Intel® Entry Storage System SS4000-E

Technical Product Specification (Hardware)

Intel Order D42567-001

Revision 1.1

Storage Systems Group Marketing

Revision History

Date	Revision Number	Modifications
Dec 1, 2005	0.75	Initial draft for review.
Dec 9, 2005	0.85	0.75 review comments edited into the document. Updated regulatory requirements section, added shipping memory size, added inserting drive carrier image, corrected BTU rating, added additional info on fan monitoring and throttling, added I2C block diagram, corrected images that did not have NIC2 LED identified
Feb 6, 2006	1.0	Incorporated correct chassis and shipping container weights. Added information related to fan speed control and throttle values. Modified relevant drawings to use labeled callouts for easier translation. Changed graphics that showed pre-silver revs of the hardware to reflect the silver hardware. Added part number for drive carrier. Corrected figure numbering for auto numbering. Added the current corporate logo on title page. Added RoHS information in section 6.2.1.1.
Apr 20, 2006	1.1	Spelling error corrected

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The Intel® Entry Storage System SS4000-E may contain design defects or errors known as errata that may cause the product to deviate from published specifications. Current characterized errata are available on request.

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

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1. Feature Summary

This Technical Product Specification provides detailed information about the hardware components of the Intel® Entry Storage System SS4000-E. Please refer to the *Intel® Entry Storage System User Guide* for complete feature, configuration and operation details of the Intel® Entry Storage System SS4000-E Network Attached Storage (NAS) Management Software that is shipped with each storage system.

The Intel® Entry Storage System SS4000-E includes a chassis, Intel® XScale® Processor based board, with a single Intel® XScale® 80219 processor, four Serial ATA hard disk drive carriers, one Intel® 31244 SATA Controller, dual Intel® 82541 Gigabit Ethernet Network controllers, 256MB of DDR SDRAM memory and a single 200 W power supply. Intel®-based system boards and chassis have feature sets designed to support the high-density storage market.

The Intel® XScale® Processor based board that is installed in the Storage System SS4000-E chassis is a printed circuit board with features that were designed to support the storage system market. The architecture is based on the Intel® XScale® Processor family.

For more information on the Intel® Entry Storage System SS4000-E Storage Management Software, please refer to the *Intel® Storage Management User Guide* available from Intel Business Link (IBL), support.intel.com or your Intel sales representative.

TP000086

Figure 1. Intel® Entry Storage System SS4000-E

Intel® Entry Storage System SS4000-E Hardware Feature Summary

Storage Capacity	Expandable to 1.0 TB – using four 250 GB drives Expandable to 2.0 TB – using four 500 GB drives **NOTE: For specific drive family and capacities supported, please refer to the SS4000-E Tested Hardware and OS List (THOL)**
Drive Bays	4 Serial ATA (SATA) Hot Pluggable
Hard Disk Drive Supported	3.5 inch SATA **NOTE: For specific drive family and capacities supported, please refer to the SS4000-E Tested Hardware and OS List (THOL)**
Processor	A single Low Voltage Intel® XScale® 80219 processor operating @ 400 MHz **NOTE: The system board is designed to support multiple XScale processors but it is not designed such that the processor can be replaced.**
Memory Capacity	1 GB maximum, using 64-bit DDR SDRAM 512 MB maximum, using 32-bit DDR SDRAM System ships with 256MB memory **NOTE: Only qualified service personnel should service system memory.**
Memory Type	Synchronous Dynamic Random Access Memory (SDRAM), PC200 – system ships with 256 MB memory **NOTE: For specific memory recommendations please refer to the Tested Hardware and OS List (THOL). Only qualified service personnel should service system memory.**
DIMM Slots	One 184-pin DIMM socket
SATA Compliance	SATA 1.5Gb/s
Client Connectivity	Client Connectivity via Dual Gigabit Ethernet
Front Panel	
LEDs	Network Ports, Disk Activity / Fault, System Status, Power, Global Disk Activity
Power	Power button
Back Panel	
Buttons and Switches	Reset button
I/O Connectors	2x RJ-45 Ethernet ports, 2 USB 2.0 Ports
Power Receptacle	1x IEC AC per installed power supply module
Chassis	
Form Factor	Cube chassis
Height	214mm (8.42”)
Width	160mm (6.30”)
Depth	243mm (9.6”)
Weight	As shipped (zero drives): approximately 3.18 kg, 7 pounds Fully configured (four drives): approximately 5.45 kg, 12 pounds Shipping container: 9.1 kg, 20 pounds (includes overpack and accessories – with drives) Height 480mm (18.9”) Width 385mm (15.15”) Length 440mm (17.3”)
Color	Black

System Cooling	
Fans	Chassis includes one single rotor 92 mm system fan for cooling the hard drives, baseboard and SATA backplane. The power supply enclosure contains one 40mm fan.
Power	
Configuration	200 W continuous power supply. Intel Entry Storage System SS4000-E ships with one 200W power supply
Max AC input current (PS Enclosure)	4 Amperes at 115 Vrms, 2 Amperes at 230 Vrms
Max +3.3 V output (PS Enclosure)	17.0 A (total combined power for the+3.3 V and +5 V outputs should not exceed 65 W).
Max +5 V output (PS Enclosure)	12.0 A (total combined power for the+3.3 V and +5 V outputs should not exceed 65 W).
Max +12 V output current (PS Enclosure)	10.0 A
Max -5 V output current (PS Enclosure)	0.3A
Max -12 V output current (PS Enclosure)	0.5 A
Max +5V Standby output current (PS Enclosure)	1.5 A
Environment	
Ambient Temperature	Operating (system): 10 degrees Celsius to +35 degrees Celsius, with maximum change not to exceed 10 degrees Celsius per hour; non-operating (system): -40 degrees Celsius to +70 degrees Celsius.
Relative Humidity	Non-operating: 90%, non-condensing @ 35 degrees Celsius non-condensing
Acoustics	4.7 BA in an idle state in at typical office ambient
Electrostatic Discharge	±15 Kilovolt (KV) per Intel® Environmental test specification
System Cooling Requirement in British Thermal Units (BTU) per Hour	< 680 BTU/hour
Safety Compliance	
Argentina	IRAM
Canada	UL60950 – CSA (60950 (UL and cUL)
China	GB4943- CNCA Certification
Europe, CE Mark	EN60950 (complies with73/23/EEC)
Germany	GS License
International	IEC60950 (CB Report and Certificate)
Nordic Countries	EMKO-TSE (74-SEC) 207/94
Russia	GOST 50377-92
United States	UL– 60950 – CSA 60950 (UL and cUL)
Electromagnetic Capability (Class B) (EMC)	
Australia/New Zealand	AS/NZS 3548 (based on CISPR 22)
Canada	ICES-003
China	GB 9254 - CNCA Certification GB 17625 - (Harmonics) CNCA Certification

Europe, CE Mark	EN55022; EN55024 & EN61000-3-2;-3-3 (complies with 89/336/EEC)
International	CISPR 22
Japan	VCCI
Korea	RRL MIC 1997-41 & 1997-42
Russia	GOST 29216-91 & 50628-95
Taiwan	CNS13438
United States	FCC, Part 15

1.1 System Components

A block diagram of the storage system functional components is shown below.

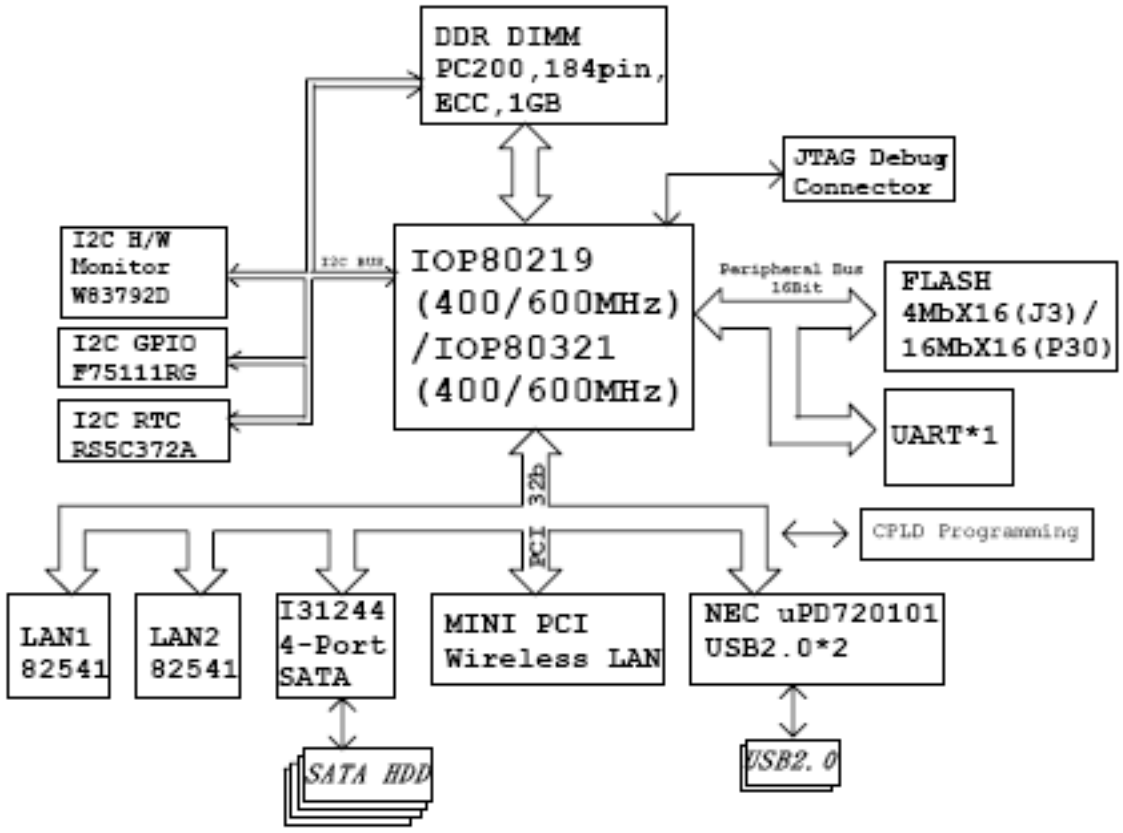
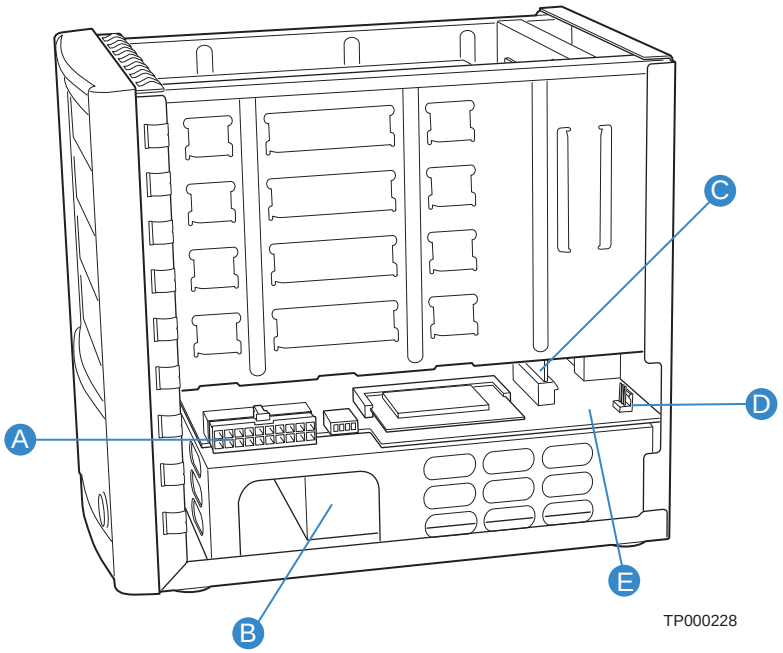


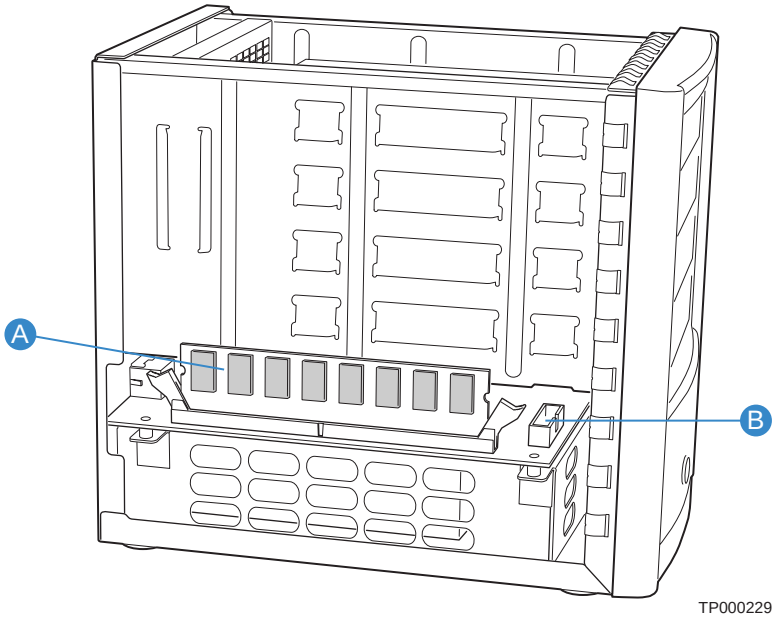
Figure 2. Intel® Entry Storage System SS4000-E Block Diagram

The components included with this storage system are diagrammed below.



A	Power Supply Connector
B	Power Supply
C	SATA Backplane Connector
D	Fan Connector
E	System Board

Figure 3. System Components - Right Side



A	System Memory
B	Front Panel Cable Connector

Figure 4. System Components – Left Side

1.2 System Board Feature Set

The Intel® Entry Storage System SS4000-E Board provides the following feature set, as implemented in the Intel® Entry Storage System SS4000-E:

Feature	Description
Processor	Single IOP80219 544 LPBGA (35mm) package with 200 MHz internal bus speed.
Memory	IMPORTANT: Intel® Entry Storage System SS4000-E supports a maximum of 1GB of DDR SDRAM system memory with ECC. The system ships with 256MB memory installed. **NOTE: For specific memory recommendations please refer to the Tested Hardware and OS List (THOL).** **NOTE: The Intel Entry Storage System SS4000-E ships with 256MB memory. Only qualified service personnel should service system memory.**
Peripheral Interfaces	1 32-bit PCI bus operating at 33MHz providing connection for: • 2 10/100/1000 Megabits per second (Mb/s) Ethernet LAN ports • 2 USB 2.0 ports • 1 Serial ATA 4 port controller operating at 1.5Gigabits per second
LAN	Intel® 82541 Dual 10/100/1000 Megabits per second (Mb/s) Ethernet Local Area Network (LAN) Controller.
Fans	Support for one system fan

1.3 Serial ATA (SATA) Host Bus Adapter

The Intel® Entry Storage System SS4000-E ships with one 4 port PCI-X to SATA Host Bus Adapters. The SATA HBA provides the following feature set:

Feature	Description
Number of ports	4, using a single Intel 31244 SATA controller.
Serial ATA Bus Speed	1.5 Gb/s
Serial ATA Data Transfer rate	150 MB/s
PCI Bus width and speed	64-bit/133 MHz PCI-X bus, backward compatible to 32-bit/33 MHz and 64-bit/66 MHz (implemented in backward compatible mode)
PCI Data transfer rate	Maximum 1.06 GB/s (backward compatible mode operates at 32-bit/33 MHz yielding maximum of 132 MB/s)
Hot Swap	Yes
RAID Management Tools	Yes, via Intel® Storage Management Software using the user interface

Please refer to http://www.intel.com/design/storage/serialata/docs/gd31244.htm for more information.

1.4 SATA Hot Swap Backplane

The SATA Hot Swap backplane board provides the following feature set:

Feature	Description
Supports up to 4 drives.	Slots provided for docking up to four 1.5 Gigabits per second (Gb/s) Serial ATA hot swap hard drives

Drive Status LEDs	Support for separate drive status LEDs that are visible at the front of each drive carrier. These LED's indicate the following:
	• Green LED –
	  o ON, Drive available
	  o Blink, Drive activity
	  o Off during a fault condition
	• Amber LED –
	  o ON, Drive fault
	  o Blink, Drive is rebuilding
	  o Off during normal operation

1.5 Enclosure Management

The enclosure management controller monitors various aspects of the storage enclosure. The enclosure management controller is comprised of the following elements and supports associated features:

- CPLD (Lattice ispMACH 4064V)
- Hardware Monitoring I/C (Winbond W83792AD)
    - Thermal sensing
    - Voltage level sensing
    - CPU temperature sensing

1.5.1 Fan Control

Fan control is managed through the Winbond W83792AD hardware monitoring component. In the event of a fan failure the system will shutdown to prevent an over temperature situation.

1.5.2 I^2C Serial Bus Interface

The enclosure management controller supports one independent I^2C interface port with bus speed of up to 400 Kb/s. Additional I2C connections and addressing are shown in the following block diagram.

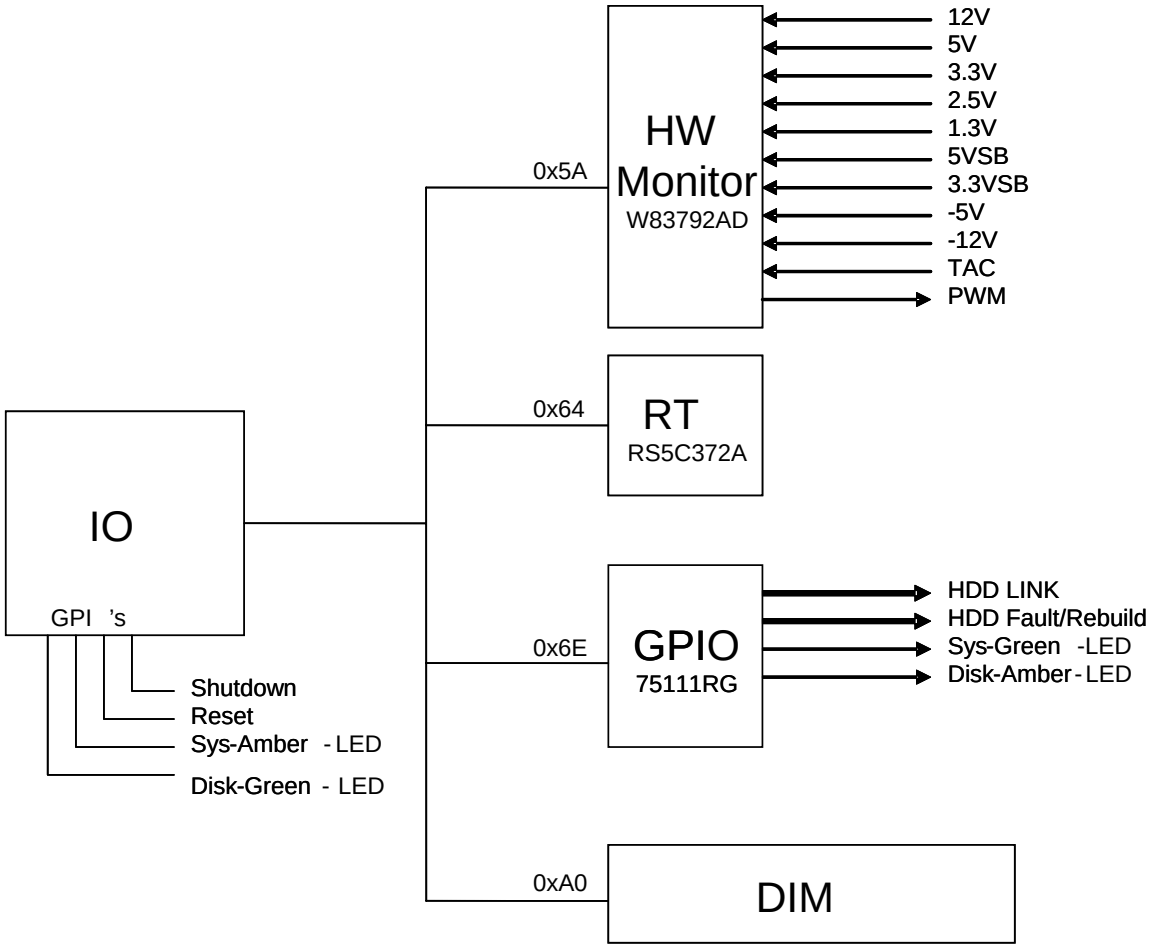


Figure 5. I2C Serial Bus Interface Block Diagram

1.5.3 Hard Disk Drive LEDs

The Intel® Entry Storage System SS4000-E SATA HSBP contains one LED for each of the four drive slots.

Table 1. HDD LED Function

Activity Light States	
Drive Status	**LED**
Drive Available	Solid Green
Drive Activity	Blinking Green
Drive is Rebuilding	Blinking Amber
Fault Condition	Solid Amber

1.6 Chassis Dimensions and Weight

Table 2. Chassis Dimensions and Weight

Height	214mm	8.42 inches
Width	160mm	6.30 inches
Depth	243mm	9.6 inches
Weight		
Chassis - as shipped (0 drives)	3.5 kilograms	7 pounds
Chassis - fully configured (4 drives)	5.45 kilograms	12 pounds
Shipping container	3.63 kilograms	8 pounds
Shipping Container Dimensions	Height	480mm (18.9”)
	Length	440mm (17.3”)
	Width	385mm (15.15”)

1.7 Back Panel I/O Ports and Features

At the rear of the chassis are two 10/100/1000 Network Interface Card (NIC) connectors and two USB 2.0 ports. The Input/Output (I/O) connectors are integrated to the back panel. The figure below shows the rear of the storage system.

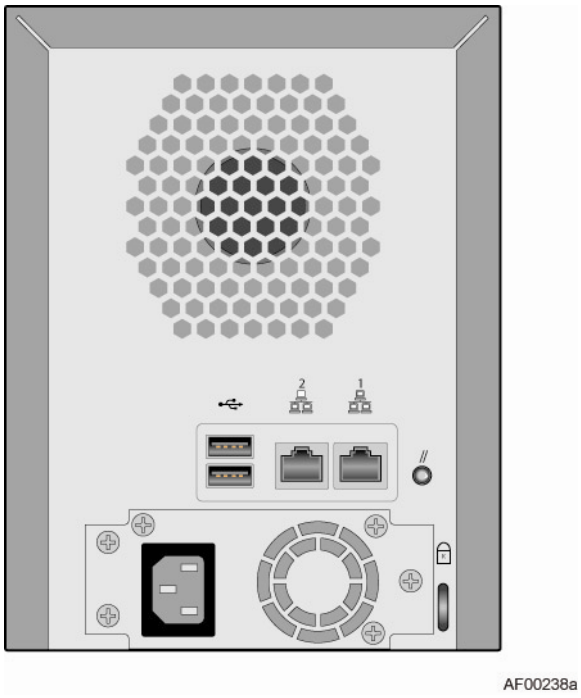


Figure 6. Chassis Rear

1.8 Front Panel and Hard Disk Drive Bays

Figure 7. Hard Disk Drive Bays

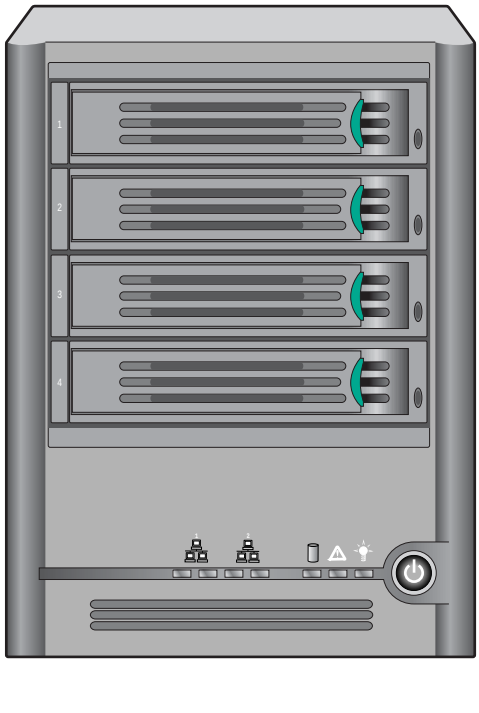


Figure 8. Chassis Front

1.8.1 Front/Rear Panel Controls and Indicators

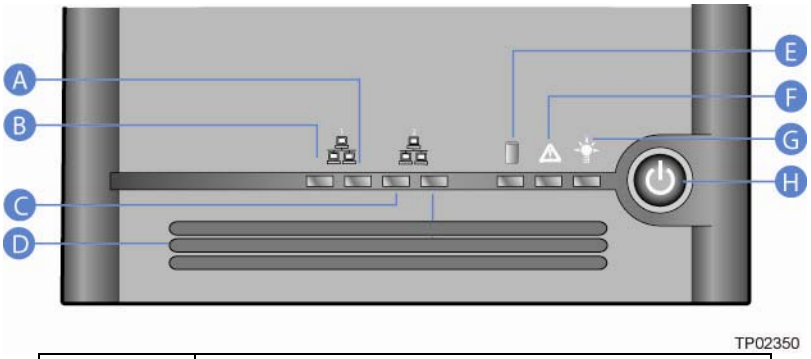
The front/rear panel controls and indicators are defined below:

Table 3. Front and Rear Control Button Functions

Power button (front)	Toggles the system power on/off. Holding button down will shut the system down.
Reset button (rear)	Reboots the system and resets the Ethernet ports to default values (DHCP client) and the Administrator password to default values.

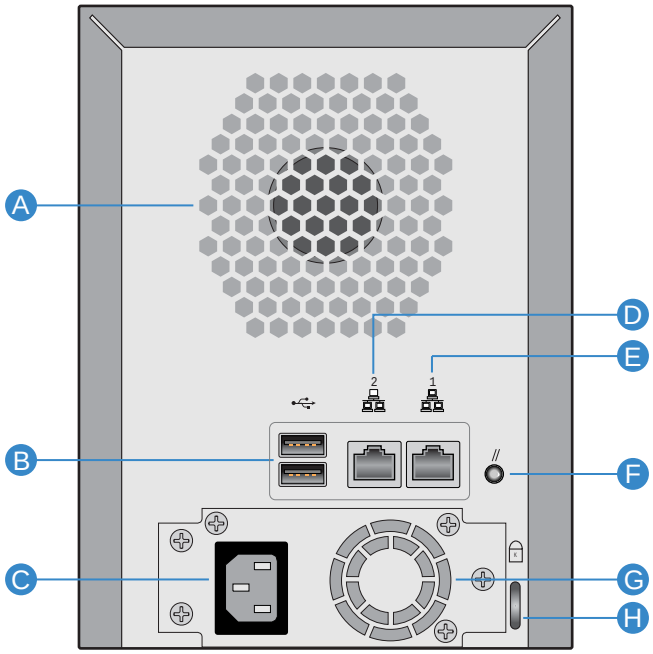
Table 4. Front Panel LED Indicators

Power	Continuous green light indicates the system has power applied to it. No light indicates the system does not have power applied to it.
System Status	Continuous green indicates system is running and operating normally. Green blinking light indicates system is in process of booting up or shutting down. Continuous amber light indicates fault present – a critical or non-recoverable condition.
NIC1 Link	Continuous green indicates an active Ethernet connection. Off indicates no active Ethernet connection.
NIC1 Activity	Blinking green indicates Ethernet activity.
NIC2 Link	Continuous green indicates an active Ethernet connection. Off indicates no active Ethernet connection.
NIC2 Activity	Blinking green indicates Ethernet activity.
Global Disk Activity	Continuous green light indicates drive health is good (1-4 drives). Amber blinking light indicates one or more drives are rebuilding.



A	NIC1 Activity
B	NIC1 Ethernet Link
C	NIC2 Ethernet Link
D	NIC2 Activity
E	Global Disk Status
F	System Status
G	Power Status
H	Power Button

Figure 9. Front Panel

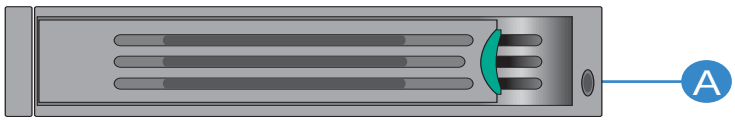


A	System Fan
B	USB Ports
C	Power Connector
D	NIC2 Ethernet Port
E	NIC1 Ethernet Port
F	Reset Button
G	Power Supply Fan
H	Cable Lock

Figure 10. Rear Panel

Table 5. Intel Disk Drive Carrier LED Functions

Disk Drive Activity LED Light Pipe	Continuous green indicates the drive is available. Blinking green indicates drive activity Continuous amber indicates a fault condition possibly requiring the drive to be replaced. Blinking amber indicates the drive is currently rebuilding RAID.



A	LED Light Pipe

Figure 11 Hard Disk Drive Carrier LED Light Pipe

2. Power Sub-System

This section provides an overview of the Intel® Entry Storage System SS4000-E power supply. The power supply is an auto sensing power supply and will detect the input voltage and provide the appropriate output voltage. **NOTE: The Intel® Entry Storage System SS4000-E ships with one 200 Watt power supply.**

2.1 Power Supply

The Intel® Entry Storage System SS4000-E accommodates one 200 Watt (W) power supply.

PARAMETER	MIN	Nominal	MAX
Voltage (in)	90 VAC_{rms}	115-230 VAC_{rms}	253 VAC_{rms}
Voltage (in frequency)	47 Hz		63 Hz
Input Current		4 (115V) 2 (230V)	

The power supply is designed to minimize EMI.

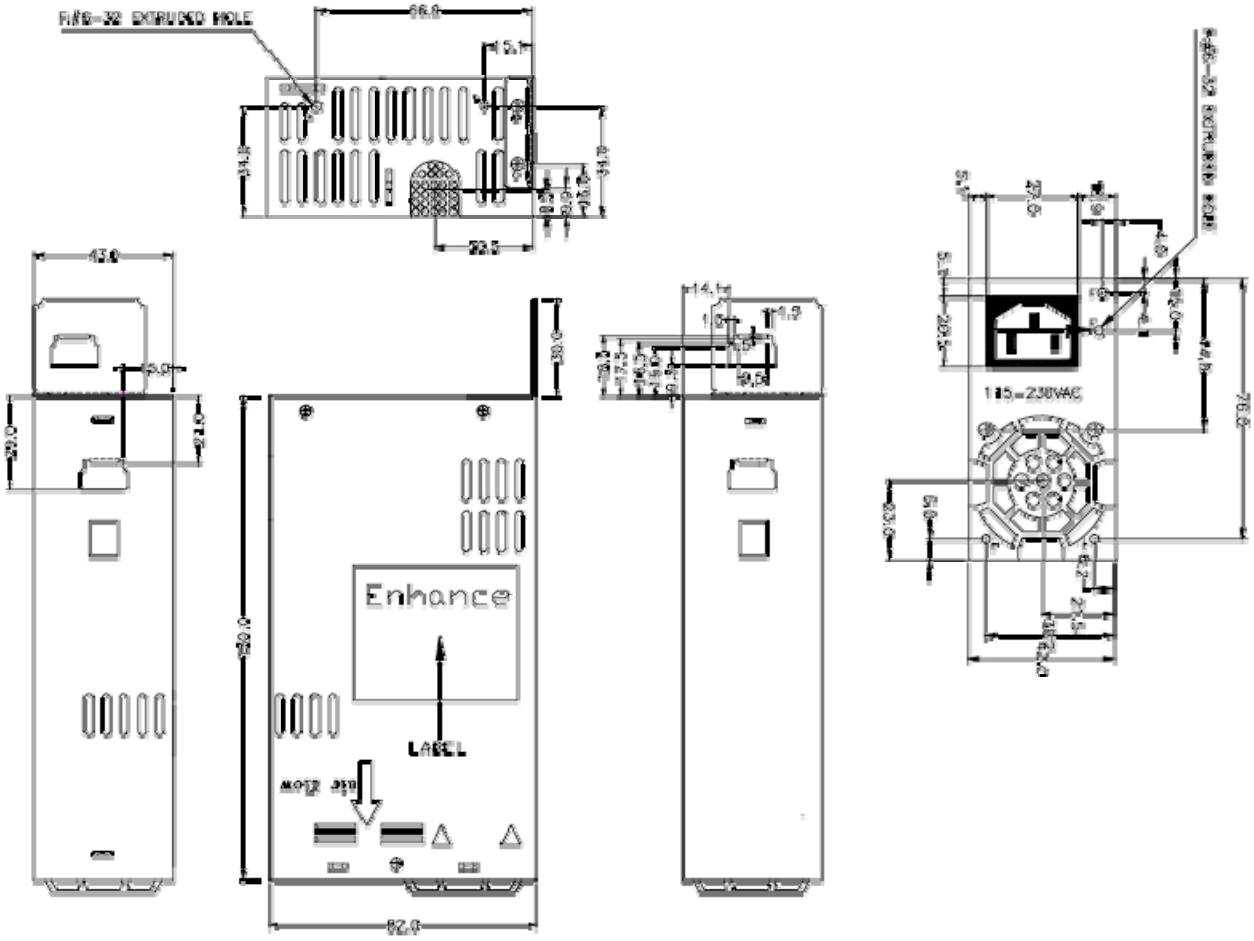


Figure 12. Power Supply Enclosure

2.1.1 Power Supply Outputs

The Intel® Entry Storage System SS4000-E power system supports one 200 W Power Supply. The power supply provides six DC output rails; +3.3V, +5V, +12V, -5V, -12V and +5Vsb.

Table 5. Power Supply Output Summary (200W 10 second peak ratings)

+3.3V	+5V	+12V	-5V	-12V	5Vsb
17A	12A	10A	0.3A	0.5A	1.5A

NOTE: The total combined power for +3.3V and +5V should not exceed 65W. The maximum continuous average DC output power shall not exceed 200W. The peak +12VDC output power shall not exceed 13 seconds in duration.

The power supply requires a #1 and/or #2 Phillips screwdriver to remove the chassis cover for insertion and extraction of the power supply.

2.1.1.1 Front Panel Power Supply LED Indicator

The power supply is connected to a single external LED to indicate the status of the power supply. When AC is applied to the Power Supply Unit (PSU) and the system is powered on, the LED will be solid on green to indicate that all the power outputs are available. Refer to the following table for conditions of the LED.

Table 6. Front Panel Power Supply LED Indicator

Front Panel Power Supply LED	Off indicates no power supplied to the unit. Continuous green indicates power is supplied to the unit.

2.2 Output Power/Currents

The following table defines power and current ratings for this 200 Watt continuous (300 Watts peak) power supply. The output power shall not exceed the rated output power. The power supply must meet both static and dynamic voltage regulation requirements for the minimum loading conditions. Outputs are not required to be peak loaded simultaneously.

Table 7. Load Ratings

Voltage Rail	Minimum	Maximum	Peak
+3.3V	0.3A	17.0A	
+5V	1.0A	12.0A	
+12V	0.5A	10.0A	13.0A
-5V	0.0A	0.3A	
-12V	0.0A	0.5A	
+5Vsb	0.0A	1.5A	2.0A

NOTE: The total combined power for +3.3V & +5V should not exceed 120W. The total combined power for +12V, -12V, 5Vsb should not exceed 300W.

2.3 Voltage Regulation

The power supply output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. All outputs are measured with reference to the COM/GND (black wire)

Table 8. Voltage Regulation Limits

Parameter	Min	Nom	Max	Units	Tolerance
+3.3V	+3.14	+3.30	+3.47	V_{rms}	+/-5%
+5V	+4.75	+5.00	+5.25	V_{rms}	+/-5%
+12V	+11.4	+12.00	+12.6	V_{rms}	+/-5%
-5V	-4.5	-5.0	-5.5	V_{rms}	+/-10%
-12V	-10.8	-12.0	-13.28	V_{rms}	+/-10%
+5Vsb	+4.75	+5.0	+5.25	V_{rms}	+/-5%

2.4 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 shall be able to reset the power supply.

2.4.1 AC Inrush Current Regulation

The power supply shall have current limit to prevent outputs from exceeding threshold values. If the current limits are exceeded the power supply shall shutdown. This will be cleared by an AC power interruption. The power supply shall not be damaged from repeated power cycling in this condition. The 5Vsb shall be protected under over-current or shorted conditions so that no damage can occur to the power supply.

Voltage	Over Current Limit
115Vrms	50A
230Vrms	100A (@ 25°C ambient cold start)

2.4.2 Over Voltage Protection (OVP)

The power supply over voltage protection shall be locally sensed. In an over voltage fault occurs, the supply will latch all DC outputs into a shutdown state except 5Vsb output. This latch shall be cleared by an AC power interruption. Table 13 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 failure. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector.

Table 9. Over Voltage Protection (OVP) Limits

Output Voltage	Min (V)	Max (V)
+5V	5.5	7.0
+3.3V	3.5	4.5
+12V	13.0	16.8

2.4.3 Short Circuit Protection (SCP)

The power supply shall shutdown and latch off for shorting +3.3V, +5V, -5V, +12V or -12V rails. The main output short circuit of any impedance shall be less than 0.1 ohms. The maximum short circuit current in any output shall not exceed 240VA.

3. System Cooling Fan

The Intel® Entry Storage System SS4000-E includes a cooling fan that has a single rotor 92 mm fan, mounted on the rear of the chassis. The Power Supply enclosure contains one 40 mm fan for cooling the power supply module.

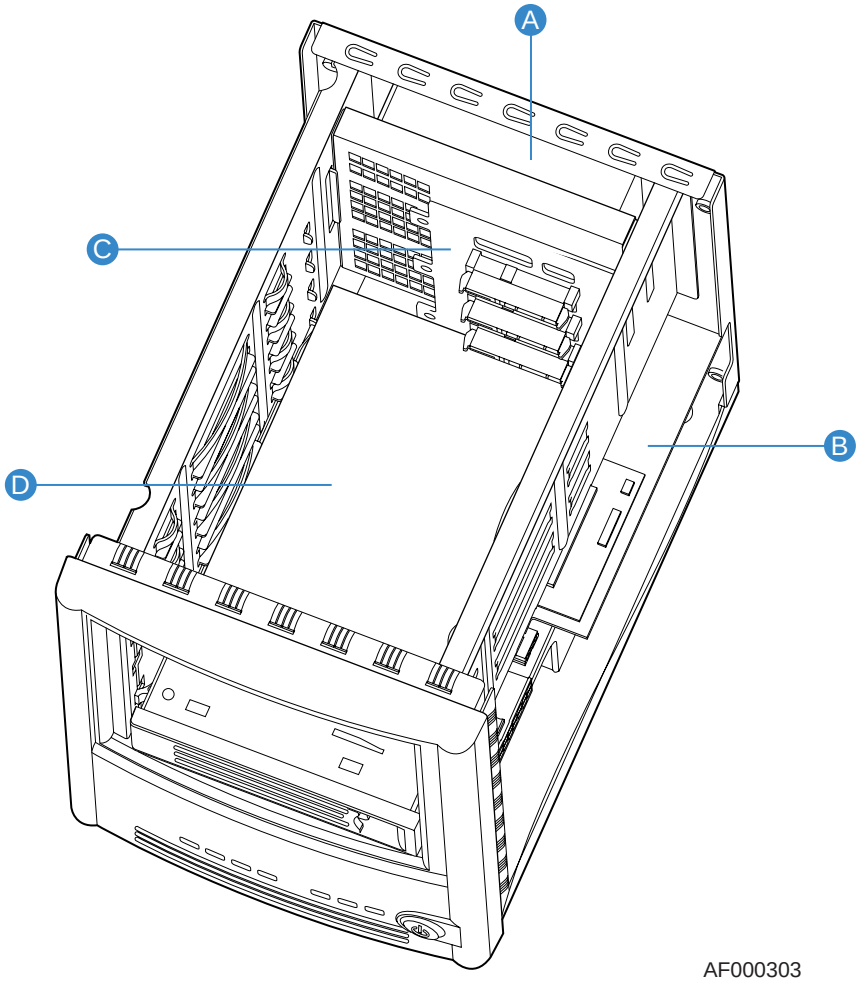
3.1 Fan Control

The fan provides optimal acoustic and thermal performance. The fan is capable of running at two speeds, low for most office environments, and high for higher temperature environments. This is controlled by two backplane mounted temperature sensors. If a sensor on the backplane is equal to or higher than 42 °C, the fan will set to high speed. The temperature reading at the backplane depends on hard disk power and loading, but will occur at the high end of the operating temperature range, somewhere around 32 °C to 35 °C. If a sensor is between 37 °C and 42 °C, the fan speed will not change. If a sensor drops below 37 °C, the fan will be set back to low speed.

If a sensor on the backplane reaches 55 °C the system will initiate a shutdown. When the system is powered back on, the system log will show the thermal shutdown event.

If the CPU temperature reaches 85 degrees C the system will initiate a shutdown. When the system is powered back on, the system log will show the thermal shutdown event.

Fan Speed	Fan Voltage	RPM
Low	~ 6.15V	~1800
High	~9.75V	~2600



A	System Chassis Fan
B	System Board
C	Backplane and connectors
D	Hard Disk Drive

Figure 13. Chassis Fan and Backplane Location

4. Chassis Bays

The Intel® Entry Storage System SS4000-E chassis provides four hard drive bays at the front of the chassis. All hard drive bays may be populated with a carrier-mounted 3.5 inch SATA hard disk drive. The latch must be open prior to inserting the drive carrier containing a disk drive. Once inserted the latch can be pushed closed to ensure the disk drive is properly connected to the backplane connector. **NOTE: For specific drive family and capacities supported, please refer to the SS4000-E Tested Hardware and OS List (THOL)**

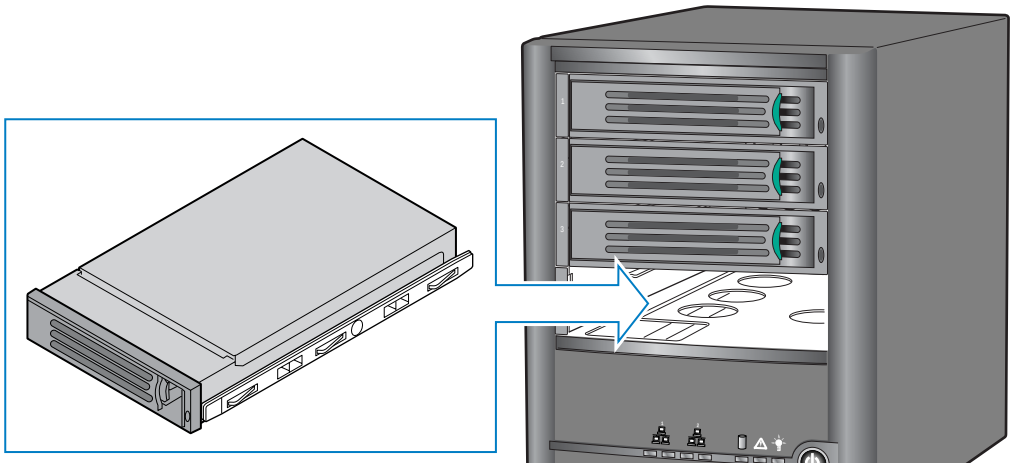


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Figure 14. Disk Drive Carrier Insertion and Removal

4.1 Hard Disk Drive Bays

The Intel® Entry Storage System SS4000-E chassis can support up to four carrier-mounted SATA, 3.5 inch x 1 inch, hard disk drives. The SATA drives may be “electrically” hot-swapped while the system power is applied, i.e., after POST (Power On Self Test). See the Intel® Entry Storage System SS4000-E User Guide for more information.

NOTE:

1) All drives must be populated in order, from top to bottom, in drive bay 1 thru drive bay 4. For example, if only 2 drives are installed, 2 drives should be inserted into bays 1 thru 2, and the remaining two drive bays left empty. When the additional two drive bays are populated they should be filled in order, i.e., bay 3 followed by bay 4.

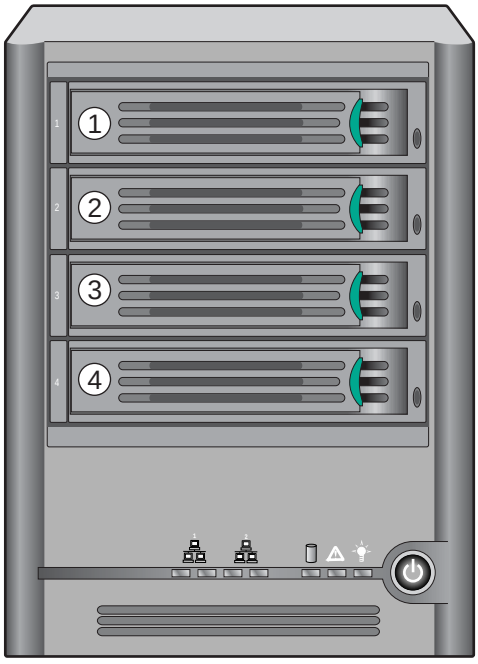


Figure 15. Drive Ordering

2) Once a particular RAID configuration is applied to the present drives, if the drives are removed from the system for any reason, they will need to be re-installed in the exact same drive bays they were removed from. Please use the HDD labels provided in your Intel® Entry Storage System SS4000-E shipping container to number the drives 1 thru 4 prior to removal.

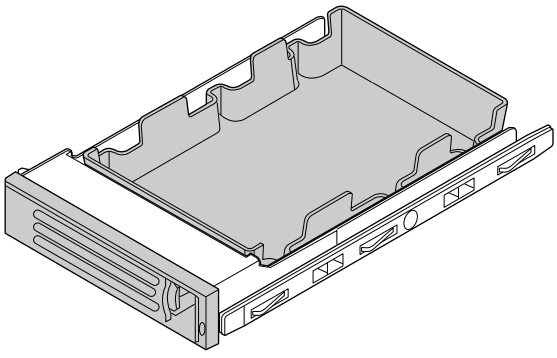
3) If a failed drive needs replacing, it should be replaced with the exact same manufacturer, model, and size.

4) For more information on configuring supported RAID levels, refer to the Intel® Storage System SS4000-E User Guide available from Intel Business Link (iBL), support.intel.com, or your Intel sales representative.

Figure 16. Hard Disk Drive Bays

4.1.1 Hard Disk Drive Carrier

Each hard drive used in the system must be mounted to a drive carrier, making insertion and extraction of the drive from the chassis very simple. Each drive tray has its own dual purpose latching mechanism that is used to both insert/extract drives from the chassis and lock the carrier in place. To remove the drive, depress the latch to remove the drive. Each drive carrier also supports a light pipe providing a drive status indicator, located on the backplane, to be viewable from the front of the chassis. See Figure 7 for location of LED light pipe on the drive carrier.



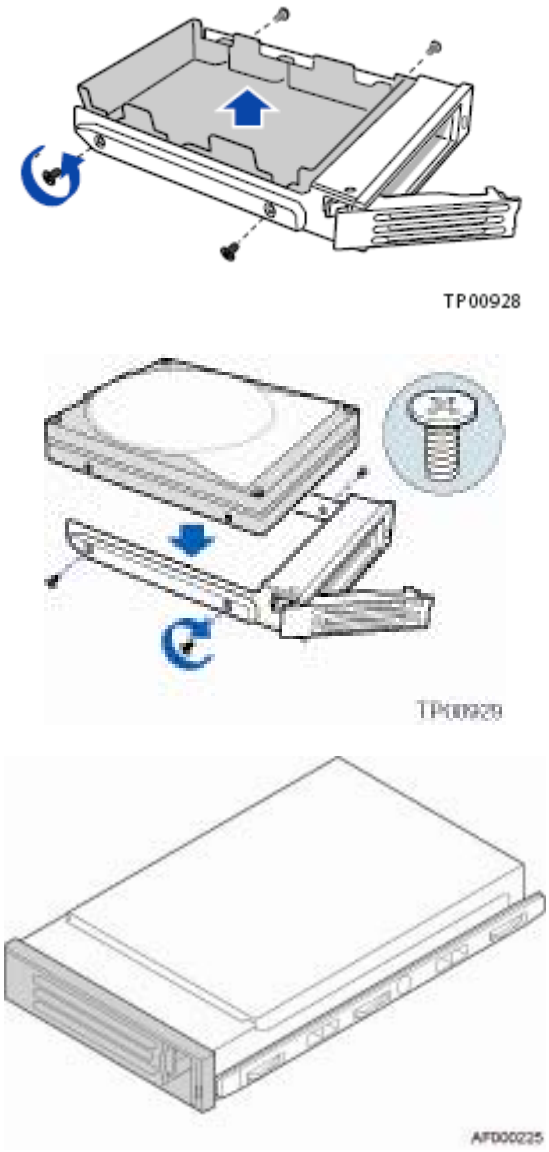


Figure 17. Hard Drive Carrier Assembly

5. System Interconnection

5.1 Chassis Internal Connectors

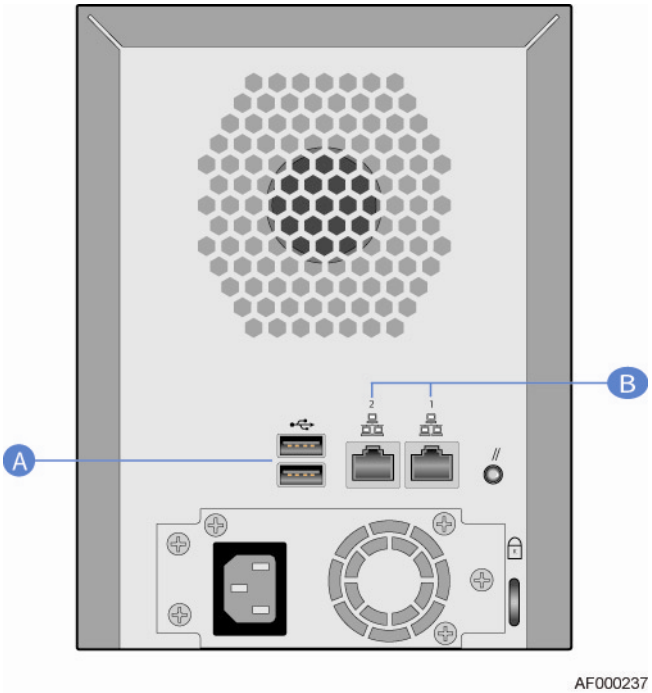
There are four Serial ATA (SATA) connectors on the backplane that the hard drives connect to. The backplane is connected to the motherboard via a PCI-Express connector that is used only as a connector for the particular signals used.

- The backplane supports the four expansion drives and provides the interconnect between the backplane and the SATA controller on the motherboard.

5.2 I/O Panel Connectors

The Intel® Entry Storage System SS4000-E provides an aperture for the rear I/O ports. The following are the I/O ports available:

- Two RJ-45 LAN connectors
- Two USB 2.0 ports



A	USB Ports
B	Ethernet Ports

Figure 18. Chassis Rear I/O Connectors

5.3 SATA HSBP Connectors

5.3.1 SATA Connector

The following table defines the pin-outs of the SATA Drive Connector. The first connector carries signals from drive 1, the second connector is connected to drive 2, the third connector connects to drive 3 and the fourth connector connects to drive 4.

Table 10. SATA Connector Pin-out

Pin	Signal Name	Pin	Signal Name
1	GND	17	GND
2	TX+	18	GND
3	TX-	19	GND
4	GND	20	+5V
5	RX-	21	+5V
6	RX+	22	+5V
7	GND	23	GND
8	+3.3V	24	GND
9	+3.3V	25	GND
10	+3.3V	26	+12V
11	GND	27	+12V

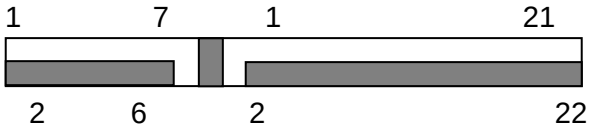


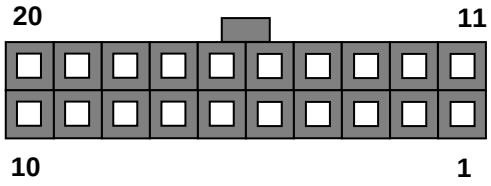
Figure 19. SATA Backplane Connector

5.3.2 Power Connector

The following table defines the pin-out of the 2x10 Power Connector.

Table 11. Power Connector Pin-out

Pin	Signal Name	Pin	Signal Name
1	+3.3V	11	+3.3V
2	+3.3V	12	-12V
3	GND	13	GND
4	+5V	14	PS-ON
5	GND	15	GND
6	+5V	16	GND
7	GND	17	GND
8	Power Good	18	-5V
9	Stand-By 5V	19	+5V
10	+12V	20	+5V



PSA1

5.3.3 Front Panel Connector

The following table defines the pin-outs of the 2x8 Front Panel connector.

Table 12. Front Panel Power Connector

Pin	Signal Name	Pin	Signal Name
1	Power LED+	2	Power LED-
3	VCC3R	4	GND
5	RAIDA	6	Status LED
7	RAIDC	8	RAIDB
9	LAN1-ACT	10	LAN1-LINK
11	LAN1-1G	12	LAN1-100M
13	LAN2-ACT	14	LAN2-LINK
15	LAN2-1G	16	LAN2-100M

6. Regulatory Information

6.1 Product Regulation Requirements

Intended Application – This product was evaluated as Information Technology Equipment (ITE), which may be installed in homes, offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as: medical, industrial, telecommunications, NEBS, residential, alarm systems, test equipment, etc.), other than an ITE application, may require further evaluation.

6.1.1 Product Safety Compliance

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)

6.1.2 Product EMC Compliance – Class B Compliance

FCC /ICES-003 - Emissions (USA/Canada)
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)

6.1.3 Certifications / Registrations / Declarations

UL Certification (US/Canada)
CE Declaration of Conformity (CENELEC Europe)
FCC/ICES-003 (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)
Ecology Declaration (International)

6.2 Product Regulatory Compliance Markings

The Intel Server Chassis product bears the following regulatory marks.

Regulatory Compliance	Country	Marking
cULus Listing Marks	USA/Canada	
GS Mark	Germany	
CE Mark	Europe	
FCC Marking (Class A)	USA	
EMC Marking (Class A)	Canada	**CANADA ICES-003 CLASS B** **CANADA NMB-003 CLASSE B**
C-Tick Mark	Australia / New Zealand	
VCCI Marking (Class A)	Japan	
BSMI Certification Number & Class A Warning	Taiwan	
GOST R Marking	Russia	
RRL MIC Mark	Korea	

6.2.1 Component Regulation Requirement Need to Support System Level Certifications

Component Power Supplies must have the following certifications:

UL, cUL
CNCA China Certification
Ctick DOC
BSMI RPC
CE DOC

CB Report (including all national deviations).

All peripheral devices, such as CD ROMS, Disk drives, Tape drives shall have the following certifications: UL or CSA NRTL, CSA or cUL, and TUV or VDE and SEMKO or NEMKO or DEMKO or FIMKO, CE, and FCC.
All Fans shall have the minimum certifications: UL and TUV or VDE
All current limiting devices shall have UL and TUV or VDE certifications and shall be suitable rated for the application where the device in its application complies with IEC60950.
All lithium batteries shall be UL recognized and battery circuits are to have suitable reverse bias current protection for the application it is used in.
All printed wiring boards shall be rated UL94V-0 and be sourced from a UL approved printed wiring board manufacturer.
All connectors shall be UL recognized and have a UL flame rating of UL94V-0.
All wiring harnesses shall be sourced from a UL approved wiring harness manufacturer. SELV Cable to be rated minimum 80 V.
All plastics used must be made of a UL recognized material, and have the appropriate flame ratings mandated by IEC60950 per system level requirements. All plastics parts shall be manufactured by an UL approved fabricator and the parts shall be marked with the appropriate UL traceability markings. Markings to include:
Plastic Fabricators name and/or UL Fabricator ID
Material Name (for example GE, C2800)
Date Code

Product safety label must be printed on UL approved label stock and printer ribbon. Alternatively labels can be purchased from a UL approved label manufacturer.
The product must be marked with the correct regulatory markings to support the certifications that are specified.
Product documentation shall incorporate all safety required information to conform to certifiers and regulators and the certifications issued for the product.

6.2.1.1 Product Ecology Requirements

All materials, parts and subassemblies must not contain restricted materials as defined in Intel's Environmental Product Content Specification of Suppliers and Outsourced Manufacturers – http://supplier.intel.com/ehs/environmental.htm.
All plastic parts shall not use brominated flame retardant or any other halogenated retardants that are not accepted by environmental programs such as Blue Angels, Nordic White Swan, and Swedish TCO.
All plastic parts that weigh >25gm shall be marked with the ISO11469 requirements for recycling. Example >PC/ABS< .
Packaging materials may not contain more than 100 ppm (total) of lead, cadmium, chromium or mercury.
If sold as a retail product, packaging materials must be marked with applicable recycling logos for Europe (green dot) and Japan (Eco-marks).
Product documentation shall incorporate all safety required information to conform to certifiers and regulators and the certifications issued for the product.
All cords and cables shall contain < 100 ppm of cadmium.

European Restriction of Hazardous Substances (RoHS)
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

7. Environmental Limits

7.1 System Office Environment

Table 13. Intel® Entry Storage System SS4000-E System Office Environment Summary

Parameter	Limits
Operating Temperature	10 degrees celcius to +35 degrees celcius with the maximum rate of change not to exceed 10 degrees celcius per hour.
Non-Operating Temperature	-40 degrees celcius to +70 degrees celcius
Non-Operating Humidity	90%, non-condensing at 35 degrees celcius
Acoustic noise	4.7 BA in an idle state at typical office ambient temperature. (23 ± degrees celcius)
Operating Shock	No errors with a half sine wave shock of 2 Giga (1.024×10^9) (G) (with 11 millisecond duration)
Package Shock	Operational after a 30 inch free fall, although cosmetic damage may be present (chassis weight 30 lbs)
Electrostatic Discharge (ESD)	±15 Kilovolt (KV) per Intel® Environmental test specification
System Cooling Requirement in British Thermal Units (BTU) per Hour	< 680 BTU/hour

7.2 System Environmental Testing

The system has been tested per the *Intel® Environmental Standards Handbook*, Intel document number 662394-06. These tests include:

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

7.3 Environmental Limits

The following table summarizes environmental limits, both operating and non-operating.

Table 14. Intel® Entry Storage System SS4000-E Operating and Non-Operating Environmental Limits

Temperature	**Specification**
Non-operating	-40 degrees celcius to 70 degrees celcius
Operating Temperature	10 degrees celcius to 35 degrees celcius
Thermal Map	Must not exceed maximum Integrated Circuit (IC) junction temperature as specified in the component data sheets (CPDs).
Thermal Shock	**Specification**
Non-operating	-40 degrees celcius to 70 degrees celcius
Humidity	**Specification**
Non-operating	90% Relative Humidity (RH) at +35 degrees celcius
Vibration	**Specification**
Non-Operating:	2.2 Grms 5-500Hz for the unpackaged and 1.09 Grms 5-500Hz for the packaged.
Shock	**Specification**
Non-operating	25 G, 11 millisecond (msec)
ESD	**Specification**
Operating	Test (air) to 15 KV and (contact) to 2-8KV with limited errors.
EMI	**Specification**
Operating	Required to meet EMI emission requirements, tested as part of system.

8. 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 TBD minutes, including diagnosis of the system problem. To meet this goal, the system enclosure and hardware have been designed to minimize the MTTR.

Below 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 with the system powered down and unplugged.

- Remove top cover 0.5 minutes (estimate)
- Remove and replace a hard disk drive 2 minutes (estimate)
- Remove and replace power supply 5 minutes (estimate)
- Remove and replace fan assembly 20 minutes (estimate)
- Remove and replace baseboard 30 minutes (estimate)

9. Calculated MTBF

The Mean Time Between Failures (MTBF) for the Intel® Entry Storage System SS4000-E is calculated at 27,248 hours operating at 40 degrees C. The following table shows the MTBF numbers for individual components within the chassis, and does not include hard disk drives.

Table 15. Intel® Entry Storage System SS4000-E Component MTBF Numbers

Subassembly (System in 40 °C ambient air)	MTBF (hours)
System Board (D40818-201)	66,250
200 W Power Supply	102,997
Hot Swap SATA Backplane (D40817-201)	1,214,078
DC Fan (C76538-001)	185,347
Front Panel Ops board	7.792.428
Memory	180,205

Appendix A: Spares and Accessories

Upgrade and Accessory Parts

Table 16. Intel® Entry Storage System SS4000-E Upgrade and Accessory Parts

Product Code	MM #	Qty.	Description
FXX10DVCARBLK	880265	1	Drive Carrier Spare – 10 Pack
FXXSS4000ECFAN	879284	1	Fan
FXXSS4000EPS	879285	1	200 Watt Power Supply

Glossary

Word / Acronym	Definition
A	Ampere
AC	Alternating Current
ACA	Australian Communication Authority
ACPI	Advanced Configuration and Power Interface
ANSI	American National Standards Institute
ATA	AT Attachment
BA	Decibel Average
BMC	Baseboard Management Controller
BTU	British Thermal Units
C	Celsius
CF	Compact Flash®
CMOS	Complementary Metal Oxide Silicon
CPD	Component Data Sheet
D2D	DC-to-DC
dBA	Decibel Average
DDR	Double Data Rate
DIMM	Dual Inline Memory Module
DMA	Direct Memory Access
DOM	Disk On Module
ECC	Error Correcting Code
EEB	Entry-Level Electronics Bay
EEPROM	Electrical Erasable Programmable Read-Only Memory
EMC	Electro Magnetic Compatibility
EMP	Emergency Management Port
ESD	Electrostatic Discharge
FC	Fibre Channel
FP	Front Panel
FRB	Fault Resilient Boot
FRU	Field Replaceable Unit
FW	Firmware
FWH	Firmware Hub
G	Giga (1.024×10^9)
GB	Gigabyte
Gb/s	Gigabits per Second
GHz	Gigahertz
HBA	Host Bus Adapter
HDD	Hard Disk Drive
HSBP	Hot Swap Backplane
Hz	Hertz
IBL	Intel Business Link

IC	Integrated Circuit
ICH	I/O Controller Hub
IDC	Internet Database Connector
IDE	Integrated Drive Electronics
IMM	Intel® Management Module
I/O	Input/Output
iSCSI	Internet Protocol Small Computer System Interface
ITE	Information Technology Equipment
K	Kilo (1.024×10^3)
KB	Kilobyte
KV	Kilovolt
KHz	Kilohertz
LAN	Local Area Network
LED	Light-Emitting Diode
LPC	Low-Pin Count
MB	Megabyte
Mb/s	Megabits per second
MCH	Memory Controller Hub
MHz	Megahertz
mm	Millimeter
msec	Millisecond
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
NIC	Network Interface Card
OTP	Over-Temperature Protection
OVP	Over-Voltage Protection
PCI	Peripheral Component Interconnect
PDB	Power Distribution Board
PFC	Power Factor Correction
PIO	Programmed Input/Output
PLD	Programmable Logic Device
PSON	Power Supply On
PSU	Power Supply Unit
PWT	Processor Wind Tunnel
RAID	Redundant Array of Inexpensive Disks
RH	Relative Humidity
RI	Ring Indicate
SAN	Storage Area Network
SATA	Serial AT Attachment (aka., Serial ATA)
SCA	Single Connector Attachment
SCC	Storage Control Console
SDR	Sensor Data Record
SDRAM	Synchronous Dynamic Random Access Memory
SE	Single-Ended
SMBIOS	System Management Basic Input/Output System

SOIC	Small Outline Integrated Circuit
SRAM	Static Random Access Memory
SSI	Server System Infrastructure
TQFP	Thin Quad Flat Pack
TB	Terabyte
UART	Universal Asynchronous Receiver Transmitter
μF	Micro Farad (1×10^{-6} Farads)
μS	Micro Second (1×10^{-6} Second)
USB	Universal Serial Bus
V	Volt
VA	Volt-Amp
VCCI	Voluntary Control Council for Interference
VQFP	Very Thin Quad Flat Pack
VRM	Voltage Regulator Module
W	Watt