BIOS Main Menu



The menu displays a scrolling list of all the AMC SAS modules visible in the system, with PCI Express (PCIe) identification information.

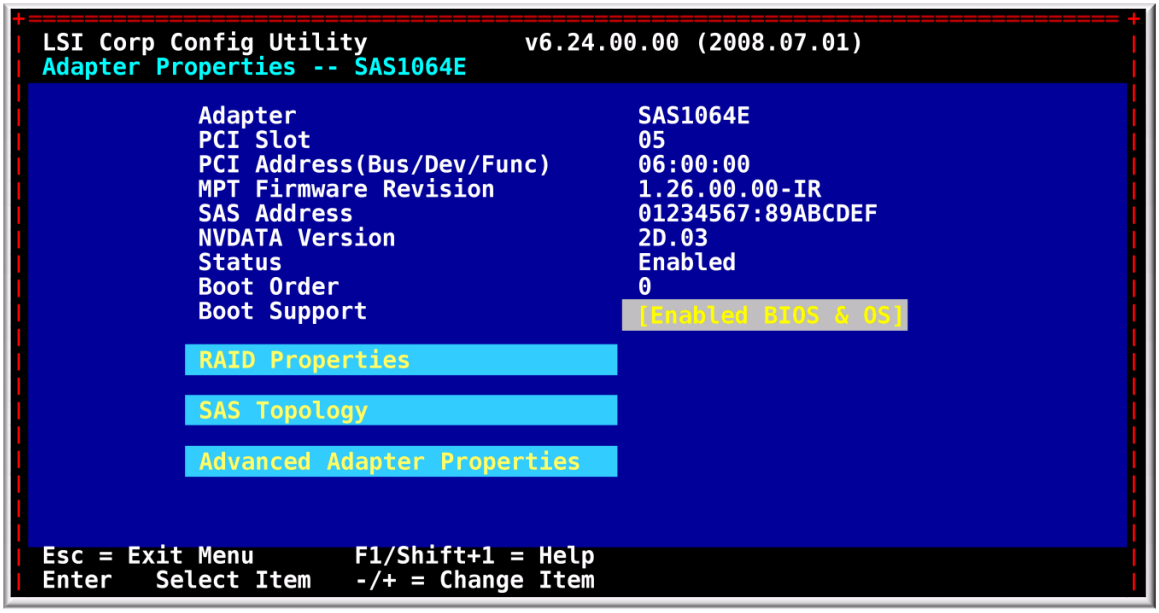
3. **Use the arrow keys to highlight the AMC module you want to configure.**

4. **Press ENTER to display the next screen.**

   The Adaptor Properties menu is displayed, where you can view and modify AMC parameters.

   This menu provides the top-level view of AMC status and configurable parameters.

FIGURE 4-2 Adapter Properties Menu



5. **Using the arrow keys, select the item of interest.**
6. **Press ENTER to display the next screen.**

4.3 OpenBoot BIOS

For information about the OpenBoot BIOS, refer to the Sun Solaris OS and SPARC documentation. The documentation is available at the following site:

http://www.sun.com/documentation/

4.4 Extensible Firmware Interface (EFI) BIOS

The AMC.1-HDD SAS disk includes an EFI boot services driver for use with ATCA blades that feature Intel® IA64 processors. Additional information is available at `http://www.lsi.com`.

4.5 Enabling and Disabling Channel Ports

As shipped from the factory, the AMC.1-HDD SAS disk *will not* drive AMC channel ports, due to the default "disable" setting. You can enable these ports using `lsiutil`, a command line utility. For instructions, see Section 1.7, "Enabling and Disabling SAS Ports" on page 1-18.

APPENDIX **A**

Connectors and Ports

This appendix describes the connectors and ports you can use to communicate with the host board and application-specific devices. A brief description of each connector and port is given, and a detailed description and pinout given for each connector.

This appendix contains the following topics:

A.1 Connector Locations and Assignments

This module is AMC.1 and AMC.3 compliant and can use ports 2 and 3, as defined in the AMC.3 specification.

Callout	Port	Function
1	2	AMC.3 Serial Storage Port 2
2	3	AMC.3 Serial Storage Port 3
3	4	AMC.1 PCI Express lane 0
4	5	AMC.1 PCI Express lane 1
5	6	AMC.1 PCI Express lane 2
6	7	AMC.1 PCI Express lane 3

A.2 Connector Pinouts

The AMC.1-HDD SAS disk includes an AMC connector, which conforms to the single-slot B+ extended connector, with 170 signal contacts.

The AMC.1-HDD SAS disk communicates with the carrier board through the AMC connectors. Connector usage for the AMC.1-HDD SAS disk is listed in the following table.

TABLE A-1 Pin Assignments

Pin#	Signal Name	Pin#	Signal Name	Pin#	Signal Name	Pin#	Signal Name
1	GND	46	GND	91	No Connect	136	No Connect
2	12V	47	'PORT4_PCIe_RX0_P'	92	GND	137	GND
3	'PRSNT1_L'	48	'PORT4_PCIe_RX0_N'	93	No Connect	138	No Connect
4	'AMC_VCC3'	49	GND	94	No Connect	139	No Connect
5	GA0	50	'PCIe_TX1_P'	95	GND	140	GND
6	No Connect	51	'PCIe_TX1_N'	96	No Connect	141	No Connect
7	GND	52	GND	97	No Connect	142	No Connect
8	No Connect	53	'PCIe_RX1_P'	98	GND	143	GND

TABLE A-1 Pin Assignments *(Continued)*

9	12V	54	'PCIe_RX1_N'	99	No Connect	144	No Connect
10	GND	55	GND	100	No Connect	145	No Connect
11	No Connect	56	'IPMI_SCL_L'	101	GND	146	GND
12	No Connect	57	12V	102	No Connect	147	No Connect
13	GND	58	GND	103	No Connect	148	No Connect
14	No Connect	59	'PCIe_TX2_P'	104	GND	149	GND
15	No Connect	60	'PCIe_TX2_N'	105	No Connect	150	No Connect
16	GND	61	GND	106	No Connect	151	No Connect
17	GA1	62	'PCIe_RX2_P'	107	GND	152	GND
18	12V	63	'PCIe_RX2_N'	108	No Connect	153	No Connect
19	GND	64	GND	109	No Connect	154	No Connect
20	'PORT1_PTX0_P'	65	'PCIe_TX3_P'	110	GND	155	GND
21	'PORT1_PTX0_N'	66	'PCIe_TX3_N'	111	No Connect	156	No Connect
22	GND	67	GND	112	No Connect	157	No Connect
23	'PORT1_PRX0_P'	68	'PCIe_RX3_P'	113	GND	158	GND
24	'PORT1_PRX0_N'	69	'PCIe_RX3_N'	114	No Connect	159	No Connect
25	GND	70	GND	115	No Connect	160	No Connect
26	GA2	71	'IPMI_SDA_L'	116	GND	161	GND
27	12V	72	12V	117	No Connect	162	No Connect
28	GND	73	GND	118	No Connect	163	No Connect
29	'TX_SAS_2+'	74	No Connect	119	GND	164	GND
30	'TX_SAS_2-'	75	No Connect	120	No Connect	165	No Connect
31	GND	76	GND	121	No Connect	166	No Connect
32	'RX_SAS_2+'	77	No Connect	122	GND	167	No Connect
33	'RX_SAS_2-'	78	No Connect	123	No Connect	168	No Connect
34	GND	79	GND	124	No Connect	169	No Connect
35	'TX_SAS_3+'	80	PREFCLKP	125	GND	170	GND
36	'TX_SAS_3-'	81	PREFCLKN	126	No Connect		
37	GND	82	GND	127	No Connect		
38	'RX_SAS_3+'	83	'PRSNT0_L'	128	GND		
39	'RX_SAS_3-'	84	12V	129	No Connect		

TABLE A-1 Pin Assignments *(Continued)*

40	GND	85	GND	130	No Connect
41	'AMC_ENABLE_L'	86	GND	131	GND
42	12V	87	No Connect	132	No Connect
43	GND	88	No Connect	133	No Connect
44	'PCIe_TX0_P'	89	GND	134	GND
45	'PCIe_TX0_N'	90	No Connect	135	No Connect

A.3 SAS Controller Ports

The AMC.1-HDD SAS disk incorporates four dedicated SAS controller ports as follows.

TABLE A-2

SAS Controller Port	Dedicated Function
0	Routes to the onboard SAS disk drive, primary port A
1 (See Note)	Routes to AMC channel 2 (connects to SAS or SATA disk)
2(See Note)	Routes to AMC channel 3 (connects to SAS or SATA disk)
3	No Connect

These SAS ports are shipped with PHY's disabled and are not driving AMC ports 2 and 3. This default configuration avoids incompatibilities with systems that have other initiators driving these AMC ports.

A.4 e-Keying Ports

The AMC.1-HDD SAS disk connects up to two SAS ports on the AMC connector. These ports are defined by the AMC.3 specification for serial storage. The module designates four PCI Express ports, per AMC.1 specification. The link type and link type extension are defined in the following table.

TABLE 0-1 AMC e-Keying Port Assignments

Port #	Port Name	Link Type	AMC Port Map Region
0	Unused		
1	Unused		
2	Channel 0	Link type 7 = AMC.3 storage, Link type extension = 2 (SAS and SATA) AMC asymmetric match = 00b (SAS)	Common options
3	Channel 1	Link type 7 = AMC.3 storage, Link type extension = 2 (SAS and SATA) AMC asymmetric match = 00b (SAS)	Common options
4-7	Channel 2	Link type 2 = AMC.1 PCI Express typ e = 4	Common options
4	Channel 3	Like type 2 = AMC.1 PCI Express type 1	
8-20	Unused		

APPENDIX **B**

Environment Specifications

This appendix describes the electrical, environmental, and mechanical specifications. It includes illustrations of the board dimensions.

This appendix contains the following topics:

B.1 Electrical and Environmental

The following sections provide tables and illustrations showing the electrical and environmental specifications.

B.1.1 Electrical

The AMC.1-HDD SAS disk shall consume no more than the following from the system supplies under normal operating conditions.

TABLE B-1 Electrical Specifications

SUPPLY	SAS (Max
Management power	Less than 100 mA
+12V (spin up less than 8 secs)	1.5A (18W)
+12V normal operating	1.0A (12W)
+12V (idle)	0.75A (9W)
Off State	Less than 0.4W
Max current draw	1.5A during spin-up

B.1.2 Environmental

The environmental values are listed in the following table.

TABLE B-2 Environmental Specifications

Specification		Enterprise SAS
Temperature	Operating (ambient)	5ºC to 55ºC
	Disk enclosure surface	5ºC to 60ºC (operating)
	Nonoperating	–40ºC to 70ºC
	Gradient	3 ºC/min – (20ºC/hour)
Relative humidity	Operating	5% to 95%
	Nonoperating	5% to 95%
	Maximum wet bulb	29ºC (operating)

TABLE B-2 Environmental Specifications *(Continued)*

Vibration	Operating	1 G (20 to 300 Hz)
	Nonoperating	5 G (20 to 300 Hz)
Shock	Operating	100 G/1ms duration
	Nonoperating	400 G/1ms duration
Altitude	Operating	–1,000 to +10,000 feet
	Nonoperating	–1,000 to +40,000 feet
Performance	RPM	10,025 rpm
	Seek time avg	Read/write 4.5 m/s (typical)
	Seek time max	Read/write 9.0m/s (typical)
	Interface	SAS 3.0 Gb
	MTBF	See the following table.

TABLE B-3 MTBF Values by Temperature

Temperature	MTBF
0ºC	1234247.92
5ºC	1104059.81
10ºC	977994.82
15ºC	858417.32
20ºC	747143.26
25ºC	645377.07
30ºC	553731.31
35ºC	472305.36
40ºC	400796
45ºC	338615.02
50ºC	284997.04
55ºC	239088.16
60ºC	200012.91
65ºC	166920.57
70ºC	139014.35

B.1.3 Absolute Maximum Ratings

The following values are stress ratings only. Do not operate at these maximums. See Section B.1.4, "Normal Operating Ranges" on page B-4 for normal operating conditions.

Payload voltage, +12V	0 VDC to +13.2 VDC
Management voltage, +3.3V	3.135 VDC to +3.465 VDC
Storage temperature	–40 to +70° Celsius
Noncondensing relative humidity	5% to 95% at 29° Celsius

B.1.4 Normal Operating Ranges

Description	Range
Nominal operating voltage	+10.8 to +13.2 VDC payload power 3.135 VDC to +3.465 VDC management power
Operating temperatures*:	
• 60m below sea level up to 1800m above sea level	–5° to +55°C
• from 1800m up to 4000m above sea level	–5° to +40°C
Operating humidity	Less than 85% at 29°C
Idle power consumption (without links)	9W
Maximum power consumption	12W

*The MTBF will be significantly reduced if operated above 30°C for more than 96 consecutive hours.

B.2 Reliability

Reliability prediction was done using Telcordia document SR-332, Issue 1. The prediction assumed 25° Celsius operating temperature with 100 percent duty cycle, in a ground-benign, controlled environment.

- MTBF: 630,000 hours
- One year limited warranty

B.3 Mechanical

This section includes the mechanical specifications for dimensions and weight. The AMC.1-HDD SAS disk meets the PICMG 3.0 AdvancedTCA Specification R2.0 ECN002 and AMC.0 R2.0 for all mechanical parameters.

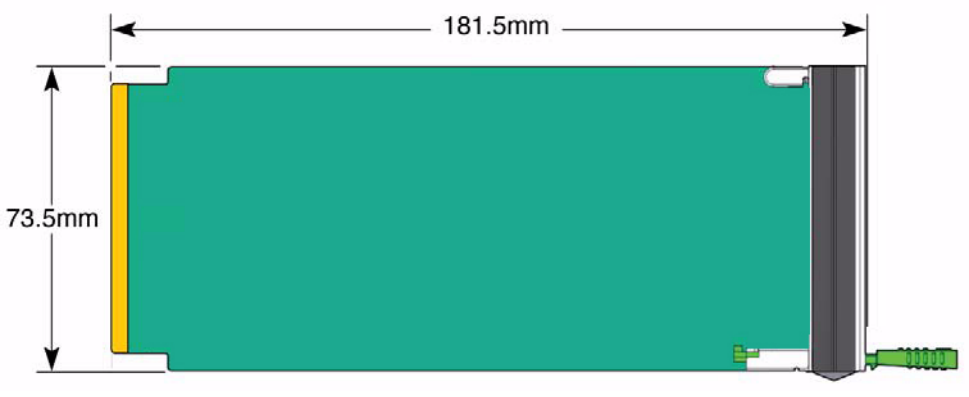
B.3.1 Board Dimensions and Weight

The AMC.1-HDD SAS disk is 181.5 mm by 73.5mm and conforms to the component height requirements of a mid-size module and can be configured as a full-size module. PCI Express x4 connections are made through the AMC edge fingers.

The AMC.1-HDD SAS disk conforms to the PICMG AMC.0 single-width, mid-height AMC Form Factor for all mechanical parameters. Mechanical dimensions are shown in the illustration and are outlined in the following table.

Item	Dimensions or Weight
PCB	181.5 mm x 73.5 mm x 1.6 mm
Board	AMC.0 R2.0 single-width, full-height form factor
Weight	181.4g

FIGURE B-1 AMC.1-HDD SAS disk PCB Dimensions



APPENDIX **C**

Agency Certifications

This appendix lists standards agencies and the certifications related to the Sun Netra CP3000 AMC.1-HDD SAS disk.

This product was tested in an EMC-compliant chassis and meets the requirements for EN55022 Class A equipment. Compliance was achieved under the following conditions:

- Conductive chassis rails connected to earth ground, providing the path for connecting shields to earth ground
- Front panel screws properly tightened

For minimum RF emissions, it is essential that these conditions be implemented. Failure to do so could compromise the EMC compliance of the equipment containing the module.

This appendix contains the following topics:

C.1 CE Certification

The Sun Netra CP3000 AMC.1-HDD SAS disk meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility [EN55024:1998, EN55022:2006] and Low-Voltage Directive 73/23/EEC for Product Safety [EN60950-1:2001]. A certificate of incorporation is available upon request. The final system configuration must be reconsidered as a whole per these directives.

C.2 NEBS/ETSI

The Sun Netra CP3000 AMC.1-HDD SAS disk has been designed to meet or exceed:

- Telcordia specification SR-3580 Issue 3, June 2007
  - Telcordia GR-63, Issue 3, March 2006, Network Equipment-Building System (NEBS) Requirements—Physical Protection
  - Telcordia GR-1089, Issue 4, June 2006, Electromagnetic Compatibility And Electrical Safety Generic Criteria For Network Telecommunication Equipment
- ETSI EN 300 019-2-1 V2.1.2 (2000-09), -2-2 V2.1.1 (1999-09), -2-3 V2.2.2 (2003-04), Environmental conditions and environmental tests for telecommunication equipment; Part 2
- ETSI EN 300 119-5, V1.2.2 (2004-12), Part 4: Engineering requirements for subracks in miscellaneous racks and cabinets
- ETSI EN 300 132-2, September 1996, Equipment Engineering Power Supply Interface At The Input To Telecommunications Equipment; Part 2: Operated by direct current (DC
- ETSI EN 300 753, October 1997, Acoustic Noise Emitted By Telecommunications Equipment

Certification is dependent on your configuration.

C.3 Safety

- UL/cUL 60950--1 Safety for Information Technology Equipment (UL File #E138926)
- EN/IEC 60950-1:2001, 1ST ED CB/CCA –scheme, Safety for Information Technology Equipment (TUV CB certificate and report)

The following group and/or national deviations were considered:

- CENELEC Common Modifications, Annex ZA
- AU (Australia and New Zealand)
- CH (Switzerland)
- DE (Germany)
- DK (Denmark)
- ES (Spain)
- FI (Finland)
- GB (United Kingdom)
- IE (Ireland)
- KR (Korea)
- NO (Norway)
- SE (Sweden)
- China (deviations to IEC 60950 3rd Ed. considered):
  - Telcordia GR-63-CORE Network Equipment-Building System (NEBS) Requirements Issue 3 Mar 2006—Physical Protection (Designed to meet section 4)
  - Telcordia GR-1089-CORE Safety for Network Telecommunication Equipment Issue 4 Jun 2006 (meets Section 7)

C.4 Emissions Test Regulations

- FCC Part 15, Subpart B Class A Commercial Equipment
- Industry Canada ICES-003:2004 Class A Commercial Equipment
- CISPR 22/EN 55022:2006 Class A Radiated, Power line Conducted
- VCCI, Japanese V-3/2007.04 Class A
- Telcordia GR-1089-CORE EMC For Network Telecommunication Equipment Issue 4 Jun 2006 (Designed to meet Sections 2 and 3)

C.4.1 EN 55022 Emissions

- Telcordia GR-1089-CORE EMC For Network Telecommunication Equipment Issue 4 Jun 2006 (designed to meet 3.2)
- EN55022:2005 Limits and Methods of Measurement of Radio Interference +A1:2000+A2:2003 Characteristics of Information Technology Equipment
- IEC CISPR22:2006 Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
- AS/NZS CISPR 22:2006 Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment

C.4.2 EN 55024 Immunity

- Telcordia GR-1089-CORE EMC For Network Telecommunication Equipment Issue 4 Jun 2006 (Sections 2.1 (ESD), designed to meet 2.2 (EFT), 3.3)
- EN 55024:1998 Information Technology Equipment – Immunity +A1:2001+A2:2003 characteristics limits and methods of measurements
- IEC 61000-4-2:2001 EMC - Part 4: Testing and measurement techniques - Section 4.2 Electrostatic discharge immunity test - Basic EMC Publication. (+/- 4KV contact and +/-8KV air discharge)
- IEC 61000-4-3:2003 EMC - Part 4. Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test
- IEC 61000-4-4:2004 EMC - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test - Basic EMC Publication
- IEC 61000-4-5:2001 EMC - Part 4: Testing and measurement techniques - Section 5: Surge immunity test
- IEC 61000-4-6:1996 EMC - Part 4: Testing and measurement techniques - Section 6: +A1:2001 Immunity to conducted disturbances induced by radio frequency fields

C.5 Regulatory Information

Caution – If you make any modification to the AMC not expressly approved by Sun, you could void your warranty and/or regulatory authority to operate the component.

C.5.1 FCC (USA)

This product has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

This AMC complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

C.5.2 Industry Canada (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Cet appareillage numérique de la classe A répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes:

1. Ce dispositif peut ne pas causer l'interférence nocive.
2. Ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

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