Intel® Server Chassis SR1500

Technical Product Specification

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February 2006

Enterprise Platforms and Services Marketing

Revision History

Date	Revision Number	Modifications
November 2005	0.5	Initial release. (Preliminary release)
February 2006	0.9	Numerous updates to text and diagrams. (Preliminary release)

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1. Product Overview

The Intel® Server Chassis SR1500 is a 1U server chassis designed to support the Intel® Server Board S5000PAL. Both the board and the chassis have a feature set that is designed to support the high-density server market. This chapter provides a high level overview of the chassis feature set. More detailed descriptions for each feature and major sub-system can be found in the following chapters.

1.1 Chassis Views

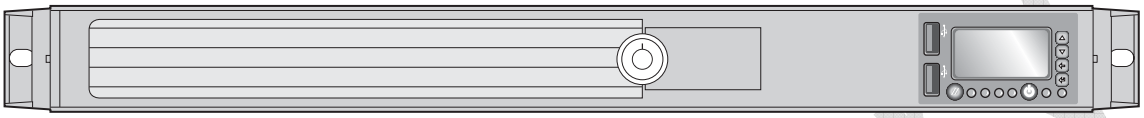


Figure 1. Front View with Bezel – Showing the Intel® Local Control Panel Option

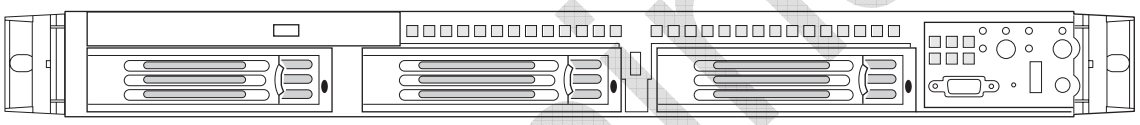


Figure 2. Front View without Bezel – Showing the Standard Control Panel Option

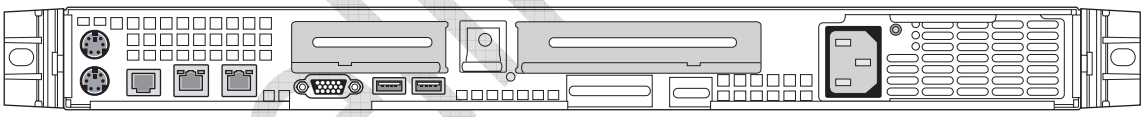


Figure 3. Rear Chassis View

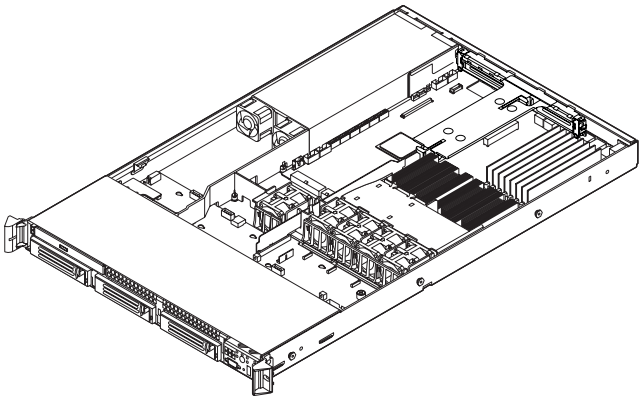


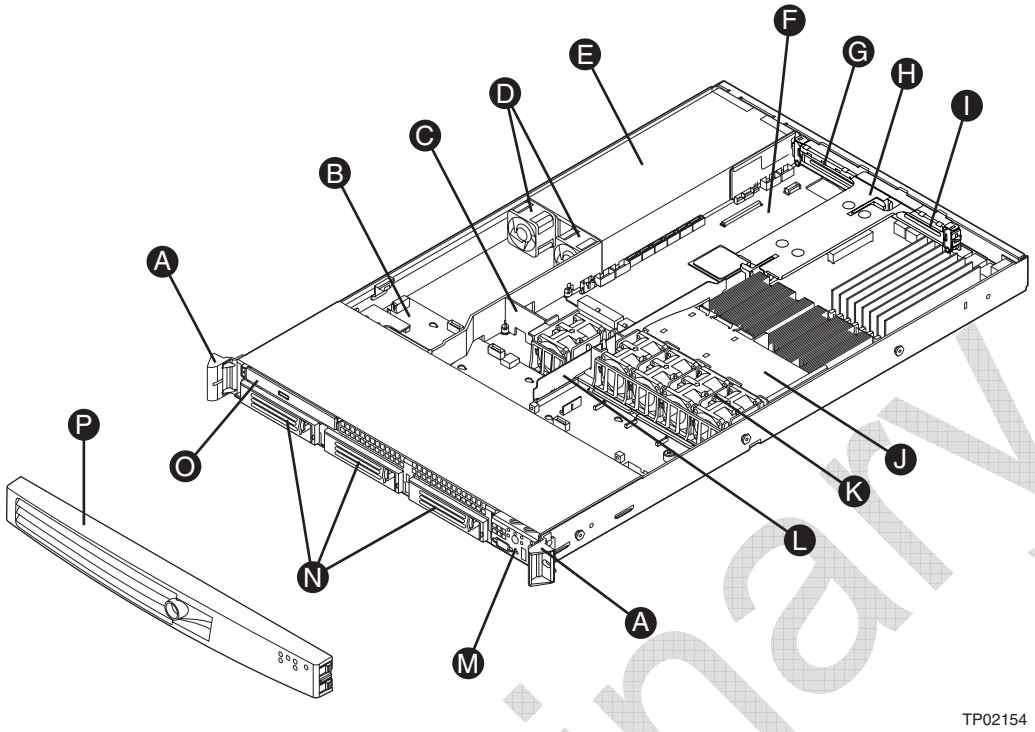
Figure 4. Internal View

1.2 Chassis Dimensions

Table 1. Chassis Dimensions

Height	43.25 mm	1.703”
Width without rails	430 mm	16.930”
Width with rails	450 mm	17.72”
Depth without CMA	692 mm	27.25”
Depth with CMA	813 mm	32”
Max. Weight	14.1 kg	31 lbs

1.3 System Components



A	Rack handles (optional)	I	PCI card bracket (low profile)
B	Backplane	J	Processor air duct
C	Air baffle	K	Fan module
D	Power supply fans	L	Bridge board
E	Power supply	M	Control panel (standard control panel shown)
F	Server board	N	Hard drive bays (drives not included)
G	PCI card bracket (full height)	O	Slimline drive bay (drive not included)
H	PCI add-in riser assembly	P	Front bezel (optional)

Figure 5. Major Chassis Components

On the back of the chassis are cutouts for all external I/O connectors found on the server board. The I/O connector locations are pre-cut, so the use of an I/O shield is not required.

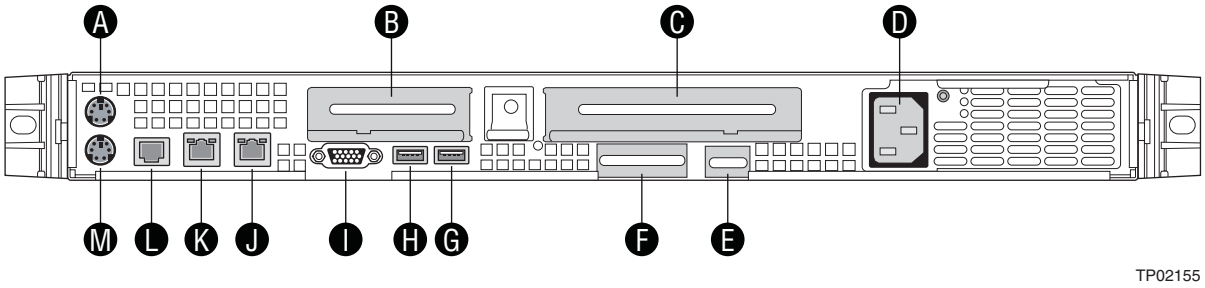


Figure 6. Back Panel Feature Overview

A	PS2 mouse connector	H	USB 2 connector
B	PCI card bracket (low profile)	I	Video connector
C	PCI card bracket (full height)	J	NIC 1 connector
D	AC Power Receptacle	K	NIC 2 connector
E	Management Network Interface (optional)	L	RJ45 serial B port
F	IO module external connector (optional)	M	PS2 keyboard connector
G	USB 1 connector		

1.4 Hard Drive and Peripheral Bays

The chassis is designed to support up to three hot-swappable SAS (Serial Attach-SCSI) or SATA (Serial ATA) hard drives and one slim-line optical device.

There are two backplane options supported. The first is a cabled passive backplane capable of supporting either SATA ports from the baseboard or SAS ports from an add-in card. Cables provided standard with the chassis are of specific length to support the SATA ports from the baseboard only.

The second backplane option is an active backplane supporting an onboard PCIe* SAS controller and requires no drive cables. Either SAS or SATA hot swappable hard drives are supported.

The slim-line peripheral bay is designed to support a single slim-line IDE optical drive.

If both an optical drive and floppy drive are required, the hard drive bay below the slim-line bay can be used to support an optional USB Floppy drive. The optional floppy drive kit includes the necessary drive tray and cables.

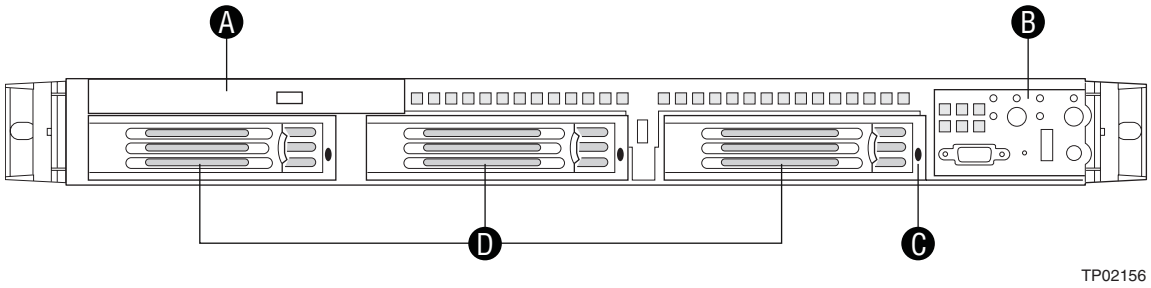


Figure 7. Drive Bay Overview

A	Slimline drive bay (drive not included)
B	Control panel (standard control panel shown)
C	Hard Drive Status LEDs
D	Hard drive bays (drives not included)

1.5 Control Panel Options

The server chassis can support either of two control panels, the standard control panel and the Intel® Local Control Panel with LCD support. The control panel assemblies are pre-assembled and modular in design. The entire module assembly slides into a predefined slot in the front of the chassis.

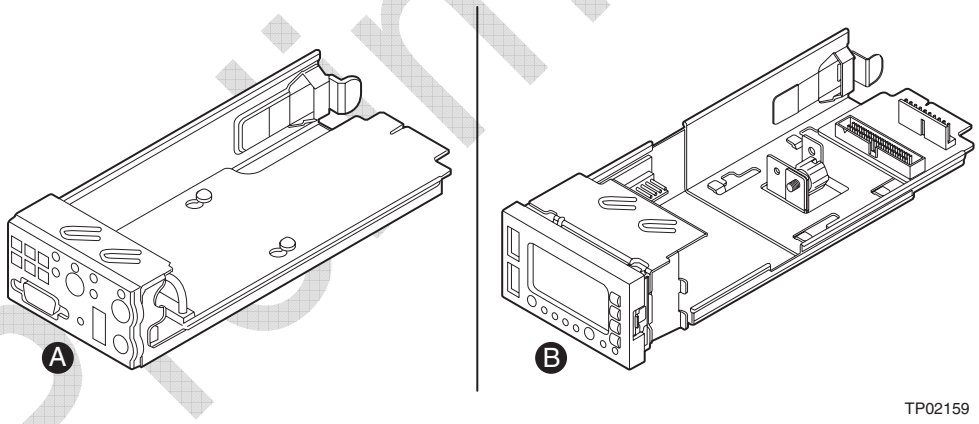


Figure 8. Control Panel Modules

The standard control panel supports several push buttons and status LEDs, along with USB and video ports to centralize system control, monitoring, and accessibility to within a common compact design. The following diagram overviews the layout and functions of the control panel.

Note: The Intel® Local Control Panel can only be used when the Intel® Remote Management Module is installed in the system.

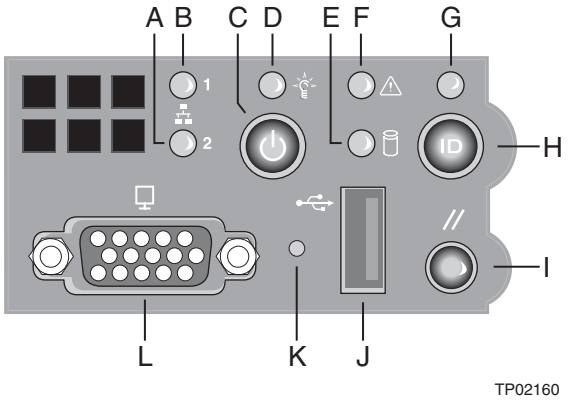


Figure 9. Standard Control Panel Overview

A	NIC 2 Activity LED	G	System Identification LED
B	NIC 1 Activity LED	H	System Identification Button
C	Power / Sleep Button	I	System Reset Button
D	Power / Sleep LED	J	USB 2.0 Connector
E	Hard Drive Activity LED	K	Recessed NMI Button (Tool Required)
F	System Status LED	L	Video Connector

The Intel® Local Control Panel utilizes a combination of control buttons, LEDs, and LCD display to provide system accessibility, monitoring, and control functions. The following diagram provides an overview of this control panel.

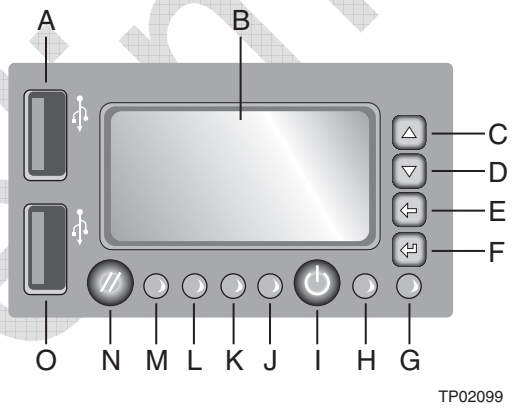


Figure 10. LCD Control Panel Overview

A	USB 2.0 Port	I	Power / Sleep Button
B	LCD Display	J	System Status LED
C	Menu control button, scroll up	K	NIC 2 Activity LED
D	Menu control button, scroll down	L	NIC 1 Activity LED
E	Menu control button, scroll left	M	Hard Drive Activity LED
F	Menu control button, enter	N	System Reset Button
G	System ID LED	O	USB 2.0 Port
H	Power / Sleep LED		

1.6 Power Sub-system

The power sub-system of the chassis consists of a single non-redundant 600 Watt power supply and provides several integrated management features including:

- Status LED
- Over-temperature protection circuitry
- Over-voltage protection circuitry

With the addition of an Intel® Remote Management Module and Intel® System Management Software, the power subsystem is capable of supporting several system management features including:

- Remote Power On/Off
- Status Alerting
- FRU Information Reporting

The power supply operates within the following voltage ranges and ratings

PARAMETER	MIN	RATED	MAX	Start up VAC	Power Off VAC	Max Input AC Current	Max Rated Input AC Current
Voltage (110)	90 V_{rms}	100-127 V_{rms}	140 V_{rms}	85Vac +/- 4Vac	75Vac +/-5Vac	9.5A_{rms} [1,3]	8.55A_{rms} [4]
Voltage (220)	180 V_{rms}	200-240 V_{rms}	264 V_{rms}			4.75A_{rms} [2,3]	4.3A_{rms} [4]
Frequency	47 Hz	50/60Hz	63 Hz				

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 is not to be used for determining agency input current markings.
4. Maximum rated input current is measured at 100VAC and 200VAC.

1.7 System Cooling

The chassis provides a non-redundant multi-system fan assembly and dual non-redundant power supply fans. When external ambient temperatures remain within specified limits, the cooling system will provide sufficient air flow for all hot-swap drive configurations, processors, supported memory, and add-in cards.

1.8 Chassis Security

The chassis provides support for several platform security features including a lockable front bezel, chassis intrusion switch (integrated into the low profile PCI riser), and a Kensington* style lock attach point.

1.9 Rack and Cabinet Mounting Options

The chassis was designed to support 19” wide by up to 30” deep server cabinets. It can be configured to support a relay rack / cabinet mount kit or a tool-less sliding rail kit. The relay rack / cabinet mount kit can be configured to support both 2-post racks and 4-post cabinets. The tool-less sliding rail kit is used to mount the chassis into a standard (19” by up to 30” deep) EIA-310D compatible server cabinet.

A cable management arm (CMA) will be made available. The CMA attaches to the tool-less sliding rail option.

1.10 Front Bezels

The optional front bezel is made of molded plastic and uses a snap-on design. When installed, its design allows for maximum airflow. Separate front bezels are available to support systems that use either a standard control panel or an Intel® Local Control Panel.

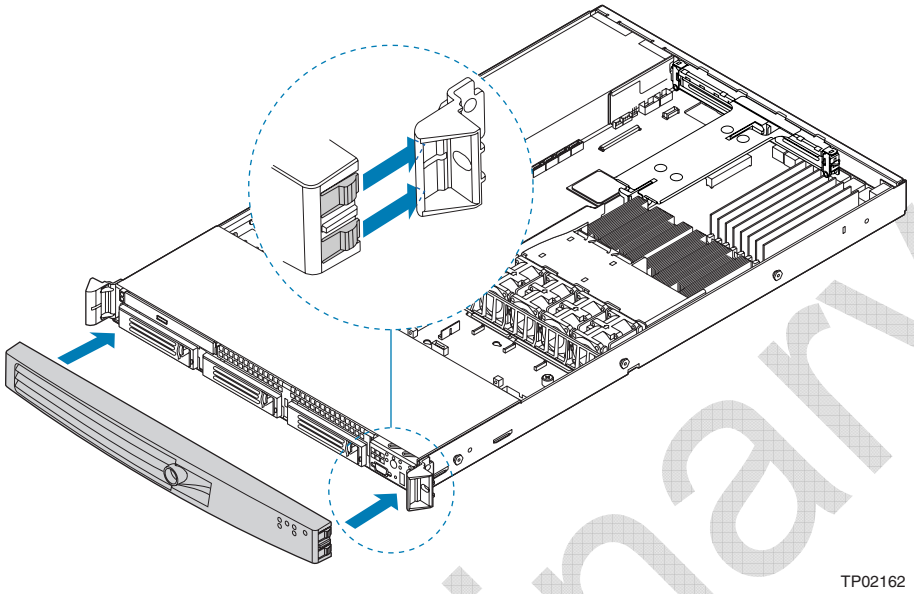


Figure 11. Optional Front Bezel

Light pipes in the front bezel supporting the standard control panel allow the system status LEDs to be monitored with the bezel installed.

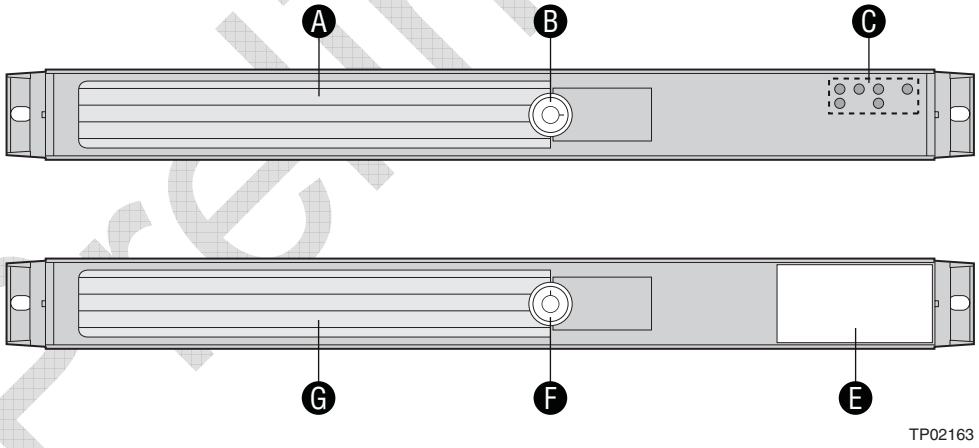


Figure 12. Front Bezel Options

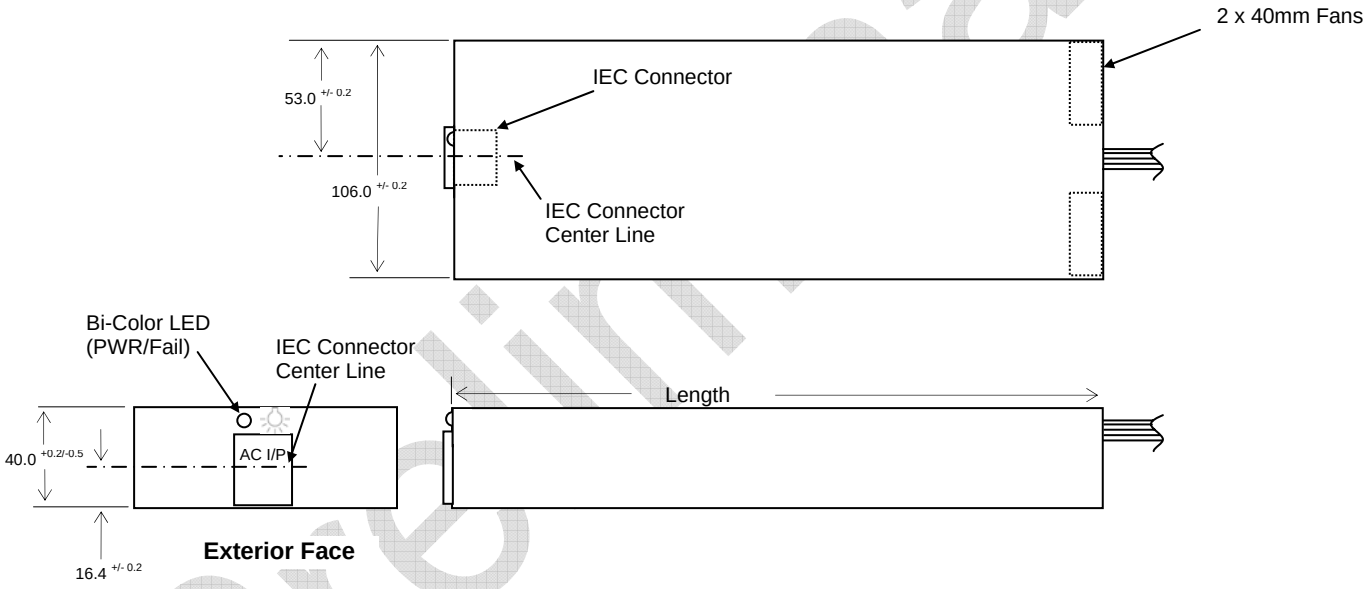
A	Ventilation	E	Opening for Intel® Local Control Panel
B	Key Lock	F	Key Lock
C	System Status LEDs	G	Ventilation

2. Power Sub-System

The power sub-system consists of a single non-redundant 600 W power supply with eight outputs; 3.3V, 5V, 12V1, 12V2, 12V3, 12V4, -12V and 5VSB. The input shall be auto ranging and power factor corrected. The form factor is SSI EPS1U at 300mm depth and wire harness output. The power supply provides two non-redundant 40mm fans for self cooling. The power supply fans also contribute to providing additional airflow for parts of the system.

This chapter provides basic technical details to the design and operation of the power supply. For more in-depth information, refer to the Intel® Server Chassis SR1500 AC Power Supply Specification.

2.1 Mechanical Overview



1. All dimensions are in mm.
2. The tolerance of the 40mm height dimension (marked with letter C) pertains to the metal case only

Figure 13. Power Supply Mechanical Drawing

2.2 Output Connectors

The power supply has a cable harness with four power connectors used to power various platform sub-systems. The following table defines each power connector

Table 2. Cable Harness Definition

Label	Length(mm)	Description
P1	210	Main Power Connector
P2	235	Processor Power Connector
P3	190	Backplane Power Connector
P4	230	Signal Connector

P1 – Main Power Connector

Connector housing: 24-Pin Molex* Mini-Fit Jr. 39-01-2245 or equivalent
Contact: Molex Mini-Fit, HCS, Female, Crimp 44476 or equivalent

Table 3. P1 – Main Power Connector Pin-out

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

Notes:

1. 5V Remote Sense Double Crimped into pin 4.
2. 3.3V Locate Sense Double Crimped into pin 2.

P2 – Processor Power Connector
Connector housing: 8-Pin Molex 39-01-2085 or equivalent
Contact: Molex, Mini-Fit Jr, HCS, 44476-1111 or equivalent

Table 4. P2 – Processor Power Connector Pin-out

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/Black Stripe
4	COM	Black	8	+12V2	Yellow/Black Stripe

P3 – Back Plane Power Connector
Connector housing: 8-Pin Molex 39-01-2085 2x4 or equivalent
Contact: Molex 2x4 mini fit Jr, HCS, 44476-1111 or equivalent

Table 5. P3 – Back Plane Power Connector Pin-out

PIN	SIGNAL	18AWG Color	PIN	SIGNAL	18AWG Color
1	GND	Black	5	+12V4	Blue/White Stripe
2	GND	Black	6	+12V4	Blue/White Stripe
3	+5V	Red	7	5VSB	Purple
4	+5V	Red	8	+3.3V	Orange

P4 – Baseboard Signal Connector
Connector housing: 5-pin Molex 50-57-9705 or equivalent
Contacts: Molex 16-02-0087 or equivalent

Table 6. P4 – Baseboard Signal Connector Pin-out

Pin	Signal	24 AWG Color
1	I2C Clock	White/Green Stripe
2	I2C Data	White/Yellow Stripe
3	NC	NC
4	COM	Black
5	3.3RS	White/Brown Stripe

2.3 Efficiency

The following table provides the required minimum efficiency level at various loading conditions. These are provided at three different load levels; 100%, 50% and 20%. Efficiency shall be tested over an AC input voltage range of 115VAC to 220VAC.

Table 7. Power Supply Efficiency

Loading	100% of maximum	50% of maximum	20% of maximum
Minimum Efficiency	72%	70%	60%

2.4 AC Input Voltage Requirement

The power supply must operate within all specified limits over the following input voltage range, shown in below table. Harmonic distortion of up to 10% THD must not cause the power supply to go out of specified limits. The power supply shall power off if the AC input is less than 75VAC +/-5VAC range. The power supply shall start up if the AC input is greater than 85VAC +/-4VAC. Application of an input voltage below 85VAC shall not cause damage to the power supply, including a fuse blow.

Table 8. AC Input Rating

PARAMETER	MIN	RATED	MAX	Start up VAC	Power Off VAC	Max Input AC Current	Max Rated Input AC Current
Voltage (110)	90 V_{rms}	100-127 V_{rms}	140 V_{rms}	85Vac +/- 4Vac	75VAC +/- 5VAC	$9.5A_{rms}$ [1,3]	$8.55A_{rms}$ [4]
Voltage (220)	180 V_{rms}	200-240 V_{rms}	264 V_{rms}			$4.75A_{rms}$ [2,3]	$4.3A_{rms}$ [4]
Frequency	47 Hz	50/60Hz	63 Hz				

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 is not to be used for determining agency input current markings.
4. Maximum rated input current is measured at 100VAC and 200VAC.

2.5 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 15sec and a $PSON^{\#}$ cycle HIGH for one second shall be able to reset the power supply.

2.5.1 Over-Current Protection (OCP)

The power supply shall have current limit to prevent the +3.3V, +5V, and +12V outputs from exceeding the values shown in the following table. If the current limits are exceeded the power supply shall shutdown and latch off. The latch will be 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. -12V and 5VSB shall be protected under over-current or shorted conditions so that no damage can occur to the power supply. Auto-recovery feature is a requirement on 5VSB rail.

Table 9. Over-current Protection (OCP)

VOLTAGE	OVER-CURRENT LIMIT (IOUT LIMIT)
+3.3V	110% minimum (= 11A) ; 150% maximum (= 15.0A)
+5V	110% min (= 22A); 150% max (= 30A)
+12V1	18A min; 20A max
+12V2	18A min; 20A max
+12V3	18A min; 20A max
+12V4	18A min; 20A max
-12V	0.625A min; 2.0A max
5VSB	6.0A max

2.5.2 Over-voltage Protection (OVP)

The power supply over-voltage protection 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 following table contains the over-voltage limits. The values are measured at the output of the power supply's connectors. 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.

Exception: +5VSB rail should be able to recover after an over-voltage condition occurs.

Table 10. Over-Voltage Protection (OVP) Limits

Output Voltage	MIN (V)	MAX (V)
+3.3V	+3.9	+4.5
+5V	+5.7	+6.2
+12V1,2, 3, 4	+13.3	+14.5
-12V	-13.3	-14.5
+5VSB	+5.7	+6.5

2.5.3 Over-temperature Protection (OTP)

The power supply is protected against over-temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU 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 OTP circuit has built in hysteresis such that the power supply will not oscillate on and off due to a temperature recovering condition. The OTP trip level has a minimum of 4°C of ambient temperature hysteresis.

2.6 Power Supply Status LED

There will be a single bi-color LED to indicate power supply status. The LED operation is defined below.

Table 11. LED Indicators

Power Supply Condition	LED
No AC power to all power supplies	OFF
Power supply critical event causing a shutdown; failure, OCP, OVP, Fan Fail	AMBER
AC present / Only 5VSB on (PS off)	1Hz Blink GREEN
Output ON and OK	GREEN

The LEDs shall be visible on the power supply's exterior face. The location of the LEDs shall meet ESD requirements. LEDs shall be securely mounted in such a way that incidental pressure on the LEDs shall not cause it to become displaced.

3. Cooling Sub-System

The cooling sub-system is compromised of five 40x40x56mm dual rotor fans, two 40x40x28mm power supply fans, a CPU air duct, and a PS / Electronics Bay Isolation Air Baffle. These components are used to provide the necessary cooling and airflow to the system. A fan on the processor heat sink is not necessary in this chassis.

In order to maintain the necessary airflow within the system, the air baffle, CPU air duct, and the top cover need to be properly installed.

Note: The Intel® Server Chassis SR1500 does not support redundant cooling. Should a fan fail, the system should be powered down as soon as possible to replace the failed fan.

3.1 Five-Fan Module

A fan assembly consisting of five 40x40x56mm dual rotor multi-speed fans provides the primary airflow for the system. Four of the dual rotor fans provide the primary cooling for the processors, memory, second and third hard drive bays, and components in the low profile PCI zone. The fifth dual rotor fan provides the primary cooling for the components in the full height PCI zone.

Removal and insertion of the fans and fan module is tool-less and provides for ease of installation and serviceability. Fans are individually replaceable through a connection to the hot-swap backplane. Neither the fan assembly nor the individual fans within it are hot-swappable. The server must be turned off before any of the fans can be replaced.

Each dual rotor fan has a 10-pin wire harness which connects to the hot-swap backplane. Each fan harness provides power and tachometer lines allowing the fans to be monitored independently by Intel® System Management Software.

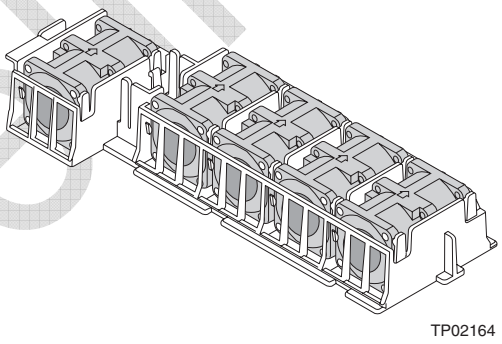


Figure 14. Fan Module Assembly

The following table provides the pin-out for each fan harness.

Table 12. Individual Fan Assembly Pin-out

Pin	Signal Name	Description
1	Fan Tach b	Tachometer signal from 1st fan rotor
2	PWM	PWM control signal
3	+12V	Power Supply 12V
4	+12V	Power Supply 12V
5	Fan Tach a	Tachometer signal from 2nd fan rotor
6	Ground	Power Supply Ground
7	Ground	Power Supply Ground
8	Not used	Not used
9	Loopback wire	Loopback to pin 10 to enable backplane presence LED functionality
10	Loopback wire	Loopback to pin 9 to enable backplane presence LED functionality

Each fan within the module is capable of supporting multiple speeds. If the internal ambient temperature of the system exceeds the value programmed into the thermal sensor data record (SDR), the Baseboard Management Controller (BMC) firmware will increase the rotational speed for the appropriate fans within fan module.

Note: There is no fan redundancy. Should a fan fail, the system should be powered down as soon as possible to have the fan replaced. The system fans are not hot-swapable.

3.2 Power Supply Fans

The power supply supports two non-redundant 40mm fans. They are responsible for the cooling of the power supply, first hard drive bay, and slim-line drive bay.

3.3 CPU Air Duct and Air Baffle

The chassis requires the use of a CPU air duct and power supply / electronics bay isolation air baffle to direct airflow and sustain appropriate air pressure.

An air baffle is used to isolate airflow of the two power supply fans from that of the system fan module. The baffle is mounted into three stand-offs with one end fitting under the back edge of the hard drive bay.

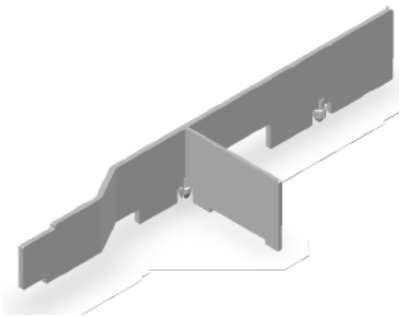


Figure 15. Air Baffle

The CPU air duct must be properly installed to direct airflow through the processor heatsink(s) to the low profile PCI and memory area of the system. The CPU air duct is designed to support either a single or dual processor configuration. For single processor configurations the pre-installed air dam must be left in place in order to maintain necessary air pressure and air flow through the processor heat sink. For dual processor configurations, the air dam must be snapped off of the CPU air duct. The CPU air duct cannot be installed if the air dam is in place and two processors are installed.

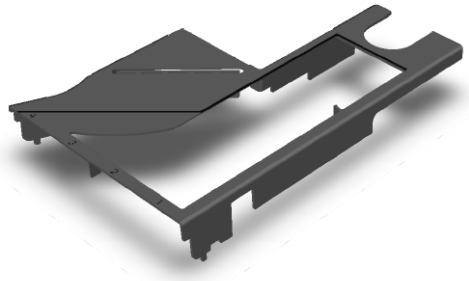


Figure 16. CPU Air Duct

Notes: IMPORTANT: Do not remove the air dam if only one processor is installed in the system. For single processor configurations, if the air dam is removed, the system will not meet the thermal cooling requirements of the processor, which will most likely result in a thermal shutdown of the system.

Once the air dam is removed from the CPU air duct, it cannot be reinstalled.

3.4 Hard Drive Bays

Hard drive bays must be populated in order to maintain system thermals. Hard drive trays, both hot-swap and cabled drives, must either have a hard drive or drive blank installed in them.

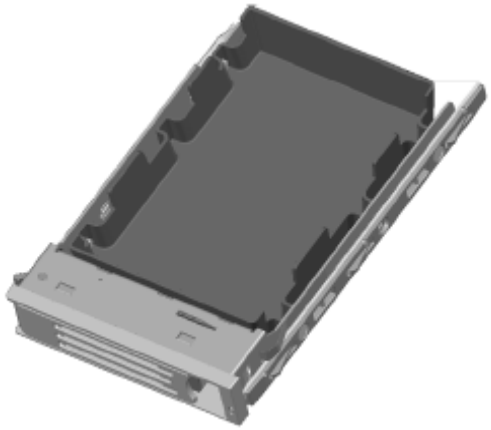


Figure 17. Hard Drive Carrier

4. Peripheral and Hard Drive Support

The server chassis provides three hard drive bays and one slim-line peripheral drive bay at the front of the chassis. The hard drive bays are designed to support both SAS and SATA hot-swap drives depending on the backplane and controller configuration. The chassis is also capable of being configured to support an IDE optical drive and a USB floppy drive.

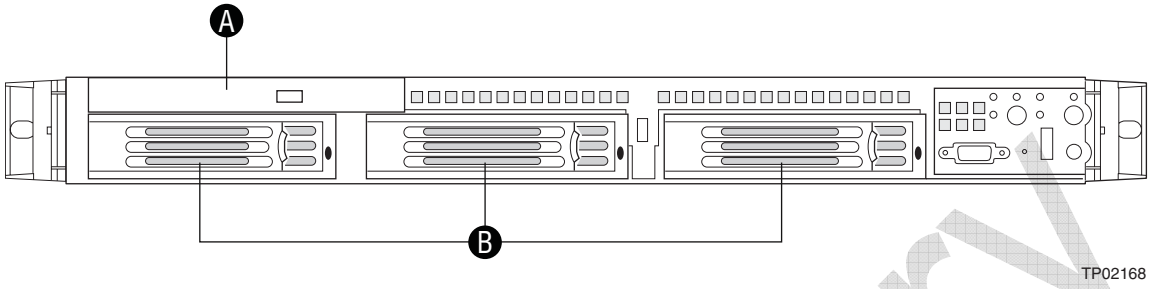


Figure 18. Intel® Server Chassis SR1500 Peripheral Bay Configuration Options

A	Slim Line Optical Drive
B	Hot Swap Drive Bays

4.1 Optical and Floppy Drive Support

The chassis provides a slim-line drive bay that can be configured for an IDE optical CD-ROM, DVD/CDR, or USB floppy drive. Drives are mounted on a tool-less tray which allows for easy installation into and removal from the chassis. The slim-line devices are not hot-swappable.

4.1.1 USB Floppy Drive Support

With an optional floppy drive installation kit, the chassis can support a slim-line USB floppy drive. The floppy drive can be inserted into either the slim-line bay or the hard drive bay directly below the slim-line bay. The option kit includes the necessary cables and trays to support either configuration. Once inserted into the drive bay, the floppy drive is cabled to a four pin USB connector on the backplane. The following table provides the pin-out for the USB connector.

Table 13. 4-pin USB Floppy Connector Pin-out

Pin	Name
1	Power
2	USB_P3n
3	USB P3p
4	Ground

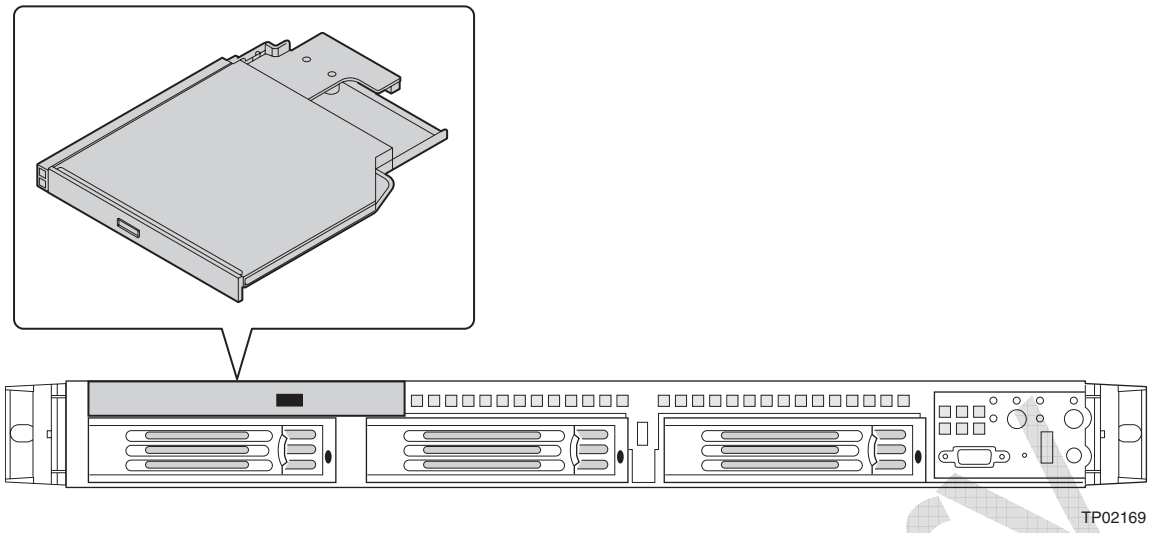


Figure 19. View of Slim-line Drive Bay

4.1.2 Optical Drive Support

The chassis has support for a slim-line IDE optical drive. The drive is mounted onto a tool-less drive tray and is connected to an interposer card attached to the tray. The drive assembly is then inserted in to the slim-line drive bay. A 44-pin ribbon cable is used to connect the drive assembly to a matching IDE connector on the server board.

Table 14. 44-pin Internal CD-ROM Connector Pin-out

Name	Pin	Pin	Name
RST_IDE_S_L	1	2	GND
IDE_SDD<7>	3	4	IDE_SDD<8>
IDE_SDD<6>	5	6	IDE_SDD<9>
IDE_SDD<5>	7	8	IDE_SDD<10>
IDE_SDD<4>	9	10	IDE_SDD<11>
IDE_SDD<3>	11	12	IDE_SDD<12>
IDE_SDD<2>	13	14	IDE_SDD<13>
IDE_SDD<1>	15	16	IDE_SDD<14>
IDE_SDD<0>	17	18	IDE_SDD<15>
GND	19	20	Unused
IDE_SDDREQ	21	22	GND
IDE_SDIOW_L	23	24	GND
IDE_SDIOR_L	25	26	GND
IDE_SIORDY	27	28	IDEP_ALE_H
IDE_SDDACK_L	29	30	GND
IRQ_IDE_S	31	32	TP_IDEIO16_L
IDE_SDA<1>	33	34	IDE_CBL_DET_S
IDE_SDA<0>	35	36	IDE_SDA<2>
IDE_SDCS0_L	37	38	IDE_SDCS1_L
IDE_SEC_HD_ACT_L	39	40	GND
P5V	41	42	P5V
GND	43	44	GND

4.2 Hard Disk Drive Support

The chassis can support up to three 3.5” x 1” hot-swap SAS or SATA hard disk drives. The drives are mounted to hot-swap drive trays for easy insertion to or extraction from the drive bay.

Note: All hard drive bays must be populated to maintain system thermals. Drive trays should either have a hard drive or drive blank installed.

4.2.1 Hot-Swap Hard Disk Drive Trays

Each hard drive must be mounted to a hot-swap drive tray, making insertion and extraction of the drive from the chassis very simple. Each drive tray has its own dual purpose latching mechanism which is used to both insert and extract drives from the chassis and lock the tray in place. Each drive tray supports a light pipe providing a drive status indicator, located on the backplane, to be viewable from the front of the chassis.

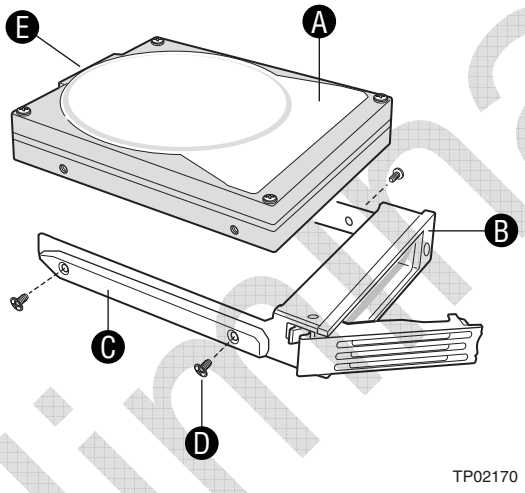


Figure 20. Hard Drive Tray Assembly

A. Hard Drive
B. Drive Carrier
C. Side Rail
D. Mounting Screw
E. Hard Drive Connector

4.2.2 Drive Blanks

Drive blanks must be used when no drive is used in a hard drive bay. Drive blanks simulate the spatial volume of a hard disk which is required to maintain proper air pressure limits necessary to cool the system.

Figure 21. Drive Tray with Drive Blank

4.3 Hot-Swap Backplane Support

The chassis can support either an active SAS or a passive SAS/SATA backplane. The backplanes provide the platform support for peripheral drives and hot-swap SAS or SATA hard drives. To eliminate several cables, the backplanes are also used as a pathway for signals from the server board to various platform interconnects, including those for the control panel and peripheral drives.

The passive backplane acts as a 'pass-through' for the SAS/SATA data from the drives to the SATA controller on the server board or a SAS/SATA controller add-in card. It provides the physical requirements for the hot-swap capabilities. The active backplane has a built-in SAS controller that does not need communication with the baseboard controller or an add-in card.

4.3.1 Feature set:

The backplanes support the following features and functions.

- Vitesse* VSC410 enclosure management controller
  - Integrated v3000 32 bit RISC microprocessor core
  - External non-volatile Flash ROM
  - Four I^2C interfaces
  - 44 GPIO pins
- Three drive control connectors supporting either SATA ports from the server board or SAS/SATA ports from an add-in card (Passive Backplane Only)
- LSI* LSISAS1064E SAS/SATA controller (Active Backplane Only)
  - Four-port, 3.0 Gbit/s SAS/SATA controller
  - Integrated Arm966 microprocessor core
  - Compliant with Fusion-MPT* architecture
  - Supports Integrated RAID* technology
  - X4 PCIe* interfaces
- Support for up to three hot swap SAS/SATA drives
- Three hard drive activity/fault LEDs
- Temperature sensor
- FRU EEPROM
- 2x4 pin power connector
- Five 1x10 pin mini system fan connectors
- 1x4 pin USB floppy drive connector
- 2x25 pin control panel I/O connector
- 1x10 pin control panel USB connector
- Add-in card I2C connector

The following diagrams show the layout of major components and connectors for each backplane.

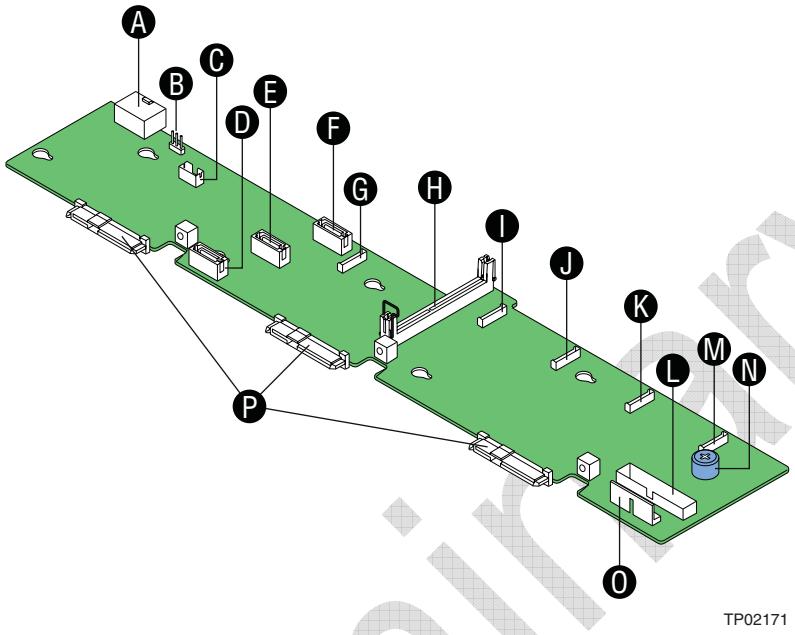


Figure 22. Hot-Swap Passive SAS/SATA Backplane Layout

A	Backplane Power	I	Fan 4 Power
B	Optical Drive	J	Fan 3 Power
C	USB	K	Fan 2 Power
D	SATA 0	L	Front Panel Connector
E	SATA 1	M	Fan 1 Power
F	SATA 2	N	Captive Screw
G	Fan 5 Power	O	Front Panel USB
H	Bridge Board Connector	P	Backplane Connectors

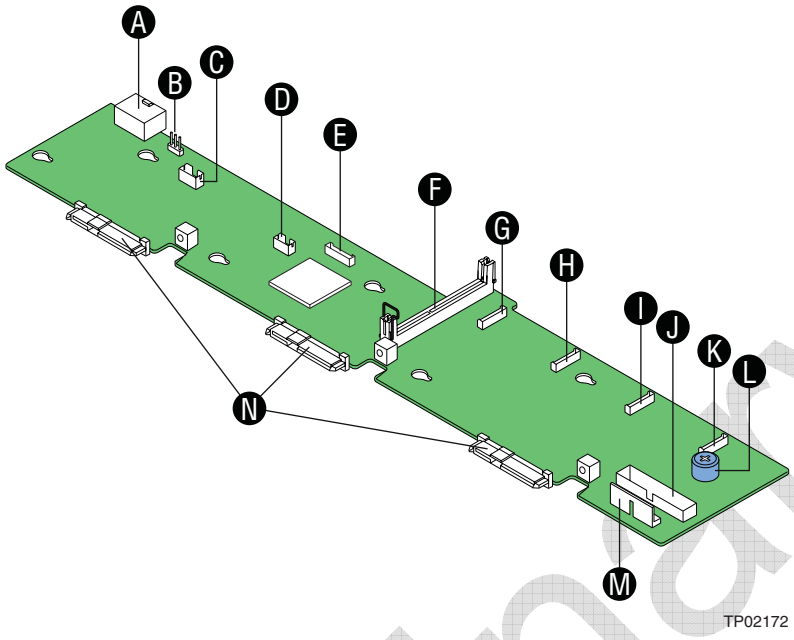


Figure 23. Active SAS Backplane Layout

A	Backplane Power	H	Fan 3 Power
B	Optical Drive	I	Fan 2 Power
C	USB	J	Front Panel Connector
D	SW RAID	K	Fan 1 Power
E	Fan 5 Power	L	Captive Screw
F	Bridge Board Connector	M	Front Panel USB
G	Fan 4 Power	N	Backplane Connectors

The following figures show the functional blocks for each backplane.

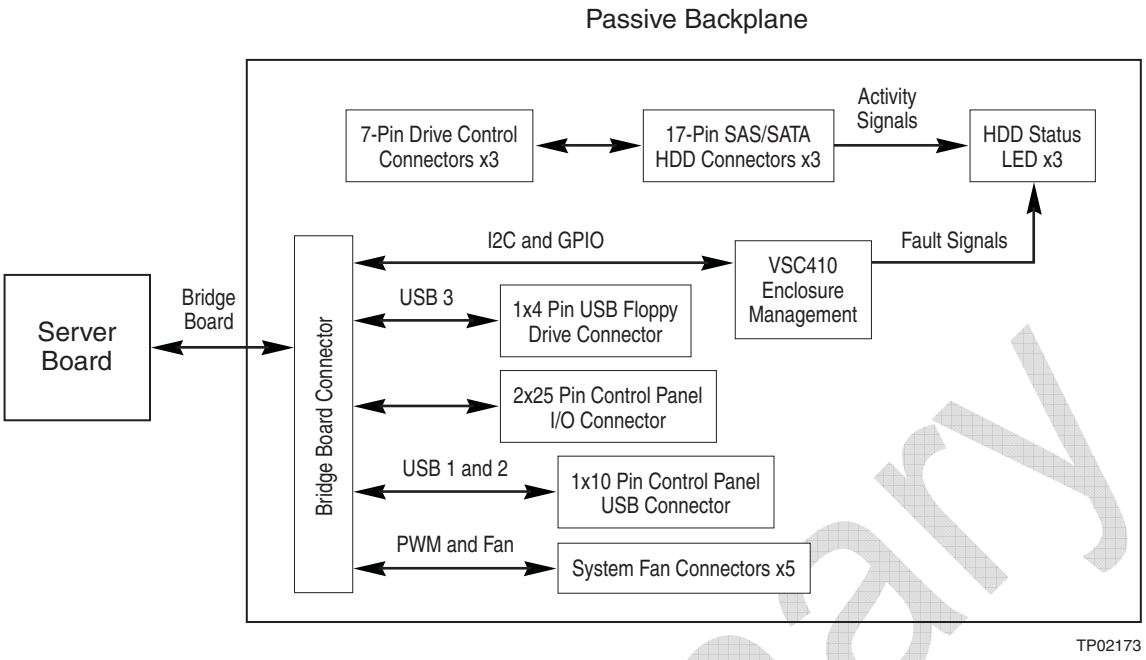


Figure 24. Hot-Swap Passive SAS/SATA Backplane Functional Diagram

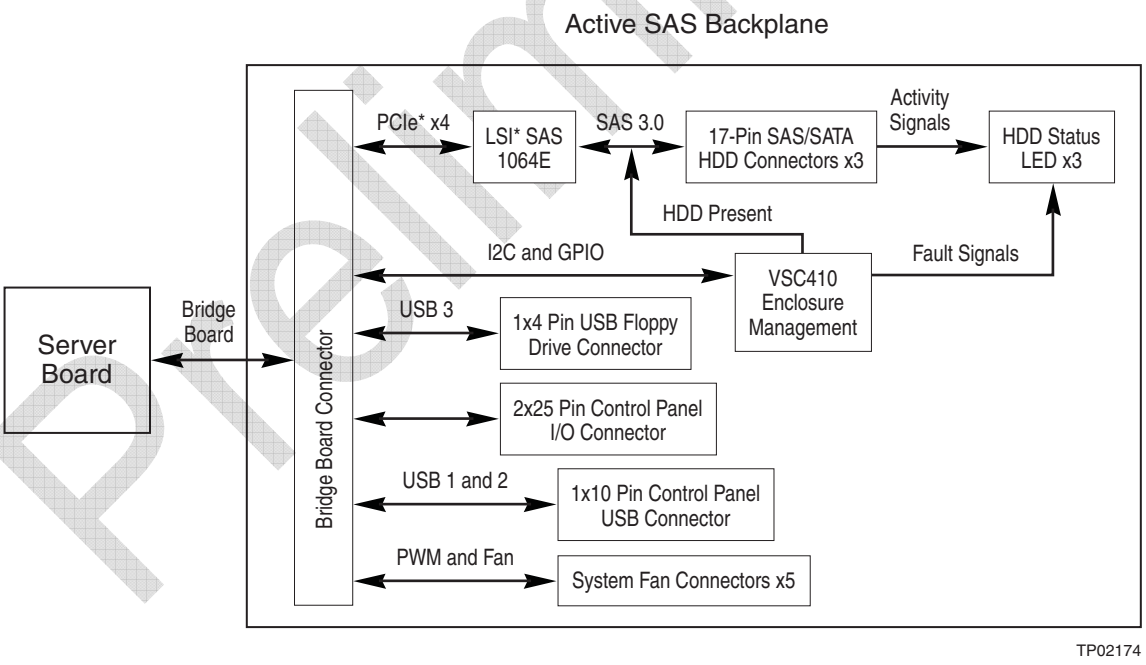


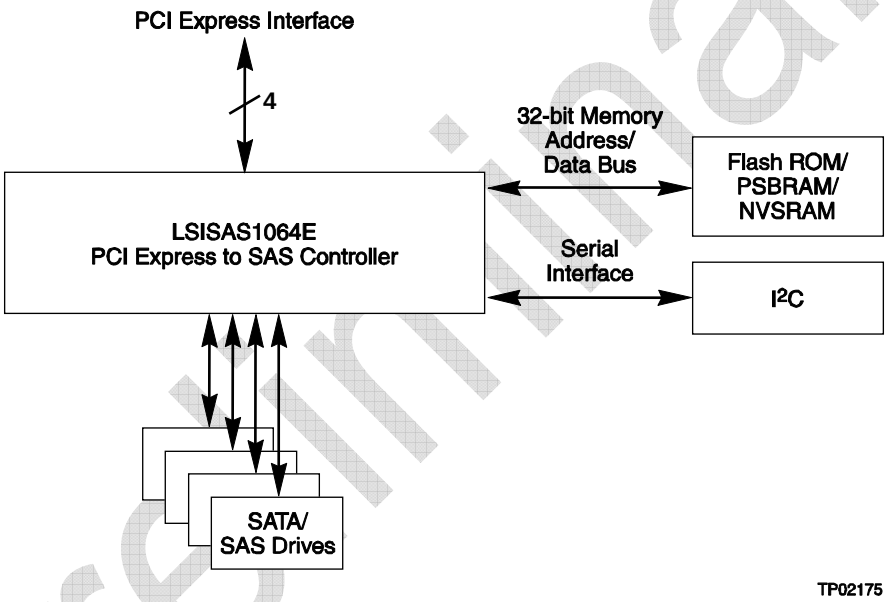
Figure 25. Hot-Swap Active SAS Backplane Functional Diagram

4.3.2 Vitesse* VSC410 Enclosure Management Controller

Both the active and passive backplanes support enclosure management using a Vitesse* VSC410 management controller. The VSC410 drives the hard drive activity/fault LED, hard drive present signal, and controls hard drive power up during system power on. In addition, the VSC410 supports the IPMI specification by providing management data to the baseboard management controller on the server board.

4.3.3 LSI* SAS1064E 3.0 Gbit/s Serial Attached SCSI Controller

Integrated on to the Active SAS Backplane is an LSI SAS1064E Serial Attached SCSI (SAS) controller. The LSISAS1064E is a four-port, 3.0 Gbit/s SAS/SATA controller that is compliant with the Fusion-MPT* architecture, provides an eight-lane PCI Express* interface, and supports Intel® Embedded RAID Technology II. The point-to-point interconnect feature of the PCI Express bus limits the electrical load on links, allowing increased transmission and reception frequencies. PCI Express transmission and reception data rates for each full-duplex interconnect is 2.5 Gbit/s.



PCI Express implements a switch-based technology to interconnect a large number of devices. Communication over the serial interconnect is accomplished using a packet-based communication protocol. Quality of Service (QOS) features provide differentiated transmission performance for different applications. Hot-Plug/Hot-Swap support enables “always-on” systems. Enhanced error handling features, such as end-to-end CRC (ECRC) and Advanced Error Reporting, make PCI Express suitable for robust, high-end server applications. Hot-Plug, power management, error handling, and interrupt signaling are accomplished using packet based messaging rather than sideband signals.

Each of the four SAS phys on the LSISAS1064E is capable of SAS/SATA link rates of 3.0 Gbit/s and 1.5 Gbit/s. The user can configure ports as wide or narrow. Narrow ports have one phy per port. Wide ports have two, three, or four phys per port. Each port supports the SSP, SMP, STP, and SATA protocols.

The SAS interface uses the proven SCSI command set to ensure reliable data transfers, while providing the connectivity and flexibility of point-to- point serial data transfers. The SAS interface provides improved performance, simplified cabling, smaller connectors, lower pin count, and

lower power requirements when compared to parallel SCSI. SAS controllers leverage an electrical and physical connection interface that is compatible with Serial ATA technology.

The LSISAS1064E supports the Intel® Embedded RAID Technology II solution, which is a highly integrated, low-cost RAID implementation. The runtime operation of the integrated RAID solution is transparent to the operating system. A single firmware build supports all integrated RAID capabilities.

For non-RAID SAS configurations, the LSISAS1064E uses the Fusion-MPT (Message Passing Technology) architecture, which features a performance based message passing protocol that offloads the host CPU by completely managing all I/Os and minimizes system bus overhead by coalescing interrupts. The proven Fusion-MPT architecture requires only thin, easy to develop device drivers that are independent of the I/O bus. LSI Logic* provides these device drivers.

4.3.3.1 Features of the LSI SAS1064E

SAS and SSP features:

- Each phy supports 3.0 Gbit/s and 1.5 Gbit/s SAS data transfers
- Provides a serial, point-to-point, enterprise-level storage interface
- Supports wide transfers consisting of 2, 3, or 4 phys
- Supports narrow ports consisting of a single phy
- Transfers data using SCSI information units
- Compatible with SATA target devices

SATA and STP Features:

- Supports 3.0 Gbits/s and 1.5 Gbits/s SATA data transfers
- Supports 3.0 Gbits/s and 1.5 Gbits/s STP data transfers

Usability features:

- Simplifies cabling with point-to-point, serial architecture
- Provides drive spin-up sequencing control
- Provides up to two LED signals for each SAS/SATA phy to indicate drive activity and faults
- Provides an SGPIO interface

4.3.4 LED Support

The backplanes support an activity/fault LED for each of the hard drive connectors. The LED will illuminate green for activity or amber for a drive fault. When the drive is used in a RAID configuration, the LED may blink amber while a rebuild is in progress.

Table 15. LED Function

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

4.3.5 Backplane Connector Definitions

The backplanes include several different connectors. This section defines the purpose and pin-out associated with each.

4.3.5.1 Power Connector (Backplane to Power Supply Harness)

The backplane provides power to the three hard drive bays and the slim-line drive bay. An 8-pin power cable is routed from the power supply and plugs into a 2x4 shrouded plastic PC power connector on the backplane. The following table shows the power connector pin-out.

Table 16. Backplane Power Connector Pin-out (J1B1)

Pin	Name	Pin	Name
1	Ground	5	+12V
2	Ground	6	+12V
3	+5V	7	5VSB
4	+5V	8	+3.3V

4.3.5.2 Bridge Board Interface (Backplane to Server Board)

The backplanes provide a pathway for the control panel, PCIe*, USB, and other miscellaneous signals from the server board to connector interfaces on the backplane. The server board and backplane have matching 120-pin connectors which are attached using a PCB called the bridge board, as shown in the following figure. To assure the bridge board is held in place while the integrated platform is shipped or installed into the rack, the bridge board is held in place using metal clips which latch the bridge board to each of its connectors on the backplane and server board.

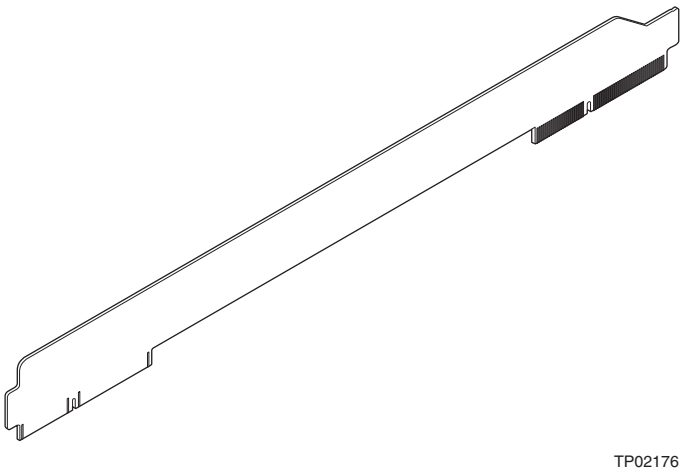


Figure 26. Bridge Board Layout

The following table provides the pin-out for the 120-pin connector.

Table 17. Bridge Board Connector Pin-out (J5A1)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	GND	61	SMB_SENSOR_3V3SB_CLK_BUF
2	PE1_ESB_TX_DN3	62	SMB_SENSOR_3V3SB_DAT_BUF
3	PE1_ESB_TX_DP3	63	FM_BRIDGE_PRSNT_N
4	GND	64	GND
5	PE_WAKE_N	65	PE1_ESB_RX_DN_C3
6	GND	66	PE1_ESB_RX_DP_C3
7	PE1_ESB_TX_DN2	67	GND
8	PE1_ESB_TX_DP2	68	FAN_PRSNT6_N
9	GND	69	GND
10	FAN_PRSNT5_N	70	PE1_ESB_RX_DN_C2
11	GND	71	PE1_ESB_RX_DP_C2
12	PE1_ESB_TX_DN1	72	GND
13	PE1_ESB_TX_DP1	73	FAN_PRSNT4_N
14	GND	74	GND
15	RST_PS_PWRGD	75	PE1_ESB_RX_DN_C1
16	GND	76	PE1_ESB_RX_DP_C1
17	PE1_ESB_TX_DN0	77	GND
18	PE1_ESB_TX_DP0	78	RAID_KEY_PRES
19	GND	79	GND
20	FM_RAID_MODE	80	PE1_ESB_RX_DN_C0
21	GND	81	PE1_ESB_RX_DP_C0
22	CLK_IOP_DN	82	GND
23	CLK_IOP_DP	83	FAN_PRSNT1_N
24	GND	84	FAN_PRSNT3_N
25	SGPIO_DATAOUT1	85	FAN_PRSNT2_N
26	SGPIO_DATAOUT0	86	GND
27	SGPIO_LOAD	87	USB1_ESB_DP
28	SGPIO_CLOCK	88	USB1_ESB_DN
29	GND	89	GND

PIN	SIGNAL NAME	PIN	SIGNAL NAME
30	USB2_ESB_DP	90	USB1_ESB_OC_N
31	USB2_ESB_DN	91	USB0_ESB_OC_N
32	GND	92	GND
33	USB2_ESB_OC_N	93	USB0_ESB_DP
34	NIC1_LINK_LED_N	94	USB0_ESB_DN
35	NIC1_ACT_LED_N	95	GND
36	LED_STATUS_AMBER_R1	96	FP_NMI_BTN_N
37	NIC2_LINK_LED_N	97	BMC_RST_BTN_N
38	NIC2_ACT_LED_N	98	FP_PWR_BTN_N
39	LED_STATUS_GREEN_BUF_R1	99	FP_ID_SW_L
40	GND	100	GND
41	SMB_PBI_5VSB_DAT	101	SMB_IPMB_5VSB_DAT
42	SMB_PBI_5VSB_CLK	102	SMB_IPMB_5VSB_CLK
43	GND	103	GND
44	V_IO_HSYNC2_BUF_FP	104	LED_HDD_ACTIVITY_N
45	V_IO_VSYNC2_BUF_FP	105	LED_HDD_5V_A
46	GND	106	FP_PWR_LED_R_N
47	V_IO_BLUE_CONN_FP	107	FP_PWR_LED_3VSB
48	V_IO_GREEN_CONN_FP	108	FP_ID_LED_R1_N
49	V_IO_RED_CONN_FP	109	FM_SIO_TEMP_SENSOR
50	GND	110	LED_FAN3_FAULT
51	LED_FAN6_FAULT	111	LED_FAN2_FAULT
52	LED_FAN5_FAULT	112	LED_FAN1_FAULT
53	LED_FAN4_FAULT	113	FAN_PWM_CPU1
54	FAN_PWM3	114	GND
55	GND	115	FAN_PWM_CPU2
56	PCI_FAN_TACH10	116	PCI_FAN_TACH9
57	FAN_TACH8	117	FAN_TACH7
58	FAN_TACH6	118	FAN_TACH5
59	FAN_TACH4_H7	119	FAN_TACH3_H7
60	FAN_TACH2_H7	120	FAN_TACH1_H7

4.3.5.3 Control Panel I/O Interface Connector (Backplane to Control Panel)

The backplanes provide a pathway for control panel I/O signals from the bridge board connector to the control panel interface connector. The pin-out for the 50-pin control panel I/O connector is shown in the following table.

Table 18. Backplane Control Panel Connector Pin-out (J9C1)

Description	Pin #	Pin #	Description
V_IO_RED_CONN_FP	1	2	GND
V_IO_GREEN_CONN_FP	3	4	GND
V_IO_BLUE_CONN_FP	5	6	GND
V_IO_HSYNC_BUFF_FP_L	7	8	GND
V_IO_VSYNC_BUFF_FP_L	9	10	GND
VIDEO_IN_USE	11	12	FP_THERM_SENSOR
EMP_DTR2_L	13	14	EMP_DCD2_L
EMP_RTS2_L	15	16	EMP_CTS2_L
EMP_SIN2_L	17	18	EMP_SOUT2
EMP_DSR2_L	19	20	EMP_IN_USE
FP_NMI_BTN_L	21	22	GND
NIC1_ACT_LED_L	23	24	NIC1_LINK_LED_R_L

Description	Pin #	Pin #	Description
	25	26	FP_CHASSIS_INTRU
FP_ID_SW_L	27	28	SMB_PB1_5VSB_CLK
GND	29	30	SMB_PB1_5VSB_DAT
FP_RST_BTN_L	31	32	NIC2_ACT_LED_L
HDD_FAULT_LED_R_L	33	34	NIC2_LINK_LED_R_L
FP_PWR_BTN_L	35	36	FP_ID_LED_R_L
IPMB_I2C_5VSB_SCL	37	38	GND
IPMB_I2C_5VSB_SDA	39	40	HDD_LED_5V_A
FP_PWER_LED_R_N	41	42	FAULT_LED_5VSB_P
FP_PWR_LED_5VSB	43	44	LED_STATUS_AMBER_R1
RST_P6_PWRGOOD	45	46	LED_STATUS_GREEN_BUF_R1
HDD_LED_ACT_R_L	47	48	P5V
P5V_STBY	49	50	P5V_STBY

4.3.5.4 Control Panel USB Interface Connector (Backplane to Control Panel)

The backplanes provide a pathway for control panel USB signals from the bridge board connector to the control panel USB interface connector. The pin-out for the 10-pin control panel USB connector is shown in the following table.

Table 19. 1x10 Pin Control Panel USB Connector Pin-out (J6B1)

Pin#	Description
1	P5V_USB_P1
2	USB_P1N
3	USB_P1P
4	GROUND
5	GROUND
6	P5V_USB_P2
7	USB_P2N
8	USB_P2P
9	GROUND
10	GROUND

4.3.5.5 Hot-Swap SATA/SAS Drive Connectors

The backplanes provide three hot-swap SATA/SAS connectors, which provide power and signals using a single docking connector. Each drive attaches to the backplane using one of these connectors.

Table 20. SAS/SATA Hard Drive Connector Pin-outs (J8N1, J6N1, J3N1)

Pin#	Signal Description
SI	Ground
S2	SAS#_TX_DP (# = 0…2)
S3	SAS#_TX_DN (# = 0…2)
S4	Ground
S5	SAS#_RX_DN (# = 0…2)
S6	SAS#_RX_DP (# = 0…2)
S7	Ground
S8	Not Used
S9	Not Used
S10	Not Used
S11	Not Used
S12	Not Used
S13	Not Used
S14	Not Used
P1	Not Used

Pin#	Signal Description
P2	Not Used
P3	Not Used
P4	Ground
P5	Ground
P6	P3V3
P7	P5V
P8	P5V
P9	P5V
P10	Ground
P11	LED_SAS#_ACT_L (# = 0…2)
P12	Ground
P13	P12V
P14	P12V
P15	P12V
PTH0	Ground
PTY1	Ground

4.3.5.6 SATA/SAS Drive Control Connectors (Passive Backplane Only)

The passive backplane includes three drive control connectors. These are used to attach SATA/SAS cables from the backplane to either the SATA ports on the server board, or to SAS/SATA ports from an add-in card. Each drive control connector has the following pin-out.

Table 21. SATA/SAS Drive Control Connector Pin-out (J3C1, J4B2, J4A1)

Pin #	Description
1	GROUND
2	SATA # TX_DP (# = 0,1,2)
3	SATA # TX_DN (# = 0,1,2)
4	GROUND
5	SATA # RX_DN (# = 0,1,2)
6	SATA # RX_DP (# = 0,1,2)
7	GROUND

4.3.5.7 USB Floppy Drive Connector

With a slim-line USB floppy drive installed (using the optional floppy drive kit) into either the slim-line drive bay or in one of the hard drive bays, the USB floppy cable is routed from the drive to a 4-pin connector on the backplane. The following table provides the pin-out for the floppy drive connector.

Table 22. 4-pin floppy connector Pin-out (J2B1)

Pin	Name
1	P5V_USB_P3
2	USBP3N
3	USBP3P
4	GROUND

4.3.5.8 System Fan Connectors

The backplanes provides a pathway for signals from the server board to monitor and control five system fans. A 1x10 mini connector is provided for each of the fans. The pin-out for each connector is provided in the following table.

Table 23. System Fan Connector Pin-outs

J9A5 - FAN_1		J8A1- FAN_2		J7A1- FAN_3	
PIN	**SIGNAL NAME**	**PIN**	**SIGNAL NAME**	**PIN**	**SIGNAL NAME**
1	FAN_TACH5	1	FAN_TACH6	1	FAN_TACH7
2	FAN_PWM_CPU1	2	FAN_PWM_CPU1	2	FAN_PWM_CPU2
3	P12V	3	P12V	3	P12V
4	P12V	4	P12V	4	P12V
5	FAN_TACH1_H7	5	FAN_TACH2_H7	5	FAN_TACH3_H7
6	GND	6	GND	6	GND
7	GND	7	GND	7	GND
8	FAN_PRSNT1_N	8	FAN_PRSNT2_N	8	FAN_PRSNT3_N
9	LED_FAN1_FAULT	9	LED_FAN2_FAULT	9	LED_FAN3_FAULT
10	LED_FAN1	10	LED_FAN2	10	LED_FAN3

J6A1- FAN_4		J4B1- FAN_5		
PIN	**SIGNAL NAME**	**PIN**	**SIGNAL NAME**	
1	FAN_TACH8	1	PCI_FAN_TACH10	
2	FAN_PWM_CPU2	2	FAN_PWM3	
3	P12V	3	P12V	
4	P12V	4	P12V	
5	FAN_TACH4_H7	5	FAN_TACH9	
6	GND	6	GND	
7	GND	7	GND	
8	FAN_PRSNT4_N	8	FAN_PRSNT5_N	
9	LED_FAN4_FAULT	9	LED_FAN5_FAULT	
10	LED_FAN4	10	LED_FAN5	

4.3.5.9 System Management Connectors

The backplanes provide connectors to interface with system management buses. The following tables define the pin-out for each of these connectors.

Table 24. IPMB Connector Pin-out (J1C1)

Pin #	Description
1	SMB_IPMB_5VSB_DAT
2	GND
3	SMB_IPMB_5VSB_CLK
4	SMB_PWR_IPMB_CONN

Table 25. Add-in Card Connector Pin-out (J6B2 – Passive Only)

Pin #	Description
1	SMB_3V3_SAS_SDA
2	GND
3	SMB_3V3_SAS_SCL

5. Standard Control Panel

The standard control panel supports several push buttons and status LEDs, along with USB and video ports to centralize system control, monitoring, and accessibility to within a common compact design.

The control panel assembly comes pre-assembled and is modular in design. The control panel assembly module slides into a predefined slot on the front of the chassis. Once installed, communication to the server board can be achieved by either attaching a 50-pin cable to a hot-swap backplane, or if cabled drives are used, can be connected directly to the server board. In addition, a USB cable is routed to a USB port on the server board.

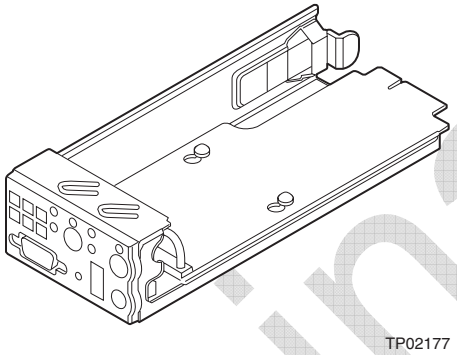


Figure 27. Standard Control Panel Assembly Module

5.1 Control Panel Buttons

The standard control panel assembly houses several system control buttons. Each of their functions is listed in the table below.

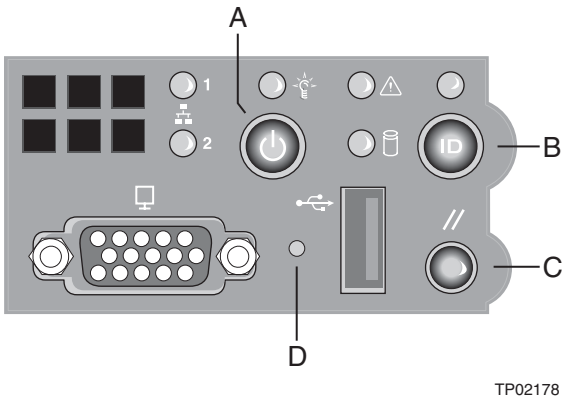


Figure 28. Control Panel Buttons

Table 26. Control Button and Intrusion Switch Functions

Reference	Feature	Function
A	Power / Sleep Button	Toggles the system power on/off. This button also functions as a Sleep Button if enabled by an ACPI-compliant operating system.
B	ID Button	Toggles the front panel ID LED and the baseboard ID LED on/off. The baseboard ID LED is visible through the rear of the chassis and allows you to locate the server you're working on from behind a rack of servers.
C	Reset Button	Reboots and initializes the system.
D	NMI Button	Pressing the recessed button with a paper clip or pin puts the server in a halt state for diagnostic purposes and allows you to issue a non-maskable interrupt. After issuing the interrupt, a memory download can be performed to determine the cause of the problem.

5.2 Control Panel LED Indicators

The control panel houses six LEDs, which are viewable with or without the front bezel to display the system's operating state.

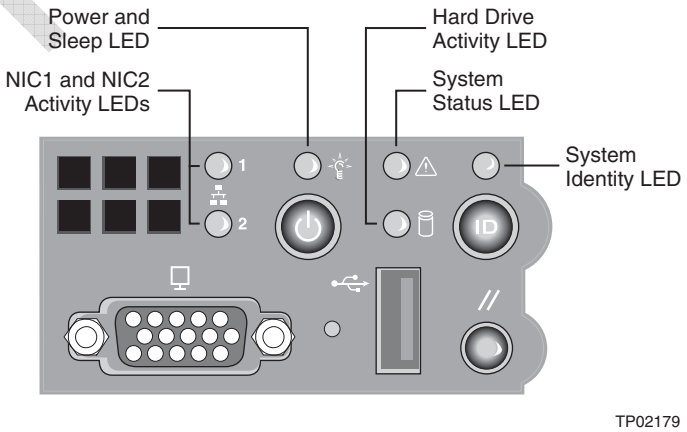


Figure 29. Control Panel LED Indicators

The following table identifies each LED and describes their functionality.

Table 27. Control Panel LED Functions

LED	Color	State	Description
NIC1 / NIC2 Activity	Green	On	NIC Link
	Green	Blink	NIC Activity
Power / Sleep (on standby power)	Green	On	Legacy power on / ACPI S0 state
		Blink [1,4]	Sleep / ACPI S1 state
	Off	Off	Power Off / ACPI S4 or S5 state
System Status (on standby power)	Green	On	Running / normal operation
		Blink [1,2]	Degraded
	Amber	On	Critical or non-recoverable condition.
		Blink [1,2]	Non-critical condition.
	Off	Off	POST / system stop.
Disk Activity	Green	Random blink	Provides an indicator for disk activity.
	Off	Off [3]	No hard disk activity
System Identification	Blue	Blink	Identify active via command or button.
	Off	Off	No Identification.

Notes:

1. Blink rate is ~1 Hz with at 50% duty cycle.
2. The amber status takes precedence over the green status. When the amber LED is on or blinking, the green LED is off.
3. Also off when the system is powered off (S4/S5) or in a sleep state (S1).
4. The power LED sleep indication is maintained on standby by the chipset. If the system is powered down without going through BIOS, the LED state in effect at the time of power off will be restored when the system is powered on until the BIOS clears it. If the system is not powered down normally, it is possible that the Power LED will be blinking at the same time that the system status LED is off due to a failure or configuration change that prevents the BIOS from running.

The current limiting resistors for the power LED, the system fault LED, and the NIC LEDs are located on the Intel® Server Board S5000PAL.

5.2.1 Power / Sleep LED

Table 28. SSI Power LED Operation

State	Power Mode	LED	Description
Power Off	Non-ACPI	Off	System power is off, and the BIOS has not initialized the chipset.
Power On	Non-ACPI	On	System power is on, but the BIOS has not yet initialized the chipset.
S5	ACPI	Off	Mechanical is off, and the operating system has not saved any context to the hard disk.
S4	ACPI	Off	Mechanical is off. The operating system has saved context to the hard disk.
S3-S1	ACPI	Slow blink 1	DC power is still on. The operating system has saved context and gone into a level of low-power state.
S0	ACPI	Steady on	System and the operating system are up and running.

Note:

1. Blink rate is ~ 1Hz with at 50% duty cycle.

5.2.2 System Status LED

Note: Some of the following status conditions may or may not be reported if the system is not configured with an Intel® Remote Management Module. Refer to the server board technical product specification for details.

5.2.2.1 Critical Conditions

A critical condition is any critical or non-recoverable threshold crossing associated with the following events:

- Temperature, voltage, or fan critical threshold crossing.
- Power subsystem failure. The BMC asserts this failure whenever it detects a power control fault (e.g., the BMC detects that the system power is remaining ON even though the BMC has deserted the signal to turn off power to the system.
- A hot-swap backplane would use the Set Fault Indication command to indicate when one or more of the drive fault status LEDs are asserted on the hot-swap backplane.
- The system is unable to power up due to incorrectly installed processor(s), or processor incompatibility.
- Satellite controller sends a critical or non-recoverable state, via the Set Fault Indication command to the BMC.
- Critical event logging errors, including: System Memory Uncorrectable ECC error, and fatal / uncorrectable bus errors such as PCI SERR and PERR.

5.2.2.2 Non-Critical Conditions

A non-critical condition is threshold crossing associated with the following events:

- Temperature, voltage, or fan non-critical threshold crossing.
- Chassis intrusion.
- Satellite controller sends a non-critical state, via the Set Fault Indication command, to the BMC.
- Set Fault Indication command from system BIOS. The BIOS may use the Set Fault Indication command to indicate additional ‘non-critical’ status such as a system memory or CPU configuration changes.

5.2.2.3 Degraded Conditions

A degraded condition is associated with the following events:

- Non-redundant power supply operation. This applies only when the BMC is configured for a redundant power subsystem.
- One or more processors are disabled by Fault Reliant Booting (FRB) or BIOS.
- BIOS has disabled or mapped out some of the system memory.

5.2.3 Drive Activity LED

The drive activity LED on the front panel indicates drive activity from the onboard hard disk controllers. The Intel® Server Board S5000PAL also provides a header giving access to this LED for add-in controllers.

5.2.4 System Identification LED

The blue system identification LED is used to help identify a system for servicing. This is especially useful when the system is installed in a high density rack or cabinet that is populated with several similar systems. The system ID LED will blink when the System ID button on the control panel is pressed, or it can be illuminated remotely through Intel® System Management Software.

5.3 Control Panel Connectors

The control panel has two external I/O connectors:

- One USB port
- One VGA video port

The following tables provide the pin-outs for each connector.

Table 29. External USB Connectors (J1B1)

Pin #	Description
1	PWR_FP_USB2
2	USB_DN2_FP_R
3	USB_DP2_FP_R
4	GND
5	GND
6	GND
7	GND

Table 30. Video Connector (J1A1)

Description	Pin #	Pin #	Description
VGA_RED	1	9	GND
VGA_GREEN	2	10	GND
VGA_BLUE	3	11	Unused
Unused	4	12	VGA_DDCDAT
GND	5	13	VGA_HSYNC_L
GND	6	14	VGA_VSYNC_L
VGA_INUSE_L	7	15	VGA_DDCCLK
GND	8	16	GND
		17	GND

If a monitor is connected to the front panel video connector, the rear video port on the server board will be disabled and the front panel video will be enabled. The video source is the same for both connectors and is switched between the two, with the control panel having priority over the rear video. This provides for easy front accessibility to the server.

6. Intel® Local Control Panel

The Intel® Local Control Panel utilizes a combination of control buttons, LEDs, and LCD display to provide system accessibility, monitoring, and control functions. The control panel assembly is pre-assembled and is modular in design. The module slides into a slot on the front of the chassis and is designed so that it can be adjusted for use with or without an outer front bezel.

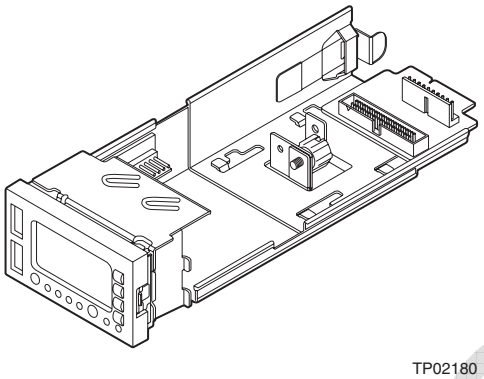


Figure 30. Intel® Local Control Panel Assembly Module

Note: The Intel® Local Control Panel can only be used when the Intel® Remote Management Module is installed in the system.

The following diagram provides an overview of the control panel features.

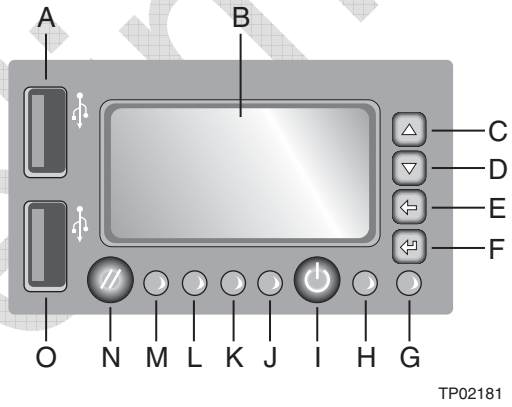


Figure 31. Intel® Local Control Panel Overview

A	USB 2.0 Port	I	Power / Sleep Button
B	LCD Display	J	System Status LED
C	Menu control button, scroll up	K	NIC 2 Activity LED
D	Menu control button, scroll down	L	NIC 1 Activity LED
E	Menu control button, scroll left	M	Hard Drive Activity LED
F	Menu control button, enter	N	System Reset Button
G	System ID LED	O	USB 2.0 Port
H	Power / Sleep LED		

6.1 LED Functionality

The following table identifies each LED and describes their functionality.

Table 31. Control Panel LED Functions

LED	Color	State	Description
NIC1 / NIC2 Activity	Green	On	NIC Link
	Green	Blink	NIC Activity
Power / Sleep (on standby power)	Green	On	Legacy power on / ACPI S0 state
		Blink [1,4]	Sleep / ACPI S1 state
	Off	Off	Power Off / ACPI S4 or S5 state
System Status (on standby power)	Green	On	Running / normal operation
		Blink [1,2]	Degraded
	Amber	On	Critical or non-recoverable condition.
		Blink [1,2]	Non-critical condition.
	Off	Off	POST / system stop.
Disk Activity	Green	Random blink	Provides an indicator for disk activity.
	Off	Off [3]	No hard disk activity
System Identification	Blue	Blink	Identify active via command or button.
	Off	Off	No Identification.

Notes:

1. Blink rate is ~1 Hz with a 50% duty cycle.
2. The amber status takes precedence over the green status. When the amber LED is on or blinking, the green LED is off.
3. Also off when the system is powered off (S4/S5) or in a sleep state (S1).
4. The power LED sleep indication is maintained on standby by the chipset. If the system is powered down without going through BIOS, the LED state in effect at the time of power off will be restored when the system is powered on until the BIOS clears it. If the system is not powered down normally, it is possible that the Power LED will be blinking at the same time that the system status LED is off due to a failure or configuration change that prevents the BIOS from running.

The current limiting resistors for the power LED, the system fault LED, and the NIC LEDs are located on the Intel® Server Board S5000PAL.

6.1.1 Power / Sleep LED

Table 32. SSI Power LED Operation

State	Power Mode	LED	Description
Power Off	Non-ACPI	Off	System power is off, and the BIOS has not initialized the chipset.
Power On	Non-ACPI	On	System power is on, but the BIOS has not yet initialized the chipset.
S5	ACPI	Off	Mechanical is off, and the operating system has not saved any context to the hard disk.
S4	ACPI	Off	Mechanical is off. The operating system has saved context to the hard disk.
S3-S1	ACPI	Slow blink 1	DC power is still on. The operating system has saved context and gone into a level of low-power state.
S0	ACPI	Steady on	System and the operating system are up and running.

Note:

1. Blink rate is ~ 1Hz with at 50% duty cycle.

6.1.2 System Status LED

6.1.2.1 Critical Conditions

A critical condition is any critical or non-recoverable threshold crossing associated with the following events:

- Temperature, voltage, or fan critical threshold crossing.
- Power subsystem failure. The BMC asserts this failure whenever it detects a power control fault (e.g., the BMC detects that the system power is remaining ON even though the BMC has deserted the signal to turn off power to the system.
- A hot-swap backplane would use the Set Fault Indication command to indicate when one or more of the drive fault status LEDs are asserted on the hot-swap backplane.
- The system is unable to power up due to incorrectly installed processor(s), or processor incompatibility.
- Satellite controller sends a critical or non-recoverable state, via the Set Fault Indication command to the BMC.
- Critical event logging errors, including: System Memory Uncorrectable ECC error, and fatal / uncorrectable bus errors such as PCI SERR and PERR.

6.1.2.2 Non-Critical Conditions

A non-critical condition is threshold crossing associated with the following events:

- Temperature, voltage, or fan non-critical threshold crossing.
- Chassis intrusion.
- Satellite controller sends a non-critical state, via the Set Fault Indication command, to the BMC.
- Set Fault Indication command from system BIOS. The BIOS may use the Set Fault Indication command to indicate additional ‘non-critical’ status such as a system memory or CPU configuration changes.

6.1.2.3 Degraded Conditions

A degraded condition is associated with the following events:

- Non-redundant power supply operation. This applies only when the BMC is configured for a redundant power subsystem.
- One or more processors are disabled by Fault Reliant Booting (FRB) or BIOS.
- BIOS has disabled or mapped out some of the system memory.

6.1.3 Drive Activity LED

The drive activity LED on the front panel indicates drive activity from the onboard hard disk controllers. The Intel® Server Board S5000PAL also provides a header giving access to this LED for add-in controllers.

6.1.4 System Identification LED

The blue system identification LED is used to help identify a system for servicing. This is especially useful when the system is installed in a high density rack or cabinet that is populated with several similar systems. The system ID LED will blink when the System ID button on the control panel is pressed, or it can be illuminated remotely through Intel® System Management Software.

7. PCI Riser Cards and Assembly

The Intel® Server Board S5000PAL provides two PCI riser slots, one supporting a low profile add-in card riser, and the other used for full height add-in card risers. The riser cards for these slots are not interchangeable due to their orientation on the board and connector differences. The low profile riser slot is only capable of supporting a riser using PCI Express* cards. The full height riser slot is capable of supporting risers that follow either the PCI-X* or PCI Express* specifications.

The riser assembly for the server chassis is tool-less. Stand-offs allow the riser cards to slide onto the assembly where a latching mechanism holds each riser in place. Holding down the latch releases the risers for easy removal.

When re-inserting the riser assembly into the chassis, tabs on the back of the assembly should be aligned with slots on the back edge of the chassis. The tabs fit into the slots securing the riser assembly to the chassis when the top cover is in place.

The riser assembly provides two extraction levers to assist with riser assembly removal from the riser slots.

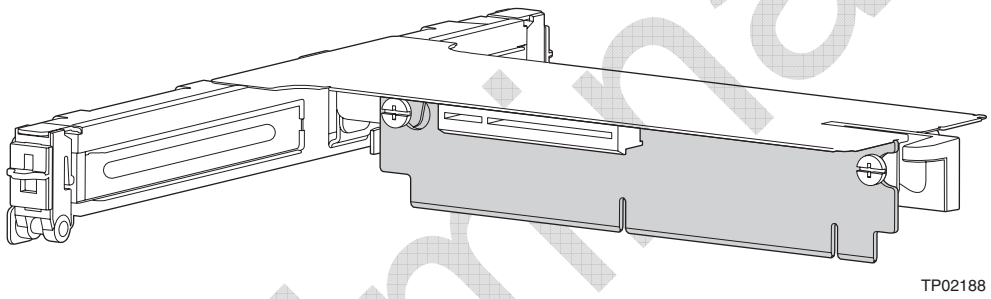


Figure 32. PCI Riser Card Assembly - FH View

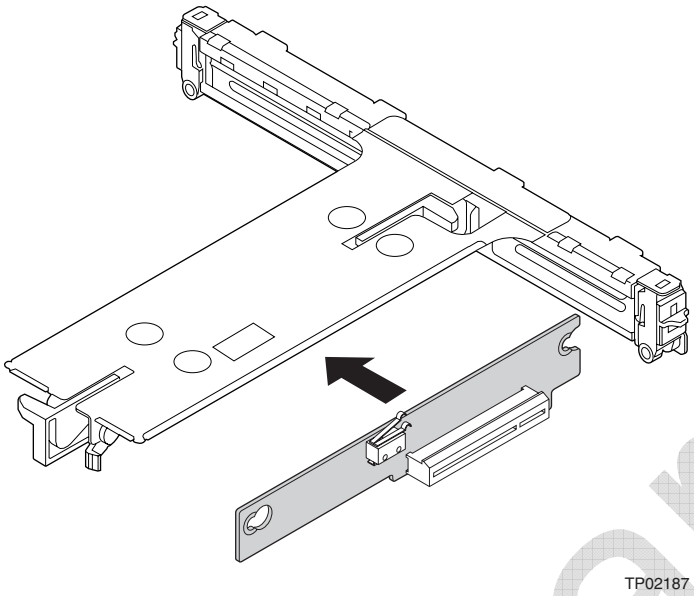
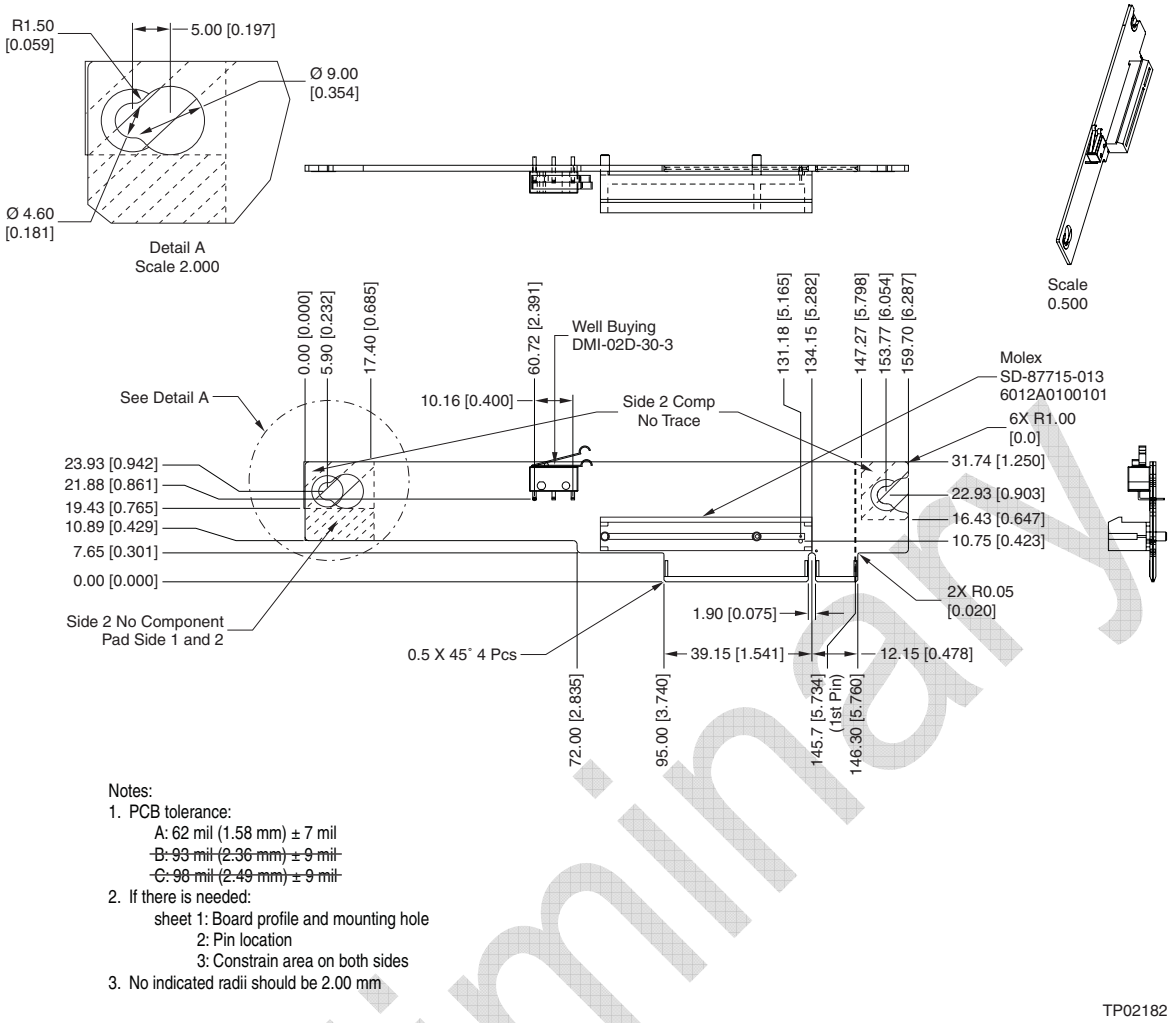


Figure 33. PCI Riser Card Assembly – LP View

7.1 Riser Card Options

There are three different riser card options offered for use in the server chassis.

- Low profile PCI Express* – capable of supporting a single x8 PCI Express add-in card
- Full length PCI-X* – capable of supporting a single PCI-X 66/100/133 MHz card;
- Full length PCI Express – capable of supporting a single x8 PCI Express add-in card.



Notes:
1. PCB tolerance:
   A: 62 mil (1.58 mm) ± 7 mil
   ~~B: 93 mil (2.36 mm) ± 9 mil~~
   ~~C: 98 mil (2.49 mm) ± 9 mil~~
2. If there is needed:
   sheet 1: Board profile and mounting hole
   2: Pin location
   3: Constrain area on both sides
3. No indicated radii should be 2.00 mm

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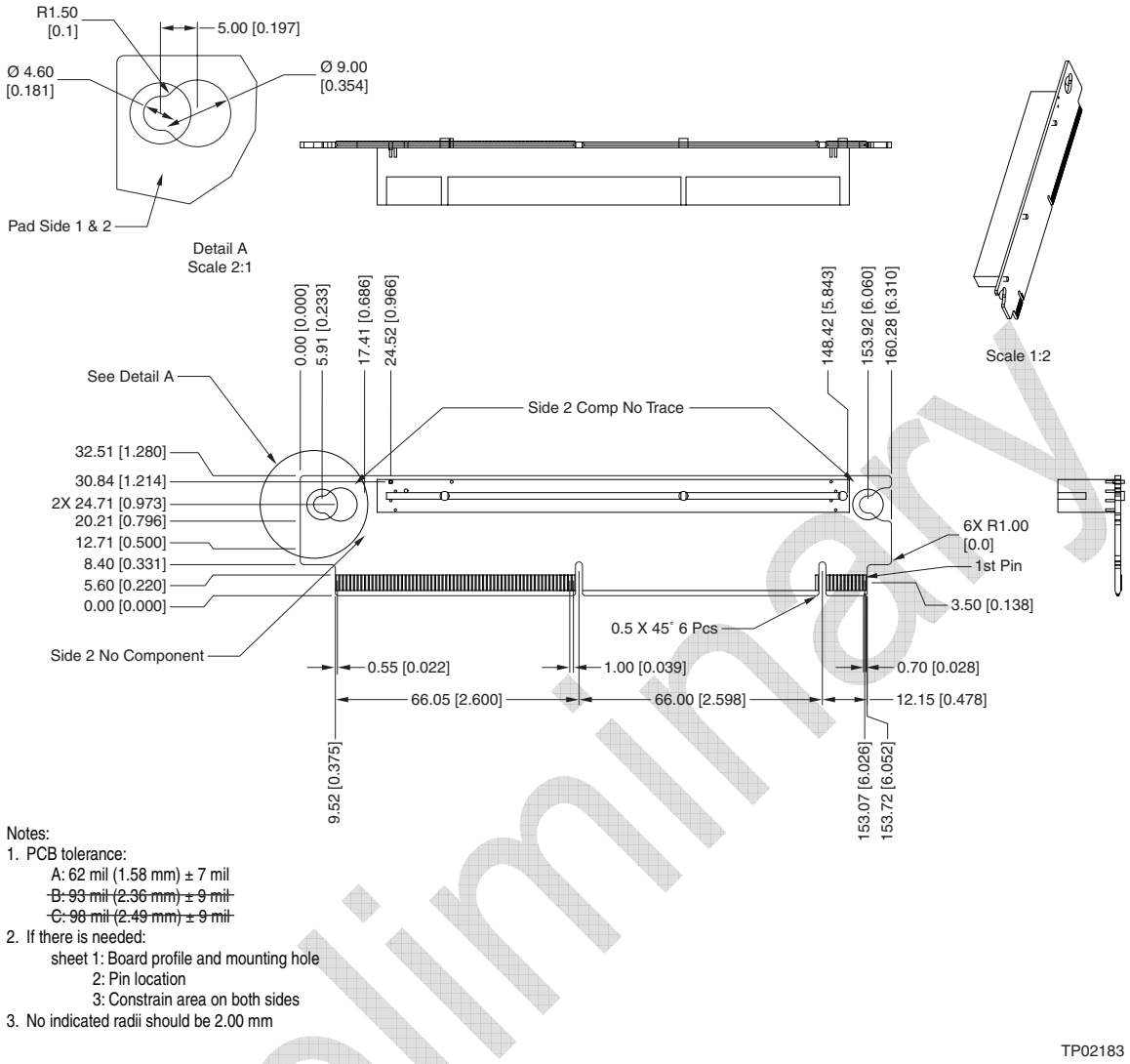
Figure 34. 1U Low Profile PCI-X* Riser Card Mechanical Drawing



Notes:
1. PCB tolerance:
   A: 62 mil (1.58 mm) ± 7 mil
   ~~B: 93 mil (2.36 mm) ± 9 mil~~
   ~~C: 98 mil (2.49 mm) ± 9 mil~~
2. If there is needed:
   sheet 1: Board profile and mounting hole
   2: Pin location
   3: Constrain area on both sides
3. No indicated radii should be 2.00 mm

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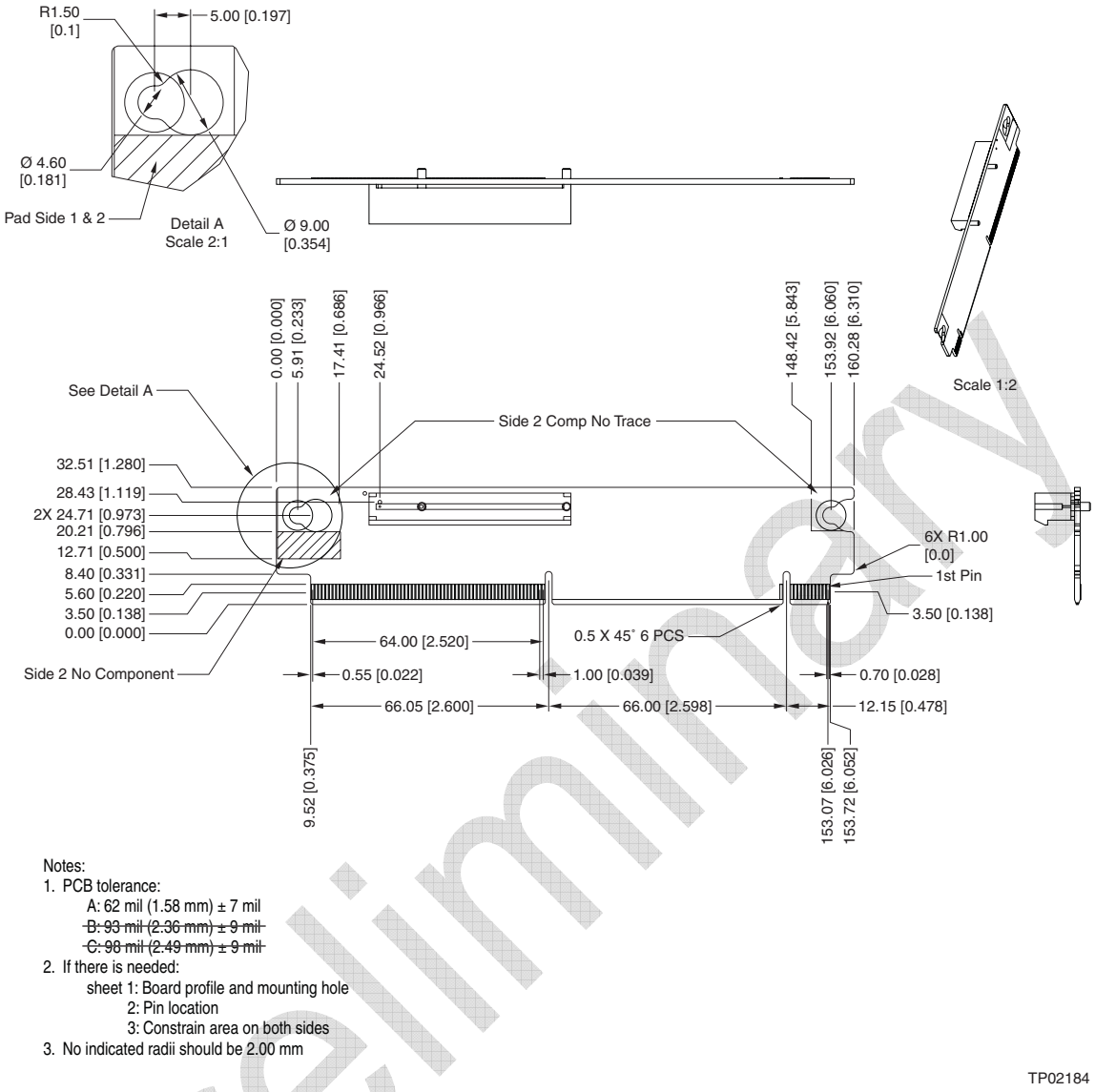
Figure 35. 1U Full Height PCI-X* Riser Card Mechanical Drawing



Notes:
1. PCB tolerance:
   A: 62 mil (1.58 mm) ± 7 mil
   ~~B: 93 mil (2.36 mm) ± 9 mil~~
   ~~C: 98 mil (2.49 mm) ± 9 mil~~
2. If there is needed:
   sheet 1: Board profile and mounting hole
   2: Pin location
   3: Constrain area on both sides
3. No indicated radii should be 2.00 mm

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Figure 36. 1U Full Height PCI Express* Riser Card Mechanical Drawing

8. Supported Intel® Server Boards

The Intel® Server Chassis SR1500 is mechanically and functionally designed to support the Intel® Server Board S5000PAL. The following sections provide an overview of the server board feature sets. The Technical Product Specification for the server board should be referenced for more detailed information.

8.1 Intel® Server Board S5000PAL

The Intel® Server Board S5000PAL is a monolithic printed circuit board with features that were designed to support the high-density 1U and 2U server markets.

Feature	Description
Processors	771-pin LGA sockets supporting one or 2 Dual-Core Intel® Xeon® processors 5000 sequence, with system bus speeds of 667 MHz, 1066 MHz, or 1333 MHz.
Memory	8 DIMM slots supporting fully buffered DIMM technology (FBDIMM) memory. 240-pin DDR2-533 and DDR2-677 FBDIMMs can be used.
Chipset	Intel® 5000 Chipset Family which includes the following components: Intel® 5000P Memory Controller Hub Intel® ESB2-E I/O Controller Note: Intel will make available an OEM SKU of this server board using the Intel 5000X Memory Controller Hub
On-board Connectors/Headers	External connections: ▪ Stacked PS/2* ports for keyboard and mouse ▪ RJ45 Serial B port ▪ Two RJ45 NIC connectors for 10/100/1000 Mb connections ▪ Two USB 2.0 ports ▪ Video Connector Internal connectors/headers: ▪ One USB port header, capable of providing two USB 2.0 ports ▪ One DH10 Serial A header ▪ Six SATA ports via ESB2 supporting 3Gb/s and integrated RAID 0/1 support ▪ One 44pin (power + I/O) ATA/100 connector for optical drive support ▪ One ASMI Connector with sole support for optional Intel Remote Management Module ▪ One I/O Module Connector supporting optional: ▪ GB NIC I/O Module ▪ External SAS Module ▪ SSI-compliant 24-pin control panel header ▪ SSI-compliant 24-pin main power connector, supporting the ATX-12V standard on the first 20 pins ▪ 8-Pin +12V Processor Power Connector
Add-in PCI, PCI-X*, PCI-Express* Cards	• One low profile riser slot supporting 1U or 2U PCIe* riser cards • One Full-height riser slot supporting 1U or 2U PCI-X* and PCIe riser cards
On-board Video	ATI* ES1000 video controller with 16MB DDR SDRAM
Hard Drive	Six SATA ports supporting 3 Gb/s and integrated RAID 0/1 support
LAN	Two 10/100/1000 Intel 82563EB PHYs supporting Intel® I/O Acceleration Technology
System Fans	Six 4-pin fan headers supporting two processor fans, and four system fans
System Management	Support for Intel® System Management Software

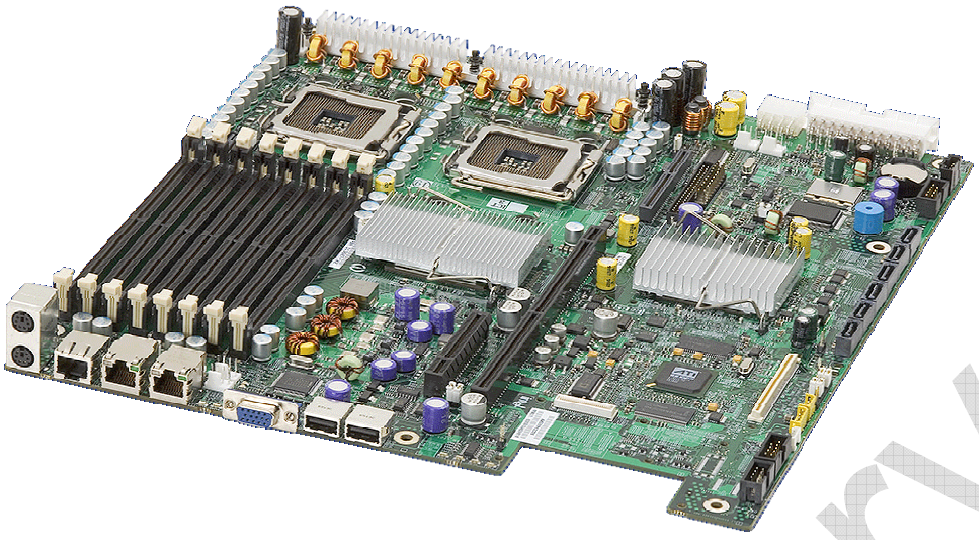
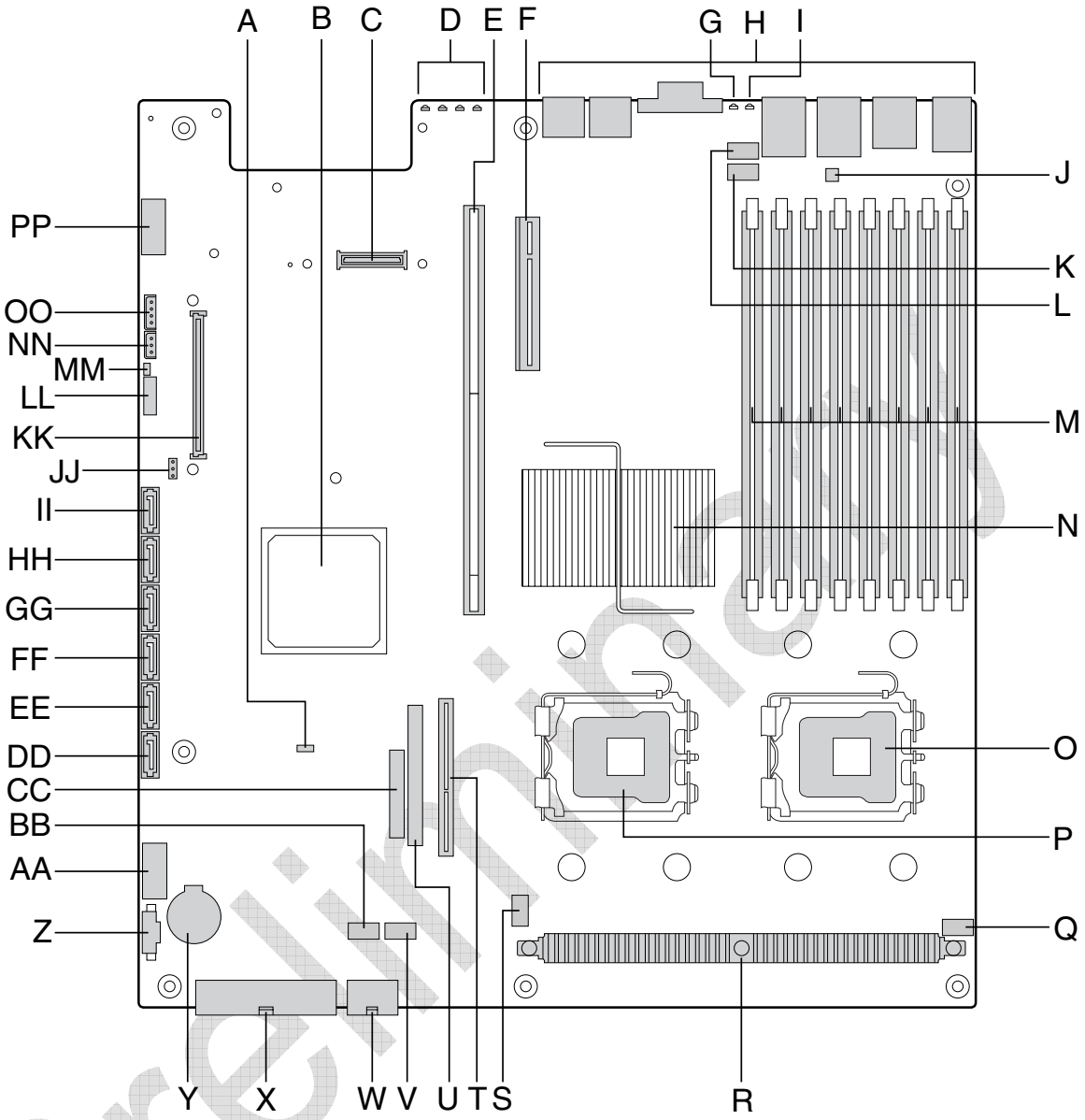


Figure 37. Intel® Server Board S5000PAL



	Description		Description
A	Rolling BIOS Select Jumper	V	System Fan #2 Header
B	Intel® ESB2-E IO Controller Hub	W	CPU Power Connector
C	IO Module Option Connector	X	Main Power Connector
D	POST Code Diagnostic LEDs	Y	Battery
E	Intel Adaptive Riser Slot – Full Height	Z	Power Supply Management Connector
F	PCI-Express Riser Slot – Low Profile	AA	Dual Port USB 2.0 Header
G	System Identification LED - Blue	BB	System Fan #1 Header
H	External IO Connectors	CC	SSI 24-pin Control Panel Header
I	Status LED – Green / Amber	DD	SATA 0
J	Serial 'B' Port Configuration Jumper	EE	SATA 1
K	System Fan #4 Header	FF	SATA 2
L	System Fan #3 Header	GG	SATA 3
M	FBDIMM Slots	HH	SATA 4
N	Intel 5000P Memory Controller Hub (MCH)	II	SATA 5
O	CPU #1 Connector	JJ	SATA RAID Key Connector
P	CPU #2 Connector	KK	ASMI Connector for Intel RMM
Q	CPU #1 Fan Header	LL	System Recovery Settings Jumper Block
R	Voltage Regulator Heat Sink	MM	Chassis Intrusion Switch Header
S	CPU #2 Fan Header	NN	3-pin IPMB Header
T	Bridge Board Connector	OO	4-pin LCP / AUX IPMB Header
U	ATA-100 Optical Drive Connector (Power+IO)	PP	Serial 'A' Header

8.2 System Level Environmental Limits

The table below defines the system level operating and non-operating environmental limits

Table 33. System Environmental Limits Summary

Parameter	Limits
Operating Temperature	+10°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	90%, non-condensing @ 35°C
Acoustic noise	Sound Power: 7.0 BA in an idle state at typical office ambient temperature. (23 +/- 2 degrees C)
Shock, operating	Half sine, 2 g peak, 11 mSec
Shock, unpackaged	Trapezoidal, 25 g, velocity change 136 inches/sec (≧40 lbs to > 80 lbs)
Shock, packaged	Non-palletized free fall in height 24 inches (≧40 lbs to > 80 lbs)
Vibration, unpackaged	5 Hz to 500 Hz, 2.20 g RMS random
Shock, operating	Half sine, 2 g peak, 11 mSec
ESD	+/-15kV except I/O port +/-8KV per Intel Environmental test specification
System Cooling Requirement in BTU/Hr	2550 BTU/hour

8.3 Product Regulatory Compliance

8.3.1 Product Safety Compliance

The platform complies with the following safety requirements:

- UL60950 – CSA 60950(USA / Canada)
- EN60950 (Europe)
- IEC60950 (International)
- CB Certificate & Report, IEC60950 (report to include all country national deviations)
- GS License (Germany)
- GOST R 50377-92 - License (Russia)
- Belarus License (Belarus)
- Ukraine License (Ukraine)
- CE - Low Voltage Directive 73/23/EEE (Europe)
- IRAM Certification (Argentina)
- GB4943- CNCA Certification (China)

8.3.2 Product EMC Compliance

The platform has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations when installed a compatible Intel host system. For information on compatible host system(s) refer to Intel's Server Builder website or contact your local Intel representative.

- FCC (Class A Verification) – Radiated & Conducted Emissions (USA)
- CISPR 22 – Emissions (International)
- EN55022 - Emissions (Europe)
- EN55024 - Immunity (Europe)
- EN61000-3-2 - Harmonics (Europe)
- EN61000-3-3 - Voltage Flicker (Europe)
- CE – EMC Directive 89/336/EEC (Europe)
- VCCI Emissions (Japan)
- AS/NZS 3548 Emissions (Australia / New Zealand)
- BSMI CNS13438 Emissions (Taiwan)
- GOST R 29216-91 Emissions (Russia)
- GOST R 50628-95 Immunity (Russia)
- Belarus License (Belarus)
- Ukraine License (Ukraine)
- RRL MIC Notice No. 1997-41 (EMC) & 1997-42 (EMI) (Korea)
- GB 9254 - CNCA Certification (China)
- GB 17625 - (Harmonics) CNCA Certification (China)

8.3.3 Certifications / Registrations / Declarations

- UL Certification (US/Canada)
- CE Declaration of Conformity (CENELEC Europe)
- FCC/ICES-003 Class A Attestation (USA/Canada)
- VCCI Certification (Japan)
- C-Tick Declaration of Conformity (Australia)
- MED Declaration of Conformity (New Zealand)
- BSMI Certification (Taiwan)
- GOST R Certification / License (Russia)
- Belarus Certification / License (Belarus)
- RRL Certification (Korea)
- IRAM Certification (Argentina)
- CNCA Certification (China)
- Ecology Declaration (International)

8.3.4 Product Regulatory Compliance Markings

The Intel® Server Chassis SR1500 is provided with the following regulatory marks.

Regulatory Compliance	Country	Marking
cULus Listing Marks	USA/Canada	
GS Mark	Germany	
CE Mark	Europe	
FCC Marking (Class A)	USA	This device complies with Part 15 of the FCC Rules. Operation of this device 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. Manufactured by Intel Corporation
EMC Marking (Class A)	Canada	CANADA ICES-003 CLASS A CANADA NMB-003 CLASSE A
C-Tick Mark	Australia / New Zealand	
VCCI Marking (Class A)	Japan	この装置は、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。VCCI-A
BSMI Certification Number & Class A Warning	Taiwan	

		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
GOST R Marking	Russia	
RRL MIC Mark	Korea	
China Compulsory Certification Mark	China	

8.4 Electromagnetic Compatibility Notices

8.4.1 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.

8.4.2 FCC Verification Statement

Product Type: SR1500; S5000PAL
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

8.4.3 ICES-003 (Canada)

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

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

8.4.4 Europe (CE Declaration of Conformity)

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

8.4.5 Japan EMC Compatibility

Electromagnetic Compatibility Notices (International)

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

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

8.4.6 BSMI (Taiwan)

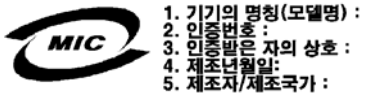
The BSMI Certification number and the following warning is located on the product safety label which is located on the bottom side (pedestal orientation) or side (rack mount configuration).

警告使用者：

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

8.4.7 RRL (Korea)

Following is the RRL certification information for Korea.



English translation of the notice above:

1. Type of Equipment (Model Name): On License and Product
2. Certification No.: On RRL certificate. Obtain certificate from local Intel representative
3. Name of Certification Recipient: Intel Corporation
4. Date of Manufacturer: Refer to date code on product
5. Manufacturer/Nation: Intel Corporation/Refer to country of origin marked on product

8.4.8 CNCA (CCC-China)

The CCC Certification Marking and EMC warning is located on the outside rear area of the product.

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取可行的措施。

8.5 Replacing the Back up Battery

The lithium battery on the server board powers the real time clock (RTC) for up to 10 years in the absence of power. When the battery starts to weaken, it loses voltage, and the server settings stored in CMOS RAM in the RTC (for example, the date and time) may be wrong. Contact your customer service representative or dealer for a list of approved devices.

WARNING

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

ADVARSEL

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

8.6 Serviceability and Availability

The system is designed to be serviced by qualified technical personnel only.

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

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 and having identified the failed component.

Activity	Time Estimate
Remove cover	TBD
Remove and replace hard disk drive	TBD
Remove and replace power supply module	TBD
Remove and replace system fan	TBD
Remove and replace backplane board	TBD
Remove and replace control panel module	TBD
Remove and replace baseboard	TBD

8.7 Restriction of Hazardous Substances (RoHS) Compliance

Intel has a system in place to restrict the use of banned substances in accordance with the European Directive 2002/95/EC. Compliance is based on declaration that materials banned in the RoHS Directive are either (1) below all applicable substance threshold limits or (2) an approved/pending RoHS exemption applies.

Note: RoHS implementing details are not fully defined and may change.

Threshold limits and banned substances are noted below.

- Quantity limit of 0.1% by mass (1000 PPM) for:
  - Lead
  - Mercury
  - Hexavalent Chromium
  - Polybrominated Biphenyls Diphenyl Ethers (PBDE)
- Quantity limit of 0.01% by mass (100 PPM) for:
  - Cadmium

8.8 Regulated Specified Components

To maintain the UL listing and compliance to other regulatory certifications and/or declarations, the following regulated components must be used and conditions adhered to. Interchanging or use of other component will void the UL listing and other product certifications and approvals. Updated product information for configurations can be found on the Intel Server Builder Web site at the following URL: http://channel.intel.com/go/serverbuilder.
If you do not have access to Intel's Web address, please contact your local Intel representative.

- **Server Chassis** (base chassis is provided with power supply and fans)—UL listed.
- **Server board**—you must use an Intel server board—UL recognized.
- **Add-in boards**—must have a printed wiring board flammability rating of minimum UL94V-1. Add-in boards containing external power connectors and/or lithium batteries must be UL recognized or UL listed. Any add-in board containing modem telecommunication circuitry must be UL listed. In addition, the modem must have the appropriate telecommunications, safety, and EMC approvals for the region in which it is sold.
- **Peripheral Storage Devices**—must be UL recognized or UL listed accessory and TUV or VDE licensed. Maximum power rating of any one device is 19 watts. Total server configuration is not to exceed the maximum loading conditions of the power supply

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Appendix A: Integration and Usage Tips

This section provides a list of useful information that is unique to the Intel® Server Chassis SR1500 and should be kept in mind while integrating and configuring your Intel® Server Board S5000PAL.

- Only low-profile (1.2 in or 30.48 mm) DIMMs can be used in the server chassis.
- Processor fans are not supported and are not needed in the server chassis. The system fan module and power supply fans provide the necessary cooling needed for the system. Using a processor fan in this chassis may cause Intel® System Management Software to incorrectly monitor the system fans.
- The CPU air duct and air baffle must be used to maintain system thermals.
- The air dam on the CPU air duct must be in place for single processor configurations. Once the air dam is removed, it cannot be re-installed.
- To maintain system thermals, all hard drive bays must be populated with either a hard drive or drive blank.
- System fans are not hot swappable
- Use of the screw found on the front edge of the top cover is required when the unit is installed in a user accessible environment.
- A USB Floppy support kit is available for installing a slim-line USB floppy drive in either the slim-line bay or in the first 3.5” hard drive bay. This kit has the following product order code:
- The FRUSDR utility must be run to load the proper Sensor Data Records for the server chassis onto the server board.
- Make sure the latest system software is loaded on the server. This includes system BIOS, FRUSDR, BMC firmware, and hot swap controller firmware. The latest system software can be downloaded from

http://support.intel.com/support/motherboards/server/S5000PAL/

Glossary

Word / Acronym	Definition
ACA	Australian Communication Authority
ANSI	American National Standards Institute
BMC	Baseboard Management Controller
CMOS	Complementary Metal Oxide Silicon
D2D	DC-to-DC
EMP	Emergency Management Port
FP	Front Panel
FRB	Fault Resilient Boot
FRU	Field Replaceable Unit
LCD	Liquid Crystal Display
LPC	Low-Pin Count
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
OTP	Over-temperature Protection
OVP	Over-voltage Protection
PFC	Power Factor Correction
PSU	Power Supply Unit
RI	Ring Indicate
SCA	Single Connector Attachment
SDR	Sensor Data Record
SE	Single-Ended
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
VCCI	Voluntary Control Council for Interference