Intel® SC5200 5U Server Chassis Kit

Technical Product Specification

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Enterprise Platforms and Services Marketing

Revision History

Date	Revision Number	Modifications
5/16/02	0.9	Initial draft for review.
5/29/02	1.0	Initial Release

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1. Introduction

This specification details the feature set of the Intel® SC5200 Server Chassis, an entry-level server chassis designed for Intel® server board products. The SC5200 chassis series of products are low cost, time to market, and allow utilization of multiple platforms and configurations.

KHD3BASE450 is the base SC5200 chassis, designed to address the entry market. It includes a single 450-W Power Factor Correction (PFC) power supply, and supports five non hot-swap hard drives. Two tachometer output fans, mounted in front of the server board, and two fans mounted at the rear of the chassis provide main chassis cooling. An optional hot-swap drive bay kit, product code AXX2HSDRVUG, provides an upgrade path to allow the SC5200 base chassis to support five hot-swap drives. This chassis is compatible with the Intel® SE7500CW2 and SHG2 Server Boards.

KHD3HSRP650 contains a 650-W, 2+1 redundant power supply that features replaceable hot-swap 350-W thin power supply (TPS) modules and dual AC power cords for increased reliability and availability. The 350-W modules can be replaced without disrupting the operation of the server system. This chassis is pre-configured with two 350-W power modules and can be upgraded to a redundant power supply with an optional third 350-W module. This version of the chassis also features redundant cooling and hot-swappable fans. Two hot-swap 80-mm fans mounted at the rear, and one hot-swap 80-mm fan at the front, provide cooling for the core area (processors and memory). Two hot-swap, 92-mm fans mounted at the front provide cooling for the PCI area. A single hot-swap Small Computer Systems Interface (SCSI) hard drive bay is pre-installed in this version of the chassis, and an optional hot-swap bay drive bay kit can be installed to provide support for up to ten hot-swap SCA hard drives. This chassis is compatible with the Intel® SHG2 Server Board.

KHD3HSRP650R is the rack-mountable version of the KHD3HSRP650 chassis. In addition to the features mentioned above, this version provides unpainted covers, black rack bezels, peripheral bay reorientation bracket, and slide mounting rails. The unit is re-positioned in a horizontal orientation. The reorientation bracket is provided to maintain a horizontal position for CD-ROM and tape drives. This chassis is compatible with the Intel® SHG2 Server Board.

The optional hot-swap SCSI hard disk drive bay, AXX2HSDRVUG, is available for all of the SC5200 chassis configurations. It supports up to five 1-inch single connector attachment (SCA) low-voltage differential SCSI (LVD) hard drives to enhance serviceability, availability, and upgradability of the system. Adapter brackets allow mounting of hard drives at the lower six 5.25-inch, half-height peripheral bays at the front of the chassis. When the hot-swap drive bay is installed, it utilizes three of the six available bay positions. For the chassis configured with a hot-swap redundant power supply, this optional hot-swap hard disk drive bay is added to the pre-installed drive bay for a total support of ten hot-swap SCSI drives.

An additional two 5.25-inch, half-height drive bays are available for other peripherals, such as CD-ROM and tape drives. Only two of the three spaces can be occupied by devices. The third location must remain open, retaining the vented panel installed, to provide an inlet for cooling air.

A removable access cover provides entry to the interior of the chassis. On the redundant configurations, the side cover features an access panel for hot-swap fan replacement. The rear I/O panel conforms to *Advanced Technology Extended (ATX) Specification*, Revision 2.03, and supports seven full-length expansion cards. The chassis is provided with a front panel board designed for Server Standards Infrastructure (SSI) Entry E-Bay (EEB) 3.0-compliant server boards.

This specification details the key features of the product. Reference documents listed in Appendix B provide additional product specification detail for the server boards, backplane, and power supplies validated for use with this chassis. Check the compatibility section on the support website for more details: http://support.intel.com/support/motherboards/server/chassis/sc5200/.

Table 1. SC5200 Product Matrix

Product Code	Intel® Server Board	Hot-swap SCSI Drives	Power Supply Configuration	Hot-swap Fans	Pedestal/ Rack
KHD3BASE450 *Base 450-W*	SHG2 SE7500CW2	None – (upgradeable to 5, except SE7500CW2)	Fixed 450-W PFC	No	Pedestal
KHD3HSRP650 *HSRP 650-W*	SHG2	Yes – 5 (upgradeable to 10)	650-W PFC 2+1 dual line cord with two 350-W modules and one blank filler.	Yes – 5	Pedestal
KHD3HSRP650R *HSRP 650-W Rack*	SHG2	Yes – 5 (upgradeable to 10)	650-W PFC 2+1 dual line cord with two 350-W modules and one blank filler.	Yes – 5	Rack

2. Chassis

Table 2. Chassis Dimensions (approximate)

Configuration	Pedestal	Rack
Height	17.5 inches	8.6 inches
Width	8.6 inches (chassis), 12.7 inches (with feet)	16.9 inches
Depth	26 inches	25 inches
Clearance Front	10 inches	N/A
Clearance Rear	5 inches	N/A
Clearance Side	3 inches (additional side clearance needed for service)	N/A

2.1 System Color

The Intel® SC5200 Server Chassis will be offered in two color configurations. The primary exterior system color (bezels and covers) will match Intel Dusty Beige (GE BR7026) for the pedestal version of the chassis. The rack version of the chassis will have covers without paint and the bezel will match GE Cycoloy*-701 (Black). Customized colors for OEM customers can be made available.

2.2 Front Bezel Features

The standard pedestal front bezel is a molded plastic door covering all drive bays. A key lock is provided to prevent unauthorized access to the peripheral bays. Each peripheral bay is covered with a removable electromagnetic interference (EMI) shield. A molded plastic sub-bezel is located on the face of the chassis under the front bezel. The sub-bezel houses the front panel buttons and light pipes for the front panel indicators.

Opening the exterior plastic door accesses the hot-swap hard drives, if so equipped. An EMI shield is incorporated into the drive carrier design, eliminating the need for a separate shield or door. This adds flexibility to the bezel design by making EMI performance independent of the cosmetic plastic parts.

Customized bezels for OEM customers can be designed from the standard bezel design.

2.3 Security

A variety of chassis security options are provided at the system level, as listed below.

- A removable padlock loop on the rear of the system access cover can be used to prevent access to the microprocessors, memory, and add-in cards. A variety of lock sizes can be accommodated by the 0.270-inch diameter loop.
- A two-position key lock/switch will unlock the front bezel.

- Intrusion switches are provided allowing server management software, such as Intel® Server Management (ISM), to detect unauthorized access to the system cover and pedestal bezel door.

Note: See the appropriate *Server Board Technical Product Specification* on the support.intel.com website for a description of BIOS and Intel® Server Management security features.

2.4 I/O Panel

All input/output (I/O) connectors are accessible on the rear of the chassis. The SSI E-bay 3.0 compliant chassis provides an ATX* 2.03-compatible cutout for I/O shield installation. Boxed server boards provide the required I/O shield for installation in the cutout. The I/O cutout dimensions are shown in *Figure 1* below for reference.

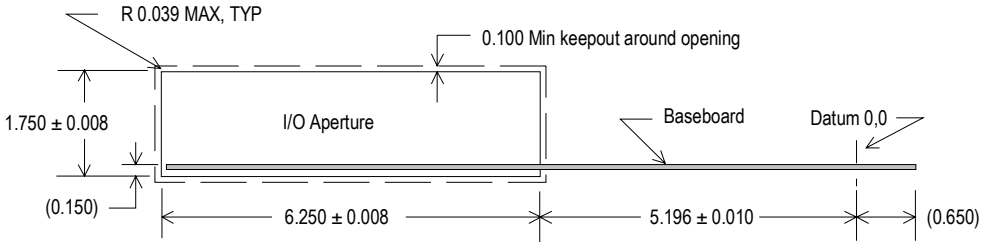

Figure 1. ATX* 2.03 I/O Aperture

2.5 Chassis Views

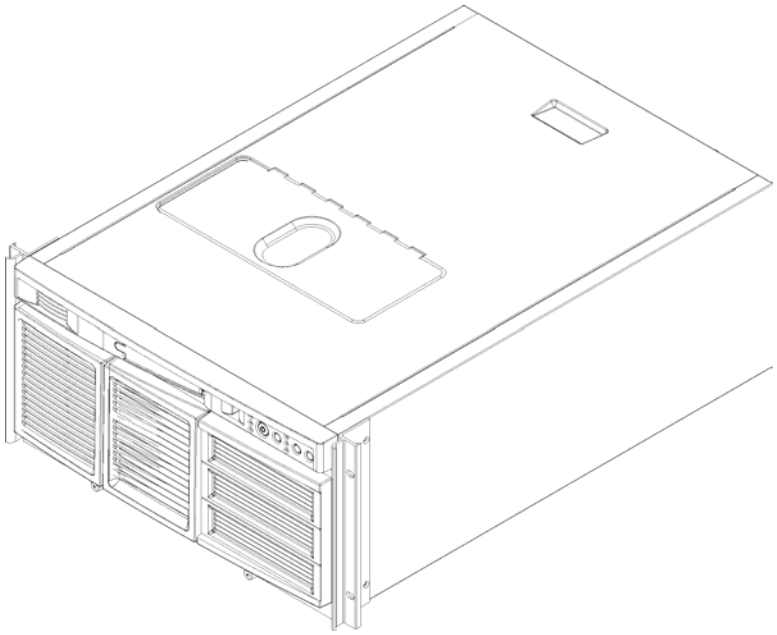

Figure 2. Rack Configuration View

(Fan access door only on redundant versions)

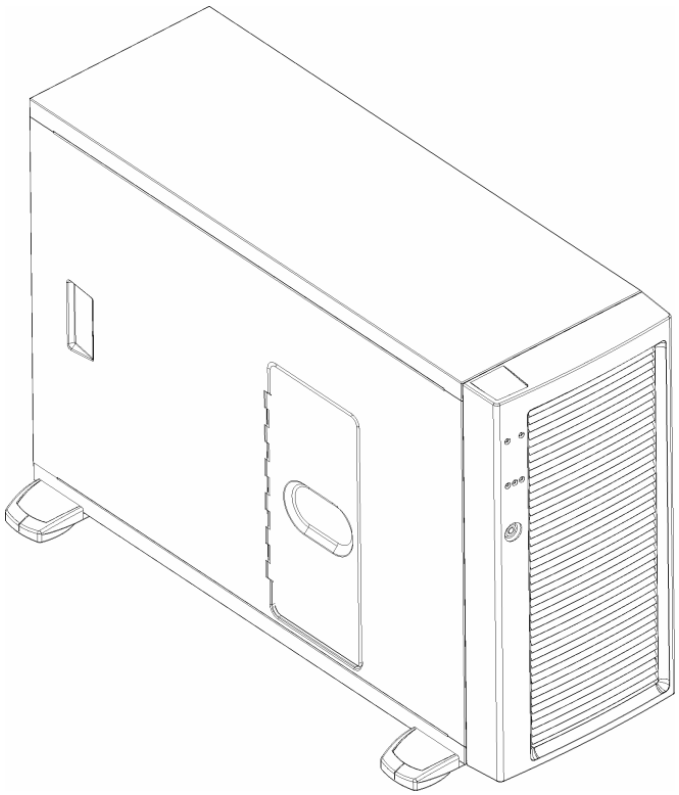

Figure 3. Front Pedestal View

(Fan access door only on redundant versions)

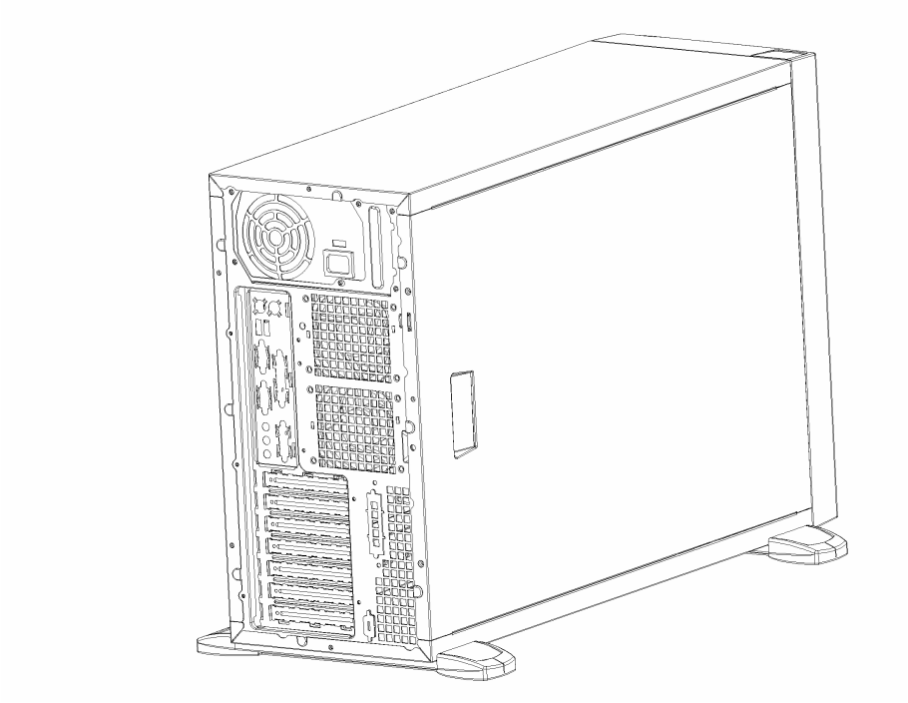

Figure 4. Rear Pedestal View (Base version)

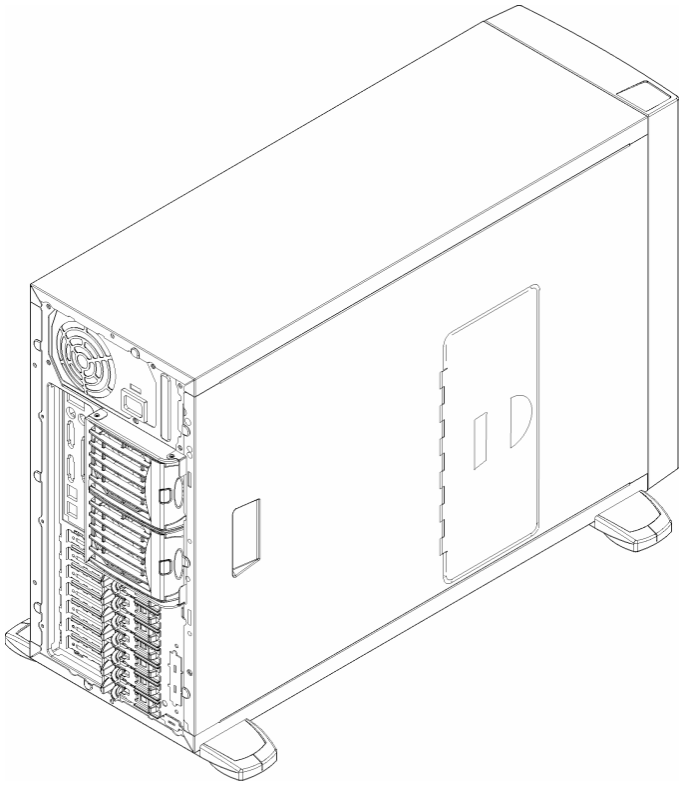

Figure 5. Rear Pedestal View (Redundant version)

(Actual power supply differs from picture)

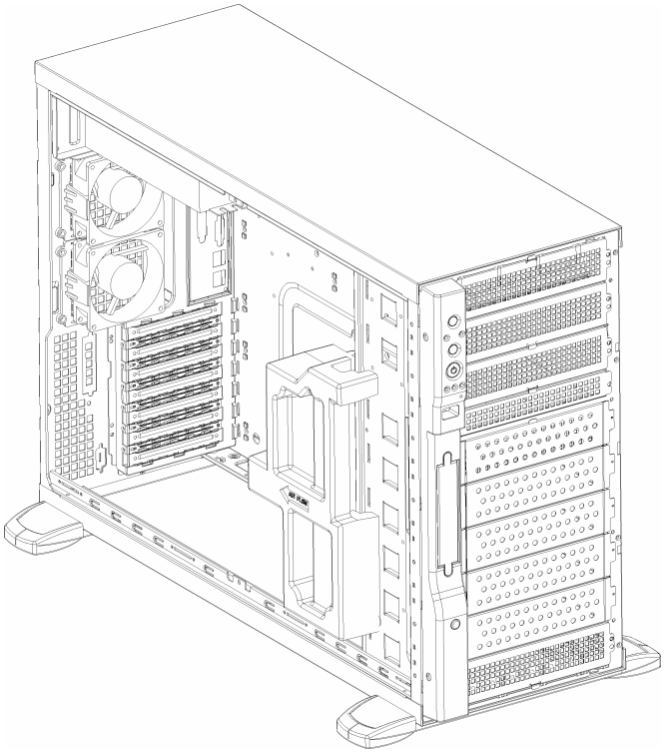

Figure 6. Front Pedestal Internal View (Base version)

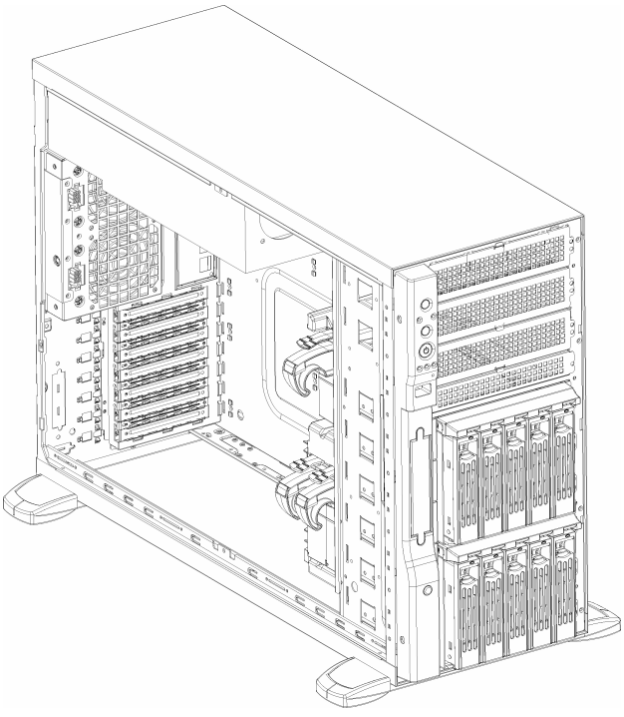

Figure 7. Front Pedestal Internal View (Redundant version)

(Shown with optional second hot-swap drive bay upgrade installed)

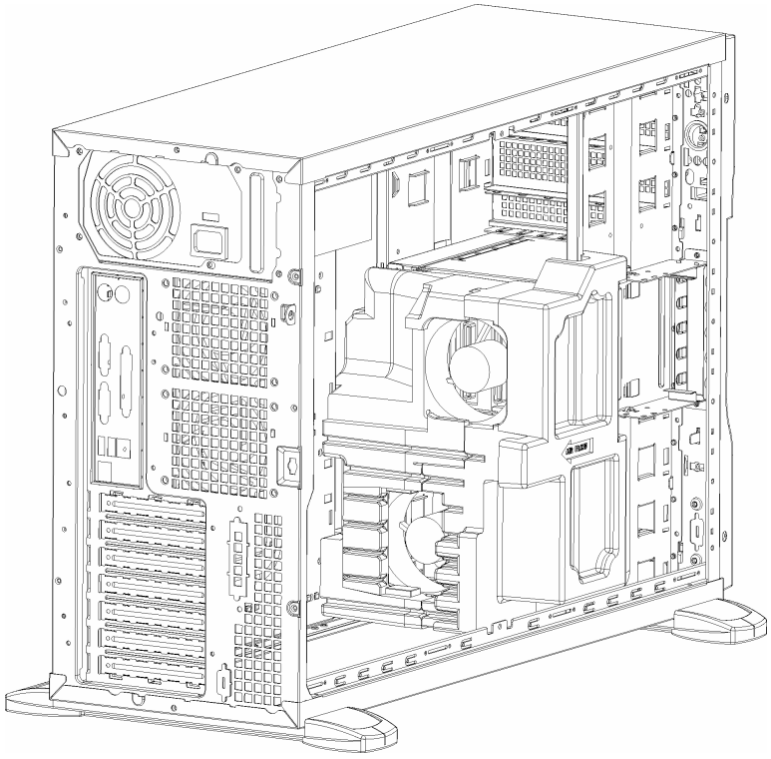

Figure 8. Rear Pedestal Internal View (Base version)

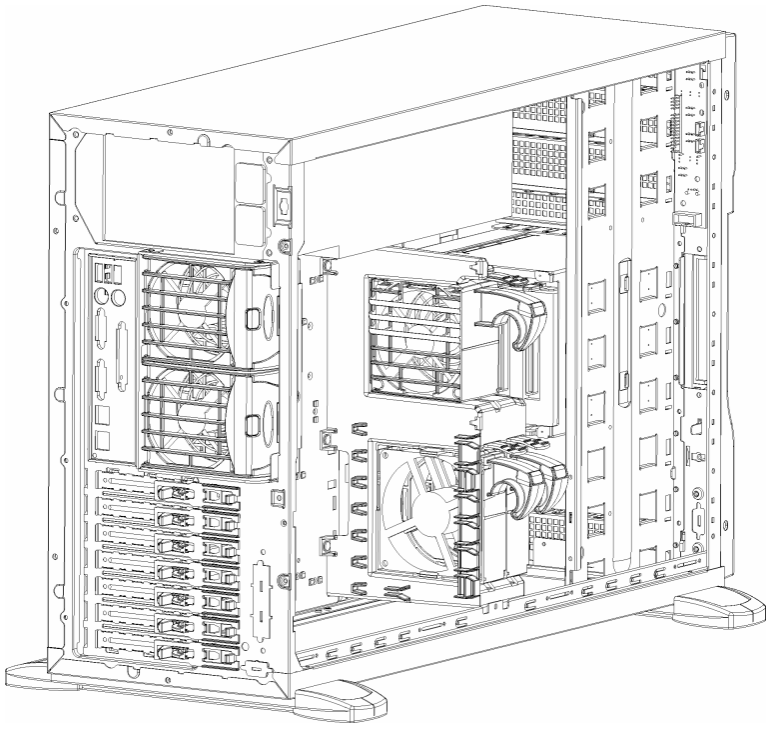

Figure 9. Rear Pedestal Internal View (Redundant version)

3. Chassis Power Subsystem

The Intel® SC5200 Server Chassis supports two different PFC power supply solutions. Additional variations may be chosen for future board sets to satisfy the system power, power distribution, thermal performance, acoustic noise, and cost requirements.

The typical PS/2 form factor power supply with a remote enable feature can be used. The remote enable feature permits the system power to be activated from a variety of sources, allowing the implementation of Wake on LAN (WOL) or other remote management features. The 450-W Entry Power Supply (EPS) features Entry SSI (Rev. 3.0)-compliant server board connectors and is positioned as the entry power supply solution for the Intel® SHG2 and SE7500CW2 Server Boards. Refer to the *450-W EPS 1.0 Power Supply Specification* for details (see Appendix B for order number).

The Intel® SHG2 Server Board system can also be configured with a 650-W, 2+1 redundant power supply. The 650-W power supply features three removable modules inserted into a main housing (or cage). The main housing contains dual AC input circuits and power distribution boards. The standard configuration ships with two 350-W TPS modules and one baffle installed for non-redundant operation. Three 350-W TPS modules and both power cords must be installed for redundant operation. The removable hot-swap DC power modules can be replaced in the event of a failure. The system will remain in operation during a failed voltage condition and remain online during a single module replacement for maximum up time. Refer to the *650-W 2+1 Redundant Power Supply Cage Specification* for details.

The following table is a brief overview of the system power.

Table 3. System Power Summary

	SC5200 450-Watt EPS	SC5200 650-Watt 2+1 RPS
Intel Part Number	A85459-XXX	A52678-XXX
+3.3 VDC Output	24 Amp Max	38 Amp Max
+5 VDC Output	20 Amp Max	38 Amp Max
+12 VDC Output	30 Amp Sustained 36 Amp / 12 second peak current	47.5 Amp Sustained 57 Amp / 12 second peak current
-12 VDC Output	0.5 Amp Max	0.5 Amp Max
+5 VDC Standby	2.0 Amp Max	2.0 Amp Max
Multiple +12V 240 VA Protection Circuits	Yes (2)	Yes (3)
Output balancing	Total combined output power of +3.3v and +5v shall not exceed 179 W.	Total combined output power of +3.3v and +5v shall not exceed 300 W.
DC Power Connections	24-pin, 8-pin	24-pin, 8-pin, 5-pin SSI
AC Line Voltage	Auto-ranging for either 100-127 VAC or 200-240 VAC	Auto-ranging for either 100-127 VAC or 200-240 VAC
AC Line Frequency	50/60 Hz	50/60 Hz
AC Input Current (System AC Rating)	6.0 Amp at 115 VAC 2.5 Amp at 220 VAC	8.0 Amp at 115 VAC 4.0 Amp at 220 VAC
Redundant Power	No	Yes
Hot-swap Power Modules	No	Three replaceable 350-W TPS Modules
Dual Line Cords	No	Yes
Redundant Fans	No	Yes
Replaceable Fans	No	No
Intended Server board	SHG2 SE7500CW2	SHG2

3.1 450-W EPS 2.0 Power Supply

3.1.1 450-W Power Supply Mechanical Outline

The mechanical outline and dimensions for the 450-W supply are an extended PS/2 form factor. The approximate dimensions are 86-mm high by 150-mm wide by 180-mm deep.

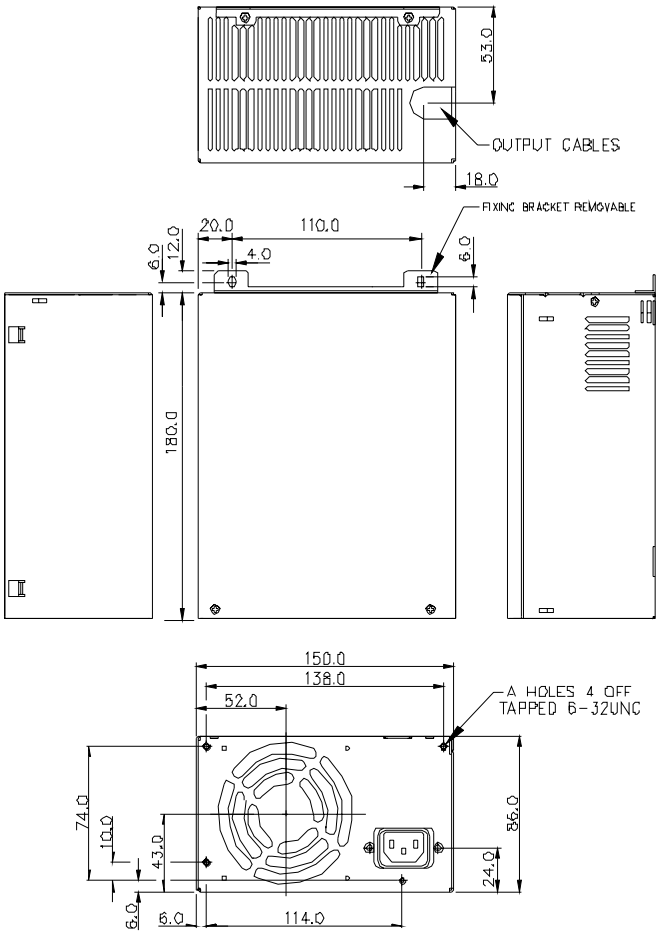

Figure 10. 450-W EPS 2.0 Power Supply

3.1.2 450-W Power Supply Fan Requirements

The 450-W EPS power supply incorporates an 80-mm low acoustic noise fan to exhaust air. The sound pressure level is measured at a distance of 1.0 meter from each side of the power supply in a free field. The worst-case peak value of the measurements shall not exceed 43 dBA at 25°C inlet temperature.

3.2 650-W 2+1 Redundant Power Supply

3.2.1 650-W Power Supply Mechanical Outline

The approximate 650-W 2+1 supply dimensions are 96-mm high by 184-mm wide by 343-mm deep.

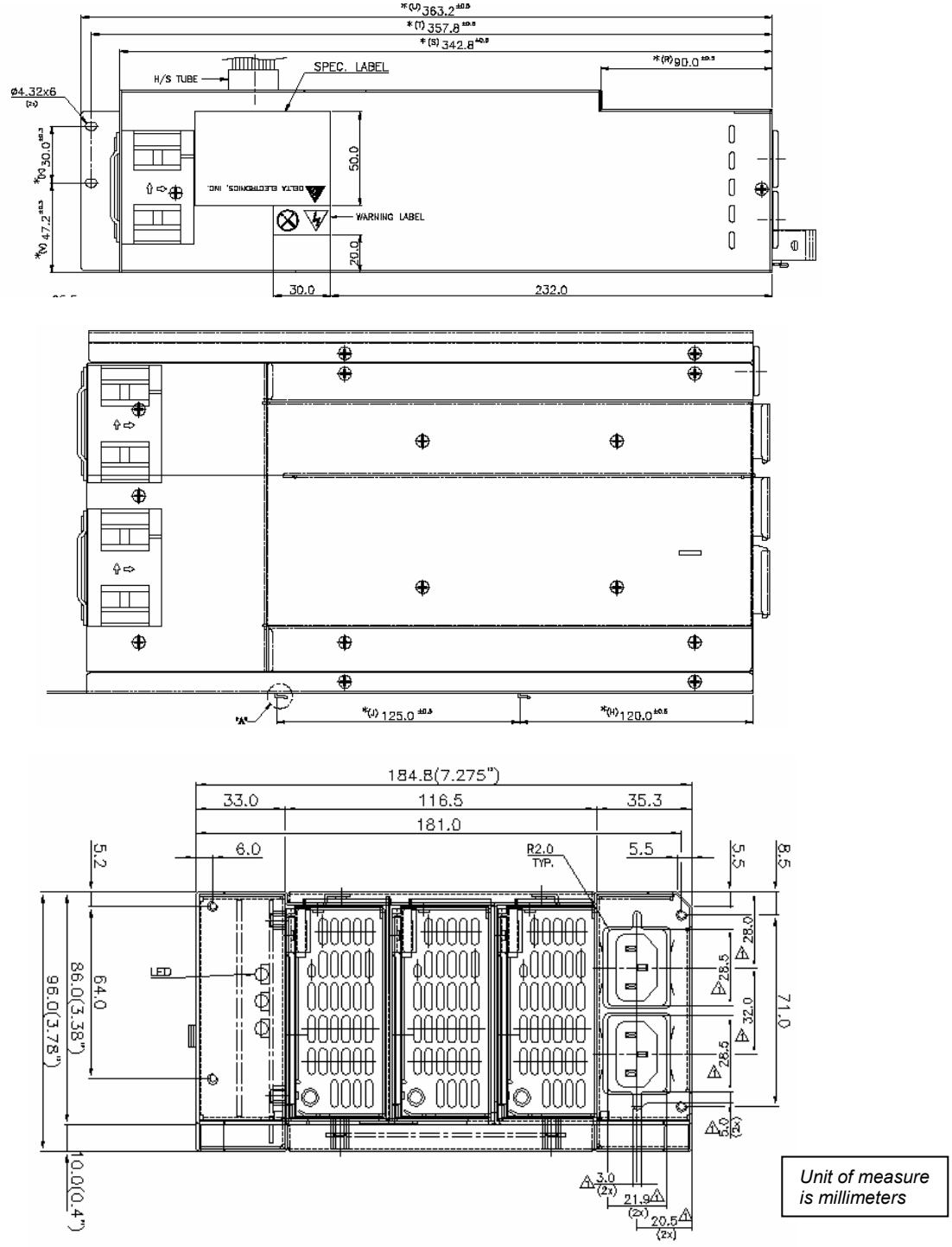

Figure 11. 650-W 2+1 Redundant Power Supply

3.2.2 Marking and Identification

Figure 12 shows AC inlet, power supply module, and LED designations on 650-W power subsystem.

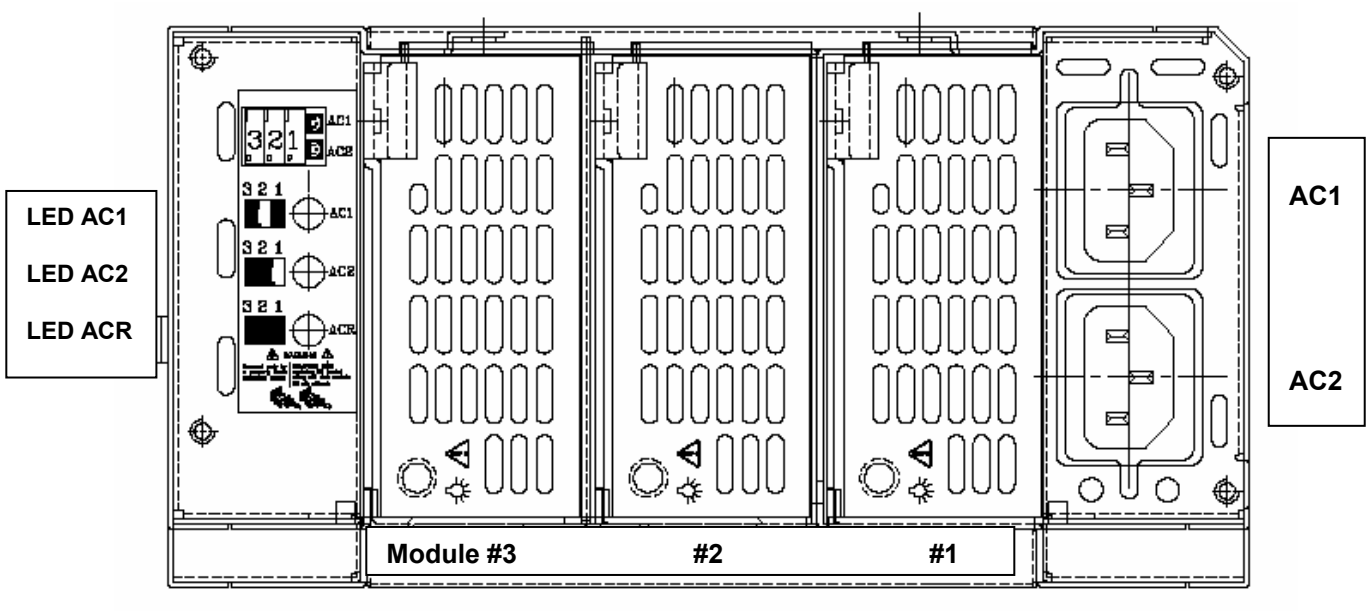

Figure 12. Power Supply Module, AC Inlet & LED Designations

3.2.3 Dual AC Inputs

The 650-W power subsystem has two AC inlets, AC1 and AC2. AC1 is connected to the inputs of TPS module #1 (PS1). AC2 shall be connected to the inputs of Module #2 (PS2). Module #3 (PS3) is connected to AC2 through normally closed transfer switch contacts. There could be a configuration where both AC inlets will be connected to the same AC source (single AC source operation).

Figure 13 illustrates how the redundant power is implemented using a transfer switch controller. The transfer switch monitors the relay operation functionality during initial AC turn on and the presence of all 3 modules.

If AC1 input fails (goes out of specified voltage range), PS2 and PS3 power modules will continue to operate taking power from the line that remains operational, AC2.

If AC2 input fails, the transfer switch will connect PS3 to AC1 so that PS1 and PS3 power modules will take power from AC1. Once AC2 recovers, PS3 will be switched into its original state.

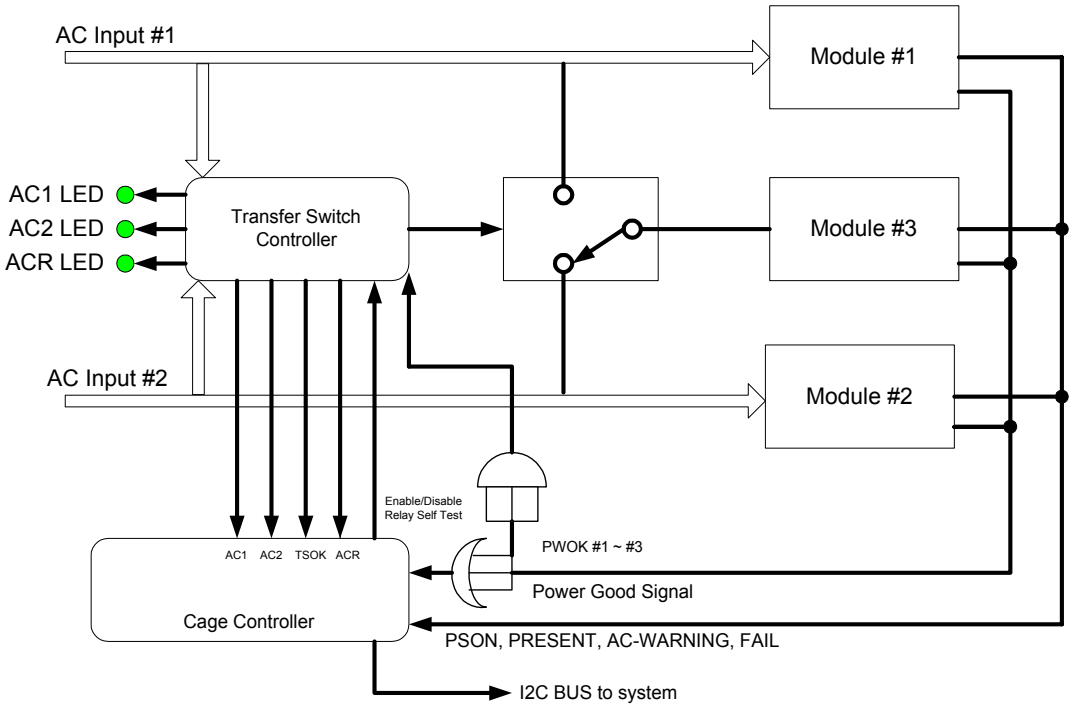

Figure 13. 650-W Power Supply Cage LED Block Diagram

3.2.4 650-W Power Supply LED Functions

Three green LEDs are positioned to the left of module #3 as shown in *Figure 13*.

- **LED AC1** indicates the availability of AC1 input voltage.
- **LED AC2** indicates the availability of AC2 input voltage.
- **LED ACR** indicates the AC redundancy status of the power subsystem depending on the following four conditions. The LED ACR is ON GREEN if all four conditions are true. Otherwise, the ACR LED is OFF.
    1. LED AC1 is green
    2. LED AC2 is green
    3. The power good signal from each of the three power modules is asserted
    4. TS-OK (transfer switch – OK) signal asserted

3.2.5 350-W TPS Module

The 350-W TPS module is redundant and hot-swappable. The module accepts AC input from an external EMI filter. The power supply docks into a power supply enclosure or cage, which contains the AC EMI filter and power distribution to the system. The supply is intended to operate with up to three modules in parallel. Refer to the *350-W TPS Power Supply Module Specification* for details.

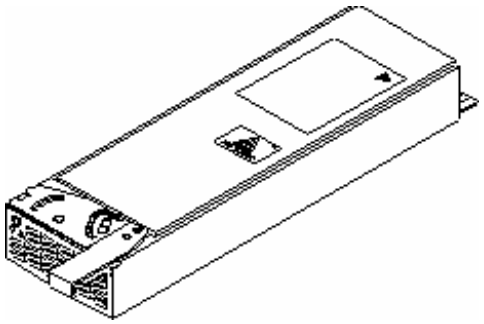

Figure 14. Replaceable 350-W Thin Power Supply Module

There is a single bi-color LED to indicate power supply status of each module. When AC is applied to the power supply module and standby voltages are available, the LED will blink GREEN. The LED turns on GREEN to indicate that all the power outputs are available. The LED turns on AMBER to indicate that the power supply has failed, shutdown due to over current, shutdown due to over temperature, or is indicating a predictive failure. Listed below are the LED indicators for conditions of the 350-W TPS module LEDs.

Table 4. 350-W TPS Module LED Indicator

Power Supply Condition	Power Supply LED
No AC1 or AC2 power input	OFF
No AC power to this PS module only	AMBER
AC present / Only Standby Outputs On	BLINK GREEN
Power supply DC outputs ON and OK	GREEN
Power supply failure (includes over voltage, over temperature)	AMBER
Current limit	AMBER

Note: The SC5200 HSRP Chassis ships in a non-redundant, 2+0 configuration with modules #2 and #3 installed. The single power cord should be inserted in AC2 inlet to ensure that the power supply is providing 650 watts of power. If the power cord is connected to AC1, module #2 should be moved to the #1 position (*see Figure 12*). Other combinations are invalid and will degrade the power supply to 350 watts as shown in *Table 5*. Adding a second power cord will allow for any combination of two modules, but does not provide redundant operation unless the third power supply module is also added.

Table 5. Non-Redundant Power Supply Configurations

AC1	AC2	Module 1	Module 2	Module 3	Output wattage
ON		GREEN		GREEN	650 W
ON		GREEN	AMBER		350 W
ON			AMBER	GREEN	350 W
	ON		GREEN	GREEN	650 W
	ON	AMBER	GREEN		350 W
	ON	AMBER		GREEN	350 W

3.2.6 650-W Power Supply Fan Requirements

The 650-W 2+1 RPS power supply incorporates two high performance 60-mm fans to exhaust air. If a module failure is detected, the fans will enter a faster boost mode to provide additional cooling until the failing module is replaced. Under a condition where one module has failed, it is acceptable for the sound pressure level to approach 72 dBA (maximum).

The fans are redundant when 3 modules and 2 power cords are present. In this case, if a fan fails, the remaining fan will enter boost mode and maintain proper cooling. If the second fan fails, module fails, or a power cord is removed, the power supply will shut off.

3.2.7 AC Power Line

The system is specified to operate from 100-127VAC, 200-240VAC, at 50 or 60 Hz. The specified PFC power supplies are auto-ranging. The system is tested to meet these line voltages, and has been tested (but not specified) at ±10% of the voltage ranges, and similarly ±3 Hz on the line input frequency.

The system is specified to operate without error at full power supply output load, nominal input voltage, with line source interruptions not to exceed one period of the AC input power frequency (i.e., 20 milliseconds at 50 Hz).

The system is not damaged by AC surge ring wave up to 2.0kV/500A. This ring wave is a 100 kHz-damped oscillatory wave with a specified rise time for the linear portion of the initial half-cycle of 0.5μsec. Additionally, the system will not be damaged by a unidirectional surge waveform of up to 2.0kV /3000A, with a 1.2μsec rise time and 50μsec duration. Further details on these waveforms can be obtained in ANSI/IEEE STD C62.45-1992.

4. System Cooling

4.1 Fan Configuration

Two cooling solutions are employed in the Intel® SC5200 Server Chassis. The base solution consists of four fixed fans working in conjunction with the active heatsinks provided in the Intel® boxed processor kits to provide sufficient system cooling. The second redundant solution is designed for maximum up-time by providing five replaceable hot-swap fans that maintain proper system cooling, even with a single failed fan.

4.2 Base Cooling Solution

Two 80 x 32-mm, two 80 x 25-mm system fans, and the power supply fan(s) will provide cooling for the processors, hard drives, and add-in cards. When the hot-swap drive bays are installed, one of the 80 x 32 mm system fans draws air through the rear of each bay to provide drive cooling. The 80 x 25 mm fans at the rear of the chassis assist in evacuating hot air from the system and draws air in at the upper, vented 5.25” peripheral bays. All system fans provide a signal for RPM detection that the server board can make available for server management functions. Removal of the side cover gives entry to the fans, which then can be easily changed with the system shut down.

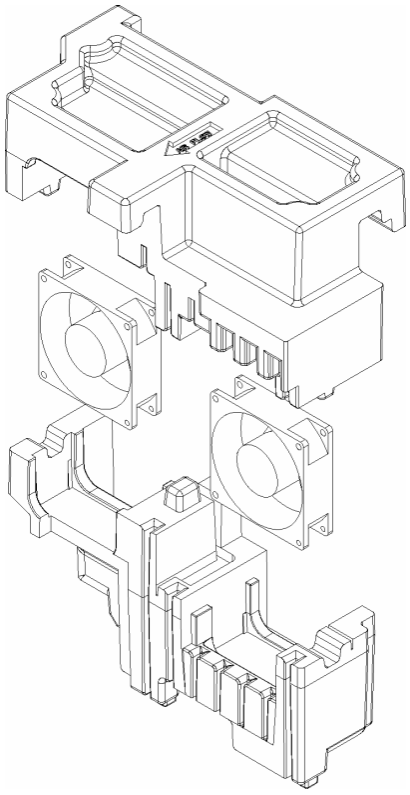

Figure 15. Close Up View of Front Fan Mounting Features

To ensure proper cooling, only processors with active heatsinks should be used unless otherwise indicated in the server board manuals. Active heatsinks incorporate a fan to provide cooling. Such a thermal solution is included with Intel® boxed processors.

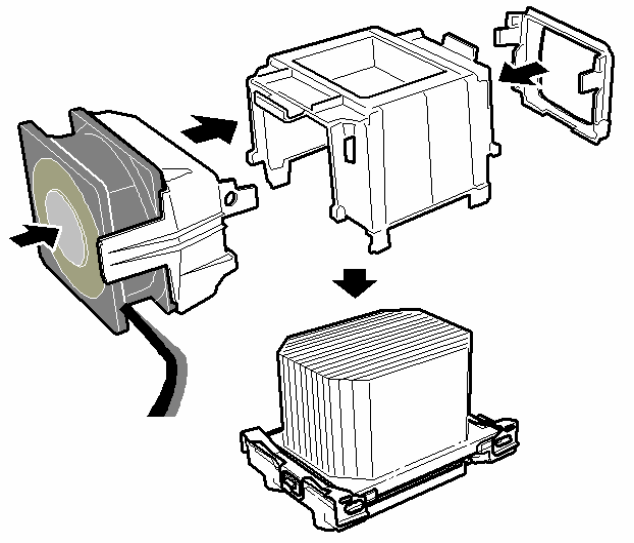

Figure 16. Processor Wind Tunnel Illustration

Air should flow through the system from front to back. The active processor cooling solution validated with this chassis is called a Processor Wind Tunnel (PWT), and is provided with the Intel® Boxed Xeon™ Processors. Proper installation places the fan portion of the PWT over the front edge of the chassis. The fans blow toward the rear of the chassis (toward I/O connectors). See illustration below. Note the direction of the fan airflow.

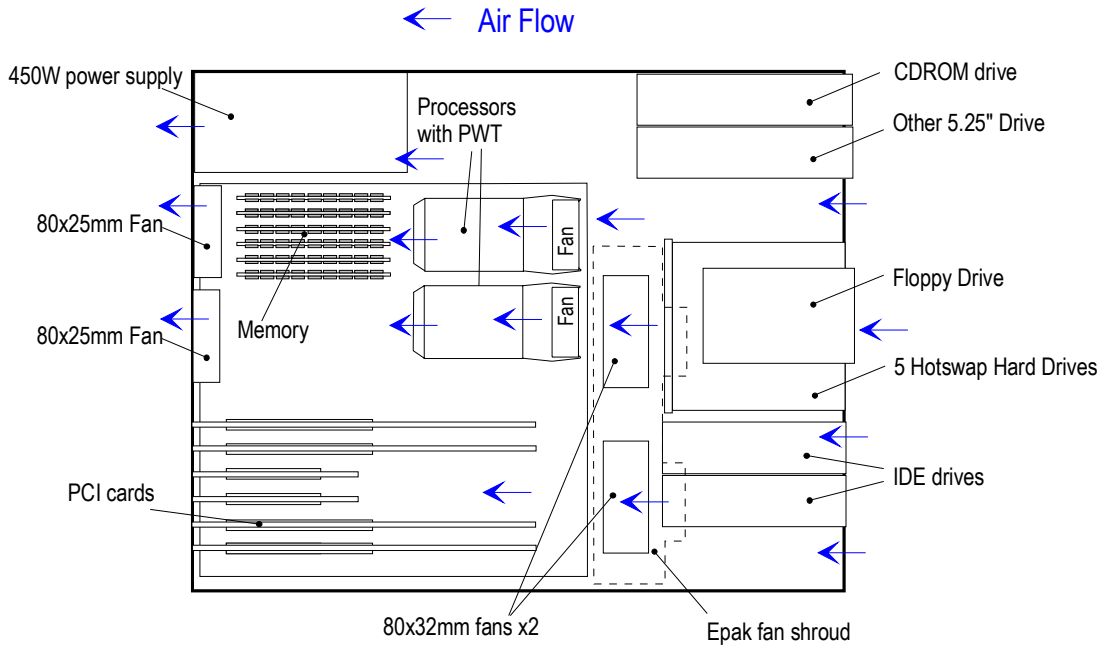

Figure 17. Base Chassis Airflow Characteristics

4.3 Redundant Cooling Solution

Three hot-swap 80 x 38 mm, two hot-swap 92 x 25 mm system fans, and the two 60 mm power supply fans provide cooling for the processors, hard drives, and add-in cards. The three 80 mm fans ensure proper cooling of the core area (processors and memory) and hot-swap drive bay. The two 92 mm fans, with help from the two rear mounted 80 mm fans, provide cooling for the PCI card area. When the optional second hot-swap drive bay is installed, the 92 mm fans provide drive cooling. Should any single fan fail, the remaining fans will increase in speed and maintain cooling until the failed unit is replaced. All system fans provide a signal for RPM detection that the server board can make available for server management functions. The two rear mounted fans are directly accessible from the back of the chassis, while the three interior system fans are accessed by opening a door on the side of the chassis. The fans can be replaced without shutting off the server, and no tools are required.

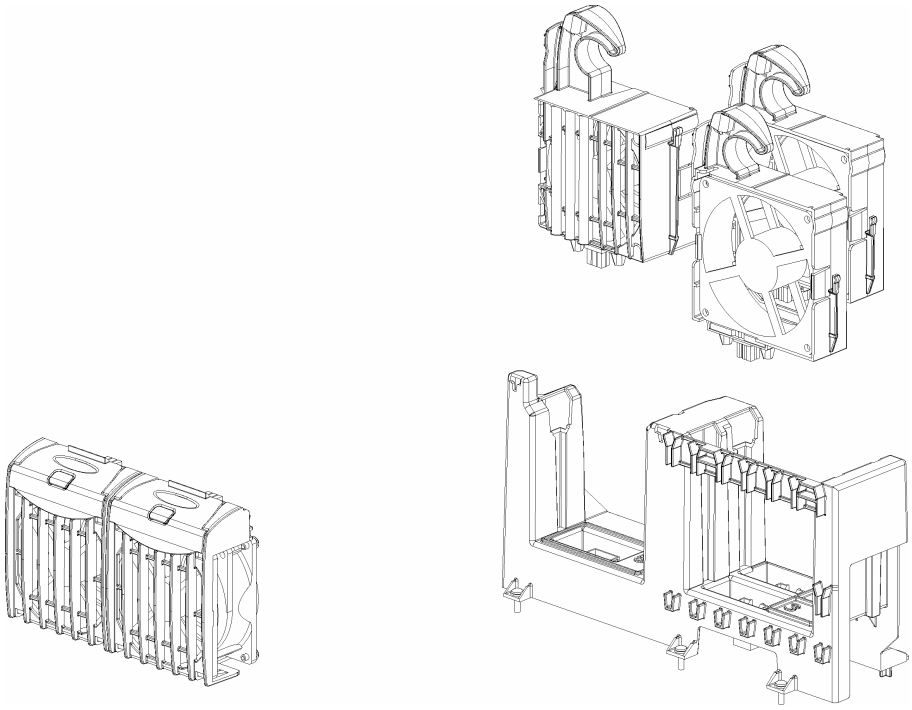

Figure 18. Close Up View of Redundant Hot-Swap Fan Assemblies

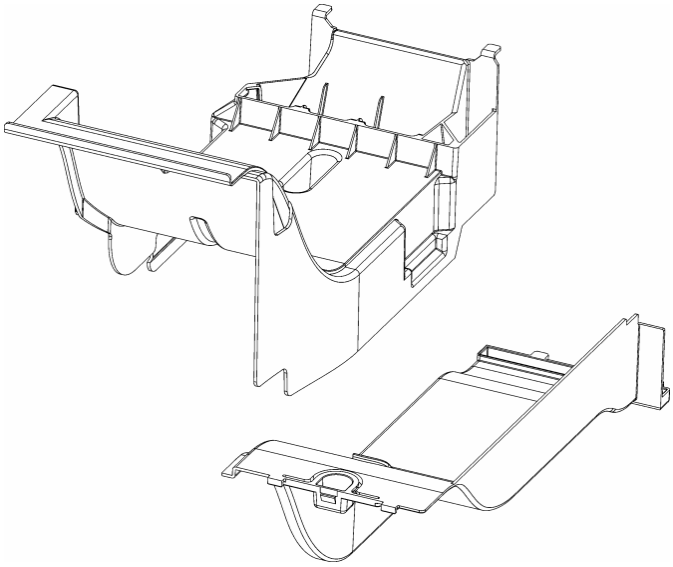

Figure 19. Processor and PCI Area Ducting

To ensure proper cooling, only processors with passive heatsinks should be used unless otherwise indicated in the server board manuals. The ducting shown in *Figure 19* is designed to work with the passive heatsink included with the Intel® Boxed Xeon™ processors.

Air flows through the system from front to back. The heatsink solution used for the HSRP version of the SC5200 chassis is provided with the Intel® Boxed Xeon™ processors. Only the retention mechanism, heatsink, clips, and thermal interface (grease) are used. The plastic PWT and fans should not be installed. Note the direction of the fan airflow.

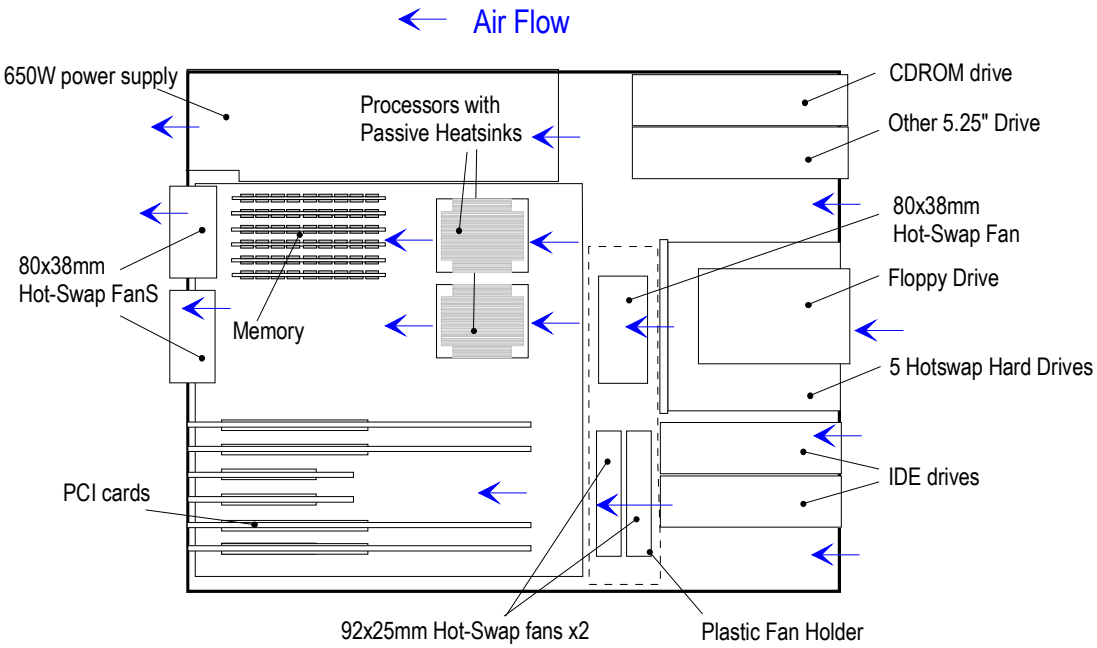

Figure 20. Redundant Chassis Airflow Characteristics

4.4 Fan Control

The fans in the Intel® SC5200 Server Chassis are designed for server boards that support fan control, such as the Intel® SHG2 Server Board. The front panel of the chassis has an active temperature sensor (i.e., Dallas* 1621) connected to the front panel's bus. Based on the inlet temperature measured, the server board's firmware will adjust the fan voltage. This will maintain proper system cooling of all components and peripherals, while minimizing the acoustic noise level. A fan sensor will be re-armed by the firmware if it was read as stopped (0 RPM) for one polling cycle (~30 seconds) and then started back up again. To hot swap a fan, the user should remove the failed fan, wait at least 30 seconds, and insert the replacement fan. The firmware will then re-arm the fan sensor. The correct Field Replaceable Unit (FRU)/Sensor Data Record (SDR) must be installed to ensure proper functionality of the fan control.

Some server boards may only utilize on onboard sensor to regulate fan speed between a nominal speed and high speed.

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5. System Peripheral Bays

5.1 3.5" Floppy Drive Bay

The Intel® SC5200 Server Chassis provides for the installation of a 3.5-inch floppy drive (*Figure 21*, item C) beside the 5.25-inch peripheral bays. However, another type of 3.5 inch device could be installed in this space. Removal of the access cover provides entry for replacement of the floppy drive. When a floppy drive is not installed, a snap-in EMI shield must be in place to ensure regulatory compliance. A cosmetic plastic filler is also provided to snap into the bezel.

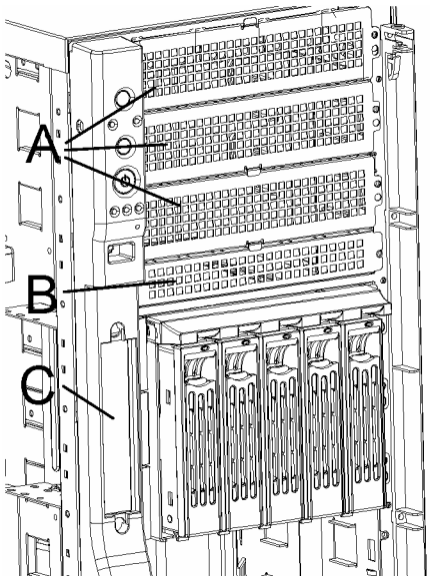

Figure 21. Drive Bay Locations

5.2 Drive Bay Locations

The SC5200 chassis supports two half height or one full-height 5.25 inch removable media peripheral device (i.e., magnetic/optical disk, CD-ROM, or tape drive). These peripherals can be up to 9 inches deep. Only the upper two of the three drive bay locations (*Figure 21*, item A) should be populated in the SC5200 chassis. The vented EMI shields in the third drive bay location and the 1-inch space below it (*Figure 21*, item B) should be retained as an air inlet for processor and memory cooling. Without this air inlet, the processors may overheat. As a guideline, the maximum recommended power per device is 18 W. Thermal performance of specific devices must be verified to ensure compliance to the manufacturer's specifications. The upper three bay locations are rotated 90 degrees (via an adapter bracket) when configured in rack mode. This allows devices (such as CDROMs) to remain in their normal operating position when the chassis is rotated to the horizontal rack position.

For the pedestal systems, an optional DLT/CDROM bracket is available as an accessory (FHD2DLTBRK). This includes a bracket to properly mount a full-height DLT type tape drive and a bracket for a slimline CDROM drive to be mounted beneath the tape drive. This allows a CDROM

drive to be installed in the pedestal system when a full-height tape drive is present and still permit proper cooling.

For the rack chassis, the upper three bay locations are rotated 90 degrees via a pre-installed adapter bracket. This allows devices (such as CD-ROMs) to remain in their normal operating position when the chassis is rotated to the horizontal rack position. This configuration supports two half-height devices or one full-height device. A DLT device will mount in this reorientation bracket without the need for the optional accessory kit.

Six additional half-height 5.25-inch drive bays are provided to support installation of up to five hard drive disk devices. Five 3.5-inch to 5.25-inch hard drive adapter trays are provided in the base configurations and must be used to ensure proper cooling and Electromagnetic Compatibility (EMC) compliance. The lowest 5.25-inch bay is covered with a ventilated EMI shield panel and should not be utilized for drives to ensure proper system cooling operation.

The 5.25-inch peripherals are removable directly from the front of the chassis after removal of the access cover (to disconnect cables) and opening front bezel (pedestal configuration only). EMI shield panels or drive trays are installed and should be retained in unused 5.25-inch bays to ensure proper cooling.

Note: Caution must be observed when approaching the maximum level of integration for these 5.25-inch drive bays. Power consumption of the devices integrated needs to be carefully considered to ensure that the power supply maximum power levels are not exceeded. Typical configurations can supply enough power for a floppy drive, a tape drive, a CD-ROM, and five SCSI hard drives. The redundant power supplies (650-W 2+1) provide enough power for up to ten hot-swap SCSI drives.

5.3 3.5-inch Hot-swap Hard Drive Bays

The backplane is an LVD/SE SCSI design, which provides support for SCSI devices, using Low Voltage Differential Signaling, as well as support for older SE SCSI devices (Ultra 160* and older). The backplane has a connector to accommodate a SAF-TE controller on an add-in card. The backplane supports five 1-inch hot-swap SCA-2 drives when mounted in the docking drive carrier. Using a “Y”-cable (AHD3HSBPYCBL), two of these backplane assemblies may be connected for ten SCSI drives from one SCSI channel (650-W redundant chassis only).

The Intel® SC5200 server chassis supports up to two hot-swap drive bays, each supporting five drives, for a total capacity of ten 3.5 inch-wide SCA LVDS hard drives. The 650-W power supply solution is required to be installed for full 10-drive support. The 450-W-powered systems are designed to only power five hard drives. Drives are accessible by opening the front access door on the pedestal configuration or directly from the front of the rack mount chassis. Five metal carriers are provided with each hot-swap bay to mount the hard drives. Each carrier features a plastic handle and bezel with an activity/fault indicator. When no drive is installed in a carrier, the air baffle should remain in place to ensure proper cooling of the hard drives.

Originally designed for the Intel® SC5100 Server Chassis, the hot-swap drive bay is designed to accept one-inch peripherals that consume up to 18 W of power. This wattage number is intended as a guideline. Thermal performance of specific hard drives must be verified to ensure compliance to the drive manufacturer’s specifications. The compatibility list of the supported Intel® server board for the SC5200 server chassis is available on support.intel.com. The Intel server board compatibility section for a list of compatible devices. (URL: http://support.intel.com/)

Further technical details of the SCSI backplane can be obtained from the *SC5100/SC5200 Low Voltage Differential (LVD)/Single Ended (SE) SCSI Backplane External Product Specification (EPS)*.

An optional hot-swap drive bay assembly (AXX2HSDRVUG) is available for the SC5200 chassis. It should be mounted in place of the middle three 5.25-inch drive trays of the base, non-redundant chassis models. For the redundant power models, the upgrade accessory should be installed in the lower three 5.25-inch drive trays to bring the total number of available hot-swap SCSI drives to ten.

Refer to the *Intel® SC5100/SC5200 Server Chassis Hot-swap Bay Upgrade Kit* for installation instructions.

5.4 SCSI Multi-Mode Termination

The multi-mode terminators provide SCSI-4 compliant termination for the backplane. These terminators provide termination in both SE modes and LVD mode. Installing a single SE drive forces all installed drives to run in the SE termination mode on the SCSI bus.

5.5 SCSI Interface

The SCSI interface on the SC5100[1] LVD/SE SCSI backplane provides the link between the SCSI bus and the microcontroller (containing the intelligence for the SC5100[1] LVD/SE SCSI backplane). This interface allows the microcontroller to respond as a SCSI target to implement the SAF-TE protocol.

Power control on the SC5100[1] LVD/SE SCSI backplane supports the following features.

- Spin-down of a drive when failure is detected and reported (using enclosure services messages) via the SCSI bus. An application or RAID controller detects a drive-related problem that indicates a data risk. In response, it removes the drive from service and sends a spin-down SCSI command to the drive. This decreases the likelihood that the drive will be damaged during removal from the hot-swap drive bay. When a new drive is inserted, the power control waits a small amount of time for the drive to be fully seated, and then applies power with a controlled power ramp.
- If the system power is on, the LVD/SE SCSI backplane immediately powers off a drive slot when it detects that a drive has been removed. This prevents possible damage to the drive when it is partially removed and re-inserted while full power is available, and disruption of the entire SCSI array from possible sags in supply voltage and resultant current spikes.

5.6 FET Short Protection

The Field Effect Transistor (FET) short protection circuit is useful to protect both 12-volt and 5-volt power control FETs located on LVD/SE SCSI backplane.

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[1] The SCSI backplane board set used for the SC5200 chassis is the same as previously used in the SC5100 chassis. This board set is referred to as the SC5100 backplane board set below.

5.7 Device SCSI ID

Each device on a SCSI bus must have a unique SCSI ID. The 5 x 1.0" LVD/SE SCSI backplane device SCSI ID is dependent on whether it is configured as a primary or a secondary backplane. This configuration is defined by the logic of pin 1 on the I^2C* connector (J2A1).

Table 6. SCSI ID Assignments

Device	SCSI ID as Primary Backplane I^2C* connector (J2A1) pin1=1	SCSI ID as Secondary Backplane I^2C connector (J2A1) pin1=0
Drive 1	0x0H	0x8H
Drive 2	0x1H	0x9H
Drive 3	0x2H	0xAH
Drive 4	0x3H	0xBH
Drive 5	0x4H	0xCH
SAF-TE Controller	0x6H	0x5H

5.8 Hard Drive Activity LED

Each SCSI drive turns on a green LED when it is accessed. The LEDs are 4-terminal dual-color (yellow and green) physically located on the backplane.

Table 7. Hard Drive Activity LED

Drive	HSBP LED Activated	LED Designator	LED Color
1	1	DS5A1	Green
2	2	DS5B1	Green
3	3	DS5C1	Green
4	4	DS5D1	Green
5	5	DS5E1	Green

5.9 Hard Drive Fault LED

The hot-swap controller(HSC) is responsible for turning the drive fault LEDs on or off according to the states specified via commands received from SAF-TE and the IMB. The drive fault LEDs are yellow and indicate failure status for each drive. The LEDs are physically located on the LVD/SE SCSI backplane. For further information on slot status to fault light state mapping refer to the *SC5100/SC5200 Hot-swap Controller Interface EPS*.

The LEDs are 4-terminal dual-color (yellow and green) physically located on the backplane.

Table 8. Hard Drive Fault LED

Drive	HSBP LED Activated	LED Designator	LED Color
1	1	DS5A1	Yellow
2	2	DS5B1	Yellow
3	3	DS5C1	Yellow
4	4	DS5D1	Yellow
5	5	DS5E1	Yellow

Further technical details of the SCSI backplane can be obtained from the *SC5100 LVD/SE SCSI Backplane External Product Specification.*

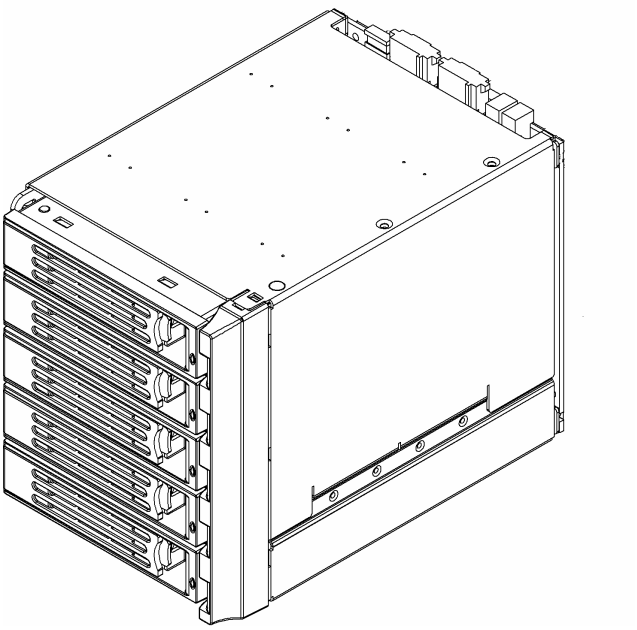


Figure 22. Hot-swap Drive Bay, Front Isometric View

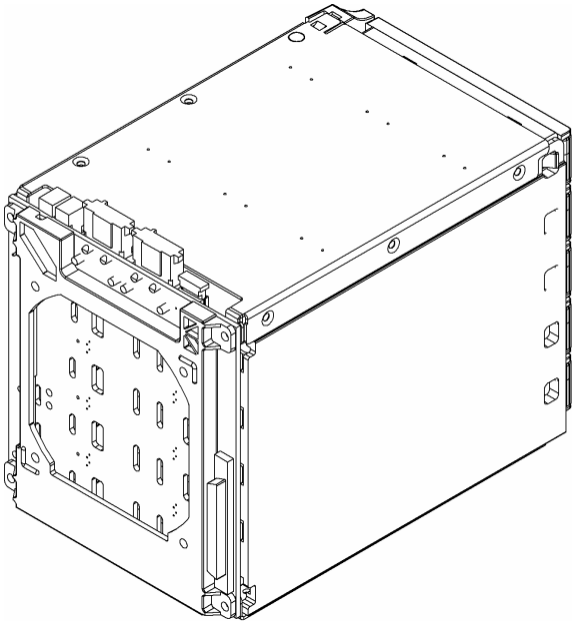


Figure 23. Hot-swap Drive Bay, Rear Isometric View

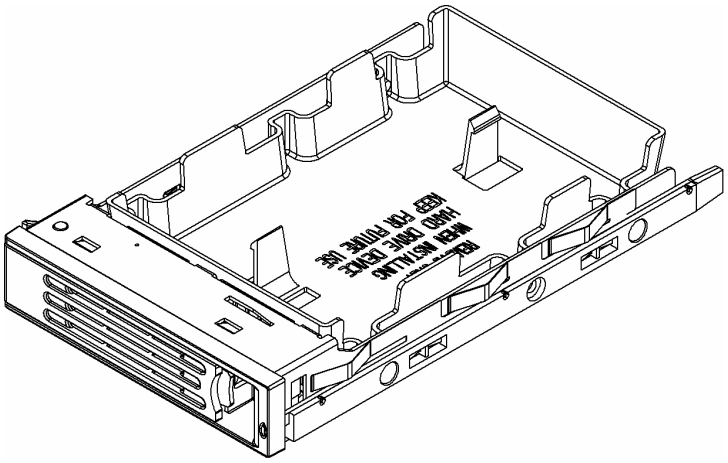


Figure 24. Drive Carrier with Air Baffle Installed

5.10 Hot-Swap Drive Bay Electronics

The hot-swap SCSI backplane board set supports the following features:

- Hot-swapping of SCSI drives, that allows connection of SCSI devices while the system power is on.
- Enclosure management and monitoring functions conforming to the *SCSI-Accessed Fault-Tolerant Enclosures Specification (SAF-TE)*, Revision 1.00.

5.10.1 SCSI HSBP Board Layout

The following diagram shows the layout of components and connectors on the hot-swap SCSI backplane printed circuit board set. This solution consists of two separate boards. The first board provides power distribution and SCSI interfacing of the drives. The second board provides the SAF-TE features and drive failure indicators.

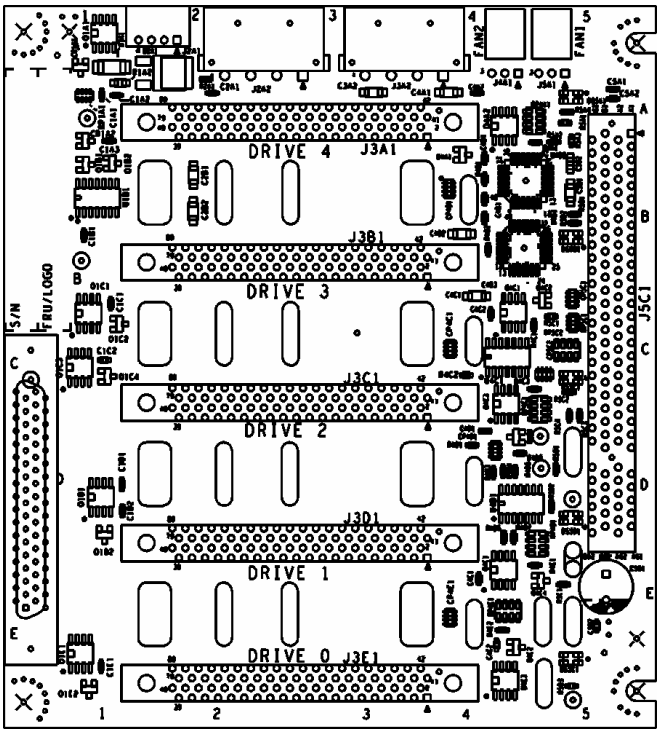


Figure 25. SC5100/SC5200 SCSI Backplane

5.10.2 SCSI Hot-Swap Backplane Specifications

The SC5100/SC5200 hot-swap SCSI backplane is an embedded application subsystem, which during normal operation does the following:

- Responds to SAF-TE messages (transmitted to the backplane via the SCSI bus).
- Monitors the temperature on the backplane, and reports a warning or critical error if outside programmed limits.
- Monitors the speed of the fans (if present), and reports a warning or critical error if outside programmed limits.

The SC5100/SC5200 hot-swap SCSI backplane board set is made up of the following functional blocks:

- SCSI Bus with SCA drive connectors, and active LVDS terminators
- Microcontroller with program Flash and RAM
- SCSI interface that allows the microcontroller to respond as a SCSI target
- I^2C interface to server board
- SCSI drive power control

- Fault indicator support
- Support for two cooling fans (fan-tach inputs and power control)
- Temperature sensor

The hot-swap SCSI backplane board set resides in the hot-swap drive bay which is included with the SC5200 650-W redundant chassis and/or is available as an upgrade.

5.10.3 SAF-TE Board Layout

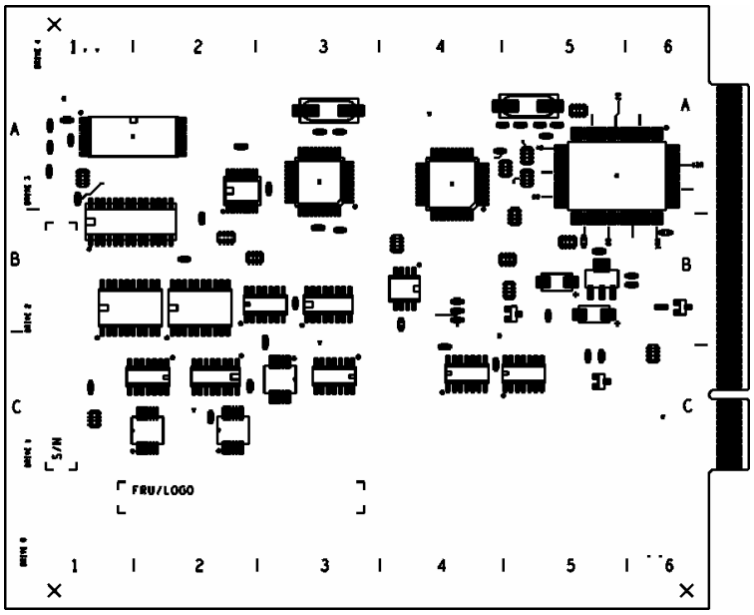


Figure 26. SC5100/SC5200 SAF-TE Board

5.11 SAF-TE Specifications

The SC5100/SC5200 hot-swap SCSI backplane board set performs the tasks associated with hot-swappable SCSI drives, enclosure (chassis) monitoring and management, as specified in the *SCSI-Accessed Fault-Tolerant Enclosures Specification (SAF-TE)*, Revision 1.0. The SAF-TE specified features supported by the hot-swap SCSI backplane include, but are not limited to, the following:

- Monitoring the SCSI bus for enclosure services messages, and acting on them appropriately. Examples of such messages include: activate a drive fault indicator, power down a drive that has failed, and report backplane temperature.

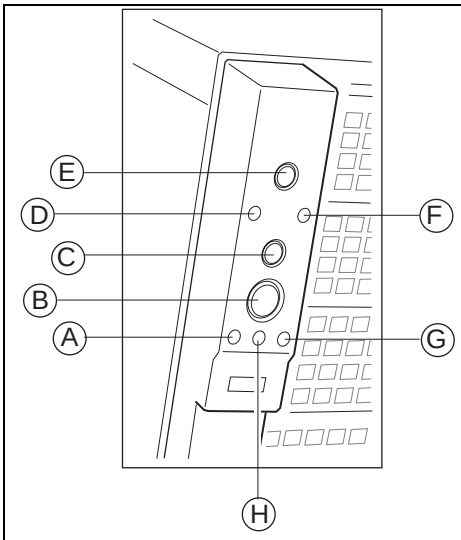
- SAF-TE intelligent agent, which acts as proxy for "dumb" I^2C devices (that have no bus mastering capability) during intra-chassis communications.

6. Front Panel

The front panel is located in the front corner of the chassis and remains unchanged from the SC5100 server chassis. For the pedestal configuration, an exterior door allows full access to the front panel features. The front panel features the control buttons and LED indicators listed in *Figure 27*. Not shown (in the figure below) is a tool-activated Non-maskable Interrupt (NMI) switch located below the Status LED. The LEDs are visible with the pedestal exterior access door closed. The blue ID LED and ID toggle switch featured in the rack mount SC5200 chassis is used to indicate which particular chassis among several in a rack configuration is being serviced. There is a second blue ID LED mounted on the baseboard and visible from the rear of the chassis, which mimics the front ID LED.

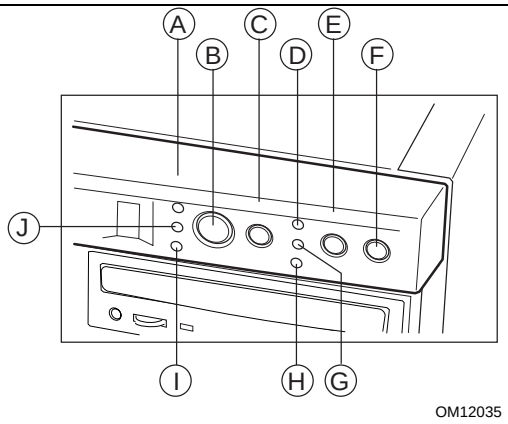
A 34-pin Entry Ebay SSI (rev 3.0) front panel header is located on the back of the front panel. This allows for a 34-pin ribbon cable connection for use with SSI rev 3.0-compliant server boards, or a 24-pin ribbon connection for use with first generation SSI server boards.

When the hot-swap drive bay is installed, a bi-color hard drive LED is located on each drive carrier (five total) to indicate specific drive failure or activity. For pedestal systems, these LEDs are visible upon opening the front bezel door.



A. Hard drive activity LED (bi-color)
B. Power button
C. Sleep button
D. NIC1 activity LED (green)
E. Reset button
F. NIC2 activity LED (green)
G. Status LED (bi-color)
H. Power/Sleep LED (green)

Figure *27*-1. Pedestal Controls and Indicators



A. Hard drive activity LED (bi-color)
B. Power button
C. Sleep button
D. NIC1 activity LED (green)
E. Reset button
F. ID toggle switch
G. ID LED (blue)
H. NIC2 activity LED (green)
I. Status LED (bi-color)
J. Power/ Sleep LED (green)

Figure *27*-2. Rack Controls and Indicators

Figure 27. Front Panel Controls and Indicators

Table 9. Typical Front Panel LED Functions

LED Name	Color	Condition	Description
Power/Sleep LED	Green	ON	Power on
	Green	BLINK	Standby/Sleep (S1)
		OFF	Power off or Sleep (S4)
Status LED	Green	ON	System ready
	Green	BLINK	Processor or memory disabled
	Amber	ON	Critical temperature or voltage fault; CPU/Terminator missing
	Amber	BLINK	Power fault; Fan fault; Non-critical temperature or voltage fault
		OFF	Fatal error during POST
Hard drive activity	Green	BLINK	Hard drive activity
	Amber	ON	Fault
		OFF	No activity
NIC1 activity	Green	ON	Linked
	Green	BLINK	LAN activity
		OFF	Disconnected
NIC2 activity	Green	ON	Linked
	Green	BLINK	LAN activity
		OFF	Disconnected
ID LED	Blue	ON	Server identification; Toggled by ID button or software
		OFF	Server identification; Toggled by ID button or software

Further details of the front panel functions supported refer to the individual server board specifications.

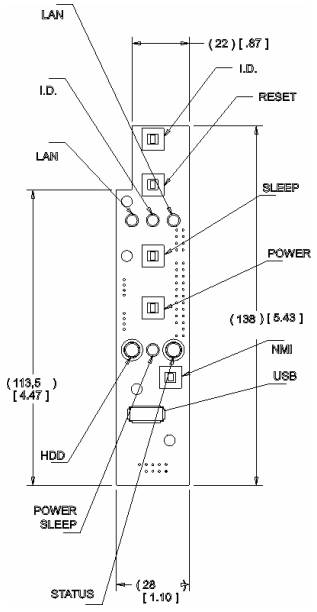


Figure 28. Front Panel, Showing Basic Layout

7. System Interconnection

7.1 Signal Definitions

The standard cable construction is briefly described following. The pin-out on the connectors referred to in this section is defined in the respective server board Technical Product Specificarion (TPS).

7.2 Interconnect Diagram

The figure below depicts cables that may be found in a fully integrated SC5200 system. Not all the cables shown below are provided with the system chassis or server board products.

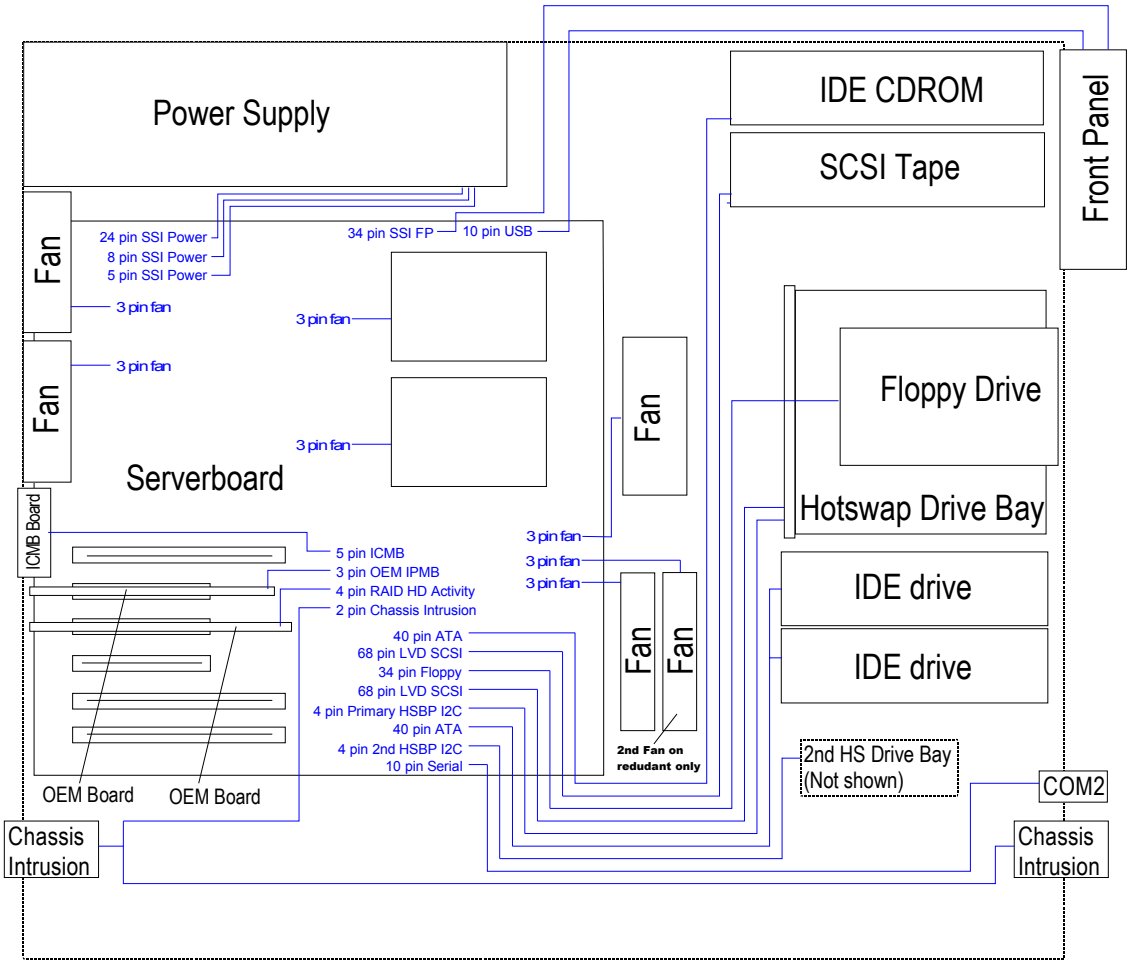


Figure 29. Chassis Interconnect Diagram

Note: Actual server board connections will vary by product. Consult the server board TPS for details. Cabled COM2 is normally routed to the rear of the chassis with front mounting as an option for rack version. Two hot-swap drive bays can be installed on the chassis with the 650-W 2+1 redundant power supply chassis. No hot-swap drive bays are shipped with the 450-W power supply chassis (see *Table 1*). Install hot-swap drive upgrade kit (AXX2HSDRVUG). ICMB board kit is a separate option (AXX2ICMBKIT). Both

power supplies have the 24-pin SSI and 8-pin power connectors, and the 650-W also has the 5-pin connector.

7.3 Chassis Internal Cables

The following cables are provided as part of the chassis kit:

7.3.1 Intrusion Alarm Switch cable

The intrusion alarm cable consists of two switches in a series which are normally open and are depressed by the access cover and front bezel. It is cabled to the server board by 22AWG twisted-pair wire terminated at a 2-pin connector.

7.3.2 Front Panel cable

A 34-conductor ribbon cable with 34-pin IDC* connectors links the front panel and SSI Revision 2.0-compliant server board (e.g., SHG2). Some boards may employ a 24-pin ribbon cable that does not fully support all the features of the front panel.

7.3.3 USB cable

A 10-conductor USB cable with 10-pin connectors is used for connecting the front panel- mounted USB connector to the server board

7.3.4 Fan Connectors

The installed system fans provide 3-pin connectors designed to mate with SSI (ATX*)-compatible fan headers. Hot-swap fans employ chassis-mounted adapter cables to provide a standard 3-pin connector for the server board.

The following cables are also provided as part of the HSRP chassis kit:

7.3.5 SCSI cable

A 68-conductor twisted-pair SCSI cable is provided to interface from the server board to the hot-swap backplane (HSBP).

7.3.6 I^2C cable

A 4-pin cable connects the server board to the HBSP to communicate server management information, such as drive and fan status to the server board. Note that the server management features will vary by server board.

7.4 Server Board Internal Cables

Depending on the specific server board support of these features, some or all of the following cables may not be included as part of the boxed board kit:

7.4.1 IDE cable

One or two 40-pin, 80-conductor DMA33/66/100 IDE cable.

7.4.2 SCSI cable

One 68-pin, 68-conductor twisted-pair wide SCSI cable with terminator. Cable supports connection of up to four SCSI drives to the server board.

7.4.3 Floppy cable

One 34-conductor cable featuring two 34-pin IDC connectors (2x17) floppy cable.

7.4.4 Serial cable

One 8-conductor cable terminated in a 2x5 header at one end and a 9-pin panel mount Dsub connector on the other.

7.5 Accessory Cables

7.5.1 ICMB Interface Card cable

One 5-pin ICMB cable connects the server board to the ICMB interface card mounted on the chassis rear panel or add-in card slot (included in the ICMB Interface Card Kit (AXX2ICMBKIT)

7.5.2 External SCSI Cable

One 68-pin SCSI cable connects the server board or add-in SCSI card to the panel which mounts to the back of the chassis (see *Figure 34*). (AXXEXTSCSICBL)

7.5.3 SCSI Y-Cable

A 68-conductor twisted-pair SCSI cable is provided to interface from the server board to two HSBPs. The server board uses the middle connector with an HSBP connected on each end. The server board or SCSI card utilized must support disabling termination on the board, as both backplanes will provide proper termination (see *Figure 33*). (AHD3HSBPYCBL)

7.6 I/O Panel Connectors

The SC5200 chassis provides an ATX 2.03 and SSI E-bay 3.0 -compliant I/O aperture for the backside I/O. The specific panel used will be provided in the boxed server board kit. The following are typical panel connections:

- PS/2 keyboard connector
- PS/2 mouse connector
- 9-pin serial port(s)
- 25-pin parallel port
- USB port(s)
- 15-pin video port
- Ethernet RJ-45 connector(s)

8. System-Compatible Server Boards

8.1 Intel® SHG2 Dual Processor Server Board

Major features of the SHG2 server board include the following:

- Dual Intel® Xeon™ processor support.
- Embedded VRMs
- ServerWorks* Grand Champion LE chipset.
- Support for six DDR200 or DDR266-registered ECC SDRAM DIMMs.
- 32-bit, 33-MHz, 5V keyed PCI segment with three expansion connectors and two embedded devices.
    - One PCI NIC—Intel® 82550PM Fast Ethernet Controller.
    - 3D/2D graphics accelerator —ATI Rage XL* 8 MB SDRAM Video Controller.
- 64-bit, 100-MHz, 3.3V PCI-X segment with two expansion connectors and one embedded device.
    - One PCI-X network interface controller—Intel® 82544GC Gbit Ethernet Controller
- 64-bit, 133-MHz, 3.3V PCI-X segment with one expansion connector and one embedded device.
    - Dual Channel Ultra160 SCSI controller—Adaptec* 7899W SCSI controller.
- X-bus segment with one embedded device.
    - 8-Mbit Flash device for system BIOS.
- LPC bus segment with two embedded devices.
    - Super I/O* controller chip providing all PC-compatible I/O (floppy, parallel, serial, keyboard, mouse).
    - Sahalee Baseboard Management Controller (BMC) providing monitoring, alerting, and logging of critical system information obtained from embedded sensors on the baseboard.
- Four Universal Serial Bus (USB) ports.
- Two IDE connectors, supporting two ATA* 33/66/100-compatible devices.
- IPMI 1.5-compliant Intel® Server Management v5.0 intelligent hardware and firmware
- Intelligent Chassis Management Bus (ICMB) support via paddle card accessory
- Support SMBus
- SHG2 has following connectors and switches: Serial x 2, Parallel, USB x 4, keyboard, mouse, video, IPMB x 2, ICMB x 1, Ultra 160* -wide SCSI x 2, IDE x 2, LAN x 2 (one 100/10Base-T, one 1Gbit) x 1, Dump (NMI) switch, DC on/off switch, Sleep switch, Reset switch, and ID switch (rack).

See the *Intel® SHG2 DP Server Board TPS* on the support.intel.com website for more detail.

8.2 Intel® SE7500CW2 Dual Processor Server Board

Major features of the SE7500CW2 server board include the following:

- Dual Intel® Xeon™ processors using the Socket* 603/604 FCPGA2 package.
- 400 MHz front side bus
- Intel® E7500 server chipset
  - Memory Controller Hub (MCH) memory controller
  - P64H2 64-bit I/O Hub
  - ICH3-S I/O controller
  - Firmware Hub (FWH)
- Support for up to four DDR200 or DDR266-compliant ECC DDR DIMMs, providing up to 4 GB of memory.
- Three separate and independent PCI buses:
  - Segment A: 32-bit, 33 MHz, 5 V (P32-A) with four embedded devices:
    - 2D/3D graphics controller: ATI Rage XL Video Controller with 8 MB of SDRAM
    - Two Intel® 10/100 82550PM Fast Ethernet Controllers
    - ATA-100 controller: Promise Technology* PDC20267
    - 2 PCI I/O riser slot capable of supporting full length PCI add-in cards
  - Segment B: PCI-X 64-bit, 100 MHz, 3.3 V, (P64-B) supporting the following configuration:
    - Two PCI slots capable of supporting full length PCI add-in cards
    - Segment C: PCI-X 64-bit, 133 MHz, 3.3 V (P64-C) supporting the following device:
    - One PCI slot capable of supporting full length PCI add-in cards
  - Segment C: PCI-X 64-bit, 133 MHz, 3.3 V (P64-C) supporting the following device:
    - One PCI slot capable of supporting full length PCI add-in cards
- Low Pin Count (LPC) bus segment with two embedded devices:
  - Super I/O controller chip providing all PC-compatible I/O (floppy, serial, keyboard, mouse) as well as integrated hardware monitoring via a Winbond* 83627HF hardware monitor
  - Flash ROM device for system BIOS: Intel® 8Mbit N82802AC flash ROM.
- Three external USB ports with an additional internal header providing one optional USB ports for front panel support.
- Two IDE connectors, supporting up to four ATA-100 compatible devices
- Support for up to four system fans and two processor fans.
- SSI-compliant connectors for SSI interface support: front panel and power connectors.
- SE7500CW2 has the following connectors and switches: Serial x 2, Parallel, USB x 4, keyboard, mouse, video, IDE x 2, ATA RAID x 2, LAN x 2 (100/10Base-T) x 1, DC On/Off switch, Sleep switch, and Reset switch.

See the *Intel® SE7500CW2 DP Server Board TPS* on the support.intel.com website for more detail.

8.3 Additional Server Boards

Future server boards may also be targeted for the SC5200 chassis family.

9. Product Regulatory Compliance

The SC5200 chassis is designed and tested to meet the standards and regulation listed below when configured with the Intel® server boards specified.

9.1 Product Safety Compliance

The SC5200 complies with the following safety requirements:

- UL 1950 – CSA 950 (US/Canada).
- EN 60 950 (European Union).
- IEC 60 950 (International).
- CE – Low Voltage Directive (73/23/EEC) (European Limits).
- EMKO-TSE (74-SEC) 207/94 (Nordics).

9.2 Product EMC Compliance

The system has been tested and verified to comply with the following EMC regulations when configured with the Intel server boards specified. For information on compatible server boards, refer to Intel's Server Builder website (http://www.intel.com/go/serverbuilder) or contact your local Intel representative.

- FCC (Class A Verification) – Radiated and Conducted Emissions (USA).
- ICES-003 (Class A) – Radiated and Conducted Emissions (Canada).
- CISPR 22, 3rd Edition (Class A) – Radiated and Conducted Emissions (International).
- EN45022 (Class A) – Radiated and Conducted Emissions (European Union).
- EN45024 (Immunity) (European Union).
- EN6100-3-2 & -3 (Power Harmonics & Fluctuation and Flicker).
- CE – EMC Directive (89/33/EEC) (European Union).
- VCCI (Class A) – Radiated and Conducted Emissions (Japan).
- RRL (Class A) – Radiated and Conducted Emissions (Korea).
- BSMI (Class A) – Radiated and Conducted Emissions (Taiwan).

9.3 Product Regulatory Compliance Markings

This product is provided with the following Product Certification Markings.

- UL / cUL Listing Mark.
- CE Mark.
- German GS Mark.
- Russian GOST Mark.
- FCC, Class A Verification Marking.
- ICES-003 (Canada EMC Compliance Marking).
- VCCI, Class A Mark.

- Australian C-Tick Mark.
- Taiwan BSMI Certification Number and Class A Warning.

9.4 Electromagnetic Compatibility Notices

9.4.1 USA

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2), this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124
1-800-628-8686

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class B limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals that are not shielded and grounded, may result in interference to radio and TV reception.

9.4.2 FCC Verification Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2), this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497

Phone: 1 (800)-INTEL4U or 1 (800) 628-8686

9.4.3 ICES-003 (Canada)

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadian des Communications.

English translation of the notice above:

"This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Canadian Department of Communications."

9.4.4 Europe (CE Declaration of Conformity)

This product has been tested in accordance too, and complies with the Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

9.4.5 Japan EMC Compatibility

Electromagnetic Compatibility Notices (International).

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of the notice above:

"This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) from Information Technology Equipment. If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual."

9.4.6 BSMI (Taiwan)

The BSMI Certification number and the following warning is located on the product safety label which is located on the bottom side (pedestal orientation) or side (rack mount configuration).

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，
可能會造成射頻干擾，在這種情況下，使用者會
被要求採取某些適當的對策。

10. Environmental Limits

10.1 System Office Environment

Table 10. System Office Environment Summary

Parameter	Limits
Operating Temperature	+5^{O}C to +35^{O}C with the maximum rate of change not to exceed 10^{O}C per hour.
Non-Operating Temperature	-40^{O}C to +70^{O}C
Non-Operating Humidity	95%, non-condensing @ 30^{O}C
Acoustic noise	55 dBA in a typical office ambient temperature (18-25C)
Operating Shock	No errors with a half sine wave shock of 2G (with 11-millisecond duration).
Package Shock	Operational after a free fall, 18 – 24 inch depending on the weight.
ESD	15kV per *Intel Environmental Test Specification*

10.2 System Environmental Testing

The system will be tested per the *Environmental Standards Handbook*, Intel Doc.#662394-05. These tests shall include:

- Temperature Operating and Non-Operating
- Humidity Non-Operating
- Packaged Shock
- Packaged and Unpackaged Vibration
- AC Voltage, Frequency, and Source Interrupt
- AC Surge
- Acoustics
- Electrostatic Discharge (ESD)
- EMC Radiated Investigation

11. Reliability, Serviceability, and Availability

11.1 MTBF

Calculated Mean Time Between Failures (MTBF) at maximum configuration has been calculated at TBD hours at 35°C.

Table 11. MTBF Calculations

Item	Percentage usage	MTBF HRs
Baseboard	100	TBD
Front panel board (typ)	100	3,566,515
Processor	100	TBD
SCSI dist BD	100	314,618
Hard Drive	100	NA
PRO 100 B	100	1,680,930
IDE CD-ROM (typ)	25	500,000
Power supply (typ)	100	150,000
1.44MB 3.5" FDU (typ)	5	405,000
32 Meg DIMM (typ)	100	283,051
FAN (typ)	100	96,062

11.2 Serviceability

The system is designed for service by qualified technical personnel only.

The desired Mean Time To Repair (MTTR) of the system is 30 minutes including diagnosis of the system problem. To meet this goal, the system enclosure and hardware have been designed to minimize the MTTR.

The following are the maximum times that a trained field service technician should take to perform the listed system maintenance procedures, after diagnosis of the system.

Table 12. Maximum Maintenance Procedure Times

Remove cover	1	minute
Remove and replace hard disk drive	1	minute
Remove and replace 5 ¼ peripheral device	5	minutes
Remove and replace power supply	5	minutes
Remove and replace drive cage fan	2	minutes
Remove and replace expansion board	5	minutes
Remove and replace front panel board	5	minutes
Remove and replace server board (with no expansion boards)	15	minutes
Overall MTTR	20	minutes

12. Upgradeability

Listed below are accessory kits available for the SC5200 chassis. Illustrations are provided to indicate some of the kit contents. Not all parts for each kit are shown and the actual part may differ in appearance.

12.1 DLT Tape Drive and Slimline CDROM Mounting Brackets

Product Code FHD2DLTBRK. Contains DLT tape drive mounting rails (can be used for proper mounting of other full-height peripherals), slim-line CDROM adapter bracket with integrated cooling grill (for proper processor cooling), and 4-pin power adapter cable.

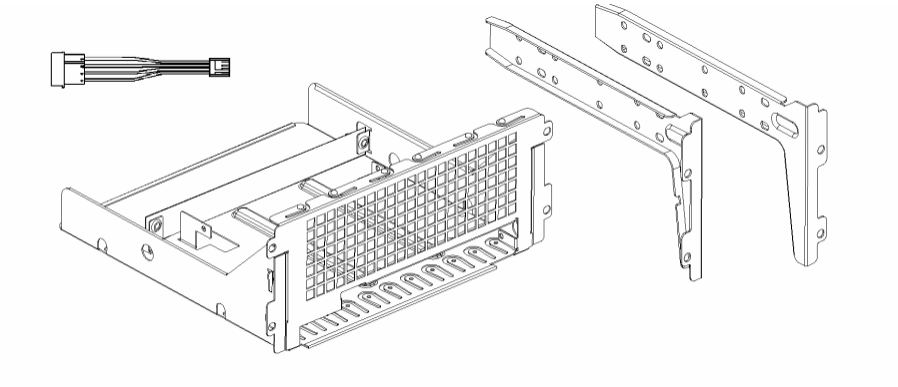


Figure 30. DLT Tape Drive and Slimline CDROM Mounting Brackets

12.2 ICMB Interface card with brackets and cable

Product Code AXX2ICMBKIT. This kit includes an interface board, adapter brackets for rear panel mounting or PCI card slot mounting, and cable for connecting a server board to external ICMB devices.

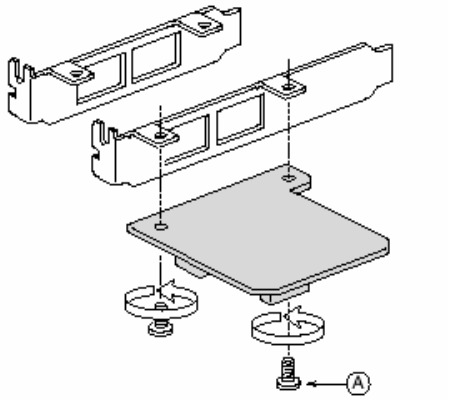


Figure 31. ICMB Interface Card

12.3 Hot-swap Drive Bay Upgrade

Product Code AXX2HSDRVUG. The kit includes a hot-swap drive bay with mounting hardware, 68-pin LVD SCSI cable for data transfer, and 4-pin I^2C cable for server management communication.

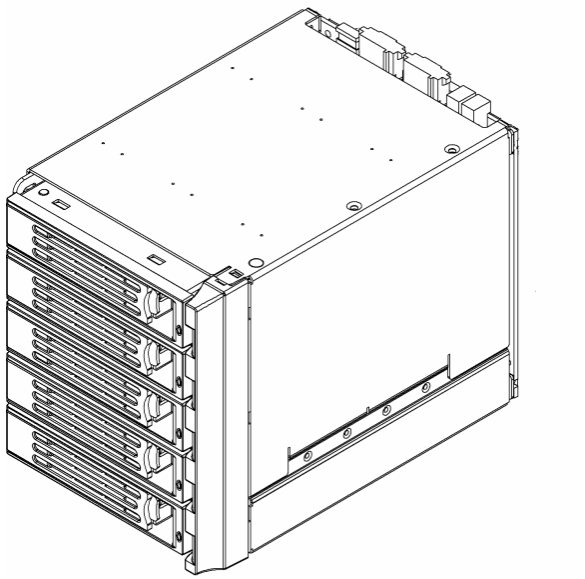


Figure 32. Hot-swap Drive Bay Upgrade

12.4 SCSI Y-Adapter Cable

Product Code AHD3HSBPYCBL. This 10-pack kit includes a Y-Cable that splits a single SCSI channel from a server board or add-in card, for connection to two 5-drive SCSI Backplanes (see AHD3HSDRVUG).

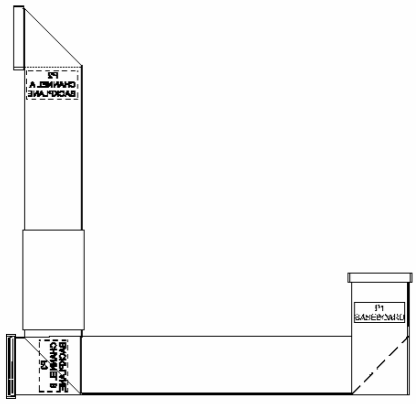


Figure 33. SCSI Y-Adapter Cable

12.5 External SCSI Adapter Cable

Product Code AXXEXTSCSICBL. This 68-pin LVD SCSI cable allows an internal SCSI connection from the motherboard to be routed to the ICMB/SCSI knockout at the rear of the chassis.

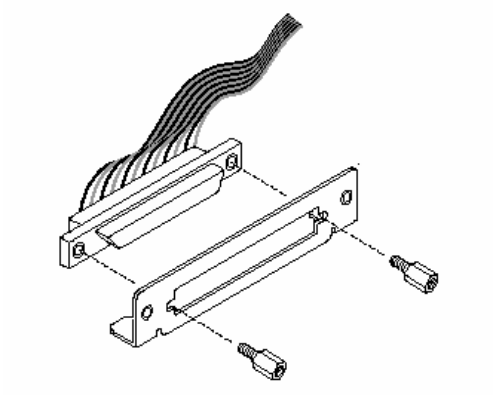


Figure 34. External SCSI Adapter Cable Detail

12.6 350-W TPS Power Module

Product Code AXX2PSMODL350. This accessory provides a single 350-W TPS module and power cord to upgrade RPS power supplies to redundant mode. It is also used as a replacement module.

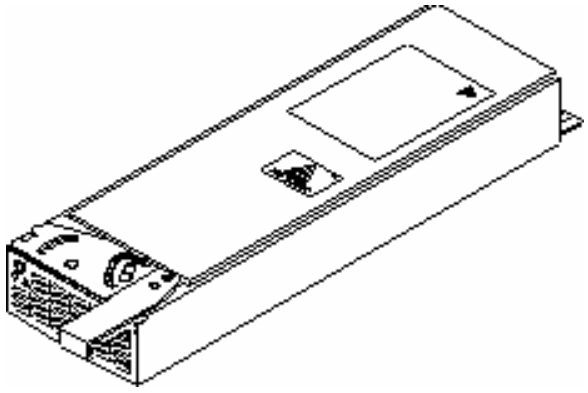


Figure 35. 350-W TPS Power Module

12.7 Rack Conversion Kit

Product Code AHD3RACK.

Kit includes all parts needed to convert a pedestal chassis into the rack version. Contents include rack bezel parts, 5.25-inch reorientation bracket, unpainted side covers, handles, mounting rails, and hardware kit.

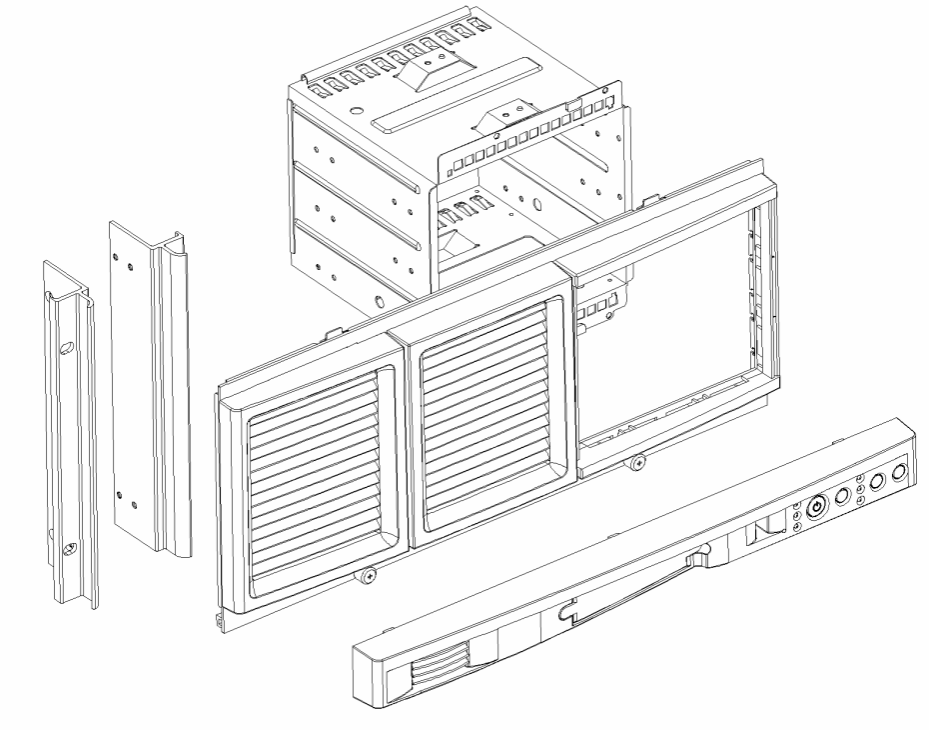


Figure 36. Rack Conversion Kit

Appendix A: Chassis Spares & Accessories

Upgrade and Accessory Parts

Product Code	MM #	UPC	Qty.	Description
AXX2PSMODL350	835945	7 35858 14629 6	1	350W Power Supply Module Upgrade or Spare
AXX2HSDRVUG	835948	7 35858 14630 2	1	Hot-Swap Drive Upgrade Kit – Upgrade Base Chassis to 5 drives or HSRP to 10 drives
AHD3HSBPYCBL	848239	7 35858 15645 5	10	New SCSI Y-cable to work with SC5200 HSRP. Permits cabling two backplanes to one SCSI/RAID channel.
AXXEXTSCSICBL	830656	7 35858 13953 3	1	External SCSI Cable Accessory. For use with SCSI Knock-out on rear of chassis.
AXX2ICMBKIT	836017	7 35858 14653 1	1	ICMB Board Assembly
FHD2DLTBRK	836423	7 35858 14669 2	5 Sets	DLT mounting bracket, includes slim-line CD ROM mounting bracket and connector board
AHD2RACK	835849	7 35858 14670 8	1	Rack Kit- Use to convert Pedestal Chassis to a 5U rack chassis. Includes rails, rack mounting hardware, and rack bezel in black. Will work with SC5100 or SC5200 Base Chassis. Use AHD3RACK for HSRP Chassis.
AHD3RACK	845727	7 35858 15426 0	1	Rack upgrade kit with new SC5200 Hot-swap fan access side cover. Backwards compatible with Hudson II (includes both side covers)

Replacement and Spare Parts

AHG2IO	844599	7 35858 15299 0	50	I/O Shield and Gasket for Intel® SHG2 and SE7500CW2 Server Boards
FHDLVDSCBL	823391	7 35858 12705 9	10	SCSI Wide, LVDS Cable. Note: Use FHD3SCSICBL for HSRP SKU.
FHD3SCSICBL	847537	7 35858 15475 8	10	New SCSI cable to work with SC5200 HSRP. Connects baseboard to SCSI backplane (non-terminated).
FHDEYE2C	823392	7 35858 12720 2	10	I^2C Cable
FXX2HSBRD	836033	7 35858 14654 8	1	Hot-Swap Backplane Board
FXX2SAFTE	836027	7 35858 14655 5	1	SAF-TE Board
FHDSHRD	823387	7 35858 12712 7	10	HSBP Fan Shroud

FXX2DRVCARBLK	835853	7 35858 14621 0	10	Hot-Swap Drive Carrier, 1 inch, black
FHD2FPBRD	835851	7 35858 14622 7	1	Front Panel Board & Cable
FHD3BASEFANS	844703	7 35858 15303 4	1	Base SKU fan spare kit: one each 80x25 mm and 80x32 mm
FHD3HSFANS	844702	7 35858 15302 7	1	Hot swap fan spare kit: (1) 92 mm and (2) 80 mm, includes carriers/connectors
FHD2EPAC	835950	7 35858 14632 6	1 Set	EPAC Set for SC5200 Base chassis (without hot swap fans)
FHD3HSDUCT	844704	7 35858 15305 8	1	Plastic duct and fan holder/harness for HSRP SKU
FHD3PS450	844924	7 35858 15351 5	1	Non-Redundant 450W Power Supply for SC5200 Base Chassis
FHD2PSCAGE2P1	836424	7 35858 14668 5	1	650W 2+1 Power Supply Cage – Dual Line Cord for SC5200 HSRP Chassis
AXX2PSMODL350	835945	7 35858 14629 6	1	350W Power Supply Module Upgrade or Spare
FHD3HSSIDE	844701	7 35858 15306 5	5	Side cover with fan access door for HSRP Chassis
FHDSDE	823386	7 35858 12706 6	5 Sets	Right and Left Side Panels - Painted
FHDTP	823385	7 35858 12707 3	10	Top Panel - Painted
FHDBTTM	823372	7 35858 12708 0	10	Bottom Panel- Painted
FHDFEET	823396	7 35858 12709 7	10	Pedestal Foot (Beige)
FHDPKG	823390	7 35858 12713 4	1	Packaging
FHD2HWKT	836557	7 35858 14707 1	1	Hardware Kit – Screws
FHD3SPRS	844685	7 35858 15304 1	1	SC5200 Channel Spares Kit

Glossary

Term	Definition
AC	Alternating Current
ACPI	Advanced Configuration and Power Interface.
ATX	Advanced technology extended (motherboard type).
BKM	Best Known Method – a document, created by an Intel organization, that details the proper or customary steps used to perform a specific task (e.g., operating system installation).
BMC	Baseboard Management Controller – Provides monitoring, alerting, and logging of critical system information obtained from embedded sensors on the baseboard.
DC	Direct Current
DDR	Double Data Rate
DIMM	Dual Inline Memory Module
DLT	Digital Linear Tape
ECC	Error Correcting Code
EEB	Entry E-Bay
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMC	Electromagnetic compatibility
EMI	Electromagnetic Interference
EPS	Entry Power Supply; External Product Specification
EPG	Enterprise Products Group – a division of Intel Corporation.
ESD	Electrostatic Discharge
FET	Field Effect Transistor
FRU	Field Replaceable Unit
FWH	Firmware Hub
HCT	Hardware Compatibility Test
HSBP	Hot-Swap Backplane
HSC	Hot-Swap Controller
Hz	Hertz (1 cycle/second)
I^2C	Inter-integrated circuit bus
ICMB	Intelligent Chassis Management Bus
IDE	Integrated Drive Electronics
IMB	
I/O	Input / Output
IP	Internet protocol
IPMI	Intelligent Platform Management Interface
ISM	Intel® Server Management
LAN	Local Area Network
LED	Light Emitting Diode
LPC	Low Pin Count
LVDS	Low-voltage differential SCSI

Term	Definition
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
NMI	Nonmaskable Interrupt
OEM	Original Equipment Manufacturer
OS	Operating System
PCI	Peripheral Component Interconnect
PFC	Power Factor Correction
RPM	Revolutions Per Minute
RPS	Redundant Power Supply
PWT	Processor Wind Tunnel – Active cooling device included with the Intel® Boxed Xeon™ Processors
SAF-TE	SCSI Accessed Fault –Tolerant Enclosure
SCA	Single connector attachment.
SCSI	Small Computer Systems Interface.
SDR	Sensor Data Record
SKU	Stock Keeping Unit
SMBus	A subset of the I^2C bus/protocol, developed by Intel.
SSI	Server System Infrastructure – Organization which defines and promotes specifications for the server market
TBD	To Be Documented – Used when item being described has not yet been designed or formalized.
TPS	Thin Power Supply; Technical Product Specification
USB	Universal Serial Bus
VCCI	Voluntary Control Council for Interference
VRAM	Video Random Access Memory
VRM	Voltage Regulation Module
WfM	Wired for Management
WOL	Wake-on-LAN

Reference Documents

Refer to the following documents for additional information:

- *Intel® SHG2 DP Server Board EPS, #11806*
- *Intel® SE7500CW2 DP Server Board EPS, #(TBD)*
- *SC5100 Low-Voltage Differential / Single Ended SCSI Backplane EPS, #10655*
- *SC5100/SC5200/SRSH4/SPSH4 Hot Swap Controller EPS, #11615*
- *450-W EPS 1.0 Power Supply Module Specification #A85459*
- *650-W 2+1 Redundant Power Supply Specification, #A52678*
- *350-W TPS Power Supply Module Specification #A45295*
- *Intel® SC5200 Base Server Chassis Subassembly Product Guide, #A86510*
- *Intel® SC5200 Hot-Swap, Redundant Power Pedestal and Rack Server Chassis Subassembly Product Guide, #A83713*
- *Intel® SC5100 and SC5200 Server Chassis Hot Swap Bay Upgrade Kit, #A58844*
- *Intel® SC5100 and SC5200 DLT Tape and Slim-line CD ROM Installation Guide, #A58846*
- *Intel® SC5100 and SC5200 Rack Kit Installation Guide, #A58842*
- *Intel® SC5100 and SC5200 ICMB Card Installation Guide, #A58841*
- *Intel® SC5100 and SC5200 External SCSI Cable Install Guide, #A27198*
- *SCSI Accessed Fault-Tolerant Enclosures Specification,* Revision 1.00
  The SAF-TE Specification is available via email @ SAF.TE@connor.com
- *SSI Entry-Level Electronics–Bay Specification,* Version 3.0
- Advance Technology Extended (ATX) Specification, Revision 2.03
  http://www.ssiforum.org/docs/entry_elecbay_spec_v3_0.pdf
- *ANSI/IEEE STD C62.45-1992*
  http://standards.ieee.org/reading/ieee/std_public/description/surge/C62.45-1992_desc.html
- *Environmental Standards Handbook, #662394-05*

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