Intel® SR2050 2U Server Chassis

Technical Product Specification

Revision 1.0

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Enterprise Platforms Group
Server Products Division

Revision History

Date	Revision Number	Modifications
10/3/00	0.9	Preliminary for review only
10/13/00	1.0	Initial release.

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1. Introduction

This specification details the feature set of the Intel® SR2050 server chassis, an ATX compatible server chassis designed to support the Intel® L440GX+ and STL2 server boards.

SR2050 features include:

- 2U rack mount chassis
- 88mm H x 480mm W x 612mm L with front bezel
- Four hot swap drive bays capable of supporting two 1” and two 1.6” SCSI hard disk drives
- Ultra2/Ultra160 SCSI backplane with SAF-TE supporting up to 4 SCA drives
- A PCI riser card for use with the Intel® L440GX+ Server Board
- A PCI riser card for use with the Intel® STL2 Server Board
- 2 system cooling fans
- 275 Watts PFC power supply with custom form factor
- One 3.5” fixed drive bay
- One slim CD-ROM drive
- External SCSI support located on the back of chassis
- Chassis intrusion switch
- Sliding rail mount kit

Note: The SR2050 family of chassis will have different product codes. The product code will determine which of the two server boards are supported. Some of the features described in this document may not apply to a particular product code.

1.1 Rail Mount Support

The SR2050 comes with a rail mount kit that is used to mount the chassis into a (19” wide X up to a 30” deep) server cabinet.

An optional front or center mounting kit is also available with brackets that allow the chassis to be mounted in either front or center mount relay racks, or regular server cabinets. The brackets can be attached at the front of the chassis for front mounting, or in the middle of the chassis for center mounting.

For mounting in a regular server cabinet, the front mount brackets are attached to the front of the chassis, and a set of rear support brackets are attached to the back end of the cabinet. This allows the weight of the server to be distributed evenly to prevent the mounting rails on the cabinet from bending.

1.2 Front Bezel Features

The standard dusty beige front bezel is made of molded plastic. When installed, its design allows for maximum airflow. By using light pipes, system status LEDs, from the front panel attached to the chassis behind the front bezel, can be monitored with the front bezel in the closed position. The front bezel is easily installed or removed by using detachable mounting arms. When mounted to the chassis, the mounting arms allow the front bezel to swing down away from the front of the chassis giving access to the system's drives bays and front panel.

1.3 Chassis Security

At the chassis level, a variety of security options is provided.

- A key lock on the front bezel can be used to prevent access to the power, sleep, and reset buttons located on the front panel and to the system drive bays.
- An intrusion switch is provided, allowing server management software to detect the removal of the top cover.

Intrusion Alarm Cable

The top cover depresses an open momentary switch. It is cabled to the server board by a 22AWG twisted pair, terminated with a 2-pin connector.

1.4 I/O panel

All input/output connectors are located on the back of the chassis. An ATX 2.03 compatible cutout is provided for I/O shield installation. A metal I/O shield must be installed in the cutout in order to maintain Electromagnetic Interference (EMI) compliance levels. The I/O cutout dimensions are shown in Figure-1 below.

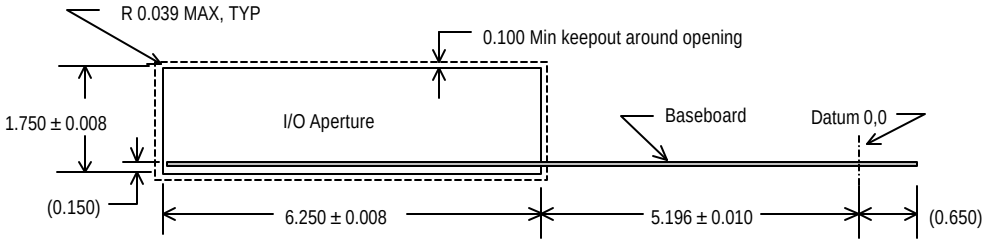
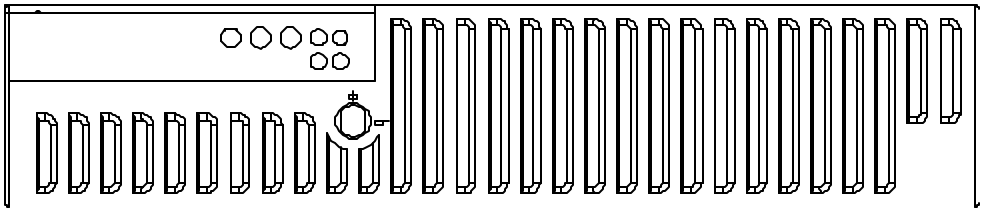
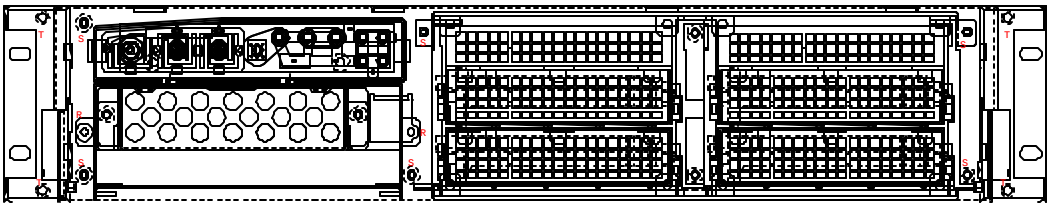


Figure 1-1. I/O Cutout Dimensions

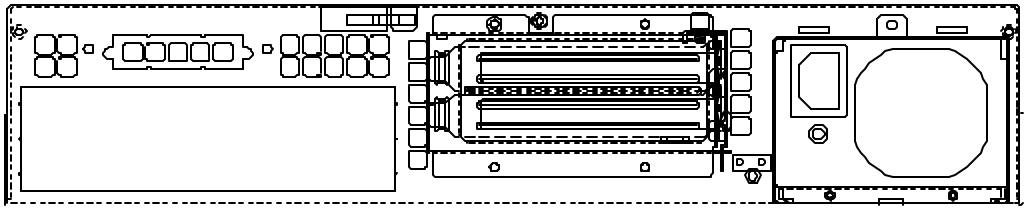
1.5 Chassis Views



(a) front view, with bezel



(b) front view, without bezel



(c) rear view

Figure 1-2 Front and Rear Chassis Views

1.6 Chassis Dimensions

Table 1-1. Chassis Dimensions

Height	80 mm
Width	480 mm
Depth	612 mm

2. Chassis Power Sub-system

The SR2050 server chassis uses a custom form factor power supply. The form factor was chosen to optimize the overall chassis dimensions. The power sub-system includes a remote enable feature which permits the chassis power to be activated from a variety of sources and allows the implementation of "Wake On LAN*" (WOL) or other remote management features. The 275 Watt PFC (Power Factor Correction) power supply features a 70 pin edge connector for DC outputs. A Power Distribution Board is used to provide a 24-pin main power connector, a 6-pin Auxiliary ATX power connector and two 4-pin peripheral power connectors. The following table is an overview of the Power Supply output:

Table 2-1. Power Supply Output Summary

Output Voltage	Voltage tolerance	Min Load Current	Full Load Current	Surge Current
+5V	±4%	1.00	20.0	
+3.3V	±4%	0.00	14.0	
+12V	±4%	0.00	14.0	14.0
-12V	±10%	0.00	0.2	
-5V	±10%	0.00	0.2	
+5 Vstdby	±5%	0.00	2.0	

2.1 70-Pin Switch Mode Power Supply Interface Connector

A 70-Pin connector (3A/pin, 2x35 positions) is used for connecting the power supply to the power distribution board (PDB). The following table defines the pin-outs for the connector:

Table 2-2. 70-pin SMPS Interface Connector Pinout

Pin #	Signal	Pin #	Signal	Pin #	Signal
1	N/C	25	On / Standby	49	RTN
2	N/C	26	Interlock	50	RTN
3	N/C	27	Installed (Present)	51	RTN
4	N/C	28	N/C	52	RTN
5	N/C	29	12V @ 14A	53	RTN
6	N/C	30	N/C	54	RTN
7	N/C	31	12V	55	RTN
8	N/C	32	12V	56	RTN
9	RTN	33	12V	57	RTN
10	RTN	34	12V	58	RTN
11	RTN	35	-12V @ 0.2A	59	RTN
12	RTN	36	-5V @ 0.2A	60	RTN
13	RTN	37	5V @ 20 A	61	5V Vaux @ 2A

Pin #	Signal	Pin #	Signal	Pin #	Signal
14	RTN	38	5V	62	N/C
15	RTN	39	5V	63	3.3V remote sense RTN
16	RTN	40	5V	64	3.3V remote sense
17	N/C	41	5V	65	3.3V @ 14A
18	N/C	42	5V	66	3.3V
19	N/C	43	5V	67	3.3V
20	N/C	44	N/C	68	3.3V
21	Power Good	45	5V remote sense RT	69	3.3V
22	NC	46	5V remote sense	70	3.3V
23	Ready signal to start up power supply	47	RTN		3.3V
24	Hard Boot	48	RTN		3.3V

2.2 Power Distribution Board Connector Description

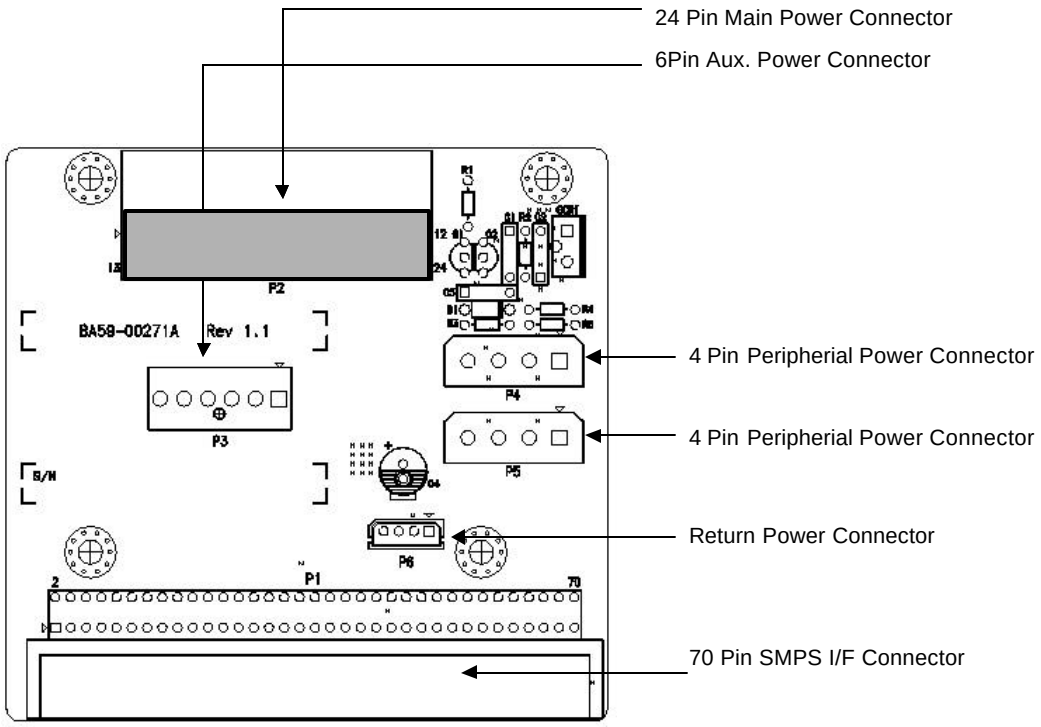


Figure 2-1. Power Distribution Board Connector Description

2.3 Power Connectors

The Hot-swap backplane power connector and peripheral power connectors are standard four-pin shrouded plastic PC power connectors with mechanical keying. Connector pinout is shown below.

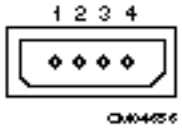


Figure 2-2. Peripheral power connector

Table 2-3. Peripheral Power Connectors

Name	Pin	Description
+12V	1	+12 Volt power supply (yellow wire)
GND	2	0V Electrical ground (black wire)
GND	3	0V Electrical ground (black wire)
+5V	4	+5 Volt power supply (red wire)

In addition, there is a 24-pin Main power connector and a 6-pin AUX power connector. Both connectors are used to provide power to the baseboard. The connector pinouts are shown in the following tables.

Table 2-4. 24-pin Main 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	+5 Vdc	Red	16	PS-ON	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	-5V	White
9	5VSB	Purple	21	+5 Vdc	Red
10	+12Vdc	Yellow	22	+5 Vdc	Red
11	+12Vdc	Yellow	23	+5 Vdc	Red
12	+3.3Vdc	Orange	24	COM	Black

Table 2-5. 6-pin AUX Power Connector

Pin	Signal	18 AWG COLOR	Pin	Signal	18 AWG COLOR
1	COM	Black	4	+3.3Vdc	Orange
2	COM	Black	5	+3.3Vdc	Orange
3	COM	Black	6	+5 Vdc	Red

2.4 Mechanical Outline of Power Supply

The mechanical outline and dimensions of the power supply were used to optimize the overall chassis dimensions. The approximate dimensions are: 97.8mm high X 63.5mm wide X 241.3mm deep. The mechanical outline and dimensions are shown in Figure 4 below.

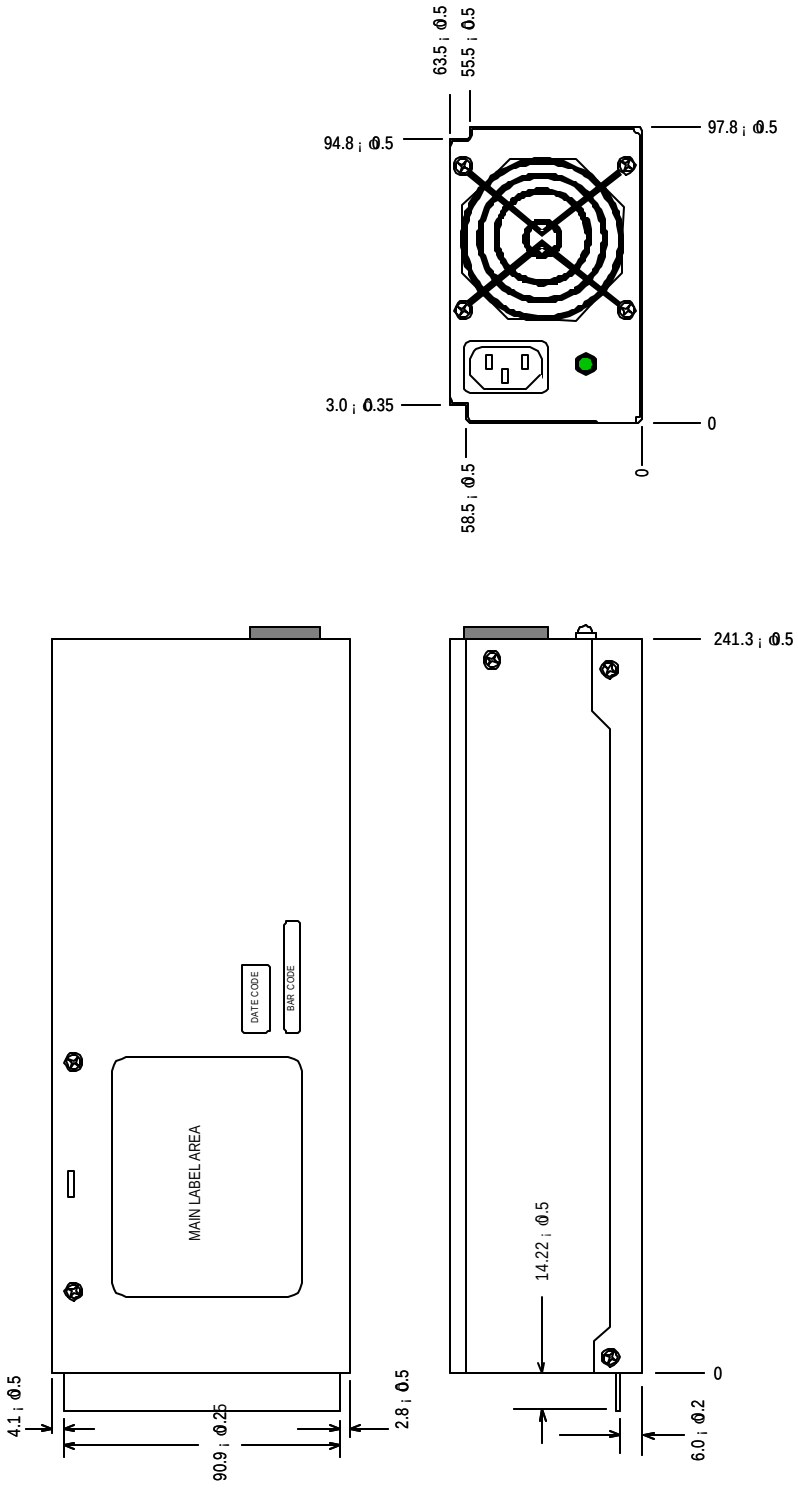


Figure 2-3. Outline Drawing Power System Enclosure

The SR2050 server chassis can only be configured with a single supply. For a more detailed specification on the power supply, see document #751913, the specification for the 275-Watt with PFC Power Supply.

3. Chassis Cooling

Two system fans, the power supply fan and processor fan(s) provide cooling for the system. Two 80mm system fans are mounted in the middle of the chassis.

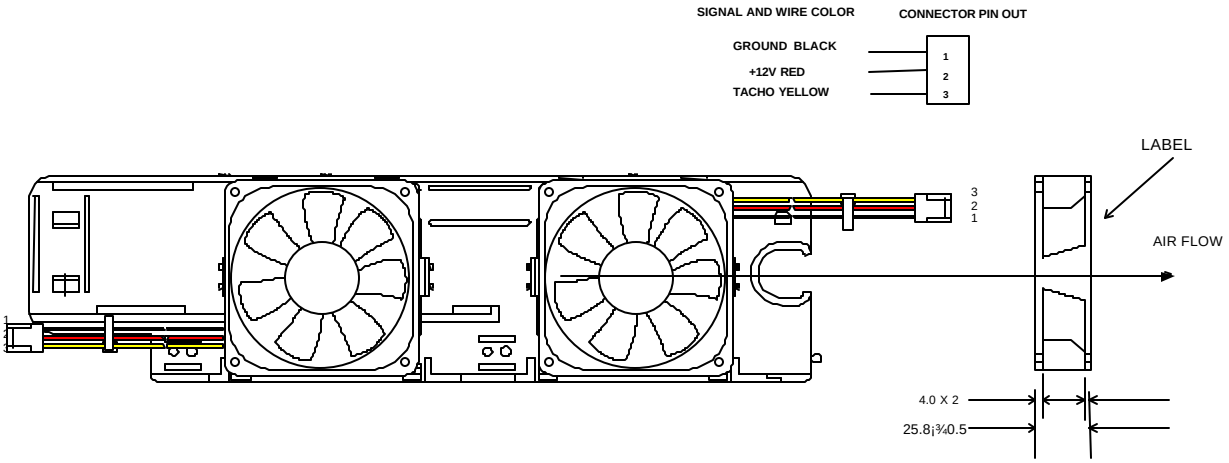


Figure 3-1. 80mm Mid System Fan

The system fans are easily swapped out with the removal of the top cover. The system fans are not hot swappable. The server must be turned off before the fans can be replaced.

4. Chassis Peripheral Bays

4.1 3.5" Fixed Drive Bay

The chassis provides a 3.5” fixed drive bay that may be used for a standard floppy drive, a 1-inch hard disk drive, or other half height peripheral. The fixed drive bay is located directly above the slim CD-ROM drive. Removal of the front bezel and top cover is required to install a device in the 3.5” drive bay.

4.2 Slim CD-ROM Drive Bay

The chassis is supplied with a 0.5” (12.7mm) Slimline IDE CD-ROM drive. The Slimline CD-ROM tray is exposed by pulling down the front bezel. When installed, the tray resides directly beneath the 3.5” drive bay.

4.3 LVD SCSI Hot Swap Drive Bay

The SR2050 server chassis can support up to four (two 1” high and two 1.6” high) 3.5", SCA2, Ultra2/Ultra160 hard drives. The SCSI drive bay is accessible from the front of the chassis when the front panel is open. Four hard drive carriers are provided with the chassis to allow hard drives to be inserted or removed from the drive bay.

5. Universal Front Panel

The front panel is located behind the front bezel above the 3.5" fixed drive bay. The Universal front panel has four switches for system operation and seven LEDs to display the system's operating state.

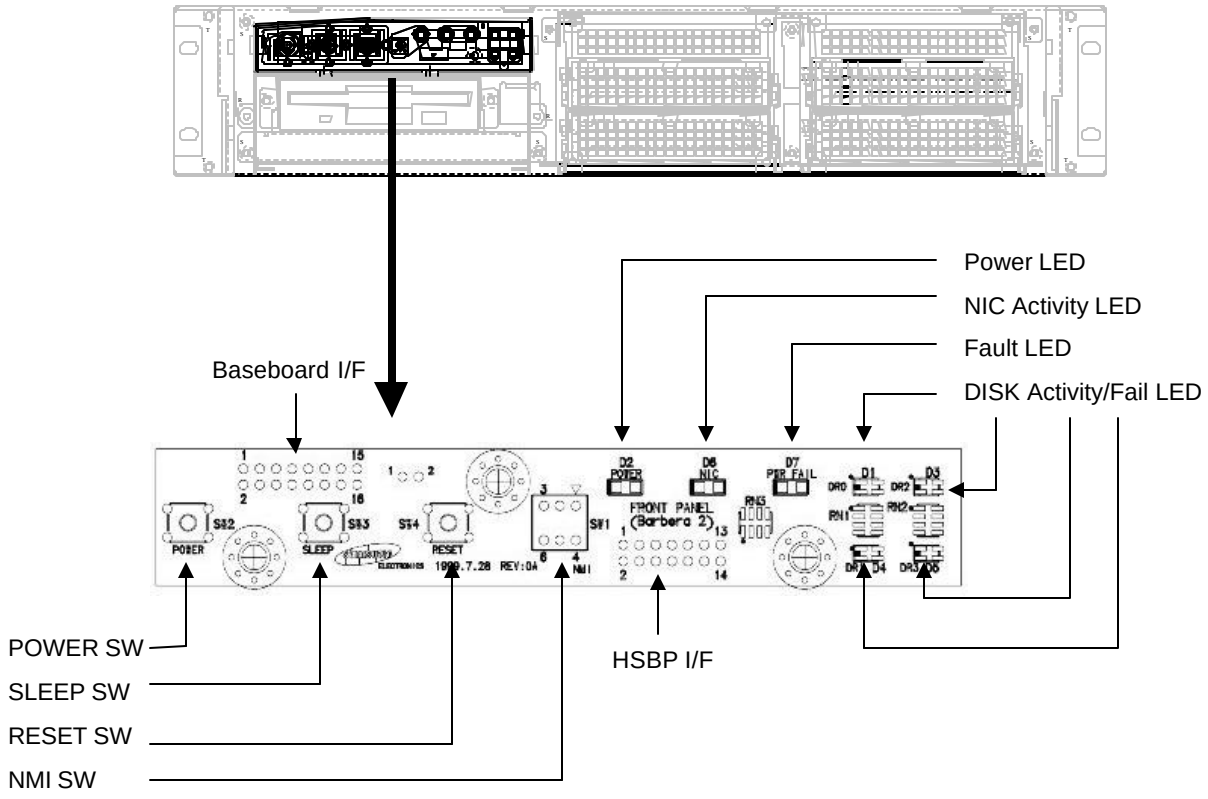


Figure 5-1. Front Panel and Functions

Table 5-1. Summary of Front Panel Features

Feature	Function	
Switches:		
Power	Toggle system power On/Off. Momentary push button switch, ACPI compliant	
Sleep	Activate sleep mode. Momentary push button switch, ACPI compliant	
Reset	Reset system, Momentary push button switch	
NMI	Assert NMI to Server Board, Momentary push button switch.	
LED Indicators:	Function	Color
Power	Indicates system power on, blinking green indicates system is in sleep mode	green
Hard Drive Activity/Fault	Green indicates hard drive activity. Yellow indicates drive failure.	Bicolor green/yellow.

Feature	Function	
NIC activity	Indicates NIC activity	green
SYS Fault	Indicates a power or fan failure	yellow
Connectors:		
J1 : Front Panel to 2P Connector in L440GX+	Interconnect Sleep button signals to 2Pin Sleep connector on the L440GX+ server board	
J2 : Front panel to STL2 Server Board	SSI compliant Interconnect to the Server Board	
J4: Front panel to L440GX+ Server Board	Interconnect to Server Board signals, passes I2C information from HSBP to Server Board	
J3: Front panel to Hot swap backplane	Transfers drive activity and status indicators from backplane to front panel, provides I2C status to front panel for transfer to Server Board.	

5.1 Switches:

- The four switches control power-on, sleep mode, reset, and NMI.
- The NMI switch is accessible via a small hole in the front of the chassis and requires a small instrument to push it.

5.2 LED Indicators:

- All LED's are Active Low.
- The current limiting resistors for the power, SYS fault LED, and NIC LED are on the Server Board.
- The LEDs on the front panel shall be rated to 20mA continuous current. Bicolor Hard drive activity/fault LEDs shall be rated appropriately for the current limiting resistors implemented on the front panel.
- The green *NIC activity LED* indicates Network activity.

5.2.1 Power LED

The Power LED is capable of showing three power related states; Solid on, Blinking 1Hz, Blinking 3 Hz. The BMC interprets the state of 5V Standby, 5V, the Power State, and the PS-ON signal and drives the Power LED according to the following table:

Table 5-2. Power LED States

Power State	5V Standby	PWR_GD	PS-ON	Power LED	Condition
ON	ON	ON	High	ON	Power ON and OK
ON	ON	OFF	High	FAST BLINK~3.3Hz	Supply failed
ON	OFF	ON	High	OFF	5V Standby failure
ON	OFF	OFF	High	OFF	AC Power has failed
OFF	OFF	ON	Low	OFF	5V Standby failure
OFF	ON	OFF	Low	OFF	Normal Power OFF

Power State	5V Standby	PWR_GD	PS-ON	Power LED	Condition
OFF	OFF	OFF	n/a	OFF	Normal OFF & Unplugged
SLEEP	ON	ON	High	SLOW BLINK ~1 Hz	Machine is in S1 - S3 sleep state

5.2.2 Fault LED

The Fault LED is NOT designed to detect all system faults. The purpose of the Fault LED is to alert the System Administrator that a power fault or fan failure has occurred. The BMC monitors whether the power supply is ON and operational using the **PWR_GD_PS** signal from the power supply. The controller uses the **PWR_GD_PS** signal to confirm whether the actual system power state matches the intended system on/off power state that was commanded using PS-ON.

This signal generates an interrupt to the BMC, which it uses to detect loss of AC power. If AC power suddenly is lost, the BMC attempts to assert a system reset before the power is completely off.

If the BMC asserts **PS-ON** and **PWR_GD_PS** does not become asserted, the BMC asserts the Fault LED signal on the front panel connector. It then continues to wait for the power supply to assert **PWR_GD_PS**; if the supply does eventually drive the signal, the BMC clears the power fault state and then proceeds to take the system out of reset.

5.2.3 Drive Fault LEDs

The four drive fault LEDs are controlled by the micro-controller on the Hot swap back-plane and are used to indicate a failure status for each drive. A front panel interface connector is provided for an electrical path between the Hot-swap SCSI Backplane and the drive status LEDs. During initialization, the micro-controller flashes the LEDs for 1 second as part of POST.

5.3 Connectors:

- A 2 pin connector provides access to 2-pin Sleep connector in L440GX+ Server
- A 24 pin SSI connector provides control and status information to/from the STL2 server board
- A 16 pin connector provides control and status information to/from the L440GX+ server board.
- A 14 pin connector provides drive activity and fault status from the hot swap backplane to the front panel, and provides I2C data to the front panel.

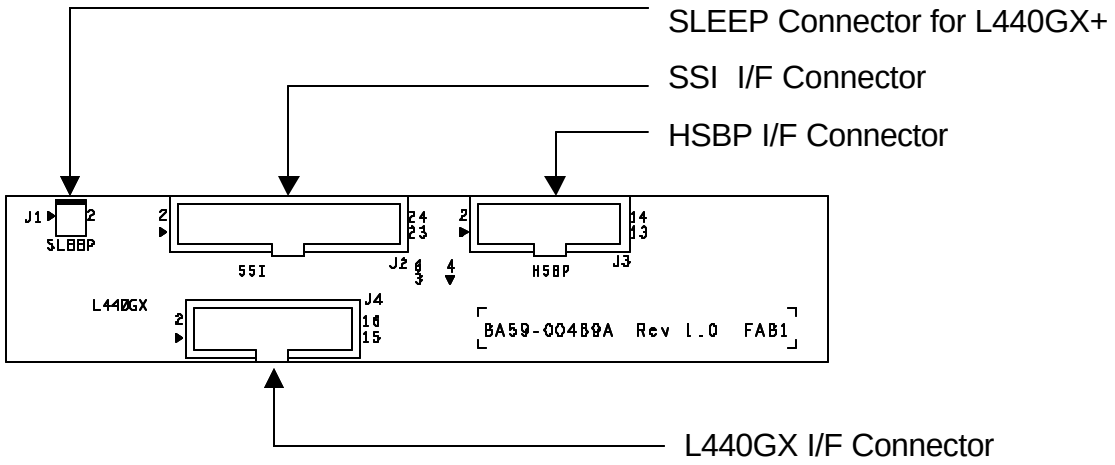


Figure 5-2. Connectors in Front Panel

The pin definitions in the following tables are classified by the following types:

Table 5-3. Pin Types

Type	Description
PWR	power connection (power or ground)
I/O	bi-directional signal
O	output signal
I	input signal
O/C	Open-collector output signal
O/D	Open-drain output signal

Table 5-4. Sleep Switch Interface (J1)

Pin #	I/O	Description
1	O	Sleep Switch=Open Collector Low True
2	PWR	Sleep Switch GND

5.3.1 Front Panel cable for the STL2

A 24-pin flat cable is used to connect the STL2 server board and J2 connector of Universal Front Panel board. The function of the each signal is listed in the following table:

Table 5-5. STL2 Server Board / Front Panel Interface (J2)

Pin #	I/O	Description
1	I	+5V Stand-by from STL2(Power LED Anode)
2	-	NC
3	-	NC
4	-	+5V Stand-by from STL2(Power/Fan Failure Anode)
5	I	Power LED Cathode
6	I	Fan-failure Cathode
7	-	NC
8	-	NC
9	-	NC
10	I	Power failure Cathode
11	O	Power Switch=Open Collector Low True
12	I	+3V(NIC Activity LED Anode)
13	PWR	GND
14	I	NIC Activity LED Cathode
15	O	Reset Switch=Open Collector Low True
16	I/O	I2C_SDA
17	PWR	GND
18	I/O	I2C_SCL
19	O	Sleep Switch=Open Collector Low True
20	-	NC
21	PWR	Sleep Switch GND
22	-	NC
23	O	NMI Switch=Open Collector Low True
24	-	NC

5.3.2 Front Panel Cable for the L440GX+

A flat 16-pin cable is used to connect the J5J1 front panel connector of the L440GX+ server board to the J4 connector of Universal Front Panel board. The function of the each signal is listed in the following table:

Table 5-6. L440GX+ Server Board / Front Panel Interface (J4)

Pin #	I/O	Description
1	PWR	GND
2	-	NC
3	O	Reset Switch=Open Collector Low True
4	O	Power Switch=Open Collector Low True
5	I	+5V(NIC Activity LED Anode)
6	-	NC

Pin #	I/O	Description
7	O	NMI Switch=Open Collector Low True
8	I	Power LED Anode
9	I	Fan-failure Cathode
10	-	NC
11	I	Power failure Cathode
12	I	+5V Stand-by from L440GX+(Power/Fan Failure Anode)
13	I/O	I2C_SDA
14	I	NIC Activity LED Cathode
15	I/O	I2C_SCL
16	I	Power LED Cathode

5.3.3 I2C, Front Panel to Hot-swap Backplane Cable

A 14-pin connector cables connect the Front Panel board to the Hot-swap backplanes to transfer the drive activities to LED indicators and provide the IMB bus path. The functions of the each signals are in the table.

Table 5-7. HSBP / Front Panel Interface (J3)

Pin #	I/O	Description
1	I/O	I2C SCL (Serial Clock)
2	PWR	GND
3	PWR	+5V
4	I/O	I2C SDA (Serial Data)
5	-	NC
6	-	NC
7	I	Drive0 Fault LED Cathode
8	I	Drive0 Activity LED Cathode
9	I	Drive1 Fault LED Cathode
10	I	Drive1 Activity LED Cathode
11	I	Drive2 Fault LED Cathode
12	I	Drive2 Activity LED Cathode
13	I	Drive3 Fault LED Cathode
14	I	Drive3 Activity LED Cathode

6. Hot-Swap SCSI Sub-System

The Hot-swap SCSI Sub-system supports the following features:

- Hot-swapping of SCSI drives, that allows connection of SCSI devices while the power is on.
- Enclosure management and monitoring functions conforming to the *SCSI-Accessed Fault-Tolerant Enclosure Specification* (SAF-TE), Revision 1.00.
- Full dual mode LVD/SE operation, compliant with Fast, Ultra, Ultra-2 and Ultra-160 SCSI bus operation.

6.1 Subsystem Purpose

The SR2050 server chassis Hot-Swap SCSI Backplane performs the tasks associated with hot-swappable SCSI drives.

6.1.1 Minimum Design Goals

The SR2050 Hot-Swap SCSI Backplane is designed to provide at least the following:

1. Four SCA2 connectors for four SCA2 compatible SCSI drives
2. Active termination on SCSI bus (SCSI-3 compatible)
3. Per-drive power control, including automatic slot power down upon drive removal

6.2 Abstract

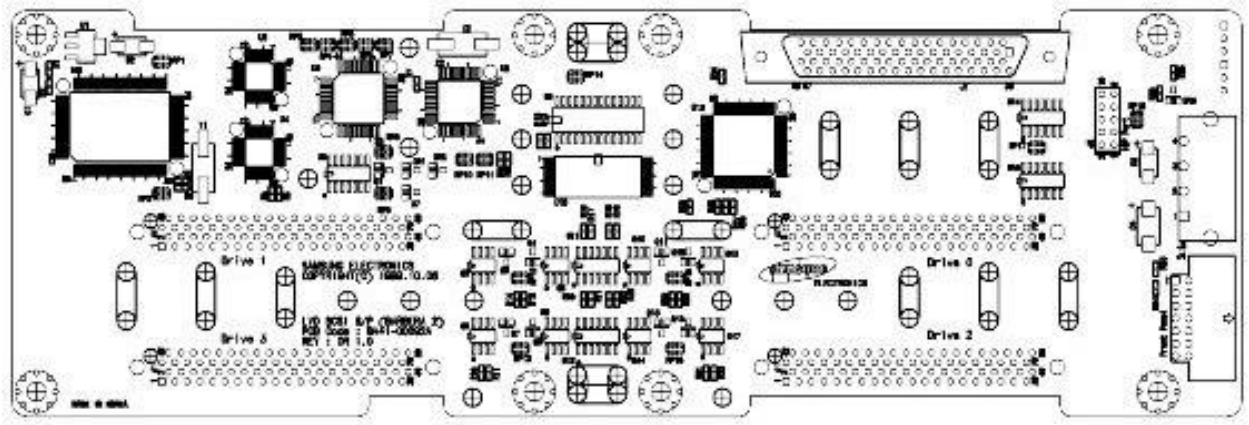
The SR2050 Hot-Swap SCSI Backplane is made up of the following functional blocks:

- SCSI Bus with SCA (Single Connector Attach) drive connectors, and active terminators
- SCSI drive power control
- Configuration jumpers

6.3 Hot-Swap Backplane Board Layout

The Hot-Swap SCSI Backplane resides in the hot-swap drive bay of the SR2050 server chassis.

The following diagrams show the layout of components and connectors on the Hot-swap SCSI Backplane printed circuit board. The ovals in the diagram below represent ventilation holes for the hard drive bay.



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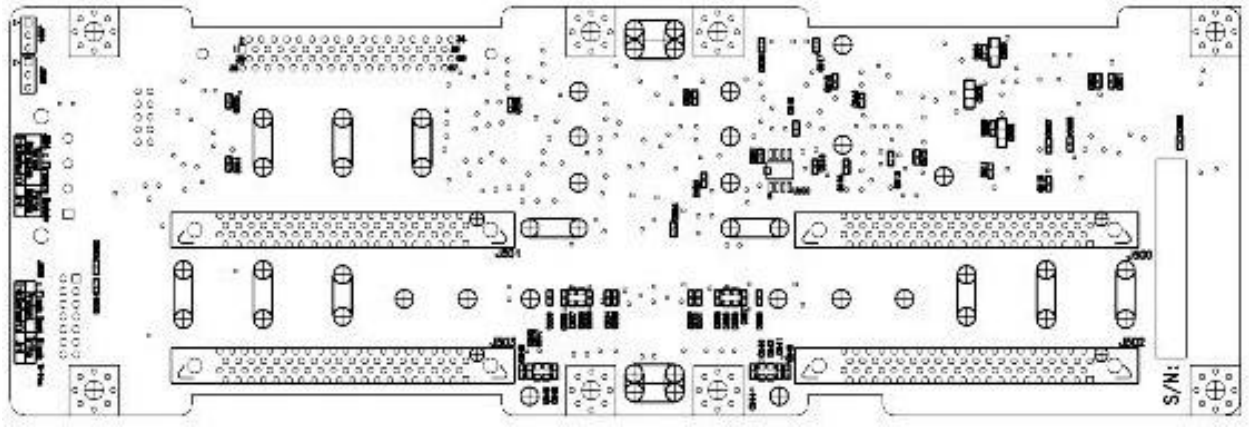


<SCA 2 Connector Side >

Figure 6-1. Hot-Swap SCSI Backplane Component and Connector Placement

6.3.1 Configuration Options

The following table describes the various configuration options on the SR2050 Hot-Swap SCSI Backplane, along with their function and intended usage.

Table 6-1. HSBP Configuration Jumpers

Option	Location	Description
Firmware Update	J504	Placing this jumper in the “FORCE UPDATE” position forces external firmware update of the program code stored in Flash memory. Placing this jumper in the “NORMAL OPERATION” position allows normal operation.
Flash Boot Block Write	J505	This jumper allows the boot block of the program flash to be updated. “PROTECT” (default) does not allow the boot block to be written to. “WRITE”, allows updating of the boot block.

6.4 Functional Description

This section defines the architecture of the SR2050 Hot-swap SCSI Backplane, including a description of functional blocks and how they operate. The following figure shows the functional blocks of the Hot-swap SCSI Backplane.

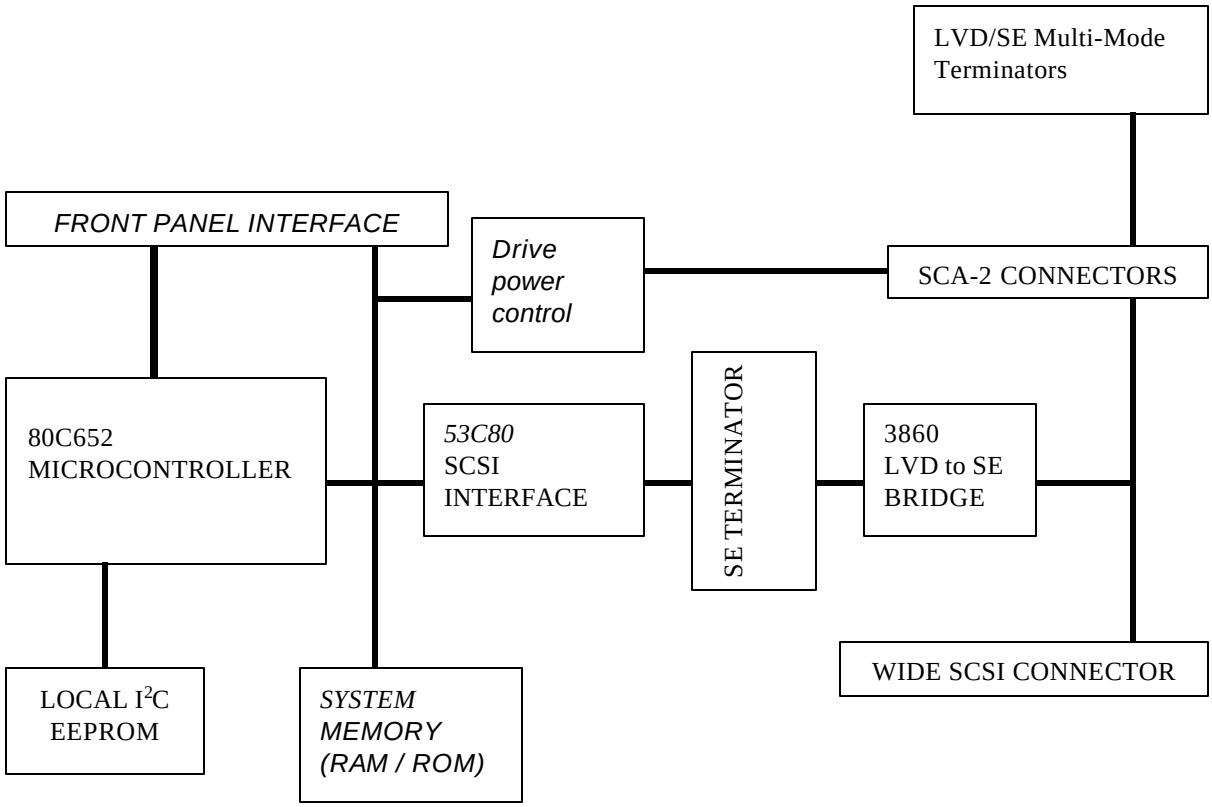


Figure 6-2. HSBP Functional Block Diagram

6.4.1 SCA2 Hot-Swap Connectors

The SR2050 Hot-swap SCSI Backplane provides four hot-swap SCA2 connectors, which provide power and SCSI signals using a single connector. Each SCA drive attaches to the backplane using one of these connectors.

6.4.2 Baseboard to SCSI Devices

A 68 pin SCSI cable is used to interface the SCSI backplane with the on-board SCSI channels of either the L440GX+ or STL2 server boards or any add-in PCI SCSI or SCSI RAID controller installed on the PCI riser card. Four SCA2 connectors provide the interface between the Hot-Swap SCSI backplane and hot-swap SCSI devices.

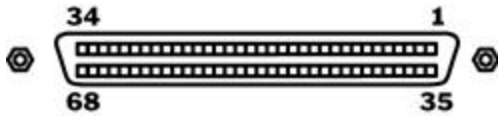


Figure 6-3. 68 Pin SCSI Cable Connector

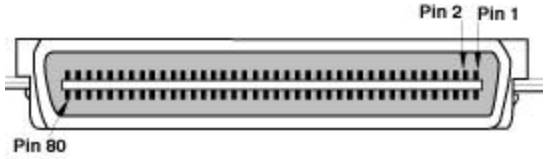


Figure 6-4. 80 Pin SCA2 Connector

Table 6-2. Ultra Wide (SE) & Ultra2 (LVD) SCSI Connector Pinout

Pin	Name	Pin	Name	Pin	Name	Pin	Name
1	+DB(12)	18	TERMPWR	35	-DB(12)	52	TERMPWR
2	+DB(13)	19	RESERVED	36	-DB(13)	53	RESERVED
3	+DB(14)	20	GROUND	37	-DB(14)	54	GROUND
4	+DB(15)	21	+ATN	38	-DB(15)	55	-ATN
5	+DB(P1)	22	GROUND	39	-DB(P1)	56	GROUND
6	+DB(0)	23	+BSY	40	-DB(0)	57	-BSY
7	+DB(1)	24	+ACK	41	-DB(1)	58	-ACK
8	+DB(2)	25	+RST	42	-DB(2)	59	-RST
9	+DB(3)	26	+MSG	43	-DB(3)	60	-MSG
10	+DB(4)	27	+SEL	44	-DB(4)	61	-SEL
11	+DB(5)	28	+C/D	45	-DB(5)	62	-C/D
12	+DB(6)	29	+REQ	46	-DB(6)	63	-REQ
13	+DB(7)	30	+I/O	47	-DB(7)	64	-I/O
14	+DB(P)	31	+DB(8)	48	-DB(P)	65	-DB(8)
15	GROUND	32	+DB(9)	49	GROUND	66	-DB(9)
16	DIFFSENS	33	+DB(10)	50	GROUND	67	-DB(10)
17	TERMPWR	34	+DB(11)	51	TERMPWR	68	-DB(11)

6.4.3 SCSI Interface

The SCSI interface on the SR2050 Hot-swap SCSI Backplane provides the required circuitry between the SCSI bus and the 80C652 micro-controller. This allows the micro-controller to

respond as a SCSI target. The interface consists of a Symbios* 53C80S SCSI Interface Chip, which functions as translator between the SCSI bus and the micro-controller. The 53C80S is a single-ended, narrow device.

6.4.4 LVD to SE Bridge

Since the 53C80S is a single-ended, narrow device, an Adaptec* AIC-3860 LVD-to-SE Transceiver (Bridge) is used to create a single-ended extension of the LVD bus. This allows the 53C80S to communicate with the LVD bus.

6.4.5 SE Termination

Passive SE termination is used for the single-ended extension of the SCSI bus that the 53C80S is on.

6.4.6 LVD/SE Multi-mode Active SCSI Termination

The SCSI active terminators provide SCSI-3 compliant active termination for the backplane end of the SCSI bus. It is assumed that the other end of the SCSI segment is properly terminated as required by the SCSI-3 specification. Multi-mode termination is implemented on the SR2050 Hot-swap SCSI Backplane using two Unitrode* UCC5638 Multi-mode SCSI 15 line terminators.

6.4.7 Power Control

Power control on the SR2050 Hot-swap SCSI backplane supports the following features:

- If supported, a RAID controller can power-down a drive when a failure is detected and reported (using enclosure services messages) via the SCSI bus. This decreases the likelihood that the drive, which may be under warranty, is 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 to the drive in preparation for operation.
- If system power is on, the Hot-swap 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.
- If supported by a given RAID controller, a Hot-spare drive can be configured. Spare drives are kept in the hot-swap bay, but are left un-powered until a drive is determined to have failed. In this case, the hot spare can be powered up and put into service automatically without requiring immediate operator intervention to replace the drive.
- The Hot-swap SCSI backplane will automatically bypass the power control circuitry if a shorted drive is inserted or if a drive develops a short during operation. This prevents the Hot-swap SCSI backplane from being damaged by a drive that draws excessive current.

6.4.8 Power Requirements

The Hot-swap SCSI backplane provides power to up to four peripherals. The following table shows the required amount of power that the backplane must supply:

< TABLE TBD >

6.4.9 Micro-controller and Memory

The micro-controller provides the intelligence for the SR2050 Hot-swap SCSI backplane. It is implemented with a Phillips 80C652 micro-controller, with a built-in I^2C interface. The micro-controller uses a 2 Mbit FLASH EEPROM for program code storage, and a 32 KB SRAM for program execution.

6.4.10 Front Panel Drive Fault LEDs

The Drive Fault Indicators are not physically part of the SR2050 Hot-swap SCSI backplane, but rather located on the system front panel. They are referenced here because the driving circuitry is entirely contained on the backplane. The drive fault LEDs are activated by the micro-controller, and indicate a failure status for each drive. A front panel interface connector is provided for an electrical path between the Hot-swap SCSI backplane, drive fault LEDs, and front panel drive activity indication. During initialization, the micro-controller flashes the LEDs for 1 second as part of the POST.

6.4.11 IMB Bus

The IMB bus is a system-wide server management bus, based on the Phillips I^2C bus specification. It provides a way for various system components to communicate independently of the standard system interfaces (e.g., PCI bus or processor/memory bus). The I^2C bus controller is integrated into the micro-controller. IMB connectivity is provided to the backplane via the front panel connector.

6.4.12 Local I^2C EEPROM & Temperature Sensor

An I^2C bus temperature sensor is connected to the micro-controller on a Private I^2C bus. Micro-controller programming implements the private I^2C connection by explicitly setting and clearing appropriate clock and data signals, to emulate an I^2C-like interface to the sensor. Temperature information is made available to other devices in the chassis using Enclosure Services messages. A Dallas DS1624 Serial EEPROM/Temperature Sensor implements this function. The EEPROM stores the Field Replaceable Unit (FRU) information for the backplane.

7. PCI-Riser Card

There are two kinds of PCI Riser Cards that can be used in SR2050 Server Chassis, the server board installed will determine which PCI card to use. The following sections describe each of the two riser cards.

7.1 PCI Riser Card for the L440GX+

The Riser Card for L440GX+ provides the following features:

- Two 32bit 33Mhz PCI slots
- PCI 2.1 compatible

This card is inserted into PCI slot 5 of L440GX+ server board. The PCI clock from the server board only operates when an add-in card is inserted into the lower slot (labeled PCI slot 5) of the riser card. The upper PCI slot (labeled PCI slot 6) can only be used when the lower PCI slot is populated. The IDSEL and interrupt routing for the PCI slots of this riser board is exactly the same as slot 5 and slot 6 of L440GX+ baseboard.

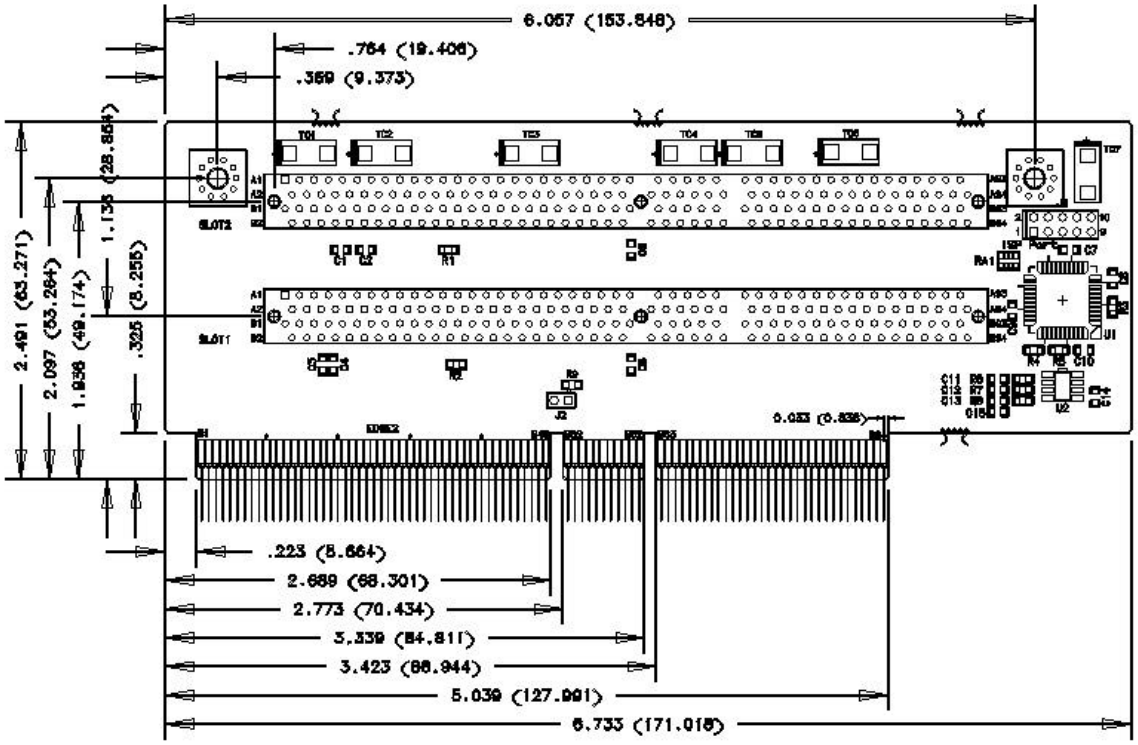


Figure 7-1. PCI Riser for L440GX+ Component and Connector Placement

7.1.1 PCI Edge Connector

The PCI edge connector was originally designed to support 64-bits. However, since the L440GX+ does not have a 64-bit PCI slot, only the standard 32-bit section of the edge connector is used.

7.1.2 Slot 5 (Lower PCI Slot)

This PCI slot provides 5V/32Bit/33MHz PCI functionality. This PCI slot must be populated to enable the PCI clocks from the server board.

7.1.3 Slot 6 (Upper PCI Slot)

This PCI slot provides 5V/32Bit/33MHz PCI functionality. This PCI slot can only be used when the lower PCI slot (slot 5) is populated. Inserting a PCI card in this slot by itself will result in the server board not recognizing the add-in card and therefore not assigning any PCI resources to it. The PCI clocks from the server board are not enabled when this slot is used by itself.

7.1.4 ISP Connector(J1)

This In-System Programming connector is used to program the Altera EPLD. This connector is used by Intel manufacturing only.

Table 7-1. ISP Connector (J1)

Pin	Signal	Pin	Signal
1	TCK	2	Ground
3	TDO	4	+3.3V
5	TMS	6	N.C
7	N.C	8	N.C
9	TDI	10	Ground

7.2 PCI Riser Card for the STL2

The Riser Card for STL2 provides the following feature sets.

- One 32bit/33Mhz PCI slot
- One 64bit/66MHz PCI slot
- PCI 2.2 compatible

The PCI riser card for the STL2 is a dual bus riser card. It has two separate edge connectors occupying two PCI slots of the STL2 server board. Each of the two STL2 PCI slots is located on a separate PCI bus. The outer connector is attached to the riser by use of a flex circuit and is used for connecting to the 64bit/66Mhz PCI Slot on STL2 board. The standard edge connector is inserted into the 32bit/33Mhz PCI slot on STL2 board.

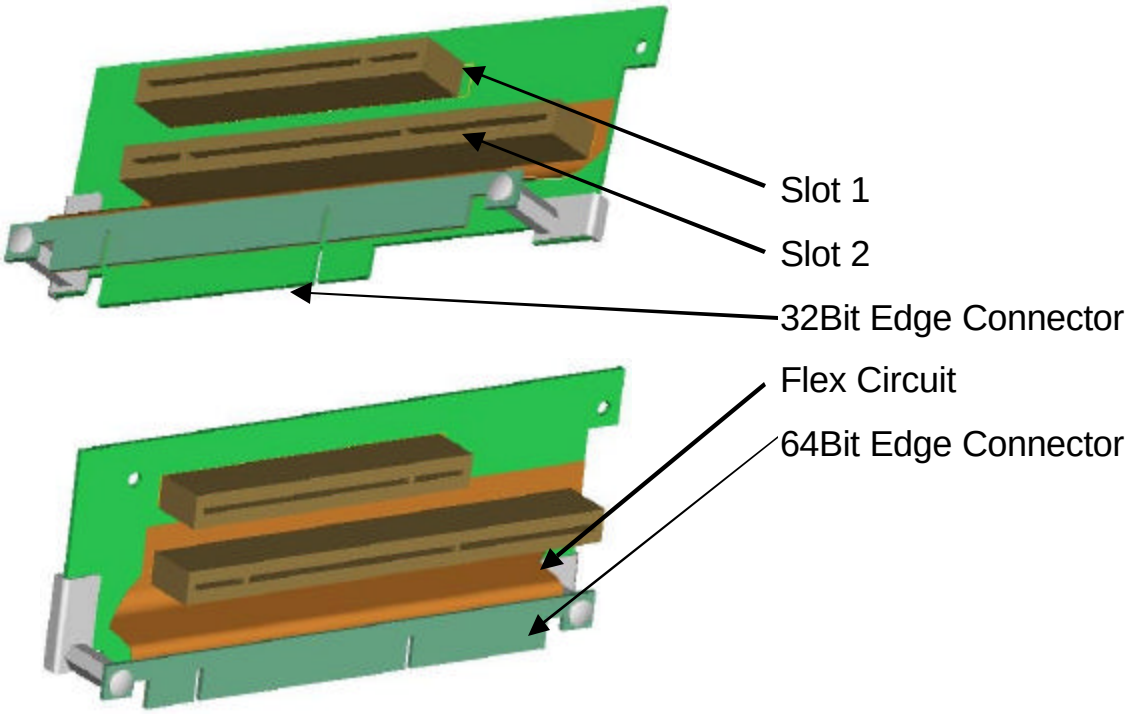


Figure 7-2. PCI Riser for STL2 Component and Connector Description

7.2.1 32 Bit PCI Edge Connector

This connector supports 5V/32bit feature and is inserted into PCI slot1 of STL2 server board.

7.2.2 64 Bit PCI Edge Connector

This connector supports 3.3V/64bit feature and is inserted into PCI slot2 of STL2 server board.

7.2.3 Slot 1 (Upper Slot)

This is a direct connect to PCI slot1 of the STL2 server board. It provides support for 5V/32Bit/33MHz PCI add-in cards.

7.2.4 Slot 2 (Lower Slot)

This is a direct connect to PCI slot2 of the STL2 server board. It provides support for 3.3V / 64Bit / 66MHz PCI add-in cards. It is also capable of supporting “Universal” 32bit PCI cards. Universal PCI cards are capable of supporting both 3.3 and 5V and have an edge connector capable of fitting into either a 5V or 3.3V only PCI slot.

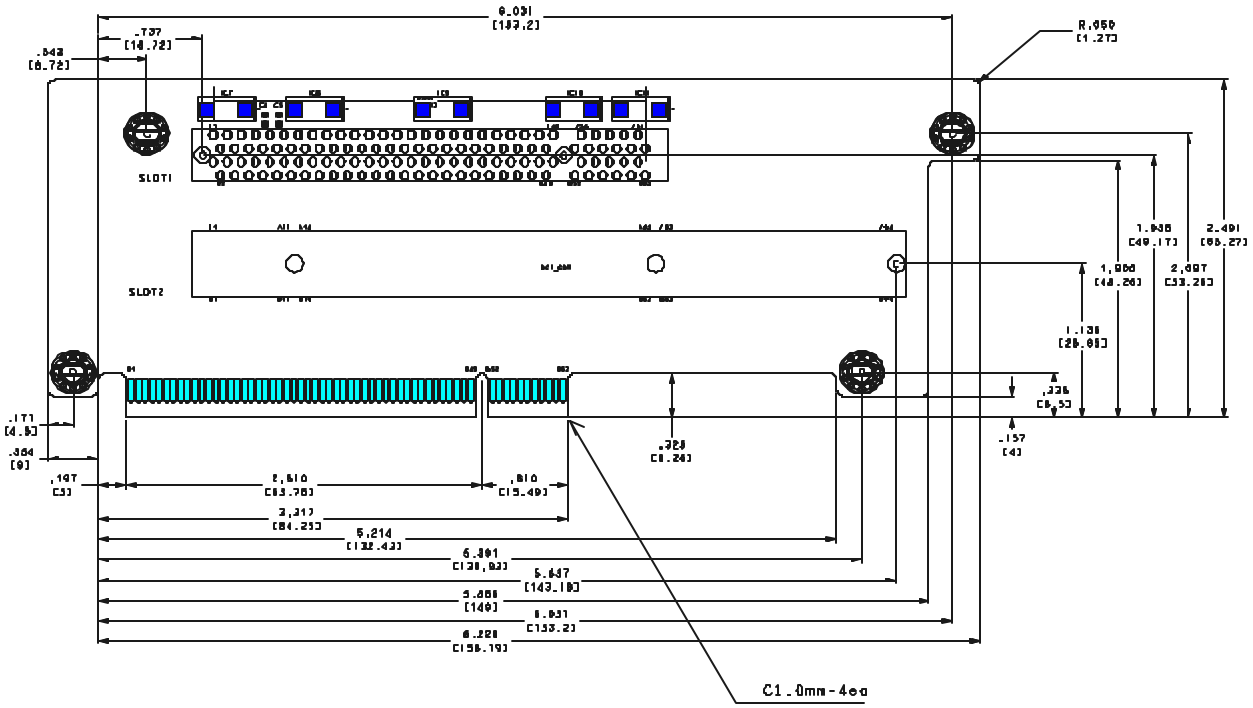


Figure 7-3. Component and Connector Placement of Rigid Printed Circuit

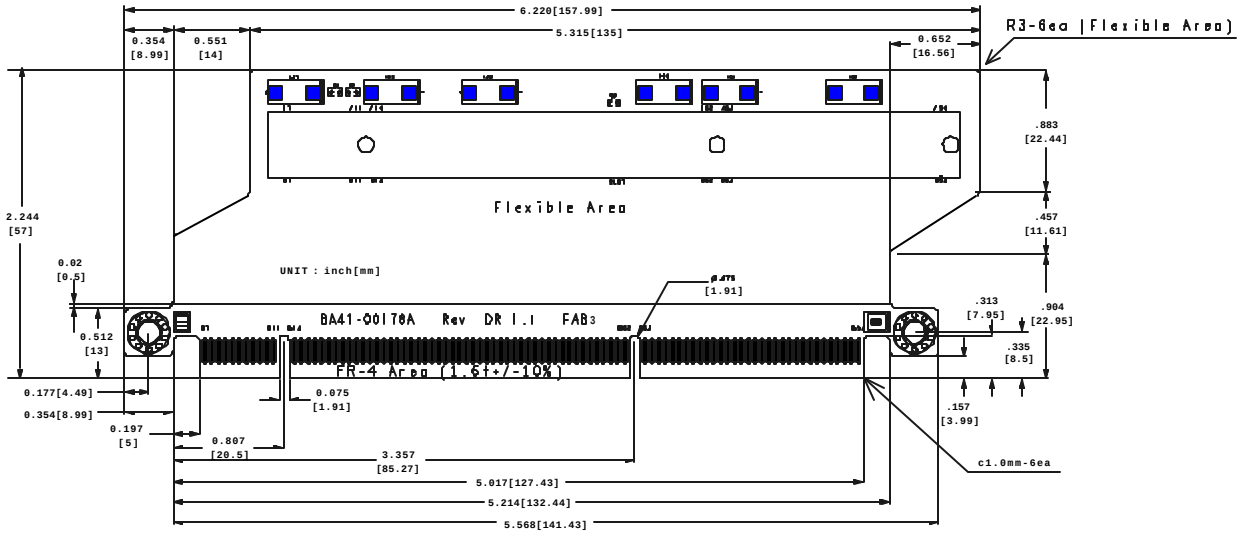


Figure 7-4. Component and Connector placement of Flexible Printed Circuit

8. Supported Intel Server Boards

The following is a summary of the feature sets for both of the Intel server boards supported in the SR2050 server chassis. Please refer to the appropriate server board Technical Product Specification for additional details.

8.1 L440GX+ DP Server Board

- Support for Single or Dual Intel® Pentium® III processors of identical speed and stepping, current revision
- Designed around the Intel® 440GX AGPSet, PIIX4e, I/O APIC devices for full MPS 1.4 compliance.
- 100MHz System Bus (Front Side Bus)
- Support for up to 2 GB 100MHz "PC/100" compliant unbuffered or registered ECC or Non-ECC SDRAM DIMMs (4 sites)
- Dual Peer PCI buses providing 6 PCI slots.
  - 4 full length PCI-33MHz/32bit slots
  - 2 full length "Universal (5v)" PCI-66MHz/32bit slots, backwards compatible to PCI-33MHz. PCI-66 implemented via Intel® 211150 AGP to PCI-66 bridge chip.
- 1 ISA expansion slot.
- Adaptec* AIC-7896 Dual function PCI SCSI controller providing Ultra2 (LVDS) wide and Ultra wide SCSI channels. Support for Adaptec ARO-1130U2 RAID*Port** "zero channel" RAID controller.
- Intel® 82559 PCI 10/100Mbit Ethernet controller with integrated physical layer. Onboard RJ-45 Network connector.
- Cirrus Logic* GD5480 PCI SVGA graphics controller, 2MB of Synchronous Graphics memory (SGRAM)
- PCI IDE controller (in PIIX4E) providing dual independent Ultra DMA/33 IDE interfaces, each able to support 2 IDE drives.
- Compatibility I/O device integrating floppy, dual serial and parallel ports, all connectors provided.
- Universal Serial Bus (USB) support with two USB connectors.
- Integration of server management features, including thermal, voltage, fan, and chassis monitoring into one controller. Emergency Management Port (EMP) feature. Introducing Platform Event Paging (PEP) Feature enabling remote notification of significant server management events.
- Flash BIOS support for all of the above.

8.2 STL2 Server Board

The STL2 server board provides the following features:

- Dual Intel® Pentium® III processor support.
  - Support for one or two identical Intel Pentium III processors for the PGA370 socket, which utilizes a new package technology called the Flip Chip Pin Grid Array (FC-PGA) package.

  - One embedded VRM for support of the primary processor, and one VRM connector for support of the secondary processor.

- ServerWorks* ServerSet* III LE chipset.
  - 133MHz Front Side Bus Capability.
  - NB6635 North Bridge 3.0 LE.
  - IB6566 South Bridge.
- Support for four JEDEC PC133 specification compliant, 3.3V, registered ECC SDRAM DIMMs.
  - Support for DIMM sizes 64MB to 1GB. Four DIMM slots allow a maximum installed memory of 4GB.
  - ECC single-bit correction, and multiple-bit detection.
- 64-bit, 66Mhz, 3.3V keyed PCI segment with two expansion connectors and one embedded device.
  - Two 64-bit, 66Mhz, 3.3V keyed PCI expansion slots.
  - Integrated onboard Adaptec* AIC7899 PCI dual-port SCSI controller providing separate Ultra-160/M and Ultra Wide SCSI channels.
- 32-bit, 33Mhz, 5V keyed PCI segment with four expansion connectors and two embedded devices.
  - Four 32-bit, 33Mhz, 5V keyed PCI expansion slots.
  - Integrated onboard Intel® EtherExpress™ PRO100+ 10/100Mbit PCI Ethernet controller (Intel® 82559) with an RJ-45 Ethernet connector.
  - Integrated onboard ATI Rage* IIC video controller with 4MB of onboard SGRAM video memory.
- Compatibility bus segment with three embedded devices.
  - Super I/O Controller (PC97317) providing all PC-compatible I/O (floppy, parallel, serial, keyboard, mouse, and Real Time Clock).
  - Baseboard Management Controller (BMC) (DS80CH11) providing monitoring, alerting, and logging of critical system information including thermal, voltage, fan, and chassis intrusion information obtained from embedded sensors on the server board.
  - 8MB Flash device for system BIOS.
- Dual Universal Serial Bus (USB) ports.
- One IDE connector.
- Flash BIOS support for all of the above.
- Extended ATX board form factor (12” x 13”).

9. Product Safety & Regulations

CAUTION: This product is considered a professional product and only technically qualified persons or technically qualified assemblers of Intel Identified Subassemblies / Products are intended to service and/or access inside the product.

9.1 Safety Precautions

Before you Begin

Only a technically qualified person shall access, integrate, configure and service this product.

Use Only for Intended Applications

- This product was evaluated as Information Technology Equipment (ITE) that may be installed in offices, schools, computer rooms and similar commercial type locations. The suitability of this product for other Product Categories and Environments other than an ITE application, such as medical, industrial, alarm systems, and test equipment, may require further evaluation.
- When you access this product for servicing, observe all warnings and cautions in this Guide.
- To avoid injury, be careful of:
  - Sharp pins on connectors
  - Sharp pins on printed circuit assemblies
  - Rough edges and sharp corners on the chassis
  - Hot components (ie: processors, voltage regulators, and heat sinks)
  - Damage to wires that could cause a short circuit
  - Other safety Caution noted in this guide

9.1.1 Before You Remove the Access Cover

The following Safety Cautions apply whenever you remove the access cover to access inside this product.

- Turn off all peripheral devices connected to this product.
- Turn off the server power by pressing the power button on the front of the product.
- Disconnect the AC power by unplugging all AC power cords from the chassis or wall outlet.
- Disconnect and label all cables and all telecommunication lines that are connected to I/O connectors or ports of this product.
- Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—when handling components.
- Retain all screws or other fasteners when removing access cover(s). Upon completing the accessing of inside the product, re-fasten access cover with original screws

CAUTION

- The power button on the front panel DOES NOT turn off the AC power. To remove power from the server, you must unplug the AC power cord from the wall outlet or the chassis.
- Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the power and disconnect all AC power cords, telecommunications and networks connections attached to the server before opening it. Otherwise, personal injury or equipment damage can result.
- Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside it. Refer all servicing to technically qualified service personnel.

9.1.2 Checking the Power Cords

WARNING

- Do not attempt to modify or use supplied AC power cords if they are not the exact type required
- The power supply cords are the main disconnect device to mains (AC power). The socket outlet shall be installed near the equipment and shall be readily accessible
- If a power cord supplied with the chassis is not compatible with the AC wall outlet in your region, get one that meets the following criteria:
  - The cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the server.
  - The connector that plugs into the wall outlet must be a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
  - The connector that plugs into the AC receptacle on the power supply must be an IEC 320, sheet C13, type female connector.
  - In Europe, the cord must be less than 4.5 meters (14.76 feet) long, and it must be flexible <HAR> (harmonized) or VDE certified cordage to comply with the chassis' safety certifications.

9.1.3 Lithium Battery Replacement

CAUTION

Refer to technically qualified persons only for replacement of battery.

The following warning is provided on the server board configuration label, which is provided with the Intel server board boxed product. There is insufficient space on the server board to place this label. Therefore, the label must be placed permanently on the inside of the chassis, as close to the battery as possible.

WARNING

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

9.1.4 Equipment Rack Precautions

WARNINGS

- **ANCHOR THE EQUIPMENT RACK**: The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The equipment rack must be installed according to the manufacturer's instructions. The anchors must be able to withstand a force of up to 113 kg (250 lbs). You must also consider the weight of any other device installed in the rack.
- **MAIN AC POWER DISCONNECT**: You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the server(s).
- **GROUNDING THE RACK INSTALLATION**: To avoid the potential for an electrical shock hazard, you must include a third wire safety-grounding conductor with the rack installation. If server power cords are plugged into AC outlets that are part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety-grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, proper grounding for the rack and other devices installed in it.
- **OVER CURRENT PROTECTION**: The server is designed for an AC line voltage source with up to 20 amperes of over current protection. If the power system for the equipment rack is installed on a branch circuit with more than 20 amperes of protection, you must provide supplemental protection for the server. If more than one server is installed in the rack, the power source for each server must be from a separate branch circuit. The overall current rating of a server configured with three power supplies is less than 12 amperes.

CAUTION

- **Temperature:** The operating temperature of the server, when installed in an equipment rack, must not go below 5 °C (41 °F) or rise above 35 °C (95 °F). Extreme fluctuations in temperature can cause a variety of problems in your server.
- **Ventilation:** The equipment rack must provide sufficient airflow to the front of the server to maintain proper cooling. It must also include ventilation sufficient to exhaust a maximum of 4,100 Btu's per hour for the server. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.

CAUTION

Integration of the SR2050 subassembly is a regulated activity: you must adhere to the assembly instructions in the SR2050 guide to ensure and maintain compliance with existing product regulations. Use only the described, regulated components specified in the SR2050 guide. Use of other products / components will void the UL listing of the product, will most likely void other compliance markings provided, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

9.1.5 Do Not Overload Power

Do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current load of all the modules within the computer is less than the maximum output current rating of the power supply. If you do not do this, the power supply may overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low voltage user accessible circuitry and result in a shock hazard. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support

9.2 Product Regulatory Compliance

The Safety and/or EMC certifications obtained for this product may have been obtained under the certification code name "BYRD"

9.2.1 Product Safety Compliance

The SR2050 complies with the following safety requirements:

- UL 1950 - CSA 950 (US/Canada)
- EN 60 950 (European Union)
- IEC60 950 (International)
- CE – Low Voltage Directive (73/23/EEC) (European Union)
- EMKO-TSE (74-SEC) 207/94 (Nordics)
- GOST R 50377-92 (Russia)
- IRAM (Argentina)

9.2.2 Product EMC Compliance

The SR2050 has been tested and verified to comply with the following Electromagnetic Compatibility (EMC) Regulations.

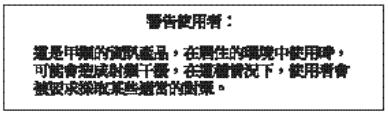
Note: The chassis kit, as shipped, has been tested and has passed product regulation EMI emissions testing with configurations using each of the supported server boards and added peripherals. Depending on the server integrators final system configuration, additional EMI gasketing may be required to maintain EMI regulatory requirements. It is the responsibility of the server integrator to validate that their final server configuration maintains compliance to regulatory requirements for the environment in which the server is intended.

- FCC (Class A Verification) – Radiated & Conducted Emissions (USA)
- ICES-003 (Class A) – Radiated & Conducted Emissions (Canada)
- CISPR 22 (Class A) – Radiated & Conducted Emissions (International)
- EN55022, 3rd Edition (Class A) – Radiated & Conducted Emissions (European Union)
- EN55024 (Immunity) (European Union)
- EN61000-3-2 (Power Harmonics) (European Union) Fluctuation and Flicker
- EN61000-3-2 (Voltage Fluctuation and Flicker) (European Union)
- CE – EMC Directive (89/336/EEC) (European Union)
- VCCI (Class A) – Radiated & Conducted Emissions (Japan)
- AS/NZS 3548 (Class A) – Radiated & Conducted Emissions (AU/NZ)
- RRL–MIC Notices No. 1997-41 / 1997-42 (Class A) Radiated & Conducted Emissions (Korea)
- BSMI (CNS13438 - Class A) Radiated & Conducted Emissions (Taiwan)
- GOST R 29216-91 (Class A) Radiated & Conducted Emissions (Russia)
- GOST R 50628-95 (Immunity) (Russia)

9.2.3 Product Regulatory Compliance Markings

This product is provided with the following Product Certification Markings.

cULus Listing Marks	
German GS Mark	
CE Mark	
FCC/ICES-003 Marking (Class A)	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. This Class A digital apparatus complies with Canadian ICES-003. Cet apprell numérique de la classe A este conforme à la norme NMB-003 du Canada. Manufactured by Intel Corporation.
Japan VCCI Marking (Class A)	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
Australia C-Tick Mark	

Taiwan BSMI Marking (Class A)	
Russia GOST R Marking	
Certification Code or Model Name	BYRD

9.2.4 EMC Regulatory Compliance Notification Information

USA - FCC

FCC Verification Notice

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:

IntelCorporation
5200N.E.ElamYoungParkway
Hillsboro,OR97124
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.

CANADA – INDUSTRY CANADA

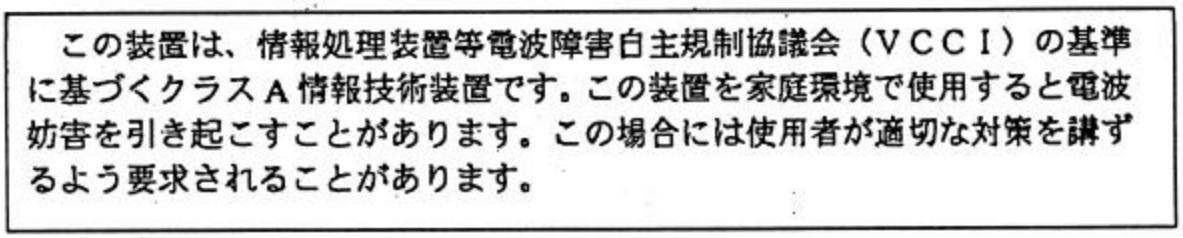
Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: “Appareils Numériques”, NMB-003 édictée par le Ministre Canadian des Communications.

(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.

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.

JAPAN – VCCI

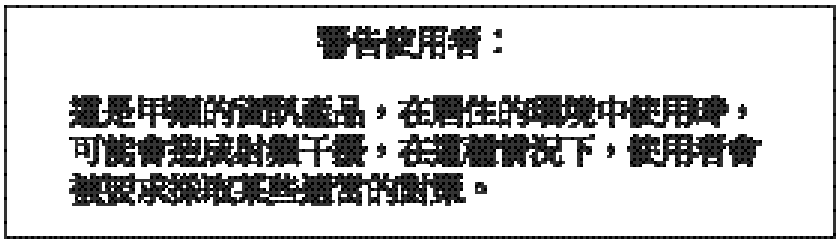

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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.

ASIA-PACIFIC

TAIWAN - BSMI

The BSMI Certification ID number 3892I932 is located on the back chassis panel. The BSMI Class A EMC Warning label is located back chassis panel


警告使用者：

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

10. Environmental Limits

10.1 System Office Environment

Table 10-1. System Office Environment Summary

Parameter	Limits
Operating Temperature	+5^{o}C to +35^{o}C with the maximum rate of change not to exceed 10^{o}C per hour.
Non-Operating Temperature	-40^{o}C to +70^{o}C
Non-Operating Humidity	95%, non-condensing @ 30^{o}C
Acoustic noise	50 dBA in an idle state at typical office ambient temperature (65-75F)
Operating Shock	No errors with a half sine wave shock of 2G (with 11 millisecond duration).
Package Shock	Operational after a 24 inch free fall, although cosmetic damage may be present
ESD	20kV per Intel Environmental test specification
System Cooling Requirement in BTU/Hr	1676 BTU/hour

10.2 System Environmental Testing

The system will be tested per the Environmental Standards Handbook, Intel Doc.#662394-03. These tests shall include:

- Temperature Operating and Non-Operating
- Humidity Non-Operating
- Packaged and Unpackaged Shock
- Packaged and Unpackaged Vibration
- AC Voltage, Freq. & Source Interrupt
- AC Surge
- Acoustics
- ESD
- EMC Radiated Investigation

11. Serviceability and Availability

11.1 Serviceability

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.

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 front system fan	5 minutes
Remove and replace expansion board	5minutes
Remove and replace front panel board	5minutes
Remove and replace baseboard (with no expansion boards)	10minutes
Overall MTTR	20 minutes

11.2 Calculated MTBF

The MTBF (Mean Time Between Failures) for the SR2050 Server chassis as configured from the factory is calculated at 43,748 hours operating at 35 Degrees C. The following table shows the MTBF numbers for individual components within the chassis.

Note: The numbers in the table were determined when tested with an L440GX+ server board installed. Having an STL2 installed may produce a slight variation in the numbers. This table will be updated at a later date to show numbers for both L440GX+ and STL2.

Table 11-1. SR2050 Component MTBF Numbers

Item	Percent Usage	Temperature	MTBF Hours
Front Panel Board	100	50 C	2,852,904
Hot Swap SCSI Backplane	100	50 C	248,836
PCI Riser Card	100	50 C	738,390
IDE CDROM	5	50 C	100,000
Power supply	100	50 C	100,000
FAN	100	50 C	612,184

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Reference Documents

Refer to the following documents for additional information:

- *L440GX+ Technical Product Specification (TPS) Rev 3.0*
- *STL2 Server Board Technical Product Specification* Rev 1.0
- *Barbera2 Server Chassis Technical Product Specification (TPS) Rev 0.91*
- *Power Supply, 275W, 5 Output, with PFC Document No. 751913*
- *Entry-Level Electronics-Bay Specification Rev 1.0*
- *ATX Specification Version 2.03*
- *SCSI Accessed Fault-Tolerant Enclosures Interface Specification*, © Conner Peripherals and Intel Corporation, Revision 1.00, October 17, 1995
- *SCSI Parallel Interface-3*, draft proposal revision 14
- *PCI Local Bus Specification Rev 2.2, December 18, 1998*
- *Single Connector Attachment for Small SCSI Disk Drives.* Small Form Factor Committee, revision 3.2
- *AIC-3860 Single-ended-to-Low Voltage Differential SCSI Transceiver Data Sheet,* Rev. A, 12/97.
- *The I^2C Bus and How to Use It,* January 1992, © 1992 Philips Semiconductors