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Intel® Server Chassis SC5300 5U Kit

Technical Product Specification

Revision History

Date	Revision Number	Modifications
June 18, 2004	1.0	Initial Release
June 25, 2004	1.1	Format Updates
July 20 , 2004	1.1.1	Format updates
Jan 5, 2005	1.2	SATA and SCSI backplane updates Incorporated T.H. Comments. Added BRP Added Errata/Integration Appendix
Jan 16, 2006	1.3	SATA backplane updates – added SAS compatibility
Jan 16, 2006	1.31	Modified Sections 1.3 and 1.4

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Intel Corporation server baseboards contain a number of high-density VLSI and power delivery components that need adequate airflow to cool. Intel's own chassis are designed and tested to meet the intended thermal requirements of these components when the fully integrated system is used together. It is the responsibility of the system integrator that chooses not to use Intel developed server building blocks to consult vendor datasheets and operating parameters to determine the amount of air flow required for their specific application and environmental conditions. Intel Corporation can not be held responsible if components fail or the server board does not operate correctly when used outside any of their published operating or non-operating limits.

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1.   Introduction

This specification details the feature set of the Intel® Server Chassis SC5300, an entry-level server chassis designed for Intel® server board products. The Server Chassis SC5300 series of products are low cost, quick to integrate, and allow utilization of multiple platforms and configurations. The Server Chassis SC5300 series comes in three configurations: 600-W SC53000BASE, 730-W SC5300BRP, and 730-W SC5300LX. The configurations are distinguishable from one another based primarily on power supply and cooling features.

1.1   Intel® Server Chassis SC5300 Design Features

The Intel® Server Chassis SC5300 series makes extensive use of tool-less hardware features and, dependent upon configuration and upgrade features, provides redundant cooling and redundant power supply capability. The following table lists the features for the SC5300BASE, SC5300BRP, and SC5300LX configurations.

Table 1. Intel® Server Chassis SC5300BASE, SC5300BRP, and SC5300LX Features

	Intel® Server Chassis SC5300BASE	Intel® Server Chassis SC5300BRP	Intel® Server Chassis SC5300LX
Power Delivery	Includes one (1) fixed 600-W power factor corrected (PFC) Intel validated power supply unit (PSU) with an integrated cooling fan, upgradeable to a redundant (1+1) 730-W PFC PSU	Includes (1 of 2) redundant 730-W PFC module Intel validated PSU. Each power module includes an integrated cooling fan. Each redundant power module includes one (1) AC line input.	Includes (1 of 2) redundant 730-W PFC module Intel validated PSU. Each power module includes an integrated cooling fan. Each redundant power module includes one (1) AC line input.
System Cooling	Two fixed, non-redundant chassis fans: one (1) 120-mm and one (1) 92-mm. Upgradeable to redundant cooling with optional accessory kit. Both fans are tool-less.	Two fixed, non-redundant chassis fans: one (1) 120-mm and one (1) 9-mm. Upgradeable to redundant cooling with optional accessory kit. Both fans are tool-less	Four tool-less, hot swappable and redundant chassis fans with handle-mounted diagnostic failure LEDs: two (2) 120-mm and two (2) 92-mm.
Peripheral Bays	Three (3) tool-less, multi-mount 5.25-inch peripheral bays	Three (3) tool-less, multi-mount 5.25-inch peripheral bays	Three (3) tool-less, multi-mount 5.25-inch peripheral bays

	Intel® Server Chassis SC5300BASE	Intel® Server Chassis SC5300BRP	Intel® Server Chassis SC5300LX
Drive Bays (6+4) Bay Layout	Includes one (1) tool-less fixed drive bay for up to six (6) fixed IDE or SCSI drives. Optional hot-swap / tool-less drive bays available: six-drive SCSI, six-drive SATA/SAS, 4-drive SCSI. A four-drive tool-less fixed drive bay is also available as an accessory The SC5300BASE configuration supports up to six drives.	Includes one (1) tool-less fixed drive bay for up to six (6) fixed IDE or SCSI drives. Optional hot-swap / tool-less drive bays available: six-drive SCSI, six-drive SATA/SAS, four-drive SCSI. A (4) drive tool-less fixed drive bay is also available as an accessory The SC5300BRP configuration supports up to 10 drives	Includes one (1) tool-less fixed drive bay for up to six (6) fixed IDE or SCSI drives. Optional hot-swap / tool-less drive bays available: six-drive SCSI, six-drive SATA/SAS, four-drive SCSI. A (4) drive tool-less fixed drive bay is also available The SC5300LX configuration supports up to 10 drives
PCI Slots	Seven full-length PCI slots	Seven full-length PCI slots	Seven full-length PCI slots. Optional hot plug PCI kit is available for the Intel® Server Board SE7520AF2.
Form Factor	5U Tower, convertible to rack mount	5U Tower, convertible to rack mount	5U Tower, convertible to rack mount
Front Panel	LEDs for NIC1, NIC2, System ID, HDD activity / failure and system status. Power Switch - ID switch, Reset, Power, Sleep, NMI Optical side cover intrusion switch and connection for bezel intrusion switch Integrated temperature sensor for fan speed management	LEDs for NIC1, NIC2, System ID, HDD activity / failure and system status. Power Switch - ID switch, Reset, Power, Sleep, NMI Optical side cover intrusion switch and connection for bezel intrusion switch Integrated temperature sensor for fan speed management	LEDs for NIC1, NIC2, System ID, HDD activity / failure and system status. Power Switch - ID switch, Reset, Power, Sleep, NMI Optical side cover intrusion switch and connection for bezel intrusion switch Integrated temperature sensor for fan speed management
External	Two (2) front USB and one (1) optional front or rear mounted serial port	Two (2) front USB and one (1) optional front or rear mounted serial port	Two (2) front USB and one (1) optional front or rear mounted serial port
Color	Black	Black	Black
Construction	1.0 mm, zinc plated sheet metal, meets Intel Cosmetic Spec # C25432	1.0 mm, zinc plated sheet metal, meets Intel Cosmetic Spec # C25432	1.0 mm, zinc plated sheet metal, meets Intel Cosmetic Spec # C25432
Chassis ABS	Fire retardant, non-brominated PC-ABS	Fire retardant, non-brominated PC-ABS	Fire retardant, non-brominated PC-ABS

	Intel® Server Chassis SC5300BASE	Intel® Server Chassis SC5300BRP	Intel® Server Chassis SC5300LX
Dimensions (Rack)	17.5-inch x 8.6-inch x 26.2-inch	17.5-inch x 8.6-inch x 26.2-inch	17.5-inch x 8.6-inch x 26.2-inch
Dimensions (Pedestal)	17.5-inch x 8.6-inch x 26.9-inch	17.5-inch x 8.6-inch x 26.9-inch	17.5-inch x 8.6-inch x 26.9-inch
Weight	34.6 kg	36.2 kg	36.2 kg
Optional Accessories	Rack Conversion Kit	Rack Conversion Kit	Rack Conversion Kit
	Rack Cable Management Arm	Rack Cable Management Arm	Rack Cable Management Arm
	Intel® Management Module	Intel® Management Module	Intel® Management Module
	Slim-line CD and Floppy Carrier	Slim-line CD and Floppy Carrier	Slim-line CD and Floppy Carrier
	Redundant Power Supply Kit	Redundant Power Supply Kit	Redundant Power Supply Kit
	Six (6) Drive Hot-swap SCSI Backplane	Six (6) Drive Hot-swap SCSI Backplane	Six (6) Drive Hot-swap SCSI Backplane
	Six (6) Drive Hot-swap SATA.SAS backplane	Six (6) Drive Hot-swap SATA/SAS Backplane	Six (6) Drive Hot-swap SATA/SAS Backplane
	Four (4) Drive Hot-swap SCSI Backplane	Four (4) Drive Hot-swap SCSI Backplane	Four (4) Drive Hot-swap SCSI Backplane
	Redundant Cooling Upgrade Kit	Redundant Cooling Upgrade Kit	Redundant Cooling Upgrade Kit
	10-pack Branding / Customization Panels	10-pack Branding / Customization Panels	10-pack Branding / Customization Panels
	Four (4) Drive Fixed Drive Bay	Four (4) Drive Fixed Drive Bay	Four (4) Drive Fixed Drive Bay
	Unpainted Rack Top Cover	Unpainted Rack Top Cover	Unpainted Rack Top Cover
			Hot-plug PCI Kit

1.2   Intel® Server Chassis SC5300BASE Summary

The Intel® Server Chassis SC5300BASE is designed to address the entry-level market. It includes a fixed single 600-W Power Factor Correction (PFC) non-redundant power supply, which supports up to six hard drives. Two tachometer output fans are mounted in front of the server board. Optional four- and six-drive SCSI hot swap drive bay kits provide upgrades to allow support for 6 hot swap SCSI drives. An optional six-drive hot swap SATA/SAS drive bay is also available. Three 5.25-inch half-height peripheral bays are available for installation of a floppy drive, CD-ROM drive and/or other accessories. Standard chassis configuration is pedestal. A rack mount conversion kit is available.

1.3   Intel® Server Chassis SC5300BRP Summary

The Intel® Server Chassis SC5300BRP supports the redundant power capability of the SC5300LX configuration and the fixed fan features of the SC5300BASE configuration. The SC5300BRP configuration includes a single 730-W PFC power supply module. Two tachometer output fans are mounted in front of the server board. When populating the server chassis with a single power supply, the power supply must be populated in the first power supply bay. A second 730-W module may be added to provide redundant power supply. Optional four- and six-drive SCSI hot swap drive bay kits provide upgrades to allow support for up to 10 hot swap SCSI drives. An optional six-drive hot swap SATA/SAS drive bay is also available. Three 5.25-inch half-height peripheral bays are available for installations of a floppy drive, CD-ROM drive and/or other accessories.

1.4   Intel® Server Chassis SC5300LX Summary

The Intel® Server Chassis SC5300LX supports redundant power and includes redundant fan features. The SC5300LX configuration includes a single 730-W PFC power supply module. When populating the server chassis with a single power supply, the power supply must be populated in the first power supply bay. A second 730-W module may be added to provide redundant power supply. Four LED hot swap tachometer output fans provide redundant cooling. Optional four- and six-drive SCSI hot swap drive bay kits provide upgrades to allow support for up to 10 hot swap SCSI drives. An optional six-drive hot swap SATA/SAS drive bay is also available. Three 5.25-inch half-height peripheral bays are available for installation of a floppy drive, CD-ROM drive and/or other accessories. The standard chassis configuration is pedestal. A rack mount conversion kit is available.

Table 2. Product Matrix

Product Code	Intel® Server Board	Optional Hot Swap SCSI/SATA/SAS Drives	Standard Fixed Hard Drive Bays	Power Supply and Required Power Cord Configuration	Hot Swap Fans	Pedestal/ Rack
SC5300BASE Fixed 600-W	SE7520AF2 SE7520BD2 SE7525SP2 SE7525GP2	6-SCSI 6-SATA/SAS 4-SCSI	6-drive bay 4-drive bay optional accessory is available	Fixed 600-W PFC Requires one power cord	No	Pedestal is Standard. Rack Conversion Kit is an accessory.
SC5300BRP Hot Swap Redundant 730-W	SE7520AF2 SE7520BD2	6-SCSI 6-SATA/SAS 4-SCSI	6-drive bay 4-drive bay optional accessory is available	One 730-W PFC module installed. Second power module is optional. Requires one power cord per module.	No	Pedestal is Standard. Rack Conversion Kit is an accessory.
SC5300LX Hot Swap	SE7520AF2 SE7520BD2	6-SCSI or 6-	6-drive bay 4-drive bay	One 730-W PFC module installed.	Yes	Pedestal is Standard.

| Redundant 730-W | | SATA/SAS 4-SCSI | optional accessory is available | Second power module is optional. Requires one power cord per module. | | Rack Conversion Kit is an accessory. |

2.   Chassis Features

2.1   Chassis Dimensions and Weight

Shipping weights include packaging.

Complete systems configured with server board, accessories and hard disk drivers will have varying weights.

Table 3. Chassis Dimensions and Weights

Configuration		Pedestal	Rack
Height		17 inches (43.2 cm)	8.6 inches (21.8 cm)
Width		8.6 inches (21.8 cm)	16.5 inches (41.9 cm)
Depth		27.9 inches (70.9 cm)	27.4 inches (69.6 cm)
Clearance Front		10 inches (25.4 cm)	N/A
Clearance Rear		5 inches (12.7 cm)	N/A
Clearance Side		3 inches (7.6 cm)	N/A
Weight	LX	36.2 kg	36.2 kg
	Base	34.6 kg	34.6 kg

2.2   System Colors

The Intel® Server Chassis SC5300 is offered in one color configuration, black.

Table 4. System Color Code

Manufacturer	Color Code
GE	Black GE701

2.2.1   Pedestal and Rack Mount 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. 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. Each peripheral bay is covered with a removable electromagnetic interference (EMI) shield.

Opening the exterior plastic door on the pedestal chassis accesses the hot swap hard drives. 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. OEM snap-in branding panels are available.

In the rack mount configuration, the front door is removed and the sub-bezel becomes the front panel for the rack mount system. The rack mount kit includes the chassis slides, rack handles, front door hinge cover plate and intrusion switch modification hardware.

2.3　Security

A variety of chassis security options are provided at the system level:

1. A two-position key lock/switch will unlock the front bezel and side cover in the pedestal configuration only. Rack mount configuration does not have a key lock.
2. For rack mounted systems, 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.
3. A Kensington* cable lock mounting hole is provided on the rear chassis I/O panel.
4. An intrusion switch for the side panel and front bezel door are standard. In the rack mount configuration, only the system cover has an active intrusion switch. 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. 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.

2.4　I/O Panel

All input/output (I/O) connectors are accessible on the rear of the chassis. The SSI E-bay 3.5-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 the following figure.

The rear I/O panel conforms to the Advanced Technology Extended (ATX) Specification, Revision 2.1, and supports seven full-length expansion PCI adaptor cards.
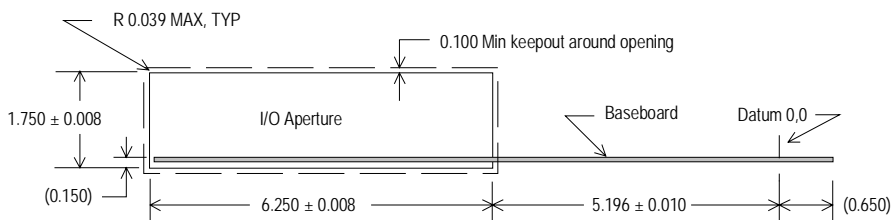
Figure 1. ATX* 2.03 I/O Aperture

2.5   Standard and Optional Hot Swap Drive Bays

One fixed bay, supporting six cabled drives, ships with the standard chassis. An optional four-drive bay for cabled (fixed) drives is available. Optional four- and six-drive hot swap bays are also available and may be installed to replace either the six- or four-drive fixed bays. No tools are required to replace the fixed drive bays. An optional six drive hot swap SATA/SAS bay is also available. See the appendix for a full list of accessories.

2.6   5.25-inch Half-height Peripheral Bays

Three 5.25-inch, half-height drive bays are available for installation of a floppy drive, CD-ROM drive or tape drive. The chassis ships with a 3.5-inch floppy or fixed drive carrier installed in the top 5.25-inch drive bay and two empty 5.25-inch drive bays. Tool-less mounting rails are included for all three drive bays and attach without screws.
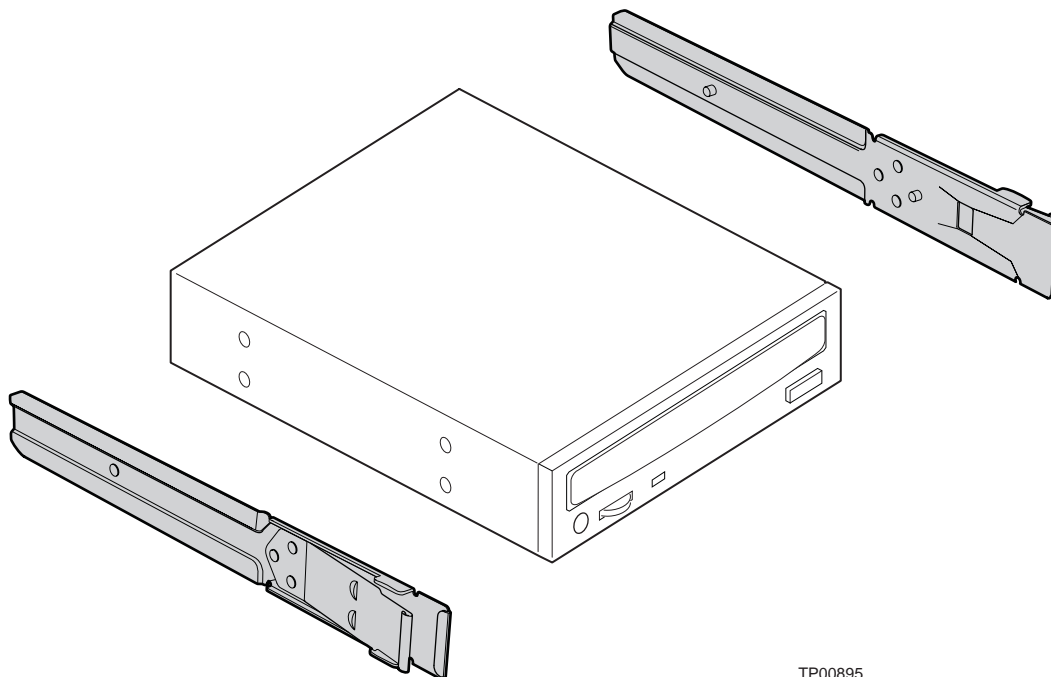
TP00895

Figure 2. Tool-less Rails Mounting 5.25-inch CDROM Drive

2.7   Chassis Views

1. Fixed Power Supply
2. PCI Add-in Card Panel
3. Upper Air Duct
4. Lower Air Duct
5. Fixed Fans (2)
6. HDD Cage Release Mechanisms (2)
7. Front Panel Control
8. 5.25" Device Bays (3)
9. Front Panel USB/Serial B
10. Fixed Drive Cage - 4 Drive *(accessory)*
11. Fixed Drive Cage - 6 Drive
12. Rear Serial-B Connector

Intel® Server Chassis SC5300 with Base Components
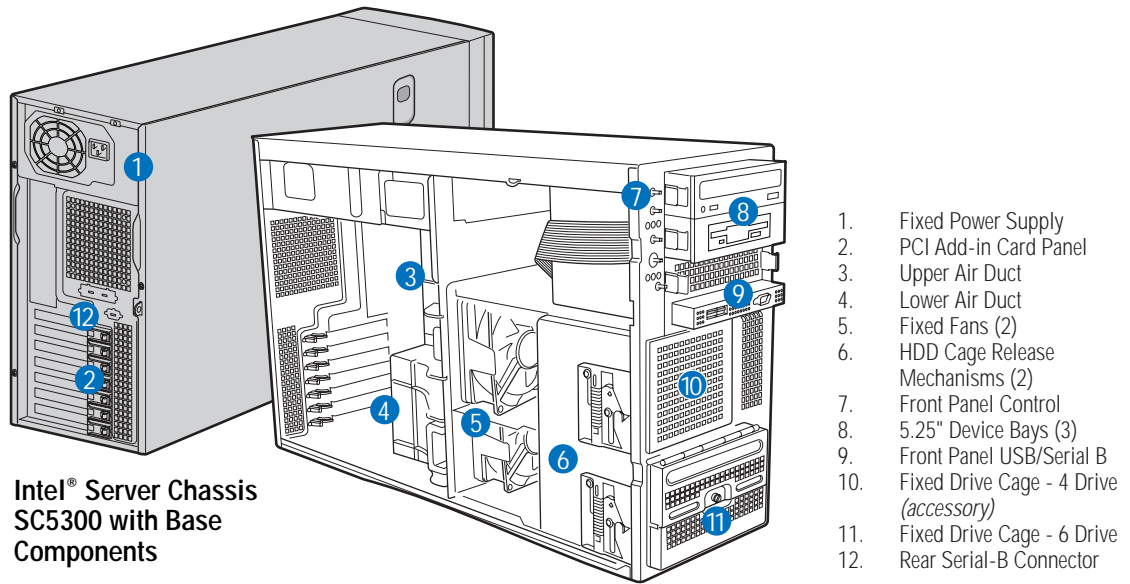
TP00901

Figure 3. Intel® Server Chassis SC5300BASE Components

1. Hot Swap Power Supply
2. Second Hot Swap Power Supply *(accessory)*
3. PCI Add-in Card Panel
4. Upper Air Duct
5. Lower Air Duct
6. Hot Swap Fans - Large (2)
7. Hot Swap Fans - Small (2)
8. HDD Cage Release Mechanisms (2)
9. Front Panel Control
10. 5.25" Device Bays (3)
11. Front Panel USB/Serial B
12. Hot Swap Drive Cage - 4 Drive *(accessory)*
13. Hot Swap Drive Cage - 6 Drive
14. Rear Serial-B Connector

Intel® Server Chassis SC5300 LX with Hot Swap Components

TP00900

Figure 4. Intel® Server Chassis SC5300LX Components
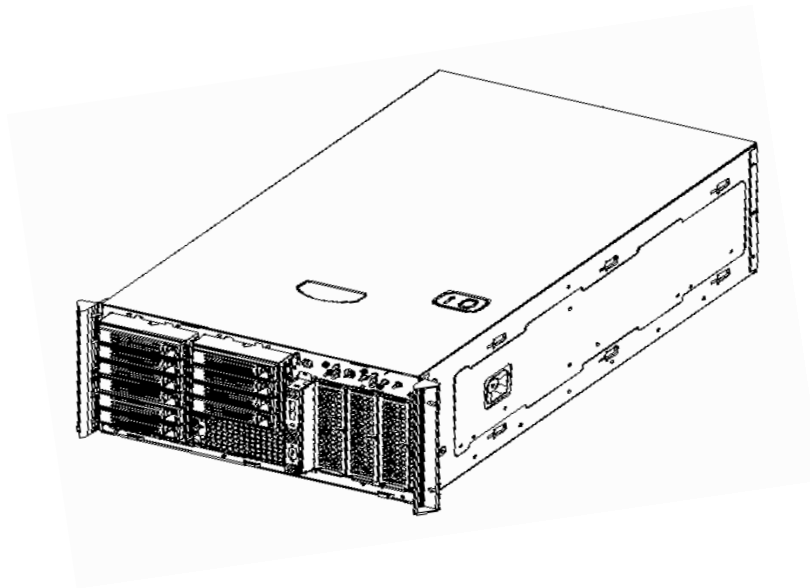
Figure 5. Rack Configuration with Sub-bezel and Right Side Panel Removed

3.   Chassis Power Subsystem

The Server Chassis SC5300 power supplies are Server System Infrastructure (SSI) compliant. The SSI specifications may be found at the following website: www.ssifourm.org. Both the 600-W and 730-W power supplies have identical power supply wire harness cable lengths to peripheral bays and server board.

3.1   600-W Power Supply

The 600-W power supply has eight outputs: 3.3V, 5V, 12V1, 12V2, 12V3, 12V4, -12V, and 5Vsb (standby). The 600-W power supply contains a single 80-mm fan for cooling the power supply, which also provides part of the system cooling. The 12V six-pin power connector is for the 150-W PCI-E (video) cards, which require an external 75-W power connector.

3.1.1   Mechanical Outline

The power supply size is 150mm x 180mm x 86mm and has a wire harness for the DC outputs. The AC power cord plugs directly into the external face of the power supply.
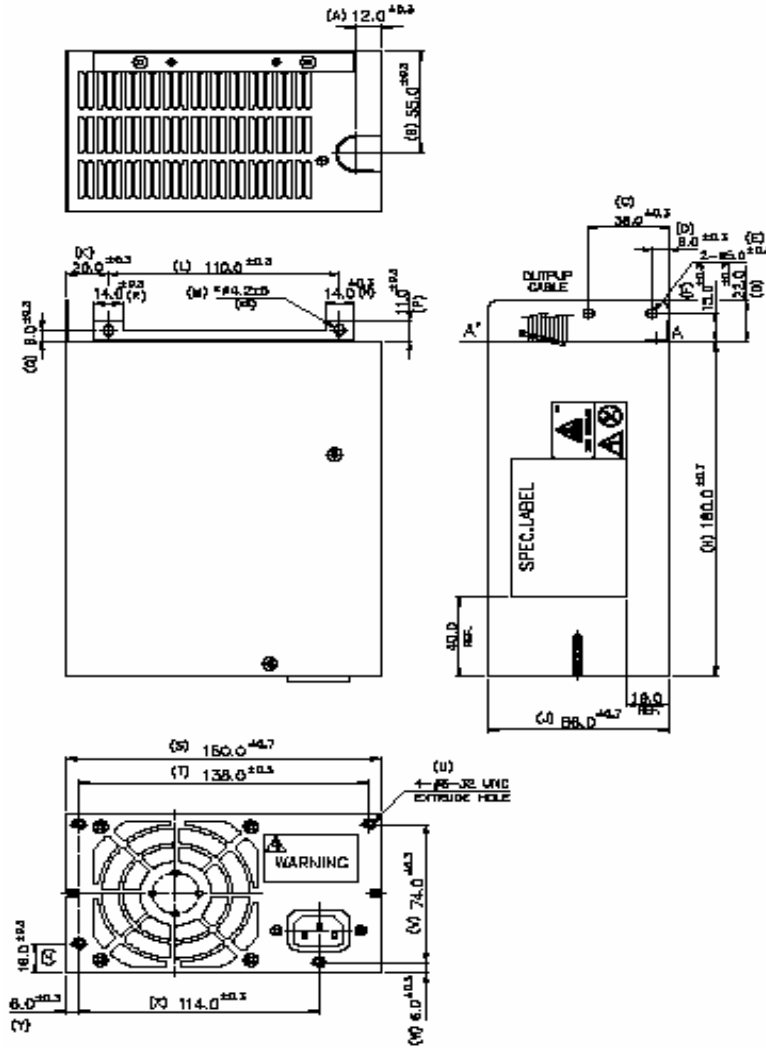
Note: All dimensions are in mm.

3.1.2   Output Wire Harness

Listed or recognized component appliance wiring material (AVLV2), CN, rated min 105°C, 300VDC shall be used for all output wiring. Cable length, connector number and description are identical for both the 600-W and 730-W power supplies.

Table 5. 600-W and 730-W Power Supply Cable Lengths

From	Length (mm)	To connector #	Number of pins	Description
Power Supply cover exit hole	425	P1	24	Baseboard Power Connector
Power Supply cover exit hole	375	P2	8	Processor Power Connector
Power Supply cover exit hole	375	P14	5	Power Signal Connector
Power Supply cover exit hole	375	P15	6	PCI Express Connector
Power Supply cover exit hole	450	P3	4	Peripheral Power Connector
Extension	100	P4	4	Peripheral Power Connector
Extension from P4	100	P5	4	Floppy Power Connector
Power Supply cover exit hole	575	P6	4	Peripheral Power Connector
Extension	75 (cover with sleeve)	P7	4	Right-angle Peripheral Power Connector
Power Supply cover exit hole	740	P8	4	Peripheral Power Connector
Extension	75	P9	4	Peripheral Power Connector
Power Supply cover exit hole	740	P10	4	Peripheral Power Connector
Extension	75	P11	4	Peripheral Power Connector
Power Supply cover exit hole	740	P12	5	Right-angle SATA Power Connector
Extension	75	P13	5	SATA Power Connector

The output cable harness and connectors is detailed in the following figure.
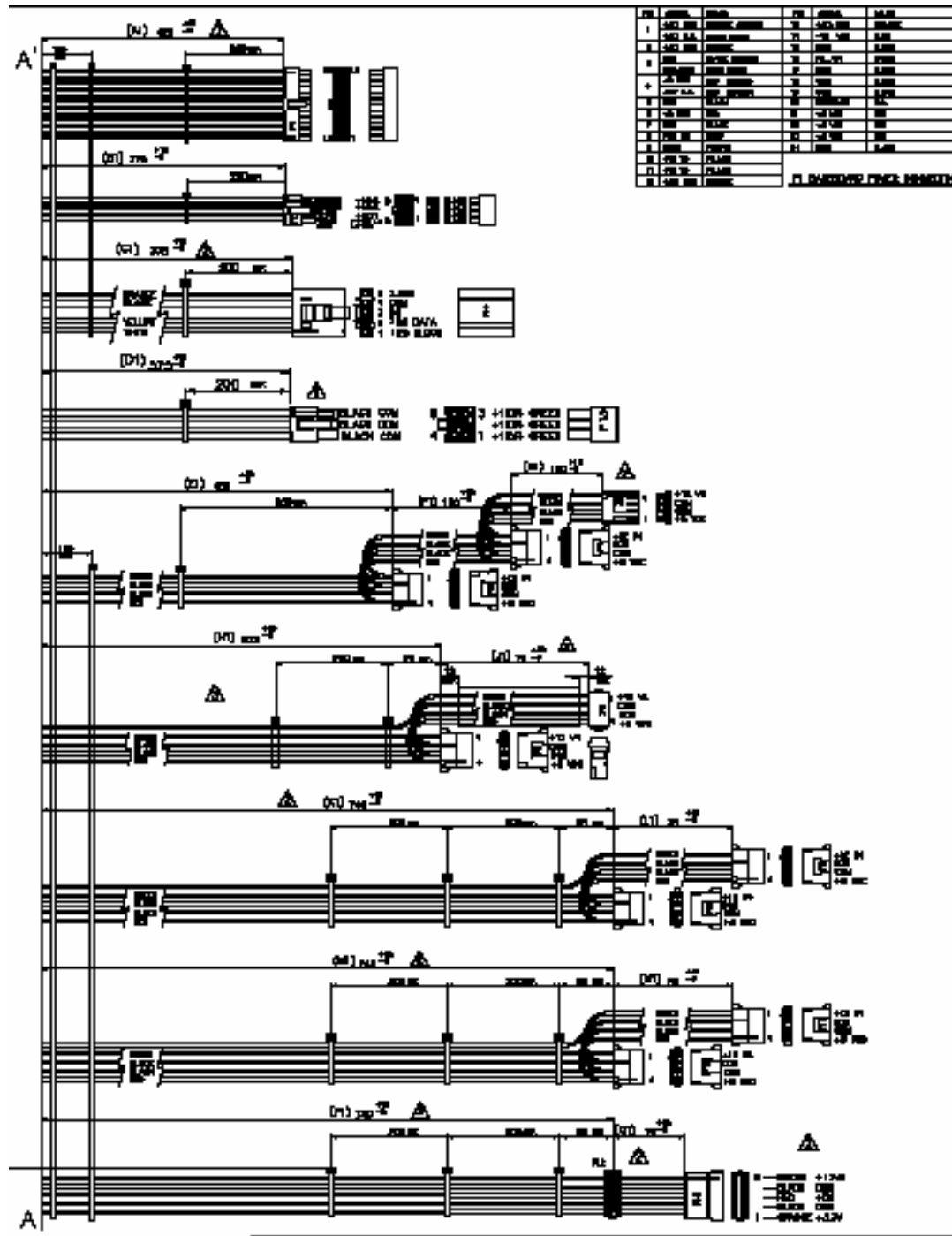
Notes: (1) All dimensions are in mm. (2) All tolerances are +15-0mm. 3. (3) Install 1 tie wrap within 12 mm of PSU case. (4) Mark reference designator on each connector. (5) Tie wrap each harness at approximately mid point or point shown.

Figure 6. Output Cable Harness for 600-W and 700-W Power Supplies

3.1.2.1   Baseboard power connector (P1)

Connector housing: 24-Pin Molex* Mini-Fit Jr. 39-01-2245 or equivalent

Contact: Molex Mini-Fit, HCS, Female, Crimp 44476 or equivalent

Table 6. Baseboard Power Connector P1 Pin-out

Pin	Signal	18 AWG Color	Pin	Signal	18 AWG Color
1*	+3.3VDC	Orange	13	+3.3VDC	Orange
	3.3V RS	Orange (24AWG)	14	-12VDC	Blue
2	+3.3VDC	Orange	15	COM	Black
3*	COM	Black	16	PSON#	Green
	COM RS	Black (24AWG)	17	COM	Black
4*	+5VDC	Red	18	COM	Black
	5V RS	Red (24AWG)	19	COM	Black
5	COM	Black	20	Reserved	N.C.
6	+5VDC	Red	21	+5VDC	Red
7	COM	Black	22	+5VDC	Red
8	PWR OK	Gray	23	+5VDC	Red
9	5 VSB	Purple	24	COM	Black
10	+12V3	Yellow			
11	+12V3	Yellow			
12	+3.3VDC	Orange			

* Remote Sense wire double crimped.

3.1.2.2   Processor Power Connector (P2)

Connector housing: 8-Pin Molex 39-01-2080 or equivalent

Contact: Molex 44476-1111 or equivalent

Table 7. Processor Power Connector P2

Pin	Signal	18 AWG color	Pin	Signal	18 AWG Color
1	COM	Black	5*	+12V1	White
2	COM	Black		12V1 RS	Yellow (24AWG)
3	COM	Black	6	+12V1	White
4	COM	Black	7	+12V2	Brown
			8*	+12V2	Brown

Pin	Signal	18 AWG color	Pin	Signal	18 AWG Color
				12V2 RS	Yellow (24AWG)

3.1.2.3   Power Signal Connector (P13)

Connector housing: 5-pin Molex 50-57-9405 or equivalent

Contacts: Molex 16-02-0087 or equivalent

Table 8. Power Signal Connector P13

Pin	Signal	24 AWG Color
1	I^2C Clock	White
2	I^2C Data	Yellow
3	Reserved	N.C.
4	COM	Black
5	3.3RS	Orange

3.1.2.4   Peripheral Power Connectors (P3, P4, and P6, P8 – P11)

Connector housing: Amp 1-480424-0 or equivalent

Contact: Amp 61314-1 contact or equivalent

Table 9. Peripheral Power Connectors

Pin	Signal	18 AWG Color
1	+12V4	Green
2	COM	Black
3	COM	Black
4	+5 VDC	Red

3.1.2.5   Floppy Power Connector (P6)

Connector housing: Amp 171822-4 or equivalent

Contact: Amp 170204-1 contact or equivalent

Table 10. Floppy Power Connector P6

Pin	Signal	22 AWG Color
1	+5VDC	Red
2	COM	Black
3	COM	Black
4	+12V4	Green

3.1.2.6   PCI Express Connector (P15)

Connector housing: 6-pin Molex 39-01-2065 or equivalent

Contacts: Molex Mini-Fit, HCS, Female, Crimp 44476

Table 11. PCI Express Connector

PIN	SIGNAL	18 AWG Colors	PIN	SIGNAL	18 AWG Colors
1	+12V4	Green	4	COM	Black
2	+12V4	Green	5	COM	Black
3	+12V4	Green	6	COM	Black

3.1.3   600-W Power Supply Airflow and Temperature Rise

The power supply incorporates one 80-mm fan for self-cooling and system cooling. The fan provides 14 CFM airflow through the power supply when installed in the system. The cooling air enters the power module from the non-AC side.

The power supply meets UL enclosure requirements for temperature rise limits. All sides of the power supply, with exception to the air exhaust side, are classified as "Handle, knobs, grips, etc., held for short periods of time only."

3.1.4   AC Specifications

The power supply incorporates universal power input with active power factor correction, which reduces line harmonics in accordance with the EN61000-3-2 and JEIDA MITI standards.

3.1.4.1   AC Inlet Connector

The AC input connector is an IEC 320 C-14 power inlet. This inlet is rated for 10A / 250VAC.

3.1.4.2   AC Input Voltage Specification

The power supply operates within all specified limits over the following input voltage range (see the following table). The power supply shall power off if the AC input is less than 75-80VAC ranges. The power supply operates properly starting at 80-85VAC input voltages.

Table 12. AC Input Ratings

PARAMETER	MIN	RATED	V_{MAX}	I_{MAX}	Start up VAC	Power Off VAC
Voltage (110)	90 V_{rms}	100-127 V_{rms}	140 V_{rms}	10 A[1, 3]	85VAC +/- 4VAC	75VAC +/- 5VAC
Voltage (220)	180 Vrms	200-240 V_{rms}	264 V_{rms}	5 A[2, 3]		
Frequency	47 Hz	50/60	63 Hz			

Notes:

(1) Maximum input current at low input voltage range shall be measured at 90VAC, at max load.

(2) Maximum input current at high input voltage range shall be measured at 180VAC, at max load.

(3) This requirement is not to be used for determining agency input current markings.

3.1.4.3   Efficiency

The 600-W power supply has an efficiency of 68% at maximum load and over the specified AC voltage.

3.1.4.4   AC Line Dropout / Holdup

An AC line dropout occurs when the AC input drops to zero VAC at any phase of the AC line for any length of time. During an AC dropout of one cycle or less, the power supply meets dynamic voltage regulation requirements over the rated load. An AC line dropout of 1 cycle or less (20 ms min) shall not cause any tripping of control signals or protection circuits. If the AC dropout lasts longer than one cycle, the power supply should recover and meet all turn-on requirements. The power supply meets the AC dropout requirement over rated AC voltages, frequencies, and output loading conditions. Any dropout of the AC line does not cause damage to the power supply.

3.1.4.5   AC Line Fuse

The power supply has one line fused in the single line fuse on the line (hot) wire of the AC input. The input fuse is a slow blow type. AC inrush current does not cause the AC line fuse to blow under any conditions. Not all protection circuits shall cause the AC fuse to blow unless a component in the power supply has failed. This includes DC output load short conditions.

3.1.5 600-W DC Output Specifications

3.1.5.1 Grounding

The output ground of the pins of the power supply provides the return path. The output connector ground pins is to the safety ground (power supply enclosure).

3.1.5.2 Output Voltage and Currents

The following tables define two power and current ratings for the 600-W power supply. The combined output power of all outputs shall not exceed the rated output power.

Table 13. Maximum System Load Ratings

Voltage	Minimum Continuous Load	Maximum Continuous Load[1, 3]	Peak Load[2, 4, 5]
+3.3V6	1.5 A	20 A	
+5V[6]	5.0 A	24 A	
+12V1	1.5 A	15 A	18 A
+12V2	1.5 A	15 A	18 A
+12V3	1.5 A	16 A	18 A
+12V4	1.5 A	16 A	18 A
-12V	0 A	0.5 A	
+5VSB	0.1 A	2.0 A	

Table 14. Light System Load Ratings

Voltage	Minimum Continuous Load	Maximum Continuous Load	Peak Load[5]
+3.3V6	0.5 A	9.0 A	
+5V[6]	2.0 A	7.0 A	
+12V1	0.5 A	5.0 A	7.0 A
+12V2	0.5 A	5.0 A	7.0 A
+12V3	2.0 A	6.0 A	
+12V4	0.5 A	5.0 A	
-12V	0 A	0.5 A	
+5VSB	0.1 A	2.0 A	

Notes:

(1) Maximum continuous total DC output power should not exceed 600 W.

(2) Peak load on the combined 12V output shall not exceed 48A.

(3) Maximum continuous load on the combined 12V output shall not exceed 43A.

(4) Peak total DC output power should not exceed 660W.

(5) Peak power and peak current loading shall be supported for a minimum of 12 seconds.

3.1.5.3   Voltage Regulation

The output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. These limits include the peak-peak ripple/noise. All outputs are measured with reference to the return remote sense signal (ReturnS). The +12V3, +12V4, −12V and 5VSB outputs are measured at the power supply connectors referenced to ReturnS. The +3.3V, +5V, +12V1, and +12V2 are measured at the remote sense signal located at the signal connector.

Table 13. Voltage Regulation Limits

PARAMETER	TOLERANCE	MIN	NOM	MAX	UNITS
+3.3V	- 5% / +5%	+3.14	+3.30	+3.46	V_{rms}
+5V	- 5% / +5%	+4.75	+5.00	+5.25	V_{rms}
+12V1	- 5% / +5%	+11.40	+12.00	+12.60	V_{rms}
+12V2	- 5% / +5%	+11.40	+12.00	+12.60	V_{rms}
+12V3	- 5% / +5%	+11.40	+12.00	+12.60	V_{rms}
+12V4	- 5% / +5%	+11.40	+12.00	+12.60	V_{rms}
- 12V	- 5% / +9%	- 11.40	-12.00	-13.08	V_{rms}
+5VSB	- 5% / +5%	+4.75	+5.00	+5.25	V_{rms}

3.1.5.4   Standby Operation

The 5V standby output is present when an AC input greater than the power supply turn on voltage is applied.

The power supply fan is off (fan-less operation) when the power supply is in the stand-by mode of operation. The power supply will work indefinitely in stand-by mode with the input AC power on, power supply off, and the 5V stand-by output at full load (=2A).

3.1.6   600-W Protection Circuits

Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 sec and a PSON# cycle HIGH for 1 sec shall be able to reset the power supply.

3.1.6.1   Over Voltage Protection

The power supply shall shutdown and latch off after an over voltage condition occurs. The voltage shall never exceed the maximum levels when measured at the power pins of the power supply connector during any single point of fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector. 5Vsb (stand-by) will be auto-recovered after removing the Over Voltage Protection limit.

3.1.6.2   Over Temperature Protection

In an over temperature condition, the power supply will shutdown. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically, while the 5VSB remains always on. The over temperature protection circuit has built-in hysterisis such that the power supply will not oscillate on and off due to a temperature recovering condition. The over temperature protection trip level shall have a minimum of 4°C of ambient temperature hysterisis.

3.1.7   600-W Power Supply Control and Indicator Functions

The following sections define the input and output signals from the power supply.

Signals that can be defined as low true use the following convention:

Signal# = low true

3.1.7.1   PSON# Input Signal

The PSON# signal is required for remotely turning on or off the power supply. PSON# is an active low signal that turns on the +3.3V, +5V, +12V, and -12V power rails. When this signal is not pulled low by the system, or left open, the outputs (except the +5VSB) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply.

3.1.7.2   PWOK (Power OK) Output Signal

PWOK is a power OK signal and is pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a LOW state. The start of the PWOK delay time shall be inhibited as long as any power supply output is in current limit.

3.1.8   Mean Time Between Failures (MTBF)

The power supply shall have a minimum MTBF at continuous operation of 100,000 hours at 80% load at 40°C, as calculated by Bellcore RPP, or 250,000 hours demonstrated at 80% load at 40°C.

3.2   730-W Power Supply

The 730W power supply replaceable module has two outputs: 12V and 5VSB. The input is power factor corrected. An IEC connector on the external face provides for AC input to the power supply. The power supply contains a cooling fan.

3.2.1   730W Power Supply Mechanical Outline
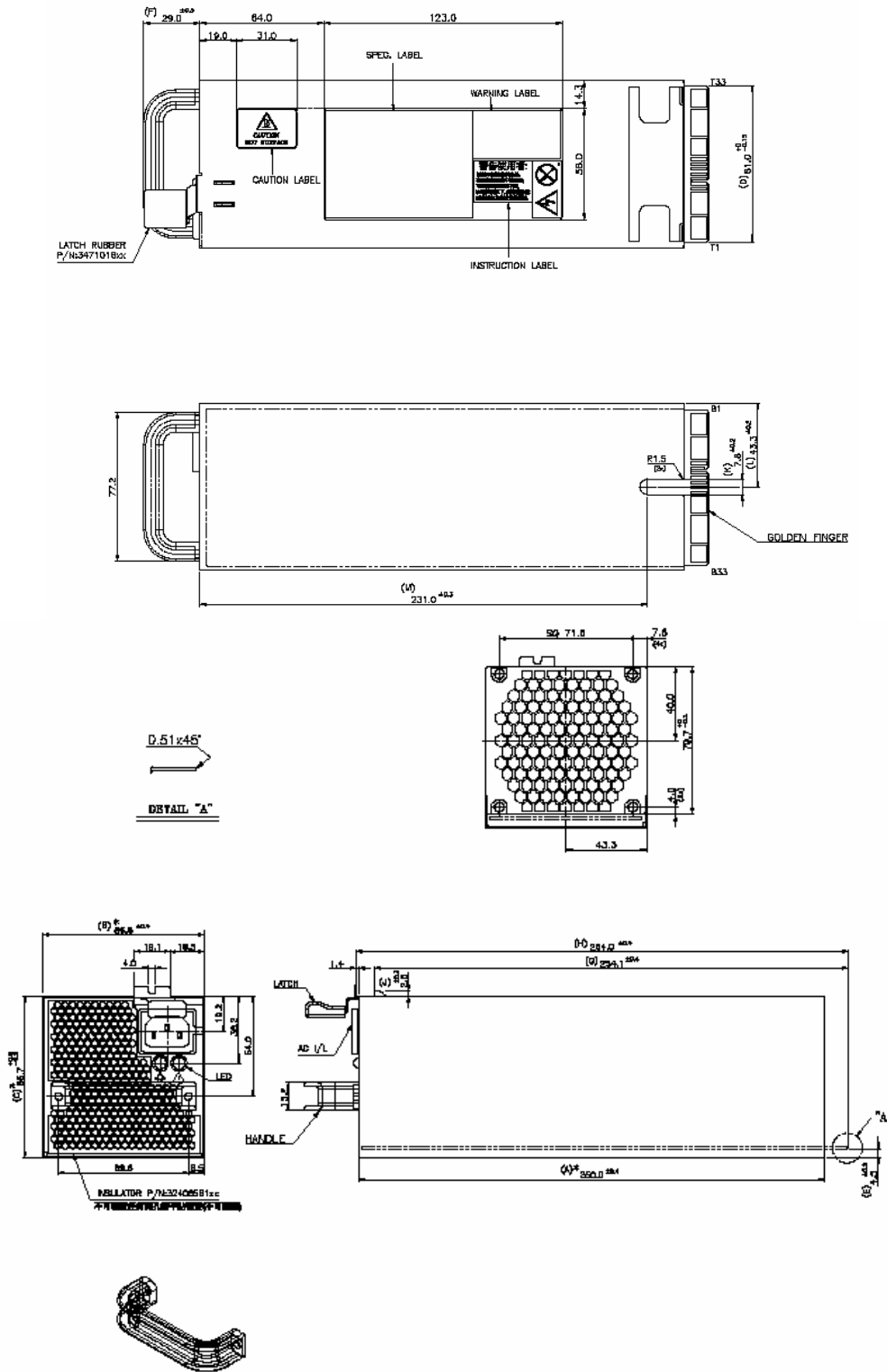
Figure 7. 730-W Power Supply Mechanical Drawings

3.2.2   Output Wire Harness

The output wiring harness is part of the power distribution board (backplane) and is described in that section. The 730-W power supply wiring harness is identical to the 600-W power supply described in Section 3.1.2 above.

3.2.3   Airflow Requirements and Temperature Rise

The power module supply incorporates one 80-mm fan. The fan will provide no less than 14 CFM airflow through the power supply when installed in the system

The power supply meets UL enclosure requirements for temperature rise limits. All sides of the power supply, with exception to the air exhaust side, are classified as "Handle, knobs, grips, etc., held for short periods of time only."

3.2.4   AC Specifications

The power supply incorporates universal power input with active power factor correction, which reduces line harmonics in accordance with the EN61000-3-2 and JEIDA MITI standards. The AC input connector shall be an IEC 320 C-14 power inlet. This inlet is rated for 15A / 250VAC.

3.2.4.1   AC Input Voltage Specification

The power supply operates within all specified limits over the following input voltage range (see the following table). The power supply shall power off if the AC input is less than the 75-80VAC range. The power supply operates properly starting at 80-85VAC input voltages.

Table 15. AC Input Rating

PARAMETER	MIN	RATED	MAX	Max Input Current	Start up VAC	Power Off VAC
Voltage (110)	90 V_{rms}	100-127 V_{rms}	140 V_{rms}	TBD A_{rms}	85Vac +/- 4Vac	75Vac +/- 5Vac
Voltage (220)	180 V_{rms}	200-240 V_{rms}	264 V_{rms}	TBD A_{rms}		
Frequency	47 Hz		63 Hz			

3.2.4.2   Efficiency

The power supply has a recommended minimum efficiency of 77% at maximum load and over the specified AC voltage.

3.2.4.3   AC Line Fuse

The power supply shall have a single line fuse, on the line (hot) wire of the AC input. The input fuse shall be a slow blow type. AC inrush current shall not cause the AC line fuse to blow under any conditions. No protection circuits in the power supply shall cause the AC fuse to blow unless a component in the power supply has failed. This includes DC output load short conditions.

3.2.5   730-W DC Specifications

3.2.5.1   Output Module Edge Connector

The power supply provides card edge fingers, which mate to a female connector located on the backplane (power distribution board). This blind mating type connector connects the power supply's output voltages and signals.

Table 16. Edge Finger Pin-out

Pin	Component side	Pin	Bottom
31	GND	31	GND
30	GND	30	GND
29	GND	29	GND
28	GND	28	GND
27	GND	27	GND
26	GND	26	GND
25	+12V	25	+12V
24	+12V	24	+12V
23	+12V	23	+12V
22	+12V	22	+12V
21	+12V	21	+12V
20	+12V	20	+12V
19	+12V	19	+12V
18	+12V	18	+12V
17	+12V	17	+12V
16	+12V	16	+12V
15	+12V	15	+12V
14	+12V	14	+12V
13	GND	13	GND
12	GND	12	GND
11	GND	11	GND

Pin	Component side	Pin	Bottom
10	GND	10	GND
9	GND	9	GND
8	GND	8	GND
7	Reserved	7	5VSB
6	PSKill	6	5VSB
5	PSON	5	Returns
4	PWOK	4	I2C SCL
3	SMBAlert	3	I2C SDA
2	+12LS	2	A0
1	Vbias	1	+12VRS

The ground of the pins of the output connector provides the power return path. The ground pin is connected to safety ground (power supply enclosure).

3.2.5.2 Output Power / Currents

The following table defines the current ratings for the 730-W power supply.

Table 17. 730-W Load Ratings

Voltage	Minimum Continuous Load	Maximum Continuous Load	Peak Load	Max Continuous Power	Max Peak Power
+12V	3.0 A	60 A	70 A peak (see note 2)	720 W	840 W
+5VSB	0 A	2.0 A	2.5 A	10 W	15 W
Total continuous power (note 1) =				730 W	
Total Peak power (note 2) =					855 W

Notes:

(1) Maximum continuous total DC output power should not exceed 730 watts.

(2) Peak power and peak current loading shall be supported for a minimum of 15 seconds.

3.2.5.3 Standby Outputs

The 5VSB output shall be present when an AC input greater than the power supply turn on voltage is applied.

3.2.5.4   Stand By Operation

Fan-less operation requirement is the power supply's ability to work indefinitely in stand-by mode: with power on, power supply off and the 5VSB at full load (=2A) under environmental conditions (temperature, humidity, altitude).

3.2.5.5   Voltage Regulation

The output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. All outputs are measured with reference to the return remote sense signal (ReturnS). The 12V and 5VSB outputs are measured at the power distribution output connectors referenced to return source.

Table 18. Voltage Regulation Limits

Parameter	Tolerance	MIN	NOM	MAX	Units
+ 12V	-4%/+5%	+11.52	+12.00	+12.60	V_{rms}
+ 5VSB	-4%/+5%	+4.80	+5.00	+5.25	V_{rms}

3.2.6   730-W Protection Circuits

Protection circuits inside the power supply shall cause only the power supply's main output to shutdown. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 sec and a PSON# cycle HIGH for 1 sec shall be able to reset the power supply.

3.2.6.1   Over Current Protection

The power supply shall have over current limit to prevent the +12V output. If the current limits are exceeded, the power supply shall shutdown and latch off. The latch is cleared by toggling the PSON# signal or by an AC power interruption. The power supply shall not be damaged from repeated power cycling in this condition. The 5VSB shall also be protected during over current or shorted conditions so that no damage can occur to the power supply.

3.2.6.2   Over Voltage Protection and Over Temperature

The power supply shall shutdown and latch off after an over voltage condition occurs. This latch is cleared by toggling the PSON# signal or by an AC power interruption.

The power supply is protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an over temperature protection (OTP) condition the power supply will shutdown. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically, while the 5VSB remains always on.

3.2.7   730-W Power Supply Control and Indicator Functions

3.2.7.1   PSON#   Input Signal

The PSON# signal is required to turn on/off the power supply. PSON# is an active low signal that turns on the +12V power rail. When this signal is not pulled low by the system, or left open, the output (except the +5VSB) turns off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply.

3.2.7.2   PWOK Output Signal

PWOK is a power OK signal and is pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK is de-asserted to a LOW state.

3.2.7.3   PSKILL Signal Requirements

The purpose of the PSKill pin is to allow for hot swapping of the power supply. The PSKill pin on the power supply is shorter than the other signal pins. When a power supply is operating in parallel with other power supplies and then extracted from the system, the PSKill pin will quickly turn off the power supply and prevent arching of the DC output contacts.

3.2.8   730-W Mean Time Between Failure (MTBF)

The power supply shall have a minimum MTBF at continuous operation of 100,000 hours at 100% load and 45°C, as calculated by Bellcore RPP, or 250,000 hours demonstrated at 100% load and 45°C.

3.2.9   Redundant (1+1) Hot Swap Mode

In the redundant (1+1) parallel configuration (two power supply modules installed) the +12V output shared output current is enough current to meet voltage regulation limits during hot swapping and power supply failures. Hot swapping a power supply is the process of inserting and extracting a power supply from an operating power system while the AC cord is unplugged. During this process, the output voltages shall remain within the limits specified. In general, a failed supply may be removed and replaced with a good power supply. Hot swap works with operational as well as failed power supplies. There is a mechanical latch on the power supply to prevent the removal or insertion of a power supply while the AC power cord is plugged into the power supply.

3.3   730-W Power Distribution Board

The power distribution board (PDB) is designed to plug directly to the output connector of the power supplies and contains the DC/DC power converters required to produce the output voltages: +3.3 VDC, +5 VDC and −12 VDC along with additional protection circuitry and a FRU EEPROM.

3.3.1   Power Distribution Mechanical Overview
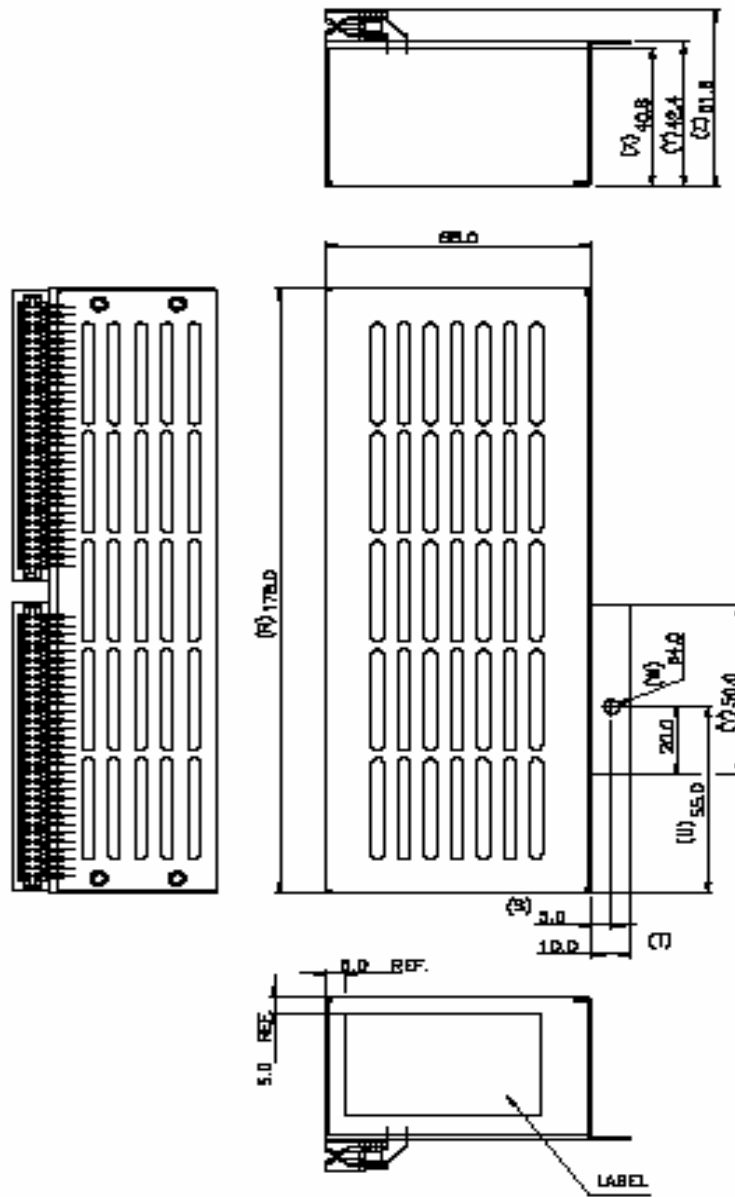
Note: All dimensions are in mm.

Figure 8. Enclosure Mechanical Dimensions
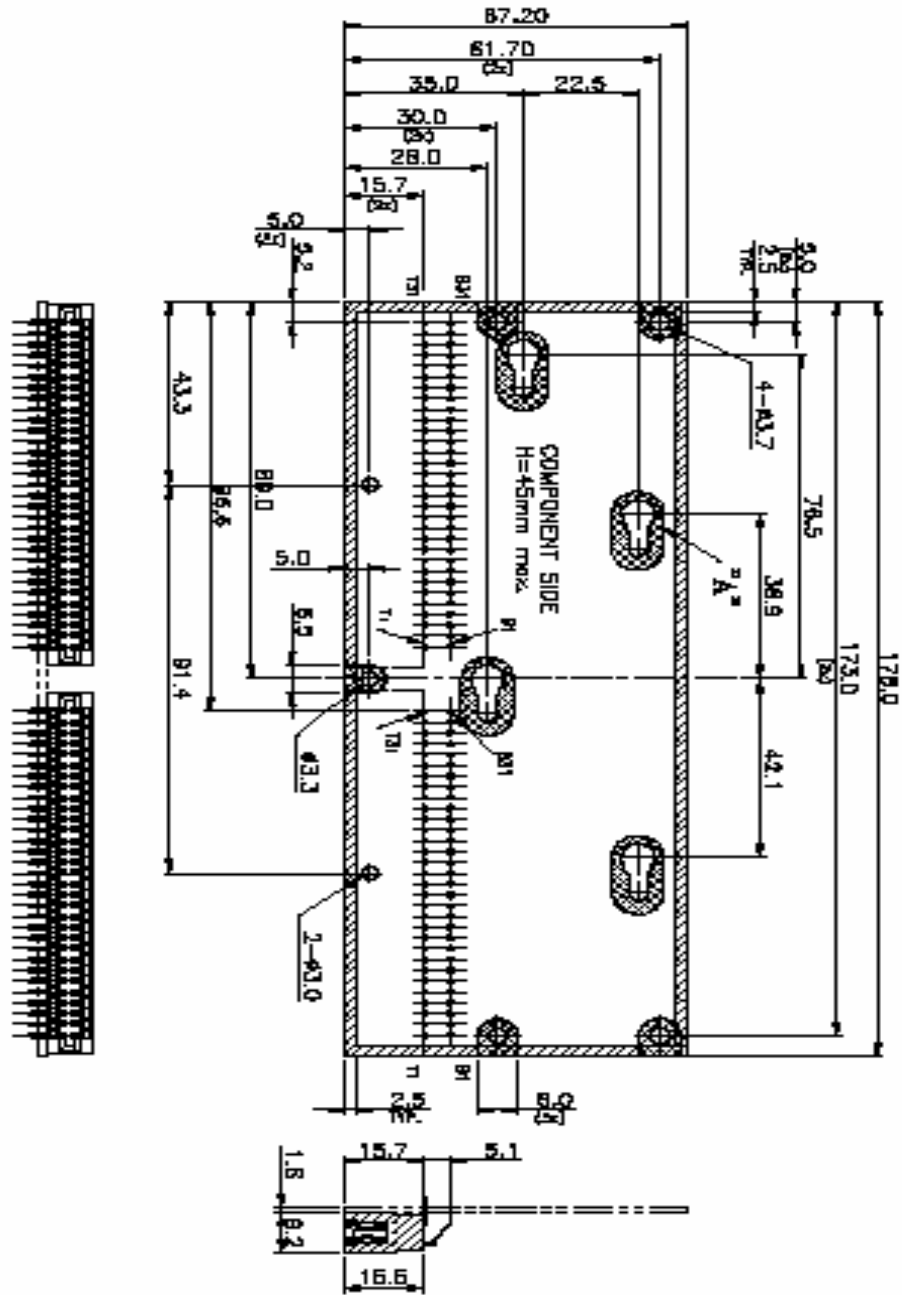
Figure 9. Mechanical Dimensions Power Distribution Board

Note: All dimensions in the drawing are in mm.

3.3.2   Temperature Operational Limits

The power supply modules provide airflow to cool the power distribution board. The power distribution board operates over the specified limits listed in the following table.

Table 19. Thermal Requirements

Item	Description	MIN	MAX	Units
T_{op}	Operating temperature range.	0	40	°C
T_{non-op}	Non-operating temperature range.	-40	70	°C

3.3.3   Electrical Specification

3.3.3.1   Input Connectors

Each connector provides card edge fingers, which mate with the female input connector on the power distribution board. The female type connector on the power distribution board is a right angle 2x31 pin type Singatron* (p/n: 2806-62-R-30T-P-K1) or equivalent.

Signals which are defined as low true or high true use the following convention:

signal# = low true

Reserved pins are reserved for future use.

Table 20. Cable Lengths

From	Length For revision S0 only (mm)	Connector #	No of pins	Description
Power Supply cover exit hole	450	P1	24	Baseboard Power Connector
Power Supply cover exit hole	450	P2	8	Processor Power Connector
Power Supply cover exit hole	230	P3	4	Peripheral Power Connector
Extension	100	P4	4	Peripheral Power Connector
Power Supply cover exit hole	350	P5	4	Peripheral Power Connector
Extension	100	P6	4	Floppy Power

				Connector
Power Supply cover exit hole	550	P7	4	Peripheral Power Connector
Extension	75	P8	4	Peripheral Power Connector
Power Supply cover exit hole	550	P9	4	Peripheral Power Connector
Extension	75	P10	4	Peripheral Power Connector
Power Supply cover exit hole	550	P11	4	Peripheral Power Connector
Extension	75	P12	4	Peripheral Power Connector
Signal	450	P13	5	Signal Connector

3.3.3.2   Baseboard Power Connector (P1)

Connector housing: 24-Pin Molex Mini-Fit Jr. 39-01-2245 or equivalent

Contact: Molex Mini-Fit, HCS, Female, Crimp 44476 or equivalent

Table 21. P1 Baseboard Power Connector

Pin	Signal	18 AWG Color	Pin	Signal	18 AWG Color
1	+3.3VDC*+	Orange	13	+3.3VDC	Orange
2	+3.3VDC	Orange	14	-12VDC	Blue
3	COM	Black	15	COM	Black
4	+5VDC*	Red	16	PSON#	Green
5	COM	Black	17	COM	Black
6	+5VDC	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	PWR OK	Gray	20	Reserved	N.C.
9	5 VSB	Purple	21	+5VDC	Red
10	+12V3	Yellow	22	+5VDC	Red
11	+12V3	Yellow	23	+5VDC	Red
12	+3.3VDC	Orange	24	COM	Black

Notes: * Remote Sense wire double crimped

+ If the signal connector is not present, the 3.3V remote sense wire will be double crimped into pin 1 in the baseboard power connector (P1)

3.3.3.3   Processor Power Connector (P2)

Connector housing: 8-Pin Molex 39-01-2080 or equivalent

Contact: Molex 44476-1111 or equivalent

Table 22. P2 Processor Power Connector

Pin	Signal	18 AWG color	Pin	Signal	18 AWG Color
1	COM	Black	5	+12V1	Yellow
2	COM	Black	6	+12V1	Yellow
3	COM	Black	7	+12V2	Yellow
4	COM	Black	8	+12V2	Yellow

3.3.3.4   Peripheral Power Connectors (P3 - P5, P7 - P12)

Connector housing: Amp 1-480424-0 or equivalent;

Contact: Amp 61314-1 contact or equivalent

Table 23. P3-P5, P7-P12 Peripheral Power Connectors

Pin	Signal	18 AWG Color
1	+12V4	Yellow
2	COM	Black
3	COM	Black
4	+5 VDC	Red

3.3.3.5   Floppy Power Connector (P6)

Connector housing: Amp 171822-4 or equivalent;

Contact: Amp 170204-1 contact or equivalent

Table 24. P6 Floppy Power Connector

Pin	Signal	22 AWG Color
1	+5VDC	Red
2	COM	Black
3	COM	Black

Pin	Signal	22 AWG Color
4	+12V4	Yellow

3.3.3.6   Power Signal Connector P13

Connector housing: 5-pin Molex 50-57-9405 or equivalent

Contacts: Molex 16-02-0087 or equivalent

Table 25. Power Signal Connector

Pin	Signal	24 AWG Color
1	I2C Clock	Brown
2	I2C Data	Blue
3	SMBAlert#	White
4	Return Sense	Black
5	3.3RS	Orange

3.3.3.7   12V Output Load Requirements

The +12V output power requirements from the power distribution board with a single or two ERP12V 730-W power supplies plugged into the input of the power distribution board are as follows.

Note: The combined total power limit for all outputs is 700-W max.

Table 26. +12V Outputs Load Ratings

	+12V1/2/3/4 combined output limit = 48A / 58Apk			
	+12V1	**+12V2**	**+12V3**	**+12V4**
MAX Load	14A	14A	16A	18A
MIN Static / Dynamic Load	0.5	0.5	1.5A	1.5A
Peak load	18A	18A	18A	22A

Notes:

(1) Combined output power from the power distribution board shall not exceed 700W.

(2) Combined power on the 3.3V/5V rails shall not exceed 140W.

(3) Combined current on the +12V rails shall not exceed 48A.

(4) Combined peak power out of the power distribution board shall not exceed 825W.

(5) Combined peak current on the total +12V rails shall not exceed 58A.

(6) Peak current on the 12V4 rail shall be supported for a minimum of 500msec.

(7) All rails from the power distribution board must meet the UL energy hazard requirements.

3.3.3.8   DC/DC Converters Loading

The following table defines the power and current ratings of the three DC/DC converters located on the power distribution board, each powered from the +12V rail. The three converters must meet both static and dynamic voltage regulation requirements for the minimum and maximum loading conditions.

3.3V / 5V combined power limit is 140W max.

Table 27. DC/DC Converters Load Ratings

	+12VDC Input DC/DC Converters		
	+3.3V Converter	**+5V Converter**	**-12V Converter**
MAX Load	24.0A	24.0A	0.5A
MIN Static / Dynamic Load	0.5A	0.5A	0A
Max Output Power, see note 1	3.3x24=79.2W	5x24=120W	0.5x12=6W

Notes:

(1) The straight sum of the three max powers = 205.2W, but considering the 3.3/5V power limit, it may be 140W +6W = 146W max combined power. In reality, at max load, each output voltage is allowed to sag to Vmin, so the actual each max power will then be is: for 3.3V, 3.2Vx24A = 76.8W; for 5V, 4.8Vx24A=115.2W; and for -12V, 11.4Vx0.5A=5.7W.

(2) All rails from the power distribution board must meet the UL energy hazard requirements.

3.3.3.9   Voltage Regulation

The DC/DC converters' output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. These limits include the peak-peak ripple/noise specified. All outputs are measured with reference to the return remote sense signal (ReturnS). The 3.3V output is measured at the 3.3 RS point, all other voltages are measured at the output harness connectors.

Table 28. Voltage Regulation Limits

Converter Output	Tolerance	MIN	NOM	MAX	Units
+ 3.3VDC	- 3% / +5%	+3.20	+3.30	+3.465	VDC
+ 5VDC	- 4% / +5%	+4.80	+5.00	+5.25	VDC
+12VDC (12V1/2/3/4)	-4%/ +5%	+11.52	+12.00	+12.60	VDC
- 12VDC	- 5% / +9%	-11.40	-12.00	-13.08	VDC

Converter Output	Tolerance	MIN	NOM	MAX	Units
5VSB	-4% / +5%	+4.80	+5.00	+5.25	VDC

3.3.3.10   Fan-less Operation in Stand-by Mode

The power supply will work indefinitely in standby mode with power on, power supply plus power distribution board off, and the 5VSB at full load under environmental conditions (temperature, humidity, altitude) as specified.

3.3.4   Protection Circuits

Protection circuits inside the power distribution board (and the power supply) shall cause either the power supply's main +12V output to shutdown, which in turn shuts down the other 3 outputs on the power distribution board or first shut down any of the 3 outputs on the power distribution board, which in turn also shuts down the entire power supply combo. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 sec min and a PSON# cycle HIGH for 1sec shall be able to reset the power supply and the power distribution board.

3.3.4.1   Over Current Protection (OCP) / 240VA Current Limit

Each DC/DC converter output on the power distribution board has individual OCP protection circuits. The power supply will shutdown and latch off after an over current condition occurs. This latch is cleared by toggling the PSON$^{\#}$ signal or by an AC power interruption. Also, the +12V output from the power supply is divided on the power distribution board into four channels and each is limited to 240 VA of power. Current sensors and limit circuits shut down the entire power supply if the limit is exceeded.

3.3.4.2   Over Voltage Protection (OVP)

Each DC/DC converter output on the power distribution board shall have individual OVP protection circuits built in and shall be locally sensed. The power supply shall shutdown and latch off after an over voltage condition occurs. This latch shall be cleared by toggling the PSON# signal or by an AC power interruption. The values are measured at the power distribution board harness connectors. The voltage shall never exceed the maximum levels when measured at the power pins of the output harness connector during any single point of fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power distribution board connector.

3.3.5   Control and Indicator Functions

The following sections define the input and output signals from the power distribution board.

Signals that can be defined as low true use the following convention:

    signal# = low true

3.3.5.1   PSON#   Input and Output Signals

The PSON# signal is required to remotely turn on/off the power supply.

3.3.5.2   PSKILL

The purpose of the PSKill pin is to allow for hot swapping of the power supply. The mating pin of this signal on the power distribution board input connector should be tied to ground, and its resistance shall be less than 5 ohms.

3.3.5.3   PWOK (Power OK) Input and Output Signals

PWOK is a Power Good, 5V TTL compatible, coming from the power supply, active HI logic signal, which will be pulled HIGH by the power supply to indicate that its +12V output is within its regulation limits. When its +12V output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a LOW state.

3.3.5.4   lert# Output Signal

This signal indicates that the power supply is experiencing a problem that the user should investigate. This signal from each supply is OR-ed on the power distribution board, and then becomes one PSALERT# output signal to the system. See the power supply specification for signal description details.

3.4   SMBus Monitoring Interface

The 600-W and 730-W power supplies are compatible with both SMBus 2.0 'high power' and I^2C Vdd based power and drive. This bus operates at 3.3V. The SMBus pull-ups are located on the server board.

The SMBus provides power monitoring, failure conditions, warning conditions, and FRU data. Two pins have been reserved on the connector to provide this information. One pin is the Serial Clock (PSM Clock). The second pin is used for Serial Data (PSM Data). Both pins are bi-directional and are used to form a serial bus.

There are two usage models depending on the system. The system shall control the usage model by setting the Usage Mode bit.

Default Mode: In this mode, the LEDs and registers must automatically clear when a warning event has occurred, because there is no software, BIOS, or other agent that will access the power supply via the SMBus to do any clearing.

Intelligent Mode: A system management controller or BIOS agent exists that can read and clear status. In this mode, the LEDs and registers should latch when a warning event occurs so that the system and user can read their status before it changes during transient events. There should also be a mechanism to allow the system management or BIOS to 'force' the LED states in order to identify which power supply should be replaced.

Critical events will cause the power supply to shutdown and latch the LED and SMBAlert signal no matter what mode the power supply is in; "default" or Intelligent."

Warning events latch the LED and SMBAlert signal when in "intelligent" mode. If in the "default" mode, the LED and SMBAlert signal will de-assert as soon as the condition driving the event clears.

3.4.1   Mean Time Between Failures (MTBF)

The backplane assembly shall have a minimum MTBF at continuous operation of 400,000 hours at 100% load and 45°C, as calculated by Bellcore RPP, or 1 million hours demonstrated at 100% load and 45°C.

4. System Cooling

4.1 Fan Configuration

Two cooling solutions are employed in the Server Chassis SC5300. The base solution consists of two fixed fans (92mm and 120mm) to provide sufficient system cooling. The second redundant solution is designed for maximum up time by providing four replaceable hot-swap fans (80mm and 120mm) that maintain proper system cooling, with a single failed fan. Air ducts are used in both configurations and an active memory heat sink solution for the server board memory may be required for a few system configurations.

4.1.1 Processor Passive Heat Sink Cooling Solution

Processors with passive heat sinks should be used unless otherwise indicated in the server board manuals. The ducting shown (see the following figure) is designed to work with the passive heat sink.

Air flows through the system from front to back. The heat sink solution used for the Server Chassis SC5300 is provided with the Intel® Xeon™ processors.
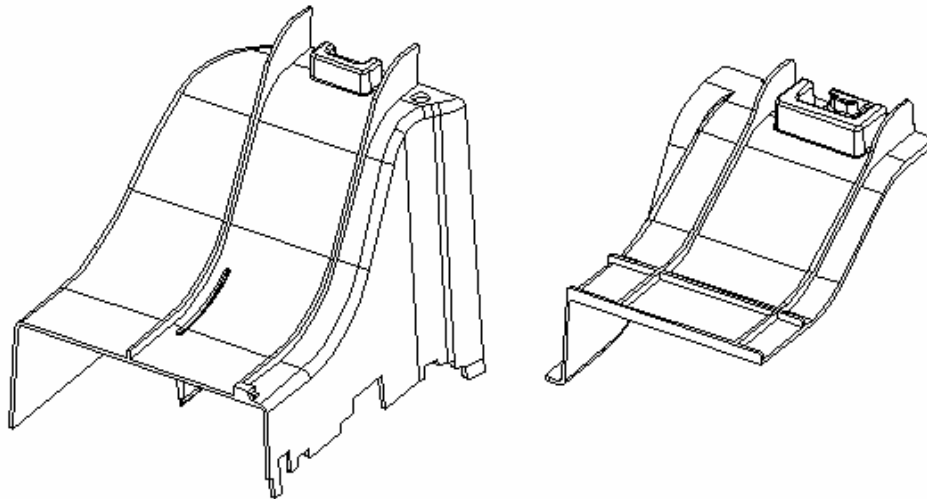
Figure 10. CPU and PCI Air Ducts

4.1.2   Base Cooling Solution

One 120 x 38mm fan and one 92 x 38mm fan provide cooling for the processors, hard drives, and add-in cards. These two fans draw air through the rear of each hard drive bay to provide drive cooling. In addition, the power supply fan provides cooling for the power supply.
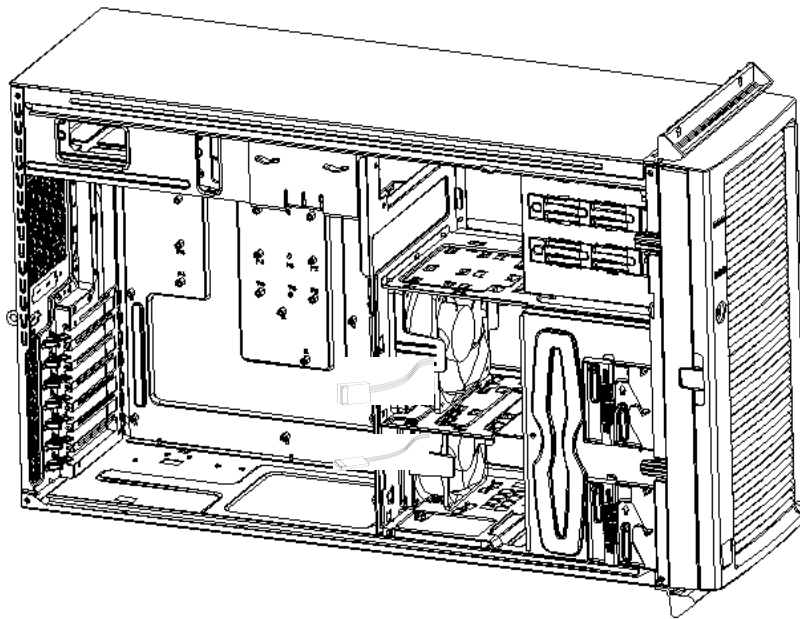
Figure 11. Fixed Fan Mounting

4.1.2   Redundant Cooling Solution

Two hot swap 120x38mm fans and two hot swap 92x38mm fans provide cooling for the processors, hard drives and add-in cards. The two 120x38mm fans ensure proper cooling of the core area (processors and memory) and the hot swap drive bay. The two 92x38mm fans provide cooling for the PCI card area. When any single fan fails, 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.
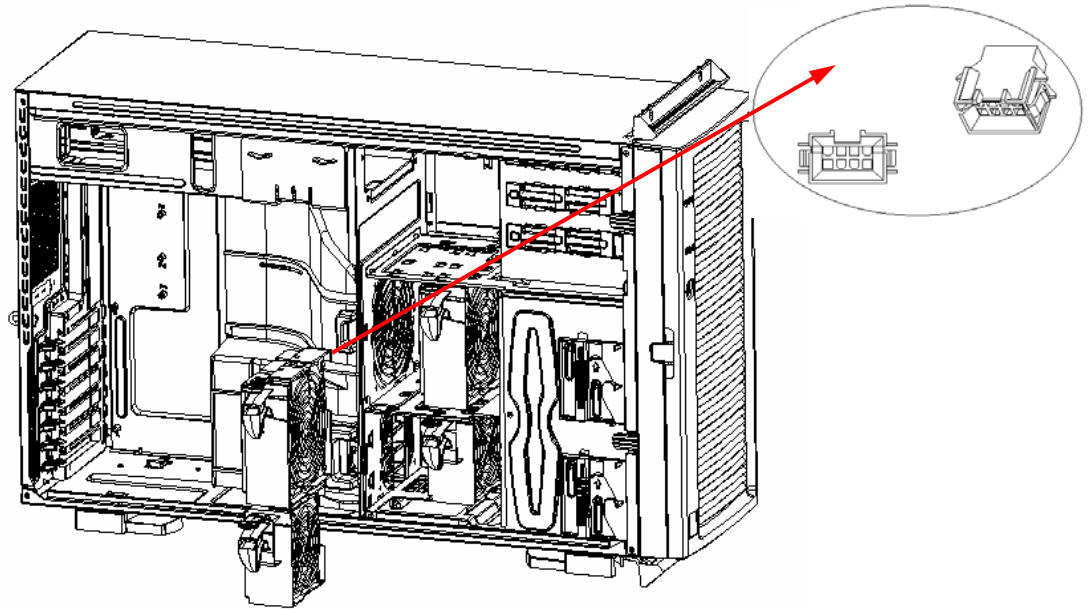
Figure 12. Hot Swap Fans and Connectors
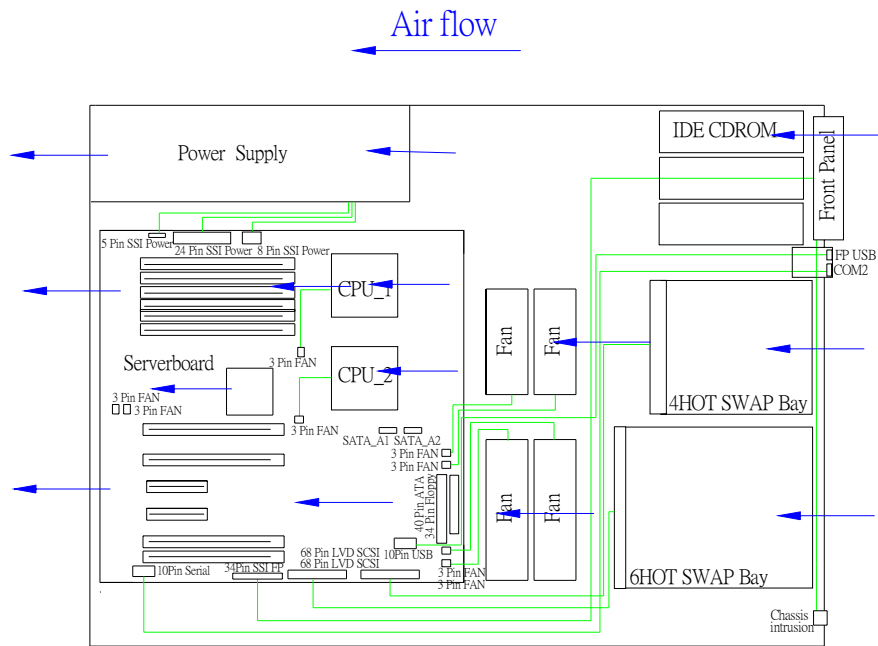
Figure 13. Redundant Chassis Airflow Characteristics

4.2   Fan Control

The fans in the Intel® Server Chassis SC5300 are designed for server boards which support fan control. 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. To hot swap a fan, the user should remove the failed fan, wait at least 30 seconds, and then 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.

4.3   FAN Header Connector Descriptions

Fan #1 and #2 headers on the supported server boards are different from Fan #3 and #4 headers due to the use of new pulse width modulated(PWM) fans used for cooling the processors in the chassis.

Fan #1 and #2 are the standard 3-pin fan headers used with 3-wire fans (pwr, tach, gnd). These fans are commonly called "TAC Fans".

Fan #3 and #4 headers are a combination of 3-pin and 2-pin fan headers. The 3-pin connector can be used for a standard 3-wire fan (pwr, tach, gnd). New for the Server Chassis SC5300 series is a 6-pin fan connector, which can span the two connectors required for the added hot swap functions. The empty pin is a key, so that these fan header connectors cannot mistakenly be plugged into headers #5 and #6.

Fan #5 and #6 are the new 6-pin fan headers for the new 4-wire fans (pwr, tach, gnd, pwm) plus the hot swap signals. All 6 pins are used on this connector.

The new 4-wire fans used for cooling the processors allows the RPM to vary from 20% to 100% of full speed. This expanded speed range provides better acoustics and thermal control. The older 3-wire fans are limited to a 60% to 100% RPM range. Fans #1 through #4 on the supported server boards remain compatible with more common (older) 3-pin fan headers.

5.   Hard Disk Drive Bays

5.1   Server Chassis SC5300 4HDD and 6HDD SCSI HSBP Overview

The Server Chassis SC5300 4HDD or 6HDD SCSI Hot Swap Backplane (HSBP) is a monolithic printed circuit board. The architecture is based on the QLogic[*] GEM359 enclosure management controller and has support for up to 4 or 6 SCSI drives.

The 4HDD and 6HDD SCSI HSBP supports the following feature set:

- QLogic[*] GEM359 enclosure management controller
  - External non-volatile Flash ROM
  - Two I^2C interfaces
  - Low Voltage Differential (LVD) SCSI Interface
  - SCSI-3 compatible
  - Compliance with SCSI Accessed Fault Tolerant Enclosures (SAF-TE) specification, version 1.00 and addendum
  - Compliance with Intelligent Platform Management Interface (IPMI)
- Support for up to 4 or 6 each U320 LVD SCSI Drives
  - Onboard LVD SCSI Termination
- Hot Swap Power Controller
- Temperature Sensor
- FRU EEPROM
- Two 4-pin Standard HD Power Connectors

5.1.1   SCSI Enclosure Management Controller

The QLogic[*] GEM359 is an enclosure management controller for the SCSI backplanes and monitors various aspects of a storage enclosure. The chip provides in-band SAF-TE and SES management through the SCSI interface. The GEM359 also supports the IPMI specification by providing management data to a baseboard management controller through the IPMB.

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

The SCSI interface on the LVD SCSI backplane provides the link between the SCSI bus and the SCSI Accessed Fault Tolerant Enclosure (SAF-TE) controller. The SAF-TE interface allows the enclosure management controller to respond as a SCSI target to implement the SAF-TE protocol.

Power control on the LVD 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 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.

5.1.2   SCSI Interface

The GEM359 controller supports LVD SCSI operation through 8-bit asynchronous SCSI data transfers.

5.1.2.1   I^{2}C Serial Bus Interface

The GEM359 supports two independent I^{2}C interface ports. This enables actual temperature value readings to be returned to the host. The Intelligent Platform Management Bus (IPMB) is supported through I^{2}C port 1.

5.1.2.2   Temperature Sensor

The SCSI HSBP provides a temperature sensor with an over-temperature detector. The host can query the backplane at any time to read the temperature. The host can program both the temperature alarm threshold and the temperature at which the alarm condition goes away.

5.1.2.3   Serial EEPROM

The SCSI HSBP provides an Atmel* 24C02 or equivalent serial EEPROM for storing FRU information. The 24C02 EEPROM provides 2048 bits of serial electrically erasable and programmable read-only memory.

5.1.3   External Memory Device

The SCSI HSBP contains a non-volatile 16K Top Boot Block, 4Mbit Flash memory device that stores the configuration data and operating firmware executed by the GEM359 controller's internal CPU.

5.1.4   Hot Swap Power Controller

The SCSI HSBP provides a Texas Instrument* TPS2320 or equivalent, Dual Channel Hot Swap Power Controller with independent circuit breaker support. The controller uses external N-channel MOSFETs as high-side switches for 5V and 12V and supports the following features: overcurrent protection (OCP), inrush-current control, and electrostatic discharge protection. The controller is housed in a 16-pin TSSOP package.

5.1.5   SCSI Drive Connectors

The SCSI HSBP provides SCA2 connectors for hot swappable drives with support up to the Ultra-320 LVD transfer rate. The HSBP only supports LVD mode, and not SE or HVD mode.

The HSBP provides one 68-pin SCSI connector to cable back to the host system.

The HSBP provides active termination, termination voltage, a reset-able fuse, and a protection diode for the SCSI channel. By design, on-board termination cannot be disabled.

5.1.6   Power Connectors

The SCSI HSBP provides two standard 4-pin hard drive power connectors.

The following table defines the pin-out of the 4-pin power connector.

Table 29. Power Connector Pin-out

Pin	Signal
1	12V
2	GND
3	GND
4	5V

5.1.7   SCA2 SCSI Connector

The following table defines the pin-out of the 80-pin SCA2 SCSI connector.

Table 30. SCA2 SCSI Connector Pin-out

Connector Contact Number	Signal Name	Signal Name	Connector Contact Number
1	12V CHARGE	12V GND	41
2	12V	12V GND	42
3	12V	12V GND	43
4	12V	MATED 1	44
5	OPT 3.3V	3.3V CHARGE	45
6	OPT 3.3V	DIFFSNS	46
7	-DB(11)	+DB(11)	47
8	-DB(10)	+DB(10)	48
9	-DB(9)	+DB(9)	49
10	-DB(8)	+DB(8)	50
11	-I/O	+I/O	51
12	-REQ	+REQ	52
13	-C/D	+C/D	53
14	-SEL	+SEL	54

Connector Contact Number	Signal Name	Signal Name	Connector Contact Number
15	-MSG	+MSG	55
16	-RST	+RST	56
17	-ACK	+ACK	57
18	-BSY	+BSY	58
19	-ATN	+ATN	59
20	-DB(P)	+DB(P)	60
21	-DB(7)	+DB(7)	61
22	-DB(6)	+DB(6)	62
23	-DB(5)	+DB(5)	63
24	-DB(4)	+DB(4)	64
25	-DB(3)	+DB(3)	65
26	-DB(2)	+DB(2)	66
27	-DB(1)	+DB(1)	67
28	-DB(0)	+DB(0)	68
29	-DB(P1)	+DB(P1)	69
30	-DB(15)	+DB(15)	70
31	-DB(14)	+DB(14)	71
32	-DB(13)	+DB(13)	72
33	-DB(12)	+DB(12)	73
34	5V	MATED 2	74
35	5V	5V GND	75
36	5V CHARGE	5V GND	76
37	SPINDLE SYNC	ACT LED OUT	77
38	RMT START	DLYD START	78
39	SCSI ID(0)	SCSI ID(1)	79
40	SCSI ID(2)	SCSI ID(3)	80

5.1.8   68-Pin SCSI Connector

The following table defines the pin-out of the 68-pin SCSI Connector.

Table 31. 68-pin SCSI Connector Pin-out

Connector Contact Number	Signal Name	Signal Name	Connector Contact Number
1	+DB(12)	-DB(12)	35
2	+DB(13)	-DB(13)	36
3	+DB(14)	-DB(14)	37
4	+DB(15)	-DB(15)	38
5	+DB(P1)	-DB(P1)	39
6	+DB(0)	-DB(0)	40
7	+DB(1)	-DB(1)	41
8	+DB(2)	-DB(2)	42
9	+DB(3)	-DB(3)	43
10	+DB(4)	-DB(4)	44
11	+DB(5)	-DB(5)	45
12	+DB(6)	-DB(6)	46
13	+DB(7)	-DB(7)	47
14	+DB(P)	-DB(P)	48
15	GROUND	GROUND	49
16	DIFFSENSE	GROUND	50
17	TERMPWR	TERMPWR	51
18	TERMPWR	TERMPWR	52
19	RESERVED	RESERVED	53
20	GROUND	GROUND	54
21	+ATN	-ATN	55
22	GROUND	GROUND	56
23	+BSY	-BSY	57
24	+ACK	-ACK	58
25	+RST	-RST	59
26	+MSG	-MSG	60
27	+SEL	-SEL	61
28	+C/D	-C/D	62
29	+REQ	-REQ	63
30	+I/O	-I/O	64
31	+DB(8)	-DB(8)	65

Connector Contact Number	Signal Name	Signal Name	Connector Contact Number
32	+DB(9)	-DB(9)	66
33	+DB(10)	-DB(10)	67
34	+DB(11)	-DB(11)	68

5.1.9   IPMB (I2C) Header

The following table defines the pin-out of the 4-pin IPMB Header at J1.

Table 32. IPMB Header Pin-out

Pin	Signal Name	Description
1	N/C	
2	BP_I2C_SCL	Clock
3	GND	
4	BP_I2C_SDA	Data

5.1.10   Power Budget

The following table shows the worst-case power budget for the 4HDD and 6HDD SCSI hot swap backplanes.

Table 33. Hot Swap Backplane Worst-case Power Budget

Intel® Server Chassis SC5300 4HDD or 6HDD SCSI Hot Swap Backplane	12V	5V
Backplane	0.1 A	2.0 A
4HDD or 6HDD	10.0 A	10.0 A
Total Current	10.1 A	12.0 A

5.1.11   Hard Drive Activity and Fault LED

The SCSI HSBP contains a green ACTIVITY LED and a yellow FAULT LED for each of the four drive connectors. The ACTIVITY LED is driven by the SCSI HD itself whenever the drive is accessed. The FAULT LED is driven by the GEM359 controller whenever an error condition, as

defined by the firmware, is detected.

Table 34. Hard Drive Activity LED

Drive	HSBP LED Activated	4 HDD Bay LED Designator	6 HDD Bay LED Designator	Fault LED Color	Activity LED Color
1	Drive 0 - Conn 2	D1	D1	Yellow	Green
2	Drive 1 – Conn 3	D2	D2	Yellow	Green
3	Drive 2 – Conn 4	D3	D3	Yellow	Green
4	Drive 3 – Conn 5	D4	D4	Yellow	Green
5 (6 HDD only)	Drive 4 – Conn 6	none	D5	Yellow	Green
6 (6 HDD only)	Drive 5 – Conn 7	None	D6	Yellow	Green

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 SCSI backplane.

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

5.1.12   SCSI Backplane Status LEDs.

Each SCSI backplane has two status LEDs used to indicate system fail or system alarm. These LED's are located on the power connector side of the SCSI backplane and are visible from the interior of the chassis.

Table 35. SCSI Backplane LED

Back plane	LED Designator	Signal Name
4 HDD	D5	SYS_FAIL
4 DD	D6	SYS_ALARM
6 HDD	D7	SYS_FAIL
6 HDD	D8	SYS_ALARM

The following are isometric views of the SCSI backplane assemblies.
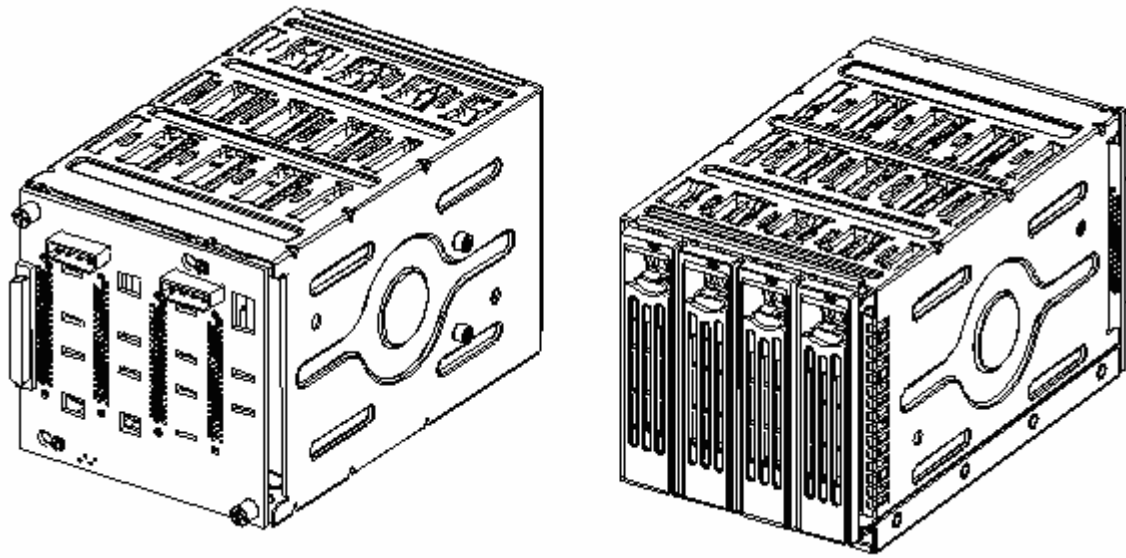
Figure 14. 4-HDD Hot Swap Drive Bay, Front/Rear Isometric View
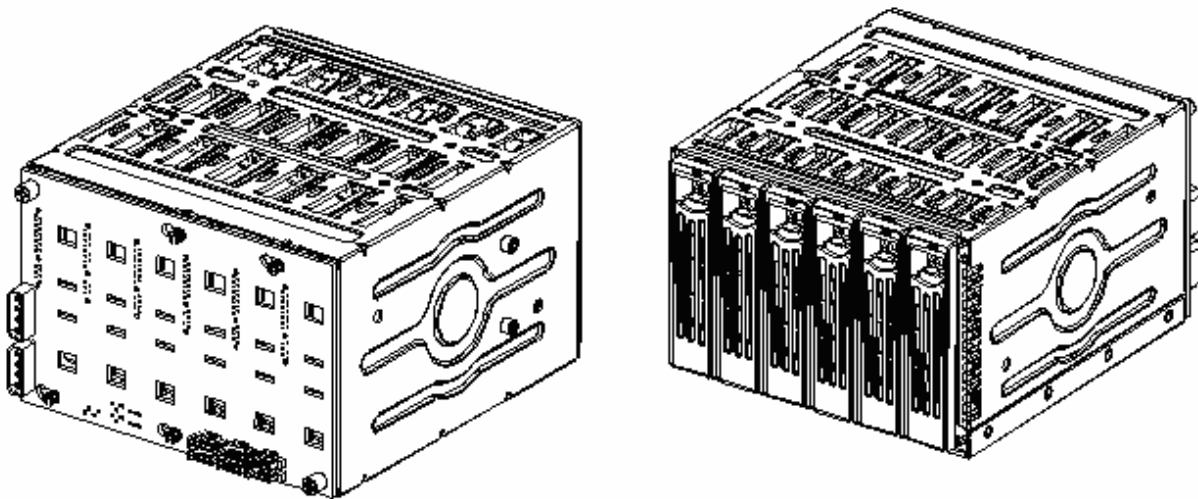
Figure 15. 6-HDD Hot Swap Drive Bay, Front/Rear Isometric View
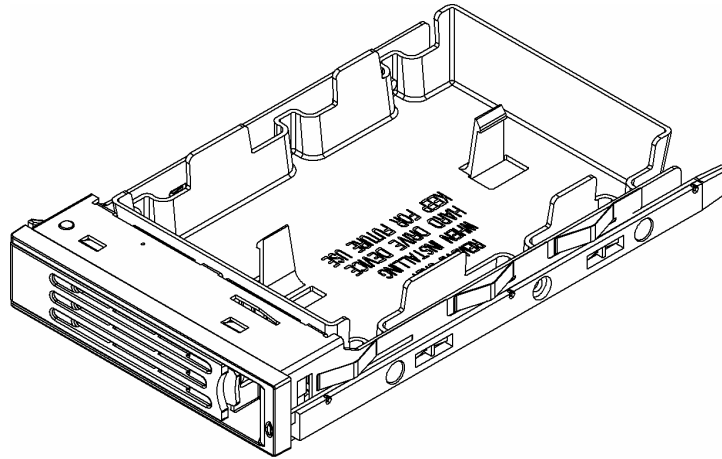
Figure 16. Drive Carrier with Air Baffle Installed

5.1.13   SCSI Hot Swap Drive Bay Upgrade Kits

The two optional SCSI HSBP drive bays allow for installation of up to six SCSI drives in the SC5300BASE configuration and up to ten SCSI drives in the SC5300BRP and SC5300LX configurations.

Kit Order Codes:

- 6 Drive Bay – AXX6SCSIDB / MM# 856604
- 4 Drive Bay – AXX4SCSIDB / MM# 856603

5.2   SATA/SAS Hot Swap Backplane

The Server Chassis SC5300 6HDD SATA/SAS HSBP is a monolithic printed circuit board. The architecture is based on a QLogic* GEM424 enclosure management controller and has support for up to 6 SATA/SAS drives.

The 6HDD SATA/SAS HSBP supports the following feature set:

- QLogic* GEM424 enclosure management controller
    - External non-volatile SEEPROMs
    - Three I^2C interfaces
    - SATA, SATA-II and SAS extension compatible
    - Compliance with SATA Accessed Fault Tolerant Enclosures (SAF-TE) specification, version 1.00 and addendum
    - Compliance with Intelligent Platform Management Interface 1.5 (IPMI)
    - Support for up to six SAS 1.5/3.0Gbps,SATA I or SATA II Drives
- Hot swap drive support
- Temperature sensor
- FRU EEPROM
- Two 4-pin standard hard drive power connectors

The following figure shows the functional blocks of the SATA/SAS HSBP.

SATA BACK PLANE BOARD – 6 PORT

SATA	SATA	SATA	SATA	SATA	SATA
HDD1	HDD2	HDD3	HDD4	HDD5	HDD6
P.8	P.8	P.8	P.8	P.8	P.8

SATA 7PIN Conn6
P.7

SATA 7PIN Conn5
P.7

SATA 7PIN Conn4
P.7

SATA 7PIN Conn3
P.7

SATA 7PIN Conn2
P.7

SATA 7PIN Conn1
P.7

STATUS
DISPLAY
LED

P.9

Hardware Monitor
& SAF-TE

P.2 & P.3
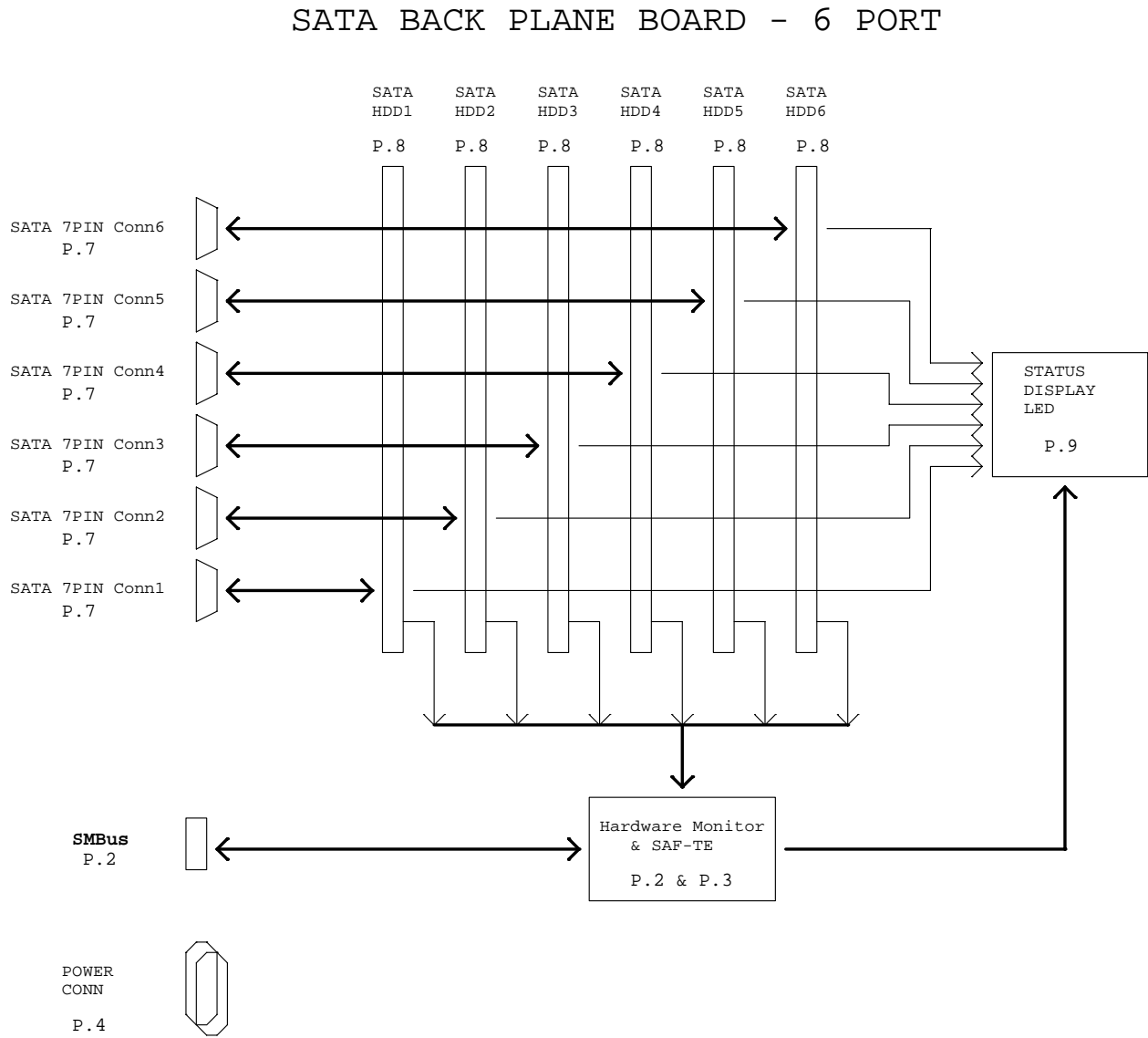
SMBus
P.2

POWER
CONN

P.4

Figure 17. Intel® Server Chassis SC5300 6-HDD SATA/SAS Hot Swap Backplane Block Diagram

5.2.1   Enclosure Management Controller

The QLogic* GEM424 is an enclosure management controller for the SATA/SAS backplane and monitors various aspects of a storage enclosure. The chip provides out-of-band SAF-TE management through the SATA/SAS Host I^{2}C interface. The GEM424 controller also supports the IPMI specification by providing management data to a baseboard management controller through the IPMB.

The GEM424 has general input and output pins (GPIO) that allow customization. These GPIOs are used for hardware drive detection and driving FAULT and ACTIVITY LEDs.

The GEM424 controller comes in an 80-pin Thin Quad Flat Pack (TQFP) package and operates from the 3.3V rail with an input clock frequency of 20MHz.

5.2.2   SATA/SAS Interface

The GEM424 controller implements SAF-TE over the HBA I^{2}C interface. The GEM424 controller supports the following SAF-TE Command Set:

- Read Enclosure Configuration
- Read Enclosure Status
- Read Device Slot Status
- Read Global Flags
- Write Device Slot Status
- Perform Slot Operation

5.2.3   I^{2}C Serial Bus Interface

The GEM424 controller supports two independent I^{2}C interface ports with bus speeds of up to 400Kbits. The I^{2}C core incorporates 8-bit FIFOs for data transfer buffering. The I^{2}C bus supports National* LM75 or equivalent I^{2}C -based temperature sensors. This enables actual temperature value readings to be returned to the host. The Intelligent Platform Management Bus (IPMB) is supported through I^{2}C port 0.

The following figure provides a block diagram of the I^{2}C bus connection implemented on the 6HDD SATA/SAS HSBP.

Addr = 0xA0   Addr = 0xA2
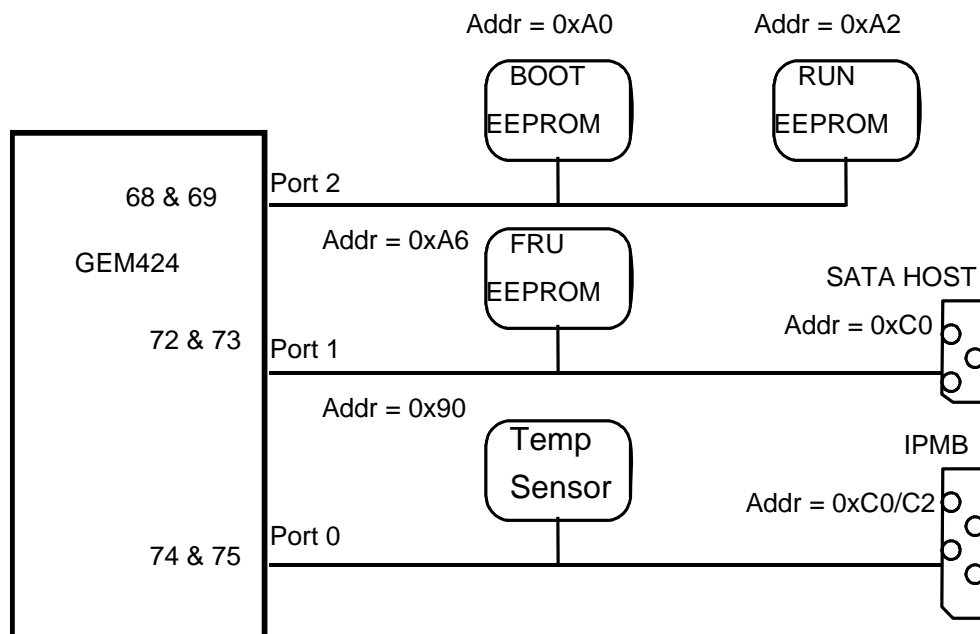
Figure 18. Intel® Server Chassis SC5300 6-HDD SATA/SAS Hot Swap Backplane I²C Bus Connection Diagram

Details of IPMI support and various firmware support can be found in the 6HDD SATA/SAS HSBP firmware EPS.

5.2.3.1   I²C Bus Address and Loading

Table 36. I²C Bus Addressing

LM75 I2C Address	24C128 EEPROM I2C	24C512 EEPROM I2C	24C02 EEPROM I2C
90h	A0h	A2h	A6h

Table 37. I²C Bus Loading

Device	Power Well	ViH	ViL	VoL	Ileak	CAP	I2C Address	I2C Bus Name
LM75	P5V	0.7VCC	0.3VCC	0.4V/3mA	6uA	20PF	94h	SDA0,SCL0
GEM424	P5V	0.7VCC	0.3VCC	0.4V/3mA	10uA	4PF	GEM424 allot	SDA0,SCL0
J13	P5V	0.7VCC*	0.3VCC*	0.4V/3mA*	10uA*	4/8P*	*	SDA0,SCL0
GEM424	P5V	0.7VCC	0.3VCC	0.4V/3mA	10uA	4PF	GEM424 allot	SDA1,SCL1

JP1	P5V	0.7VCC*	0.3VCC*	0.4V/3mA*	10uA*	4/8P*	*	SDA1,SCL1
GEM424	P5V	0.7VCC	0.3VCC	0.4V/3mA	10uA	4PF	GEM424 allot	SDA2,SCL2
PCA9554	P5V	0.7VCC	0.3VCC	0.4/3mA	10uA	10PF	40h	SDA2,SCL2
AT24C512	P5V	0.7VCC	0.3VCC	0.4V/2.1mA	3uA	8PF	A2h	SDA2,SCL2
AT24C128	P5V	0.7VCC	0.3VCC	0.4V/2.1mA	3uA	8PF	A0h	SDA2,SCL2
AT24C02	P5V	0.7VCC	0.3VCC	0.4V/2.1mA	3uA	8PF	A6h	SDA2,SCL2
JP2	P5V	0.7VCC*	0.3VCC*	0.4V/3mA*	10uA*	4/8P*	*	SDA2,SCL2

5.2.3.2   Temperature Sensor

The 6HDD SATA/SAS HSBP provides a National* LM75 or equivalent temperature sensor. The host can query the LM75 at any time to read the temperature.

The temperature sensor has an I^{2}C address of 0x90h on the GEM424 controller Port 0.

5.2.3.3   Serial EEPROM

The 6HDD SATA/SAS HSBP provides an Atmel* 24C02 or equivalent serial EEPROM for storing FRU information. The 24C02 provides 2048 bits of serial electrically erasable and programmable read-only memory.

The serial EEPROM has an I^{2}C address of 0xA6h on the GEM424 controller Port 1.

5.2.4   General Purpose Input/Output (GPIO)

The GEM424 controller supports GPIO pins that are customizable. The following table lists the GPIO pins with their assigned functions.

Table 38. GEM424* Controller GPIO Assignment

GEM424 PIN NAME	I/O Type	Power Well	Programming Description	System Function	Reset State	Initial Value	Connection
GPIO0	O	3.3V	HDD0 Active LED	HD0_ACT_LED			Pull up 4.7K to 5V
GPIO1	O	3.3V	HDD1 Active LED	HD1_ACT_LED			Pull up 4.7K to 5V
GPIO2	O	3.3V	HDD2 Active LED	HD2_ACT_LED			Pull up 4.7K to 5V
GPIO3	O	3.3V	HDD3 Active LED	HD3_ACT_LED			Pull up 4.7K to 5V
GPIO4	O	3.3V	HDD4 Active LED	HD4_ACT_LED			Pull up 4.7K to 5V

GEM424 PIN NAME	I/O Type	Power Well	Programming Description	System Function	Reset State	Initial Value	Connection
GPIO5	O	3.3V	HDD5 Active LED	HD5_ACT_LED			Pull up 4.7K to 5V
GPIO6	O	3.3V	SATA HDD0 Status LED	HD0_FLT_LED_L			Pull up 4.7K to 5V
GPIO7	O	3.3V	SATA HDD1 Status LED	HD1_FLT_LED_L			Pull up 4.7K to 5V
GPIO8	O	3.3V	SATA HDD2 Status LED	HD2_FLT_LED_L			Pull up 4.7K to 5V
GPIO9	O	3.3V	SATA HDD3 Status LED	HD3_FLT_LED_L			Pull up 4.7K to 5V
GPIO10	O	3.3V	SATA HDD4 Status LED	HD4_FLT_LED_L			Pull up 4.7K to 5V
GPIO11	O	3.3V	SATA HDD5 Status LED	HD5_FLT_LED_L			Pull up 4.7K to 5V
GPIO12	I	3.3V	SATA HDD0 present detection	HD0_INSTALL_L			
GPIO13	I	3.3V	SATA HDD1 present detection	HD1_INSTALL_L			
GPIO14	I	3.3V	SATA HDD2 present detection	HD2_INSTALL_L			
GPIO15	I	3.3V	SATA HDD3 present detection	HD3_INSTALL_L			
GPIO16	I	3.3V	SATA HDD4 present detection	HD4_INSTALL_L			
GPIO17	I	3.3V	SATA HDD5 present detection	HD5_INSTALL_L			
GPIO18	O	3.3V	GPIO18				Pull up 4.7K to 5V
GPIO19	I	3.3V	FORCE UPDATE	FROCE_UPDATE_L			Pull up 4.7K to 5V
GPIO20	I	3.3V	I^2C Address control	I2C_ADDR_CNRL			Pull up 4.7K to 5V
GPIO21	O	3.3V	GPIO21				Pull up 4.7K to 5V
GPIO22	O	3.3V	GPIO22				Pull up 4.7K to 5V
GPIO23	O	3.3V	GPIO23				Pull up 4.7K to 5V

5.2.5   External Memory Device

The 6HDD SATA/SAS HSBP contains non-volatile 32K and 64K Serial EEPROM devices for Boot and Run-Time/Configuration code storage, respectively. These devices reside on the GEM424 controller's private I^{2}C bus.

The SEEPROMs operate off the 5.0V rail and are housed in 8-pin SOIC packages.

5.2.6   LEDs

The 6HDD SATA/SAS HSBP contains a green ACTIVITY LED and a yellow FAULT LED for each of the six drive connectors. The ACTIVITY LED is driven by the GEM424 controller or, for drives that support the feature, by the SATA/SAS hard drive itself whenever the drive is accessed. The FAULT LED is driven by the GEM424 controller whenever an error condition, as defined by the firmware, is detected.

Table 39. LED Function

Status LED	Definition
GREEN ON	HDD Activity
YELLOW ON	HDD Fail
YELLOW Blinking	Rebuild in progress

5.2.7   SATA/SAS Drive Connectors

The 6HDD SATA/SAS HSBP provides six 22-pin S-ATA/SAS connectors for hot swappable drives supporting a 1.5GHz and 3.0GHz transfer rate.. The following table defines the pin-out of the 22-pin SATA/SAS Drive Connectors (J7-J12).

Table 5. 22-pin SATA Connector Pin-out

Connector Contact Number	Signal Name
1	SATA HDD Present
2	H_TXPn
3	H_TXNn
4	GND
5	H_RXNn
6	H_RXPn
7	GND
8	3.3V - NC

Connector Contact Number	Signal Name
9	3.3V - NC
10	3.3V Precharge - NC
11	GND
12	GND
13	GND
14	5V Precharge
15	5V
16	5V
17	GND
18	
19	GND
20	12V Precharge
21	12V
22	12V
G1	GND
G2	GND

5.2.8   Power Connectors

The 6HDD SATA/SAS HSBP provides two standard 4-pin hard drive power connectors. The following table defines the pin-out of the 4-pin Power Connectors (JP4 and JP5).

Table 7. Power Connector Pin-out

Pin	Signal
1	12V
2	GND
3	GND
4	5V

5.2.9   Clock Generation and Distribution

The 6HDD SATA/SAS HSBP provides one clock source. A 20MHz oscillator provides the clock to the GEM424 controller.

5.2.10   7-Pin SATA/SAS Connector – Drive0-Drive5

The following table defines the pin-outs of the 7-pin SATA Control Connectors (J1-J6).

Table 6. 7-pin SATA Connector Pin-out

Connector Contact Number	Signal Name
1	GND
2	H_TXPn
3	H_TXNn
4	GND
5	H_RXNn
6	H_RXPn
7	GND

5.2.11   IPMB Header - IPMB

The following table defines the pin-out of the 4-pin IPMB Header (J13).

Table 8. IPMB Header Pin-out

Pin	Signal Name	Description
1	I^2C Address Control	IPMI interface address selection. Primary = 0xC0, Secondary = 0xC2
2	BP_I2C_SCL	Clock
3	GND	
4	BP_I2C_SDA	Data

5.2.12   SATA/SAS Host I^{2}C Header - I2C_1

The following table defines the pin-out of the 3-pin SATA/SAS Host I2C Header (JP1).

Table 40. SATA Host I^{2}C Header Pin-out

Pin	Signal Name	Description
1	BP_I2C_SDA	Data
2	GND	
3	BP_I2C_SCL	Clock

5.2.13   Power Budget

The following table illustrates the worst -case power budget for the 6HDD SATA/SAS HSBP.

Table 13. 6-HDD SATA/SAS Hot Swap Backplane Worst-case Power Budget

Intel® Server Chassis SC5300 6HDD SATA/SAS Hot Swap Backplane	12V	5V
Backplane	0.1A	2.0A
6 HDD	15.0A	15.0A
Total Current	15.1A	17.0A

5.2.14   Board Layout

The following figure shows the 6HDD SATA/SAS HSBP board layout and connector placement.
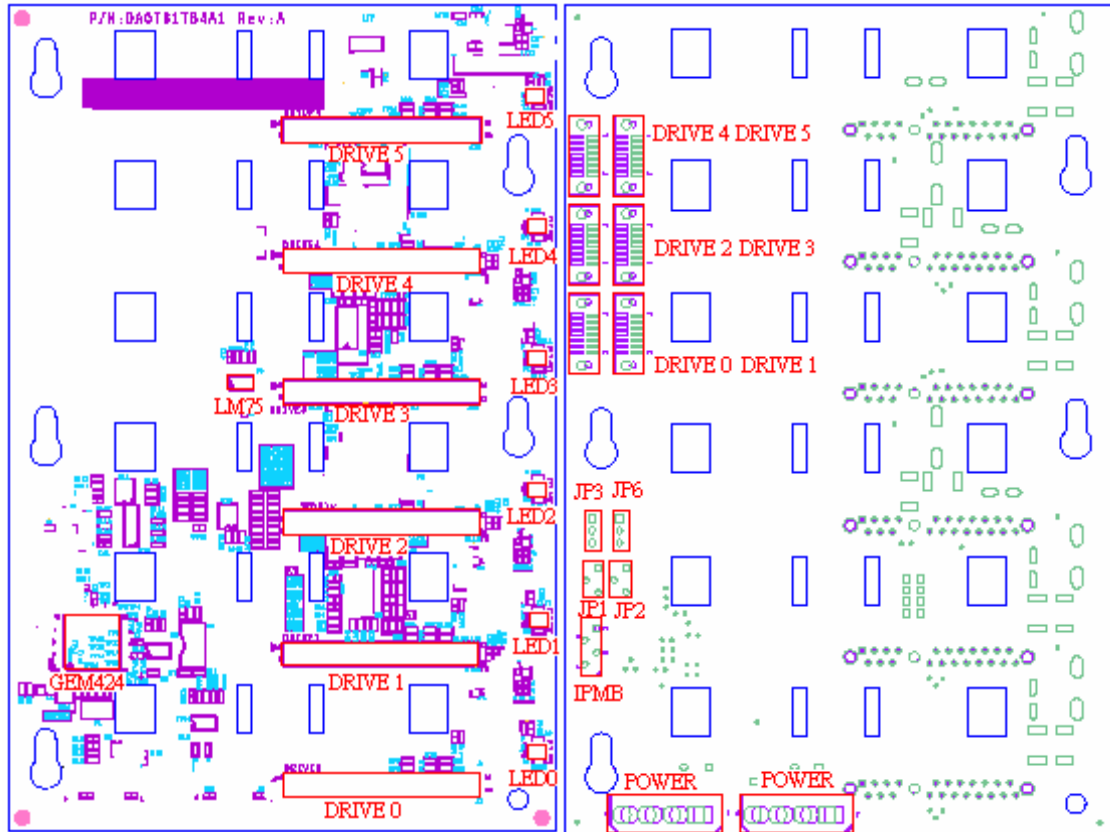
Note: Secondary side is mirrored.

Figure 19. Intel® Server Chassis SC5300 6-HDD SATA/SAS Hot Swap Backplane Board Layout

5.2.15   Connector Specifications

Table 14. SATA/SAS Hot Swap Backplane Connector Specifications

Qty	Manufacturer and Part Number	Description	Reference
6	Amphenol* G16A2111	SMD 7-pin SATA Control	J1 – J6
6	Foxconn* LD28223-S03	THM 22-pin SATA Drive	J7 – J12
1	Molex* 22-43-6040	THM 4-pin Header – IPMB J13	J13
1	Molex 22-43-6030	THM 3-pin Header – I2C JP1, JP	JP1
1	Molex 22-44-7031	THM 3-pin Header – I2C (debug-yellow)	JP2
2	Molex 8981-04V	THM 4-pin Connector – Power	JP4, JP5

5.2.16   SATA/SAS Hot Swap Drive Cage Upgrade Kit

The SATA/SAS drive cage allows for installation of up to six SATA/SAS drives in the server. The kit includes a SATA/SAS hot swap drive bay with mounting hardware.

With this kit, the SATASAS hot swap drive cage can be directly connected to the SATA/SAS connectors on the server board for those server boards that have integrated Serial ATA/SAS, or to a Serial ATA/SAS RAID card, such as the Intel® RAID Controller SRCS14L. The RAID level that is supported depends on the feature set of the Serial ATA controller.

Kit Order Codes:

- AXX6SASDB / MM# 875063

6.   Front Panel

The Server Chassis SC5300 provides a 34-pin cable option with the chassis kit. A 34-pin Entry Ebay SSI (rev 3.0) front panel header for Intel® server boards is located on the back of the front panel. This allows for connection of a 34-pin ribbon cable for use with SSI rev 3.0-compliant server boards. The connector cable is compatible with the 24-pin SSI standard. The front panel features control buttons and LED indicators. The LEDs are visible with the pedestal exterior access door closed. The blue ID LED and ID toggle switch featured in the rack mount SC5300 chassis is used to indicate which particular chassis among several in a rack configuration is being serviced.
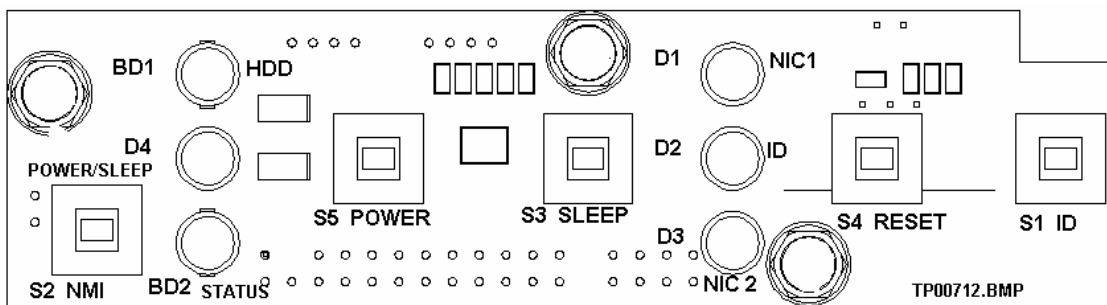
6.1   Front Panel Board Layout

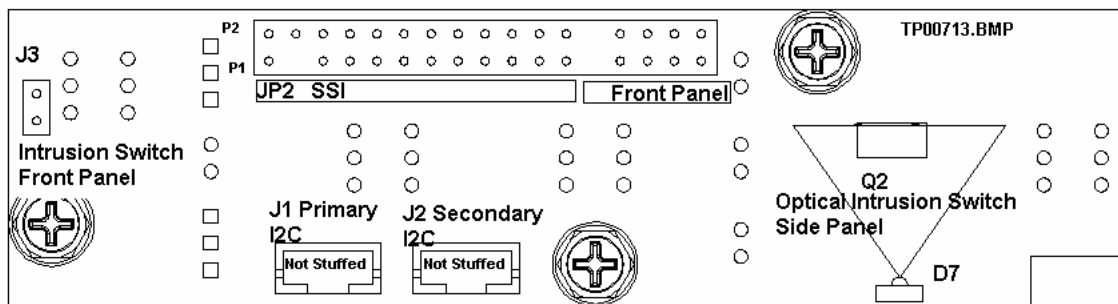**Figure 20. Front Panel Primary Side**

Figure 21. Front Panel Secondary Side

6.1.1   Front Panel Connectors

Front Panel connectors are listed in the following table. The I²C connectors are not stuffed and there are no headers installed at J1 and J2.   The front panel SSI connector, JP2, incorporates both the standard 24-pin SSI front panel signals and the eight LED status signals used by the Server Chassis SC5300 front panel.

Table 41. Front Panel Connector Designations

Designator	Header Size	Description
JP2	17x2	Front Panel SSI Connector
JP3	2x1	Intrusion or Front Panel Key Switch
J1	4x1	Primary I2C Connector Not Stuffed
J2	4x1	Secondary I2C Connector Not Stuffed

6.1.2   Front panel JP2 Header (17x2) Pin-out.

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.

Table 42. Front Panel JP2 Pin-out Descriptions

Pin #	Description	Pin #	Description
Pin 1	PWR_LED PWR	Pin 2	+5V
Pin 3	No Connection	Pin 4	FAN_FAIL PWR
Pin 5	PWR_LED SLEEP/PWR	Pin 6	FAN_FAIL L
Pin 7	HD_ACT_PWR	Pin 8	POWER_FAULT PWR
Pin 9	HD_ACT_L	Pin 10	PWER _FAULT L
Pin 11	PWR_TOGGLE_L	Pin 12	NIC_ACT PWR
Pin 13	PWR_TOGGLE GND	Pin 14	NIC_ACT L
Pin 15	RESET_L	Pin 16	I2C_SDA
Pin 17	RESET GND	Pin 18	I2C_SCL
Pin 19	SLEEP_L	Pin 20	Intrusion
Pin 21	SLEEP GND	Pin 22	NIC2_ACT PWR
Pin 23	NMI_L	Pin24	NIC2_ACT L
Pin 25	No Connection	Pin26	No Connection
Pin 27	ID_LED_PWR (+)	Pin28	STATUS_LED PWR
Pin 29	ID_LED_L (-)	Pin30	STATUS_LED L
Pin 31	ID_TOGGLE_L	Pin 32	HDD_FAULT PWR

Pin #	Description	Pin #	Description
Pin 33	ID_TOGGLE GND	Pin 34	HDD_FAULT L

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.

### 6.1.3   I^{2}C Connectors at J1 and J2 (Not Installed) Pin-out

Table 43. Front Panel J1 and J2 I^{2}C Pin-out

Pin 1	SDA
Pin 2	GND
Pin 3	SDL
Pin 4	NC

6.1.4   Front Panel Controls and Indicators

The front panel control buttons and LED indicators are displayed in the following figure. The tool-activated non-maskable Interrupt (NMI) switch is located below the Status Fault LED. When the hot swap drive bay is installed, a bi-color hard drive LED is located on each drive carrier (six total) to indicate specific drive failure or activity. For pedestal systems, these LEDs are visible upon opening the front bezel door.

Figure 22. Front Panel Controls and Indicators
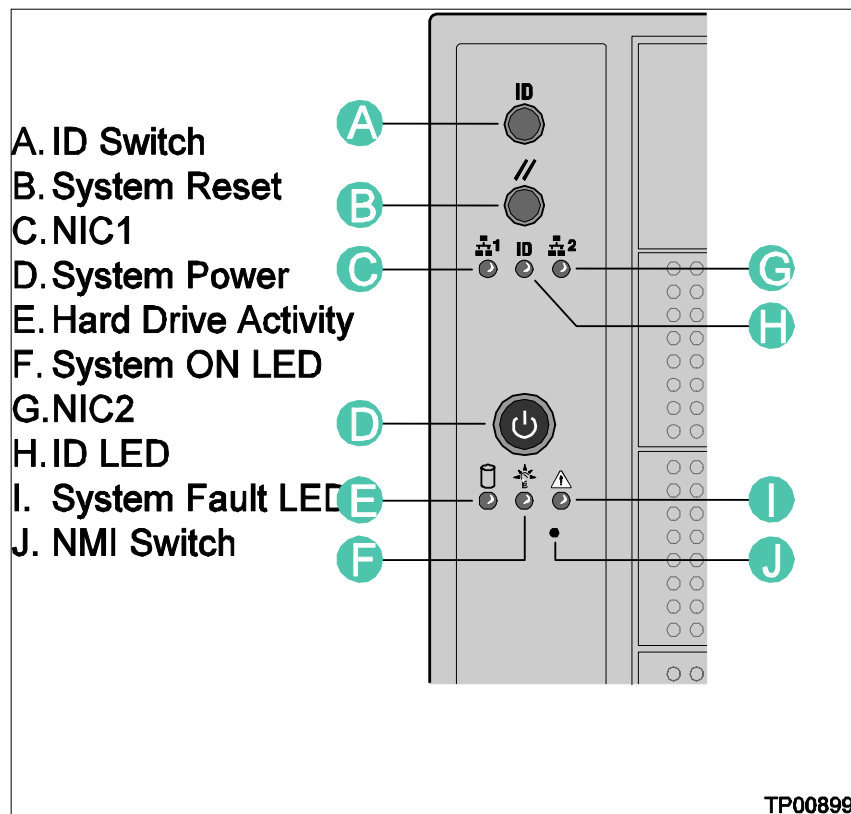
Front panel buttons and indicator LED's function and location is shown in the following table.

Table 42. Front Panel LED Functions

LED Name	Color	Condition	Description
Power/Sleep	Green	ON	Power on
	Green	BLINK	Standby/Sleep (S1)
		OFF	Off (also Sleep S4)
System Fault	Green	ON	System ready
	Green	BLINK	System ready, but degraded: some CPU fault, DIMM Killed
	Amber	ON	Critical alarm: Critical power module failure, critical fan failure, voltage (power supply), Voltage and thermal fault
	Amber	BLINK	Non-Critical failure: Redundant fan failure, redundant power failure, non-critical power and voltage
		OFF	System not ready: Post error/NMI event/PCI or terminator missing

Hard drive activity	Green	BLINK	Hard drive activity
	Amber	ON	Fault
		OFF	No activity
LAN #1 activity	Green	ON	Linked
	Green	BLINK	LAN activity
		OFF	Idle
LAN #2 activity	Green	ON	Linked
	Green	BLINK	LAN activity
		OFF	Idle
Identification	Blue	BLINK	Server identification; Toggled by ID button or software
		OFF	Server identification; Toggled by ID button or software

For further details of the front panel functions supported, refer to the individual server board specifications.
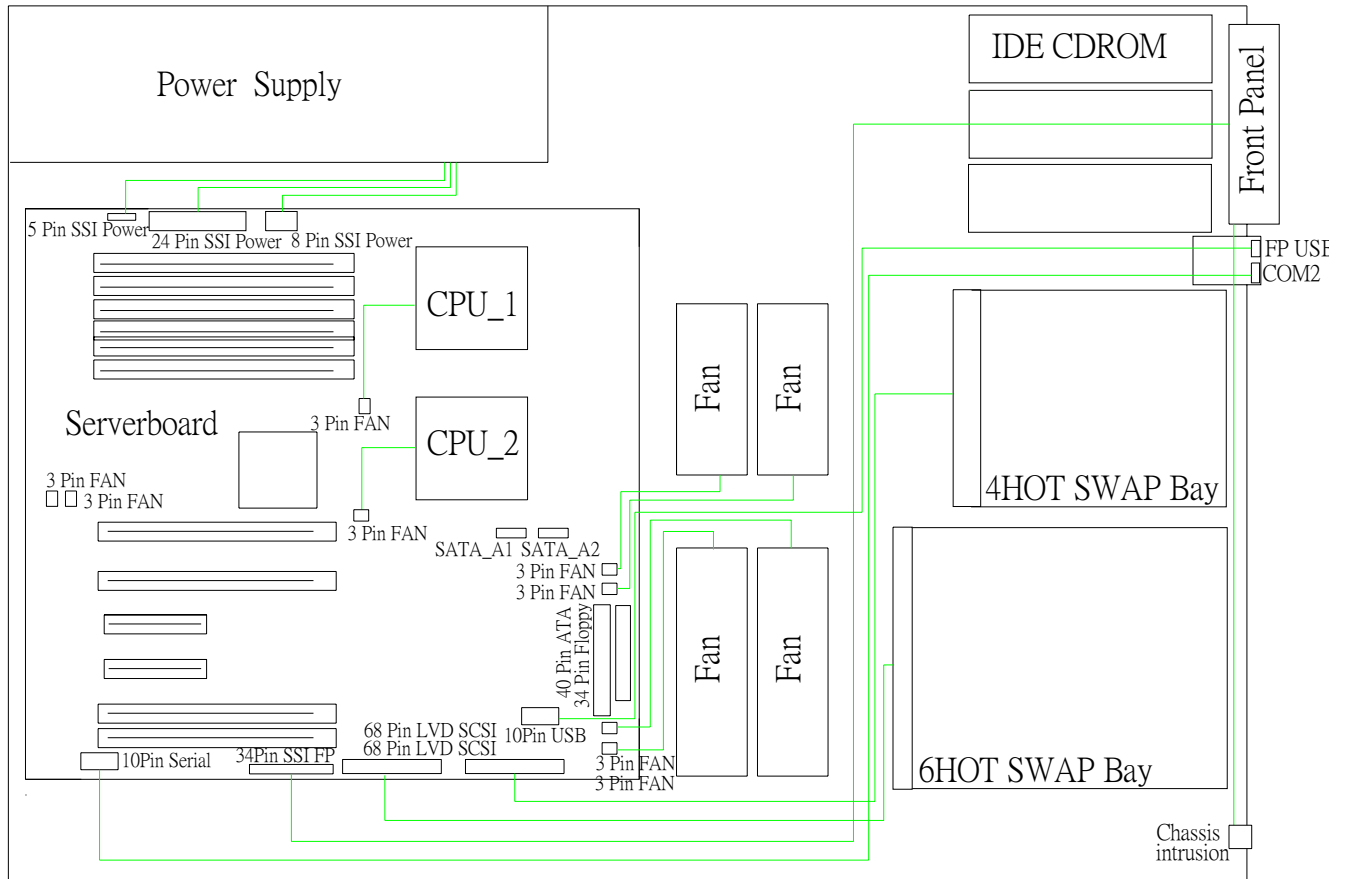
6.2   Chassis Interconnect

Figure 23. Chassis Interconnect SCSI Diagram

6.3   Chassis Internal Cables

The following cables are provided as part of the chassis kit and accessories.

Table 44. Intel® Server Chassis SC5300 System Cables

Cable Description	Source
Front Panel cable 34-pin	SC5300 (BASE, BRP and LX)
Floppy cable (Round With Twist-- standard ATX compatible floppy cable)	SC5300 (BASE, BRP and LX)
ATA 100 (IDE) cable	SC5300 (BASE, BRP and LX)
FAN Cable for 92-mm Hot Swap Fan	SC5300LX
FAN Cable for 120-mm Hot Swap Fan	SC5300LX
SCSI Cable 6 HDD	AXX6SCSIDB Accessory
SCSI Cable 4 HDD	AXX4SCSIDB Accessory
I^{2}C 3-pin cable	AXX6SASBP, AXX6SCSIDB Accessory
IPMB 4-pin cable	AXX6SASBP, AXX6SCSIDB Accessory
SATA cables	Boxed Board
LCP (Local Control Panel) I^{2}C cable	Accessory
USB cable	SC5300 (BASE, BRP and LX)
Serial COM cable	SC5300 (BASE, BRP and LX)
Floppy data cable (Flat No Twist required for slim-line floppy drive)	ARIGCDFDBRK Accessory

6.3.1   Front Panel Cable

A 34-conductor ribbon cable with 34-pin IDC connectors links the front panel and SSI Revision 3.0-compliant server board. Some server boards may employ a 24-pin ribbon cable that does not fully support all the features of the front panel.
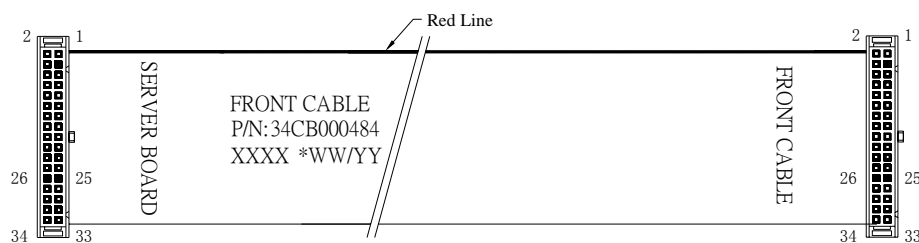
Figure 24. Chassis Panel Cable

6.3.2   USB Cable and Connectors

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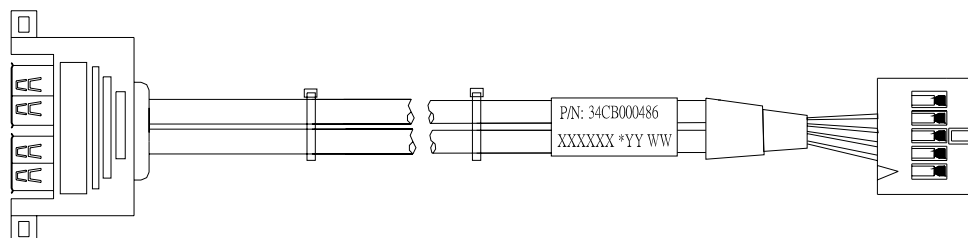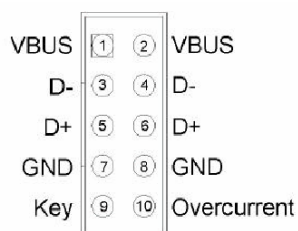

Figure 25. USB Cable Drawing

Figure 26. USB Connector

Table 45. USB Connector Pin-out

Pin	Signal	Pin	Signal
1	VBUS	2	VBUS
3	D-	4	D-
5	D+	6	D+
7	GND	8	GND
8	KEY	10	Overcurrent

6.3.3   Hot Swap Fan Cables and Connectors

There are four hot swap fans. The 90-mm fans are labeled fans 1 and 2 and use the keyed 5-pin connector. The 120-mm fans are labeled fans 3 and 4 and use the 6-pin un-keyed connector.
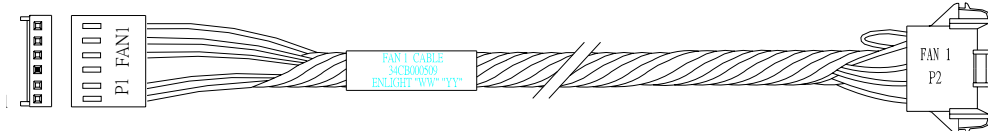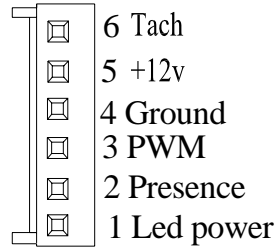
Figure 27. 120-mm Hot Swap Fan Cable

6 Tach
5 +12v
4 Ground
3 PWM
2 Presence
1 Led power

Figure 28. Hot Swap Fan 6-pin Cable Connector

6 Tach
5 +12v
4 Ground
3 Key
2 Presence
1 Led power
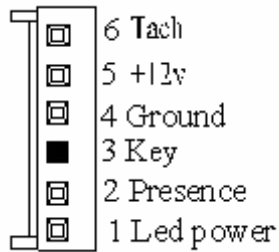
Figure 29. 90-mm Hot Swap 5-pin Cable Connector

5 Gnd   1 Gnd
6 Led power   2 Presence
7 EMPTY   3 +12v
8 EMPTY   4 Tach
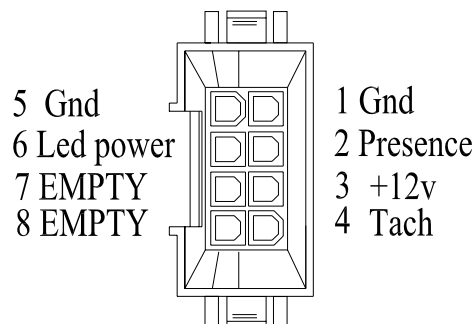
Figure 30. Hot Swap 8-pin (8 CM) Fan Cable Connectors

5 Gnd   1 Gnd
6 Led power   2 Presence
7 PWM   3 +12v
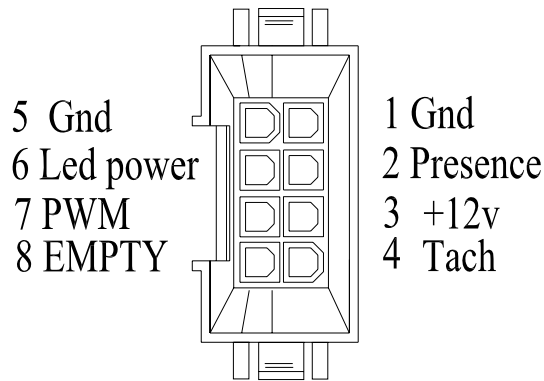8 EMPTY   4 Tach

Figure 31. 8-pin (12 CM) Fan Connector

6.3.4   SCSI Cable

A 68-conductor twisted-pair SCSI cable is provided to interface from the server board to the hot-swap backplane. There are two kinds of SCSI cables in the chassis. They are used to connect the 6 HDD and 4HDD hot swap back planes. The longer SCSI cable connects the 4-HDD HSBP; the shorter cable connects 6-HDD HSBP.
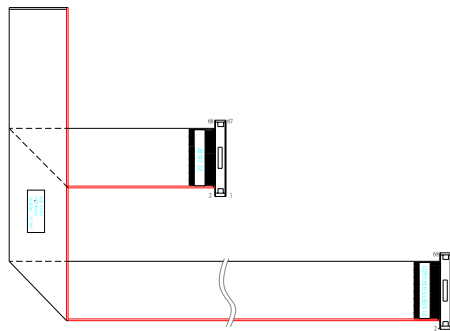

Figure 32. SCSI Cable 4-Drive Bay
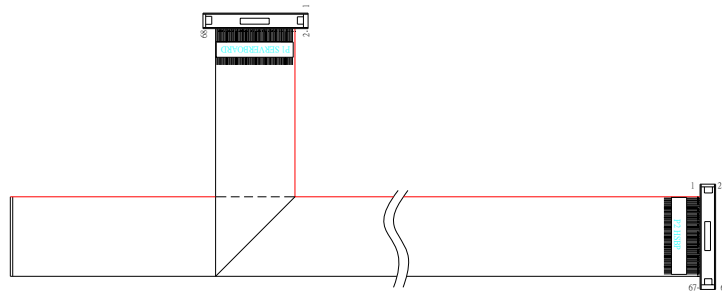
Figure 33. SCSI Cable 6-Drive Bay

6.3.5   Serial Cable

The 8-conductor cable provided is terminated in a 2x5 header at one end and a 9-pin panel mount D-sub connector on the other.
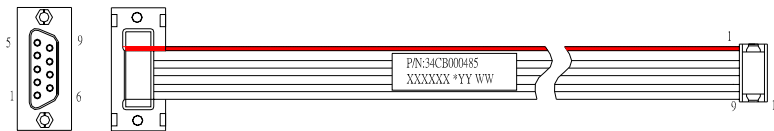

Figure 34. Serial Cable

6.3.6   SATA Cable

A SATA cable is provided to interface from the server board to the hot swap backplane. The SATA cables ship with the upgrade kit.
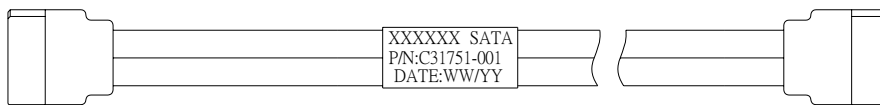

Figure 35. SATA Cable
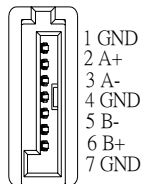
Figure 36. SATA Cable Connector

6.3.7   IPMB cable for 6-Drive Bays (4-pin)

A 4-pin cable connects the server board to the HSBP 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. This cable plugs into the IPMB 4-pin connector on the server board. The 4-pin cable ships with the upgrade kit. Note that the 3-pin cable described below also ships with the upgrade kit.
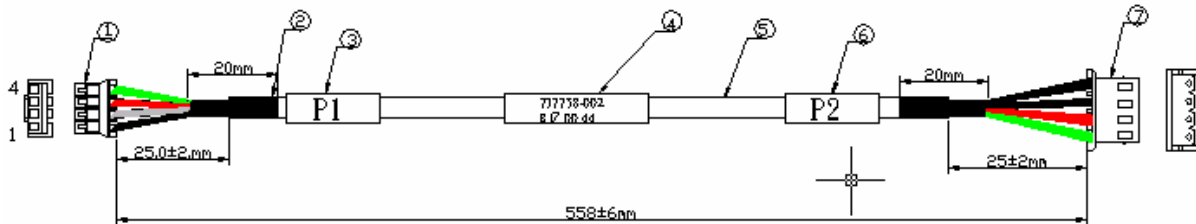
Figure 37. I^{2}C 4-pin Cable

6.3.8   I^{2}C Cable for 6-Drive Bays (3-pin)

The 3-pin cable connects a RAID controller to the HSBP to communicate server management information, such as drive status to the server board. This cable is required if the RAID controller is to drive the SATA HDD LED activity lights via the SAFT-E commands. This 3-pin cable ships with the upgrade kit and usually connects to the RAID controller card.
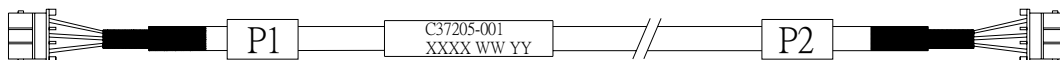
Figure 38. I^{2}C 6-Pin Cable

7.   System-Compatible Server Boards

The Intel® Server Chassis SC5300 supports the following Intel® server boards:

- Intel® Server Board SE7320SP2
- Intel® Server Board SE7520AF2
- Intel® Server Board SE7525GP2
- Intel® Server Board SE7520BD2

8.   Upgrade Accessories

Principle upgrades include the tool-less four-drive fixed drive bay, four- and six-drive SCSI hot swap drive bays, six-drive SATA/SAS hot swap drive bay, rack mount conversion kit, hot swap fan upgrade kit and power supply upgrade conversion kit. See Appendix A for a complete listing of spares and upgrade accessories.

8.1   AXX6SCSIDB and AXX4SCSIDB Hot Swap SCSI Drive Bays

The optional hot-swap SCSI hard disk drive bays, AXX6SCSIDB and AXX4SCSIDB, are available for all the Server Chassis SC5300 configurations. They support six or four 1-inch single connector attachment (SCA) low-voltage differential SCSI (LVD) hard drives. The kits include a hot-swap drive bay with mounting hardware, a 68-pin LVD SCSI cable for data transfer, a 4-pin IPMB cable, and a 3-pin I^2C cable for server management communication.

8.2   SATA/SAS Hot Swap Drive Bay Upgrade Accessory AXX6SASDB

The SATA/SAS Hot Swap Drive Bay Kit, Product Code AXX6SASDB, includes a SATA/SAS hot swap drive bay with mounting hardware, six SATA data transfer cables, a 4-pin IPMB cable, and a 3-pin I^2C cable for server management communication. It supports up to six 1-inch single connector attachment (SCA) low-voltage differential SATA (LVD) hard drives to enhance serviceability, availability, and upgradeability of the system.

8.3   External SCSI Adapter Cable AXXEXTSCSICBL

The 68-pin LVD SCSI cable allows an internal SCSI connection from the motherboard to the SCSI knockout at the rear of the chassis.
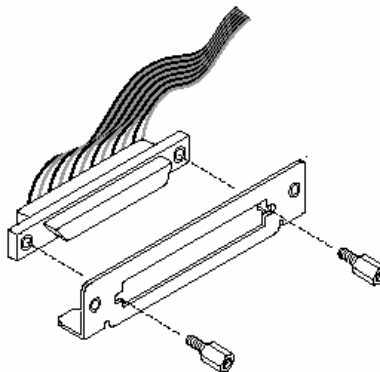

Figure 39. External SCSI Adapter Cable Detail

8.4   Rack Conversion Kit ARIGRACK

The Rack Conversion Kit includes all parts needed to convert a pedestal chassis into a rack mount chassis. The conversion kit includes rack bezel plastic parts, rack handles, and rack mounting rails.

9.   Reliability, Serviceability, and Availability

9.1   MTBF

The following is the calculated Mean Time Between Failures (MTBF) at maximum configuration at 35° C.

Table 46. MTBF Calculations

Item	Percentage usage	MTBF HRs
Front panel board	100	3,566,515
SATA/SAS Back Plane	100	2,024,479
SCSI dist BD	100	314,618
Hard Drive	100	NA
PRO 100 B	100	1,680,930
IDE CD-ROM (typical)	25	500,000
Power supply (typical)	100	150,000
1.44MB 3.5-inch FDU (typical)	5	405,000
32 Meg DIMM (typical)	100	283,051
FAN (typical)	100	96,062

9.2   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 mean time to repair.

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 47. 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 (PCI Adaptor Card)	5	minutes
Remove and replace front panel board	5	minutes
Remove and replace server board (with no expansion boards)	15	minutes
Overall Mean Time To Repair (MTTR)	20	minutes

10. Environmental Limits

10.1 System Office Environment

Table 48. System Office Environment Summary

Parameter	Limits
Operating Temperature	+5°C to +35°C with the maximum rate of change not to exceed 10°C per hour.
Non-Operating Temperature	-40°C to +70°C
Non-Operating Humidity	95%, non-condensing @ 30°C
Acoustic noise	55 dBA in a typical office ambient temperature (18-25°C)
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 the *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. Product Regulatory Compliance

The Intel® Server Chassis SC5300 is designed and tested to meet the standards and regulation listed below when configured with the Intel® server boards specified.

11.1 Product Safety Compliance

The Server Chassis SC5300 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)

11.2 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)

11.3 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

11.4 Electromagnetic Compatibility Notices

11.4.1   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.

11.4.2   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

11.4.3   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 above notice:

 "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."

11.4.4   Europe (CE Declaration of Conformity)

This product has been tested in accordance to, 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.

11.4.5   Japan EMC Compatibility

Electromagnetic Compatibility Notices (International):

　　この装置は、情報処理装置等電波障害白主規制協議会（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 preceding notice:

"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."

11.4.6   BSMI (Taiwan)

The BSMI Certification number and the following warning are 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。

Appendix A: Intel® Server Chassis SC5300 Spares and Accessories

Product	MM#	Description
SC5300BASE	857678	SC5300 Base Chassis w/600W PFC Fixed PSU, 2 chassis fans, 1 PSU fan, supports up to 6 tool-free cabled drives, upgradeable to 6 hot swap drives (SCSI or SATA/SAS) without power cord
SC5300BASENA	865052	SC5300 Base Chassis w/600W PFC Fixed PSU, 2 chassis fans, 1 PSU fan, supports up to 6 tool-free cabled drives, upgradeable to 6 hot swap drives (SCSI or SATA/SAS) includes North America power cord
SC5300BRP .	862502	SC5300 Base Redundant Power (BRP) Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 2 chassis fans, 1 PSU fan, supports up to 10 tool-free cabled drives, upgradeable to 10 hot-swap drives (SCSI or SATA/SAS), without power cord
SC5300BRPNA SC5300BRP	865077	SC5300 Base Redundant Power (BRP) Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 2 chassis fans, 1 PSU fan, supports up to 10 tool-free cabled drives, upgradeable to 10 hot-swap drives (SCSI or SATA/SAS) includes N.A. power cord
SC5300LX	857677	SC5300 LX Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 4 hot-swap redundant fans, 1 PSU fan per module, supports up to 6 tool-free cabled drives, upgradeable to 10 hot-swap SCSI drives or 6 hot-swap SATA/SAS drives, without power cord
SC5300LXNA	865053	SC5300 LX Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 4 hot-swap redundant fans, 1 PSU fan per module, supports up to 6 tool-free cabled

		drives, upgradeable to 10 hot-swap SCSI drives or 6 hot-swap SATA/SAS drives, includes N.A. power cord
SC5300GP2	866230	SC5300 Base Chassis w/600W PFC Fixed PSU, 2 chassis fans, 1 PSU fan, supports up to 6 tool-free cabled drives, upgradeable to 6 hot-swap drives (SCSI or SATA/SAS) without power cord, Intel® Server Board SE7525GP2
SC5300GP2NA	867447	SC5300 Base Chassis w/600W PFC Fixed PSU, 2 chassis fans, 1 PSU fan, supports up to 6 tool-free cabled drives, upgradeable to 6 hot-swap drives (SCSI or SATA/SAS) includes North America power cord, Intel® Server Board SE7525GP2
SC5300AF2	867231	SC5300 LX Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 4 hot-swap redundant fans, 1 PSU fan per module, supports up to 6 tool-free cabled drives, upgradeable to 10 hot-swap SCSI drives or 6 hot-swap SATA/SAS drives, without power cord, Intel® Server Board SE7520AF2
SC5300AF2NA	867369I	SC5300 LX Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 4 hot-swap redundant fans, 1 PSU fan per module, supports up to 6 tool-free cabled drives, upgradeable to 10 hot-swap SCSI drives or 6 hot-swap SATA/SAS drives, includes North America power cord, Intel® Server Board SE7520AF2
SC5300BD2	867230	SC5300 Base Redundant Power (BRP) Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy) 2 chassis fans, 1 PSU fan, supports up to 10 tool-free cabled drives, upgradeable to 10 hot-swap drives (SCSI or SATA/SAS), without power cord, Intel® Server Board SE7520BD2
SC5300BD2NA	869042	SC5300 Base Redundant Power (BRP) Chassis w/730W PFC redundant PSU (2nd PSU module is required for redundancy), 2 chassis fans, 1 PSU fan, supports up to 10 tool-free cabled drives, upgradeable to 10 hot-swap drives (SCSI or SATA/SAS) includes North America

		power cord, Intel® Server Board SE7520BD2
AXX04HSBPYCBL	864463	SC5300 SCSI Y Cable with unique lengths for 4 drive and 6 drive bays, AXX4SCSIDB and AXX6SCSIDB.
ARIGRACK	856670	Rack Conversion Accessory Kit, Includes slide rails, front bezel hinge cover, handles, jumper for front panel intrusion switch, rail mounting hardware, and bezel icon label.
ARIGDLTRAIL	856600	DLT Accessory, Left and Right, Rails Kit (10 pack)
ARIGCDFDBRK	856599	5.25 " CD/DVD/Floppy bracket, hardware kit, interface board, installation guide; Note: Supports the AXXSFLOPPY (Floppy) and AXXSCD (CDROM) accessories.
AXX4SCSIDB	856603	SC5300 only 4 drive SCSI Drive Bay, 4 drive carriers, SCSI cable, 4-drive bay, I2C Cable, common installation guide
AXX6SCSIDB	856604	SC5300 and SC5275 6-drive SCSI Drive Bay, 6 ea drive carriers, SCSI cable, 6-drive bay, I2C Cable, common installation guide
AXX6SASDB	875063	SC5300 and SC5275 6-drive SATA/SAS Drive Bay, 6 ea drive carriers, 6 ea SATA cables, 2 ea I2C Cables, common installation guide, SATA configuration label
FXX600WPSU	856597	SC5300 and SC5275 replacement 600W Power supply
FXX730WPSU	856596	SC5300 redundant 730W Power Supply Module and power supply filler panel
FRIGPDB	856819	Power Distribution Board, power supply cage, power supply divider
ARIGHSFANKIT	856963	SC5300 Hot Swap Fan Upgrade Kit: 2 pairs of ea fan, 120mm & 92mm, hot swap fan cables (4 ea) hot swap label, installation guide.
FRIGHSFANS	857578	SC5300 replacement hot swap fans, 1 ea 120mm & 1 ea 92mm fan
FRIGFIXFANS	856960	SC5300 replacement 120mm & 92mm Standalone Fans (fixed fans)
ARIGPMKIT	857002	SC5300 Chassis PM Kit: Includes;

		front panel board, front panel cable, serial cable, USB cable, (1) 92mm HS fan + plastic housing, (1) 120mm HS fan and plastic housing , 4 ea HS fan wires, (1) fixed 92 mm fan, (1) fixed 120mm fan, bezel intrusion switch, power supply filler panel, 2 sets (4) 5.25 tool-less bay rails, 2 sets (4) of fixed hard drive bay rails, (1) IDE cable and (1) FDD cable
FXX4SCSIBRD	857005	4 Drive SCSI Back Plane Board only
FXX6SCSIBRD	857004	6 Drive SCSI Back Plane Board only
ARIGHPPCI	857577	SC5300/SE7520AF2 hot plug PCI kit includes; (1) Glove, (1) Insulator, (1) light pipe assembly, 4 green PCI rocker latches, HP-PCI label and installation guide
AXX4FIXDB	857882	SC5300 cabled 4 drive tool-less drive bay assembly 4 drive fixed drive bay
ASPIO	859267	OEM 50 Pak IO Shield – Single NIC I/O panel – (SP/GP)*
ASPIO2	859781	OEM 50 Pak IO Shield – Dual NIC I/O panel (SP/GP)*
ARIGBEZPNL	860750	SC5300 Branding Panels (1) upper and (1) lower bezel customization panel (10 pair)
ARIGRACKCVR	860747	SC5300 Unpainted removable side (Top) cover to be used in rack mode
AXXCMA3U7U	862119	Universal 3U though 7U Rack Mode Cable Management Arm (CMA)
AXXSCD	856519	Slim Line CD ROM drive
AXXSFLOPPY	856444	Slim Line Floppy Drive

Appendix B: Intel® Server Chassis SC5200, SC5250-E, SC5275-E and SC5300 Common Spares & Accessories Components

Product Code	MM #	Description
FXX2DRVCARBLK	835853	HS DRIVE CARR, 1 INCH, BLACK
FHDEYE2C	823392	I2C Cable – 10 each
FHDLVDSCBL	823391	SPARE CABLE, SCSI WIDE, LVDS.
AXXEXTSCSICBL	830656	ACCESSORY, EXTERNAL SCSI CABLE. For use with SCSI Knockout on chassis.
AXX2ICMBKIT	836017	ICMB Board Assembly for use with SE75020BD2 and SE7520AF2
PWRCABLEUS	816324	North American power cord

Appendix C: Errata and Integration Notes

Errata: Redundant Hot Swap Fan LED

The redundant fan (hot swap fan) red LED indicators used in the Intel® Server Chassis SC5300LX will turn on (red) if a fan failure is detected by the Intel® Server Board SE7520BD2. Upon replacement of the hot swap fan, the red LED will remain lighted. To turn off (reset) the red LED located in the hot swap fan handle, the system must be rebooted.

Integration Note

Full support of Intel® Server Chassis SC5300LX redundant features requires installation of an IMM module.

Reference Documents

Refer to the following documents for additional information:

- 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