Intel® Storage System SSR212CC

Technical Product Specification

Revision 1.2

Storage Group Technical Marketing

Revision History

Date	Revision Number	Modifications
May 16, 2006	1.0	Release copy.
July 11, 2006	1.1	Added RoHS statement, section 6.2.
December 06, 2007	1.2	DDR2 pin number correction

Disclaimers

Information in this document is provided in connection with Intel® products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life saving, or life sustaining applications. Intel may make changes to specifications and product descriptions at any time, without notice.

Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them.

The Intel® Storage System SSR212CC 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.

Intel, Pentium, Itanium, and Xeon are trademarks or registered trademarks of Intel Corporation.

*Other brands and names may be claimed as the property of others.

Copyright © Intel Corporation 2003 - 2006.

Table of Contents

List of Figures

List of Tables

This page intentionally left blank

1.   Feature Summary

This Technical Product Specification provides detailed information about the hardware components of the Intel® Storage System SSR212CC.

The Intel® Storage System SSR212CC includes a 2U chassis, Intel® Server Board SE7520JR2 with a single Low Voltage Intel® Xeon® processor, an Intel® Management Module (IMM), twelve Serial ATA hard disk drive carriers, two Intel® RAID Controller SRCS28X's, dual Intel® PRO/1000 Network connections, and a single 500 W power supply (dual redundant 1+1 capable). Intel®-based system boards and chassis have feature sets designed to support the high-density storage market.

Figure 1. Intel® Storage System SSR212CC

Intel® Storage System SSR212CC Hardware Feature Summary

Storage Capacity	Expandable to 3.0 TB – using twelve 250 GB drives. Expandable to 4.8 TB – using twelve 400 GB drives. Expandable to 6.0 TB – using twelve 500 GB drives.
Drive Bays	12 Serial ATA (SATA) Hot Pluggable.
Hard Disk Drive Supported	3.5 inch SATA I & SATA II. **NOTE: For specific drive family and capacities supported, please refer to the SSR212CC Tested Hardware and OS List (THOL).**
Processor	A single Low Voltage Intel® Xeon® processor 2.8 GHz with 800 MHz system bus and 1MB L2 cache.
Memory Capacity	Expandable to 12 GB maximum, using DDR2-400 memory.
Memory Type	Synchronous Dynamic Random Access Memory (SDRAM), DDR2-400, Registered, ECC.
DIMM Slots	Six 240-pin DIMM sockets.
Enclosure Controller	On-board Vitesse* VSC055 micro-controller.
Temperature Sensor	Two temperature sensors are located on the backplane that allows drive cage temperature monitoring by enclosure management.
SATA Compliance	SATA 1.5, 3.0.
Connectivity	Internet Protocol Small Computer System Interface (iSCSI) or Microsoft* Windows* Common Internet File System (CIFS), via Dual GB Ethernet.
Front Panel	
LEDs	3x: Fault, ID, Power.
Hard Disk Drive Carrier	
LEDs	2x: Activity, Fault.
Back Panel	
Buttons and Switches	Power button, Reset button.
I/O Connectors	1x RJ-45 COMB Serial port, 2x RJ-45 Ethernet ports, 1x DB-15 Video connector, 1x 2.0 USB port, 1x Stacked PS/2 Mouse/Keyboard connector.
Power Receptacle	1x IEC AC per installed power supply module.
Chassis	
Form Factor	2U rack-mount chassis
Height	86.7 mm, 3.41 in
Width	447 mm, 17.6 in
Depth	631 mm, 24.8 in
Weight	As shipped (zero drives): approximately 19.1 kg, 42 pounds Fully configured (twelve drives): approximately 30.4 kg, 67 pounds Shipping container: 3.2 kg, 7 pounds
Color	Black
Rack Support	Rail mount, compatible with four-post rack mount only, and compliant to the SSI Server Rack specification and EIA 310-D.

System Cooling	
Fans	Chassis includes three dual rotor and two single rotor 40 mm hot-swappable redundant system fans for cooling the hard drives, baseboard and SATA Host Bus Adapter (HBA) cards. The Power supply enclosure contains one 60mm fan.
Power	
Configuration	500 W continuous, 1+1 redundant power supplies. Intel Storage System SSR212CC ships with one 500W power supply
Max AC input current (PS Module)	7.2 Amperes at 110 Vrms, 3.5 A at 220 Vrms (each power supply module)
Max +3.3 V output (PS Enclosure)	20.0 A (total combined power for the+ 3.3 V and +5 V outputs should not exceed 120 W).
Max +5 V output (PS Enclosure)	20.0 A (total combined power for the+ 3.3 V and +5 V outputs should not exceed 120 W).
Max +12 V output1 current (PS Module)	18.0 A (total combined power for the +12 V outputs should not exceed 360 W).
Max +12 V output2 current (PS Module)	18.0 A (total combined power for the +12 V outputs should not exceed 360 W).
Max +12 V output3 current (PS Module)	18.0 A (total combined power for the +12 V outputs should not exceed 360 W).
Max -12 V output current (PS Module)	0.5 A (each power supply module)
Max +5V Standby output current (PS Module)	2.0 A (each power supply module)
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% @ 35 degrees Celsius non-condensing
Acoustics	< 7.0 BA (rack-mount) in an idle state in an normal office environment (23 degrees Celsius)
Electrostatic Discharge	15 KV per Intel test specification
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 A) (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.
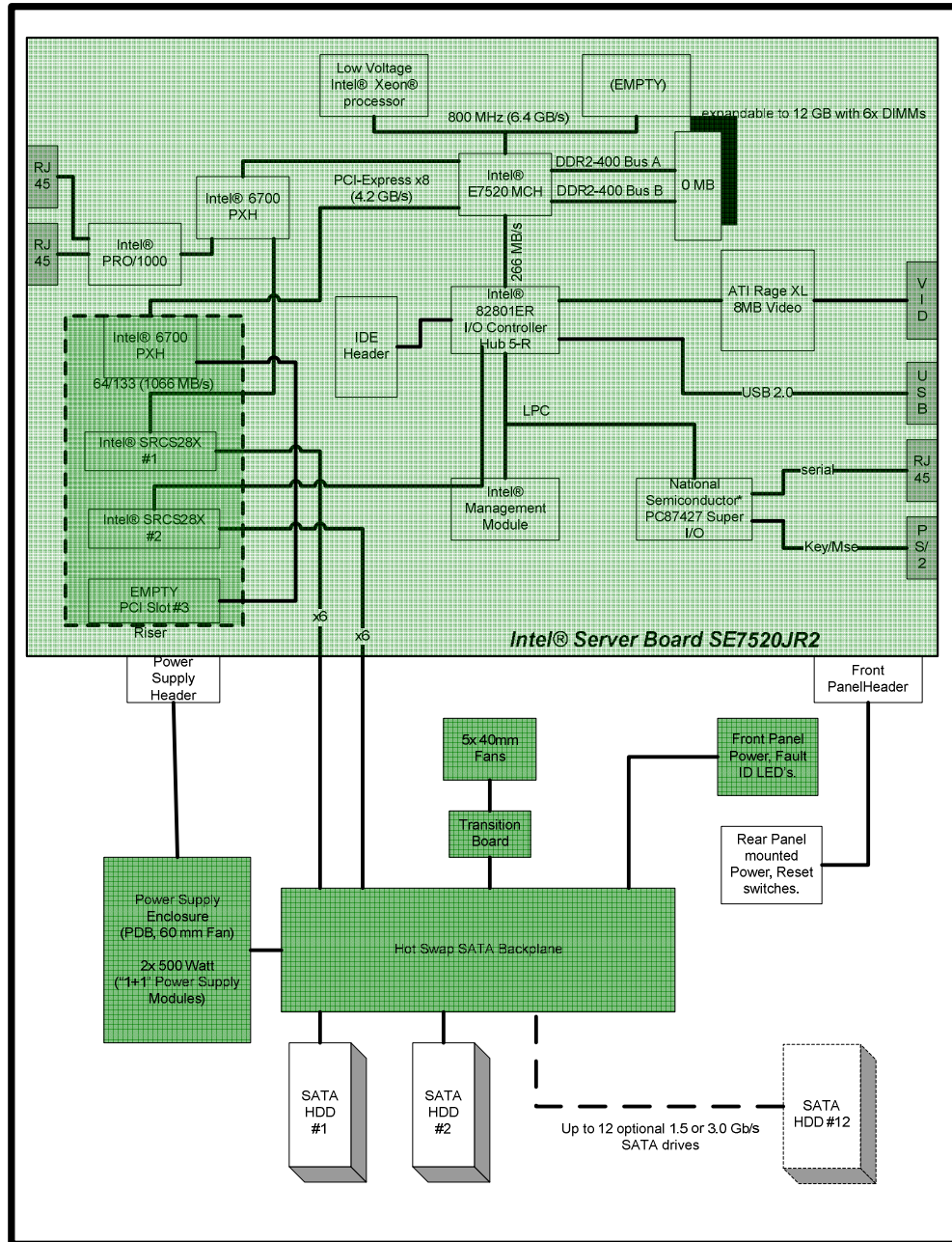
Figure 2. Intel® Storage System SSR212CC Block Diagram

The components included with this storage system are diagrammed below.
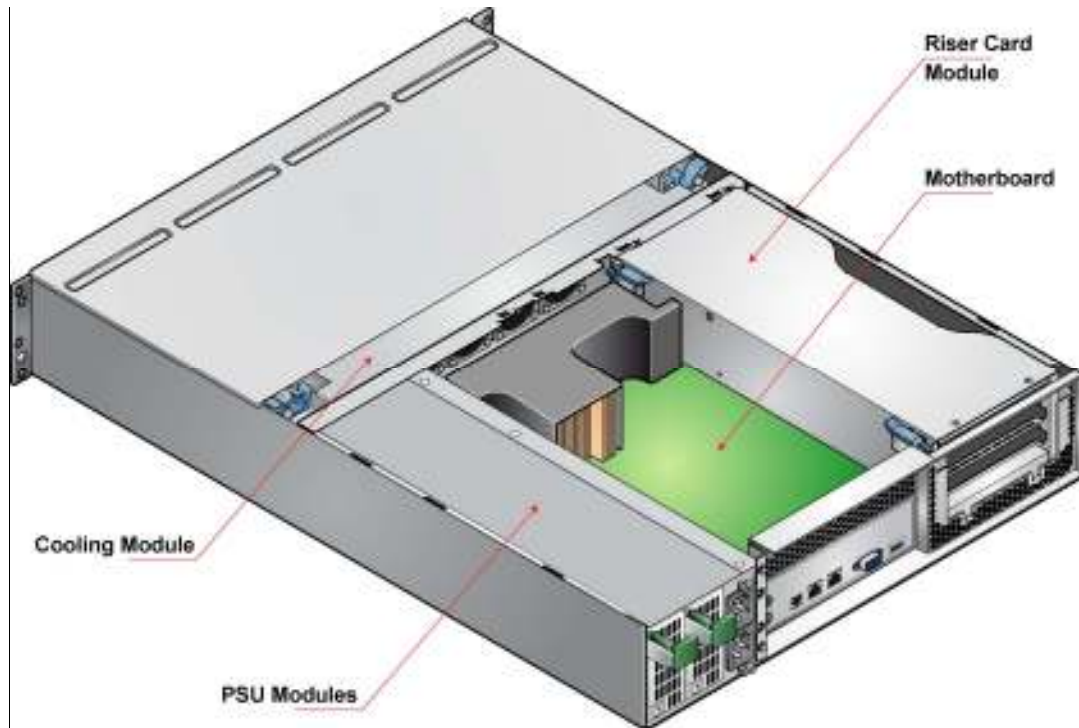
Figure 3. System Components

1.2 System Board Feature Set

The Intel® Server Board SE7520JR2 provides the following feature set, as implemented in the Intel Storage System SSR212CC:

Feature	Description
Processors	Dual 604-pin Socket Support for FC-mPGA2P Low Voltage Intel® Xeon® processors with 800 MHz systen bus speed. **NOTE: Intel® Storage System SSR212CC only supports a single Low Voltage Intel® Xeon® processor 2.8 GHz with 800 MHz system bus and 1MB L2 cache.**
Memory	▪ Six 240-pin DDR2-400 SDRAM Dual Inline Memory Module (DIMM) sockets ▪ Support for up to 12 GB Registered Error Correcting Code (ECC) system memory , using DDR2-400 DIMMs. ▪ Support for single-sided or double-sided DIMMs (DDR2-400) _table below_
Chipset	Intel® E7520 chipset, consisting of: ▪ Intel® E7520 Memory Controller Hub (MCH) ▪ Intel® 6700 PCI-X Controller Hub (PXH) ▪ Intel® ICH5-R I/O Controller Hub (ICH) ▪ Intel® 8 Mb (1 MB) Firmware Hub (FWH)

SDRAM Parts/SDRAM Technology used	_128Mb_	_256Mb_	_512Mb_	_1Gb_
X8 single row	128MB	256MB	512MB	1GB
X8 double row	256MB	512MB	1GB	2GB
X4 single row	256MB	512MB	1GB	2GB
X4 stacked double row	512MB	1GB	2GB	

Feature	Description

Peripheral Interfaces	Four separate and independent PCI buses using Intel® Adaptive Slot Technology for high throughput of data via an active 2U riser board:
	
	• Segment 1 (from baseboard): 64-bit, 133 MHz, 3.3 V, supporting the following configuration:
	   o One 64-bit/133 MHz PCI-X component
	     ▪ Intel® 82546GB Dual 10/100/1000
	
	• Segment 2 (from baseboard): 64-bit, 133 MHz, 3.3 V, Full-length PCI supporting the following configuration:
	   o One riser slot 64-bit/133 MHz PCI-X
	     ▪ Slot 1 SATA HBA #1.
	
	• Segment 3 (from riser): 64-bit, 133 MHz, 3.3 V, Full-length PCI supporting the following configuration:
	   o one slot: 64-bit/133 MHz PCI-X
	     ▪ Slot 2 SATA HBA #2.
	
	• Segment 4 (from riser): 64-bit, 133 MHz, 3.3 V, Full-length PCI supporting the following configuration:
	   o one slot: 64-bit/133 MHz PCI-X
	     ▪ Slot 3 used for expanded connectivity.
	
	▪ One RJ-45 serial port.
	▪ IDE interface for optional Disk On Module (DOM) support.

LAN	Intel® 82546GB Dual 10/100/1000 Megabits per second (Mb/s) Ethernet Local Area Network (LAN) Controller. Can be configured for failover or port aggregation.
Fans	Support for four system fans (not implemented on SSR212CC).
BIOS	AMI* BIOS with support for: ▪ Advanced Configuration and Power Interface (ACPI) ▪ 8 megabit symmetrical flash memory ▪ Support for System Management Basic Input/Output System (SMBIOS)
SSI interface support	Server System Infrastructure (SSI)-compliant connectors for SSI interface support: front panel, power connector (not implemented on Intel® Storage System SSR212CC).

Please refer to the Intel® Server Board SE7520JR2 Technical Product Specification available at http://support.intel.com for more information on the Storage System SSR212CC's server board.

1.3   Serial ATA (SATA) Host Bus Adapter

The Intel® Storage System SSR212CC ships with two 8 port PCI-X to SATA Host Bus Adapters (HBA). Each SATA HBA board provides the following feature set:

Feature	Description
Number of ports	8, using a single Marvell* 88SX6081 controller **NOTE: Only 6 of the 8 ports are utilized per HBA on the Intel® Storage System SSR212CC.**
Serial ATA Bus Speed	1.5 and 3.0 Gb/s
Serial ATA Data Transfer rate	150 MB/s and 300 MB/s
PCI Bus width and speed	64-bit, 133 MHz
PCI Data transfer rate	1066 MB/s
RAID Levels	0, 1, 5, 10, 50
SDRAM Support	128 MB ECC DDR333 SDRAM
Cache function	Write-back, Write-through, Adaptive Read Ahead, Non-Read Ahead, Read Ahead, Cache I/O, Direct I/O
Hot Spare Pool	Yes
Hot Swap	Yes
Enclosure Management Support	Yes
Basic Input-Output (BIOS) RAID Management Tools	Yes, via BIOS RAID Management Tools
RAID Management Tools	Yes, via Intel® Storage Control Console (SCC)
Battery Back Up option	Yes, with 72 hour minimum hold up time

Please refer to the Intel® RAID Controller SRCS28X Hardware Users Guide available at http://support.intel.com 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 12 drives.	Slots provided for docking up to twelve 1.5 or 3.0 Gigabits per second (Gb/s) Serial ATA hot swap hard drives
Enclosure Management Controller	• On-board Vitesse* VSC055 micro-controller with 256Kbit external SRAM memory2 SATA Host Controller I^{2}C Interfaces • SATA and SATA-II extension compatibility • Hot swap support for up to 12 SATA Drives
FRU/Configuration SEEPROM	A Vitesse* VSC055* provides a serial EEPROM memory for storage of configuration and product FRU information.

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, Activity.
	• Amber LED –
	   o ON, drive fault.

Audible Alarm	A piezo-electric buzzer on the backplane provides an audible alarm (disabled on the Intel® Storage System SSR212CC).

The following figure shows the functional blocks of the SATA Hot Swap Backplane.
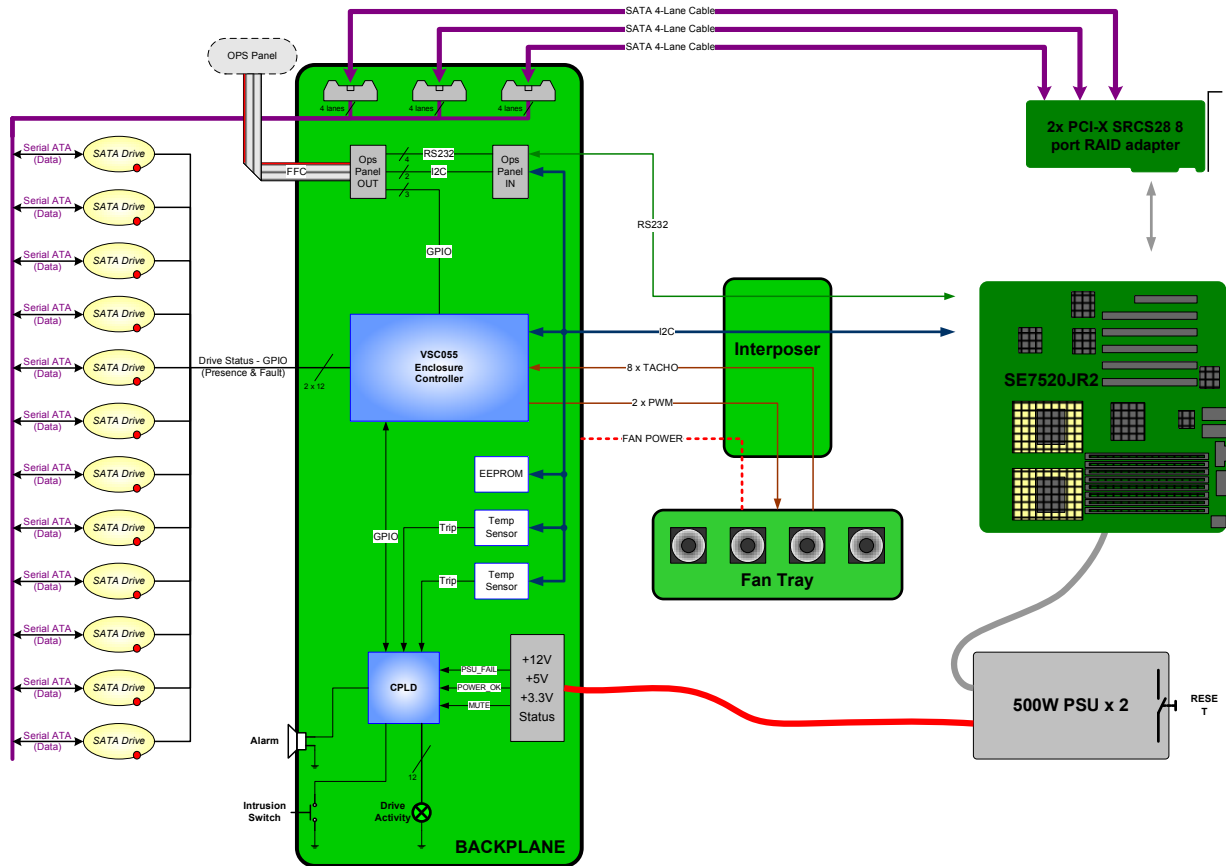
Figure 4. SATA HSBP Block Diagram

1.5   Enclosure Management

The enclosure management controller monitors various aspects of a storage enclosure.

Note: Enclosure Management Software is available from Intel for the Red Hat* Enterprise Linux* AS 4, update 2 operating system. Intel® Server Management Software is also available for Microsoft* Windows* Storage Server 2003 R2 and Microsoft* Windows* Server 2003 Enterprise Edition SP1 operating systems. However, limited enclosure management (no hard disk drive, fan or power supply monitoring) is provided via Intel® Server Management software on the Intel Storage Server SSR212CC.

The enclosure management controller is comprised of the following elements and supports associated features:

- Vitesse* VSC055 (Enhanced Two-Wire Serial controller)
  - o Drive fault LED
  - o Drive presence detection
  - o I^2C link to Intel® Server Board SE7520JR2
  - o 8× fan speed (tacho) input
  - o 2× PWM output
  - o 3 I/O signals to operator panel capable of driving LED's
- CPLD (Altera* EPM3128ATC100-10)
  - o Alarm output
  - o Alarm event monitor (enclosure, disk drive and PSU status)
  - o Cooling module fault LED mounted to rear of backplane
  - o Software override capability through I^2C

1.5.1   Fan Control

- PWM high-side drive configuration
- Fan tach filtering
- Protective diodes on all hot-swappable signal lines

1.5.2   Miscellaneous Functions

- I^2C EEPROM for FRU data

1.5.3 I^2C Serial Bus Interface

The enclosure management controller supports four independent I^2C interface ports with bus speeds of up to 400 Kb/s.

The figure below provides a block diagram of I^2C bus connection implemented on the Storage System SSR212CC SATA Hot Swap Backplane (HSBP).
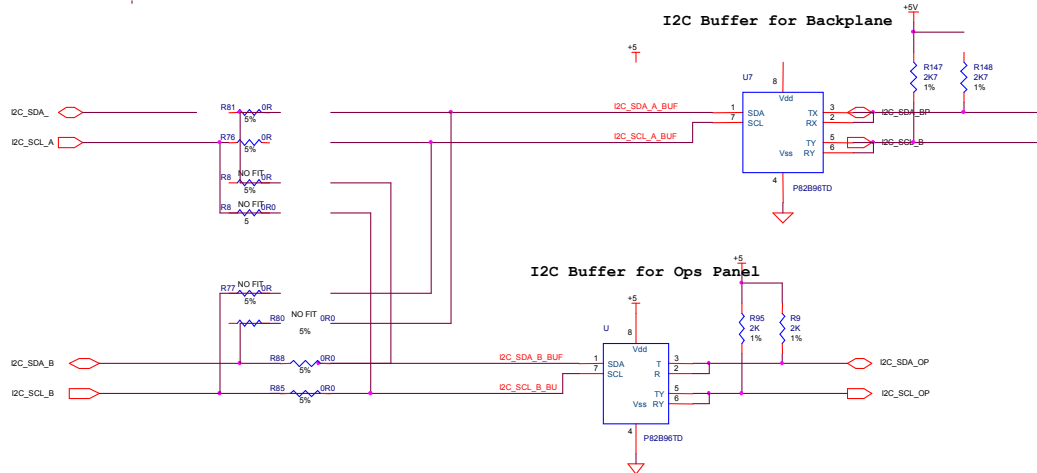
Figure 5. SATA HSBP I^{2}C Bus Connection Diagram

1.5.4   Hard Disk Drive LEDs

The Intel® Storage System SSR212CC SATA HSBP contains two LEDs for each of the twelve drive slots.

Table 1. HDD LED Function

Activity Light States	
Drive Status	**LED**
Idle	Both Off
Access in Progress	Green Blinking
Fault	Amber On

1.6   Chassis Dimensions and Weight

Table 2. Chassis Dimensions and Weight

Height	86.7 mm	3.41 inches
Width	447 mm	17.6 inches
Depth	631 mm	24.8 inches
Weight		
Chassis - as shipped (0 drives)	19.1 kilogram	42 pounds
Chassis - fully configured (12 drives)	30.4 kilogram	67 pounds
Shipping container	3.2 kilogram	7 pounds

1.7   Back Panel I/O Ports and Features

At the rear of the chassis is a serial management port and two 10/100/1000 Network Interface Card (NIC) connectors. The Input/Output (I/O) connectors are integrated to the back panel. The figure below shows the rear of the storage system.
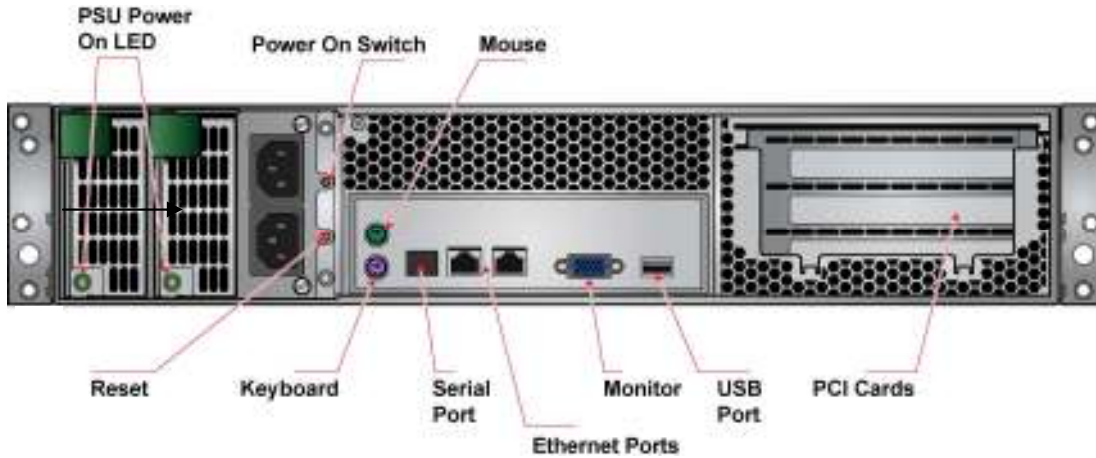
Figure 6. Chassis Rear

1.8   Front Panel and HDD Bays

Figure 7. Chassis Front and Rear

1.8.1   Front/Rear Panel Controls and Indicators

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

Table 3. Rear Control Button Functions

Power button	Toggles the system power on/off.
Reset button	Reboots the system.

Table 4. Front LED Indicator Status

Power On	Continuous green light indicates the system has power applied to it.
	No light indicates the system does not have power applied to it (other than 5 V standby power).
Fault	Continuous amber light indicates fault present.
Enclosure ID	The blue system identification LED is used to help identify a system for servicing. This is especially useful when the system is installed within a high density rack or cabinet that is populated with several similar systems.
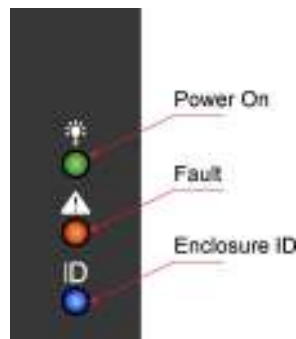
Figure 8. Front Panel

1.9   Fan Monitoring

The fans provided in the Storage System SSR212CC contain a tachometer signal that can be monitored by enclosure management software.

1.10 Rack and Cabinet Mounting Options

The chassis was designed to support cabinets that are 19 in (483 mm) wide by up to 36 in (914 mm) deep, and are compliant to the SSI Server Rack specification and EIA 310-D. A set of Rack Mounting Rails are provided and will accommodate either square or round hole rack mounting methods.

When mounting the system into a 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 of the cabinet. This allows the weight of the system to be as evenly distributed as possible.

Latch
(both sides)

(Left hand assembly shown
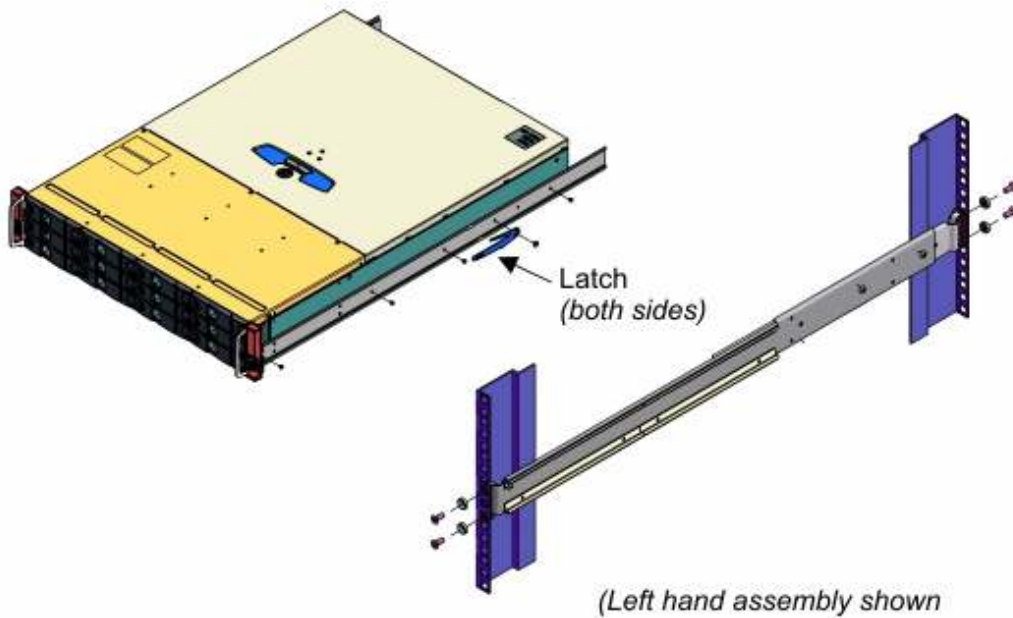
Figure 9. Rack Mounting

2.   Power Sub-System

This section provides an overview of the Storage System SSR212CC power supply sub-system; the *power supply enclosure* and the *power supply module*. **NOTE: The Storage System SSR212CC ships with one 500 Watt power supply module.**

2.1   Power Supply Enclosure

The Storage System SSR212CC accommodates one or two 500 Watt (W) redundant power supply modules.

PARAMETER	MIN	RATED	MAX	Max Input Current
Voltage (low-line)	90 V_{rms}	100-127 V_{rms}	140 V_{rms}	7.2 A_{rms}
Voltage (high-line)	180 V_{rms}	200-240 V_{rms}	264 V_{rms}	3.5 A_{rms}
Frequency	47 Hz		63 Hz	

The system can operate with one failed module without loss of performance until the failed module is replaced. The modules can be replaced without powering down or disturbing system operation. The power supply is designed to minimize EMI.
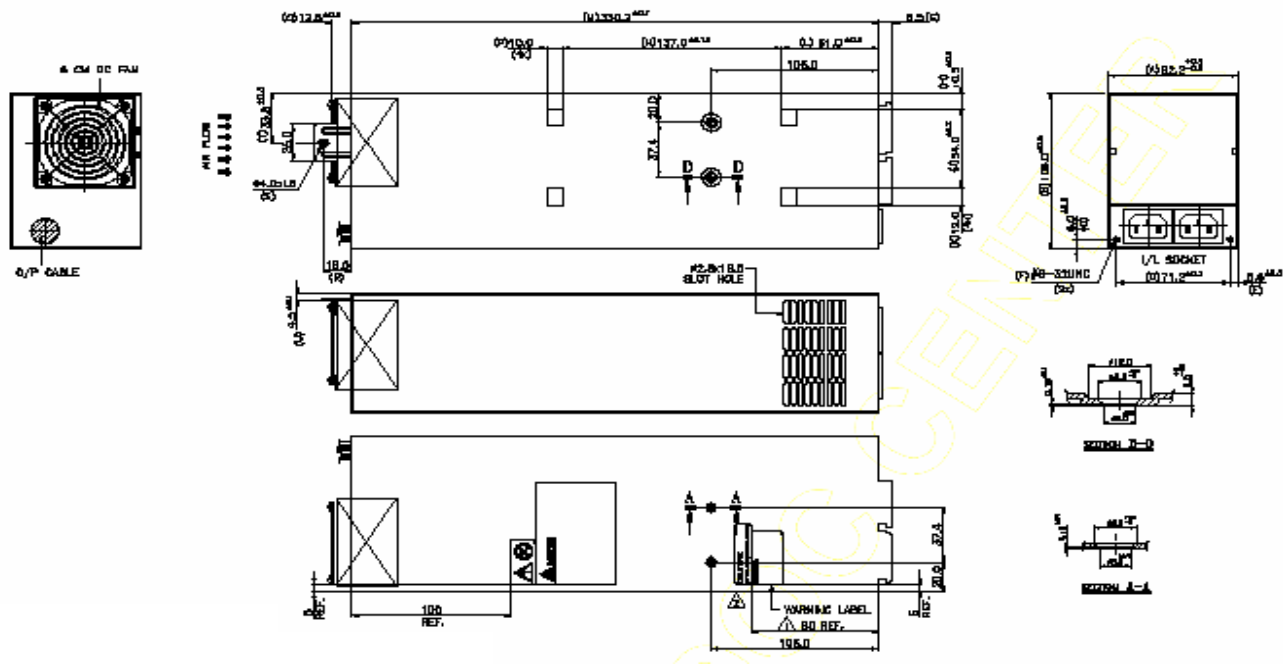
Figure 10. Power Supply Enclosure

2.1.1   Hot Swapping Power Modules

The Storage System SSR212CC power supply assembly is capable of supporting hot swapping of power supply modules in a 1+1 configuration.

2.1.2   Power Supply Outputs

The Storage System SSR212CC power system supports one or two 500 W Power Supply module's in a 1+1 redundant configuration. The power supply module provides five DC output rails; +12V1, +12V2, +12V3, -12V, +5VSB, while the Power Supply Enclosure provides two DC output rails: +3.3V and +5V.

Table 5. Enclosure & Module Output Summary (500W 10 second peak ratings)

+3.3V	+5V	+12V1	+12V2	+12V3	-12V	5VSB
20A	20A	18A	18A	18A	0.5A	2.5A

NOTE: The total combined power for +3.3V & +5V should not exceed 120W. The total combined power for +12V, -12V, 5VSB should not exceed 360W.

The module provides a handle to assist in insertion and extraction and can be inserted and extracted without the assistance of tools.

2.1.2.1   Power Supply LED Indicator

The power supply module provides a single external bi-color LED to indicate the status of the power supply. When AC is applied to the Power Supply Unit (PSU) and standby voltages are available, the LED will blink green. The LED will be solid on green to indicate that all the power outputs are available. The LED will be solid on amber to indicate that the power supply has failed, shutdown due to over current, shutdown due to over temperature, or is indicating a predictive failure. Refer to the following table for conditions of the LED.

Table 6. LED Indicators

POWER SUPPLY CONDITION	Power Supply LED
No AC power to all PSU	OFF
No AC power to this PSU only	AMBER
AC present / Only Standby Outputs On	BLINK GREEN
Power supply Direct Current (DC) outputs ON and OK	GREEN
Power supply failure (includes over voltage, over temperature)	AMBER
Voltage Regulator Module (VRM) failure (cage related)	BLINK GREEN
240VA limit (cage related)	BLINK GREEN
Current limit	AMBER

2.2   Output Power/Currents

The following table defines power and current ratings for this 500 Watt continuous (606 Watts peak) power supply in 1+0 or 1+1 redundant configuration. The combined output power of both outputs shall not exceed the rated output power. The power supply must meet both static and dynamic voltage regulation requirements for the minimum loading conditions. Also, the power supply shall be able to supply the listed peak currents and power for a minimum of 10 seconds. Outputs are not required to be peak loaded simultaneously.

Table 7. Load Ratings

	+3.3V	+5V	+12V1	+12V2	+12V3	-12V	5VSB
MAX	20A	20A	18A	18A	18A	0.5A	2.0A
MIN STATIC	0.5A	0.5A	1.5A	1.5A	0.5A	0A	0A
MIN DYNAMIC	2A	2A	1.5A	1.5A	1.5A	0A	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 360W.

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 return remote sense signal (ReturnS).

Table 8. Voltage Regulation Limits

PARAMETER	MIN	NOM	MAX	UNITS	TOLERANCE
+3.3V	+3.25	+3.30	+3.35	V_{rms}	+1.5/-1.5%
+5V	+4.90	+5.00	+5.10	V_{rms}	+2/-2%
+12V1	+11.76	+12.00	+12.24	V_{rms}	+2/-2%
+12V2	+11.76	+12.00	+12.24	V_{rms}	+2/-2%
+12V3	+11.76	+12.00	+12.24	V_{rms}	+2/-2%
-12V	-11.40	-12.20	-13.08	V_{rms}	+9/-5%
+5VSB	+4.85	+5.00	+5.20	V_{rms}	+4/-3%

2.3.1   Dynamic Loading

The output voltages shall remain within limits specified in Table 9 for the step loading and capacitive loading specified in Table 10, below. The load transient repetition rate shall be tested between 50 Hz and 5 KHz at duty cycles ranging from 10%-90%. The load transient repetition rate is only a test specification. The Δ step load may occur anywhere within the MIN load to the MAX load shown in Table 10.

Table 9. Transient Load Requirements

Output	Δ Step Load Size	Load Slew Rate	Capacitive Load
+3.3V	6A	0.5 A/μsec	5,600 μF
+5V	6A	0.5 A/μsec	1,000 μF
+12V1	13A	0.5 A/μsec	1,000 μF
+12V2	5A	0.5 A/μsec	1,000 μF
+12V3	5A	0.5 A/μsec	1,000 μF
+5VSB	1A	0.5 A/μsec	0 μF

2.4   Capacitive Loading

The power supply shall be stable and meet all requirements with the following capacitive loading ranges. Min capacitive loading applies to static load only.

Table 10. Capacitive Loading Conditions

Output	Minimum Turn-on Capacitance	Maximum Dynamic Capacitance	Units
+3.3V	10	68,000	μF
+5V	10	24,000	μF
+12V1	10	11,000	μF
+12V2	10	11,000	μF
+12V3	10	11,000	μF
-12V	1	350	μF
+5VSB	1	350	μF

2.5   Protection Circuits

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

2.5.1   Over-Current Protection (OCP)

The power supply shall have current limit to prevent the +12 V and 5Vsb outputs from exceeding the values shown below. If the current limits are exceeded the power supply shall shutdown and latch off. The latch will be cleared by toggling the PSON# signal or by an AC power interruption. The power supply shall not be damaged from repeated power cycling in this

condition.   5Vsb shall be protected under over-current or shorted conditions, so that no damage can occur to the power supply.

Table 11. Over Current Protection Limits

VOLTAGE	OVER CURRENT LIMIT (Iout limit)
+3.3V	<30A
+5V	<30A
+12V1	18.2A
+12V2	18.2A
+12V3	18.2A
-12V	Short Circuit
5VSB	Short Circuit

2.5.2   Over Voltage Protection (OVP)

The power supply over voltage protection shall be locally sensed. The power supply shall shutdown and latch off after an over voltage condition occurs. This latch shall be cleared by toggling the PSON[#] signal or by an AC power interruption. 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 fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector.

Table 12. Over Voltage Protection (OVP) Limits

Output Voltage	MIN (V)	MAX (V)
+3.3V	3.8	4.3
+5V	5.7	6.5
+12V1	13.5	15.0
+12V2	13.5	15.0
+12V3	13.5	15.0
-12V	-13.3	-14.5
+5VSB	5.7	6.5

2.5.3   Over Temperature Protection (OTP)

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shutdown. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically. The OTP circuit must have built in hysteresis such that the power supply will not oscillate on and off due to temperature recovering condition. The power supply shall alert the system of the OTP condition via the power supply FAIL signal and the amber LED.

3.   System Cooling Module

The Storage System SSR212CC includes a cooling module that has three dual rotor 40 mm fans and two single rotor 40 mm fans, mounted in a common frame for ease of maintenance. The fans are mounted in a single fan tray located in the center of the chassis. The Power Supply enclosure contains one 60 mm fan for cooling the power supply modules.

3.1   Fan Control

Each fan within the module is capable of supporting multiple speeds. At normal room ambient of 23 degrees Celsius (C), the fans will run at slow speed for best acoustic performance. If the external temperature of the system increases, the backplane fan control circuitry will increase fan speed to compensate for the increased ambient.
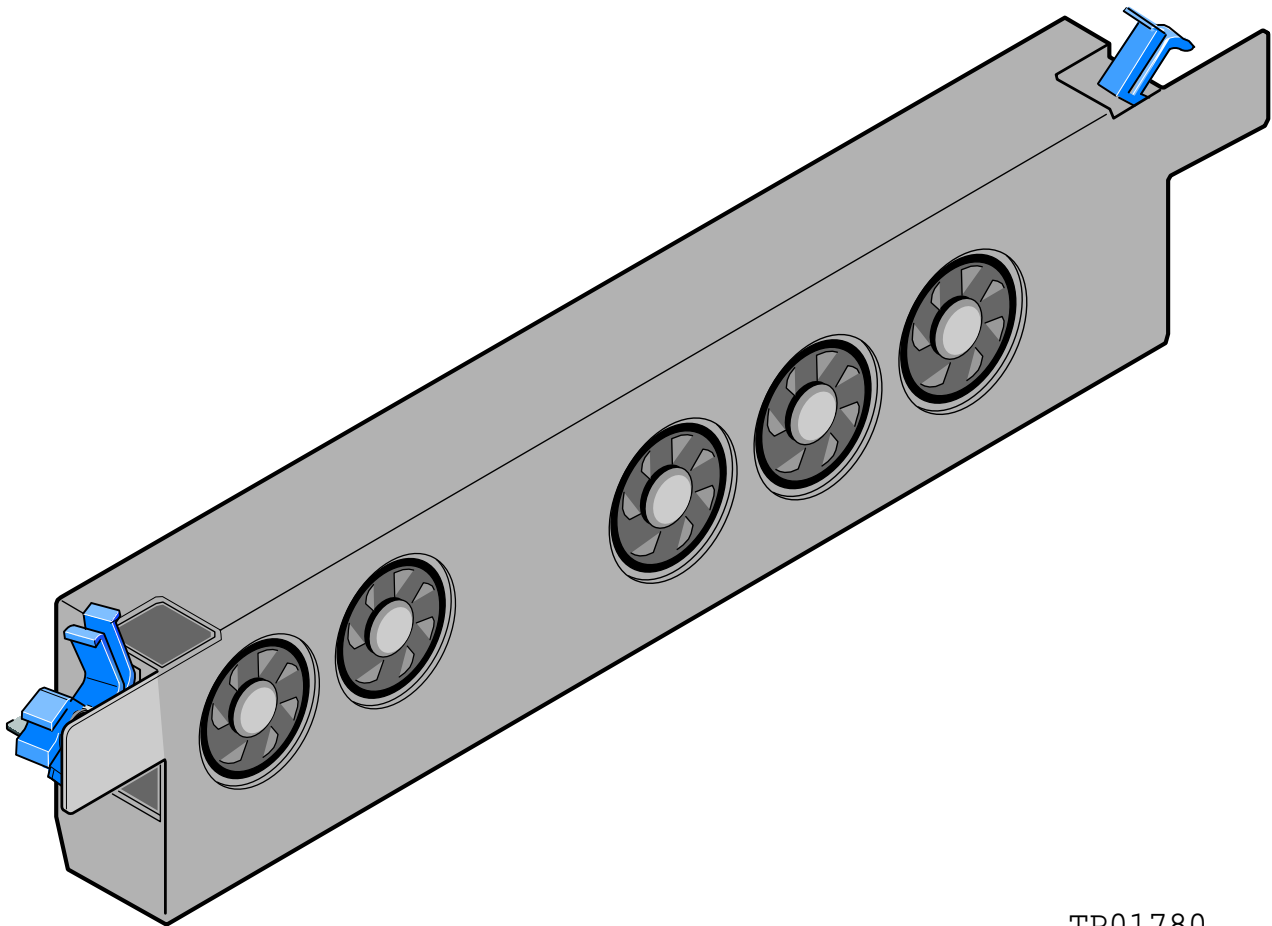
TP01780

Figure 11. Cooling Module

4.   Chassis Bays

The Storage System SSR212CC chassis provides twelve 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.
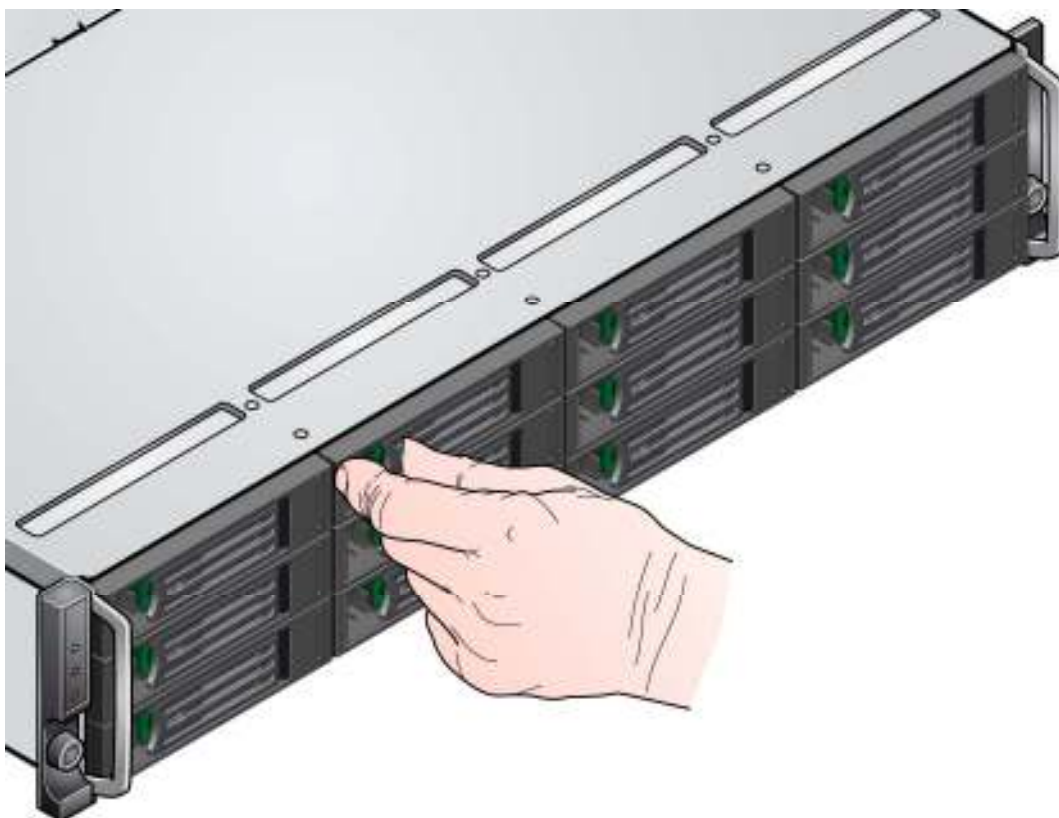
Figure 12. Drive Bay Removal

4.1 Hard Disk Drive Bays

The Storage System SSR212CC chassis can support up to twelve 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., before or during POST.

NOTE:

1) Drive bays 1 thru 6 are controlled by a single Intel® RAID Controller SRCS28X, while drive bays 7 thru 12 are controlled by a second Intel® RAID Controller SRCS28X.

2) To correspond with cable connection across both SRCS28X SATA HBAs, all drives must be populated in order, from left to right, top to bottom, in drive bay 1 thru drive bay 12, sequentially distributed across both SRCS28X SATA HBA's. For example, if only 8 drives are installed, 6 drives should be inserted into bays 1 thru 6, and two drives inserted into bays 7 and 8.

1	2	3	4
5	6	7	8
9	10	11	12

3) HDD labels are provided in your Storage System SSR212CC shipping container to number the drives 1 thru 12.

4) If a failed drive needs replacing, it should be replaced with the exact same manufacturer, model, and size.
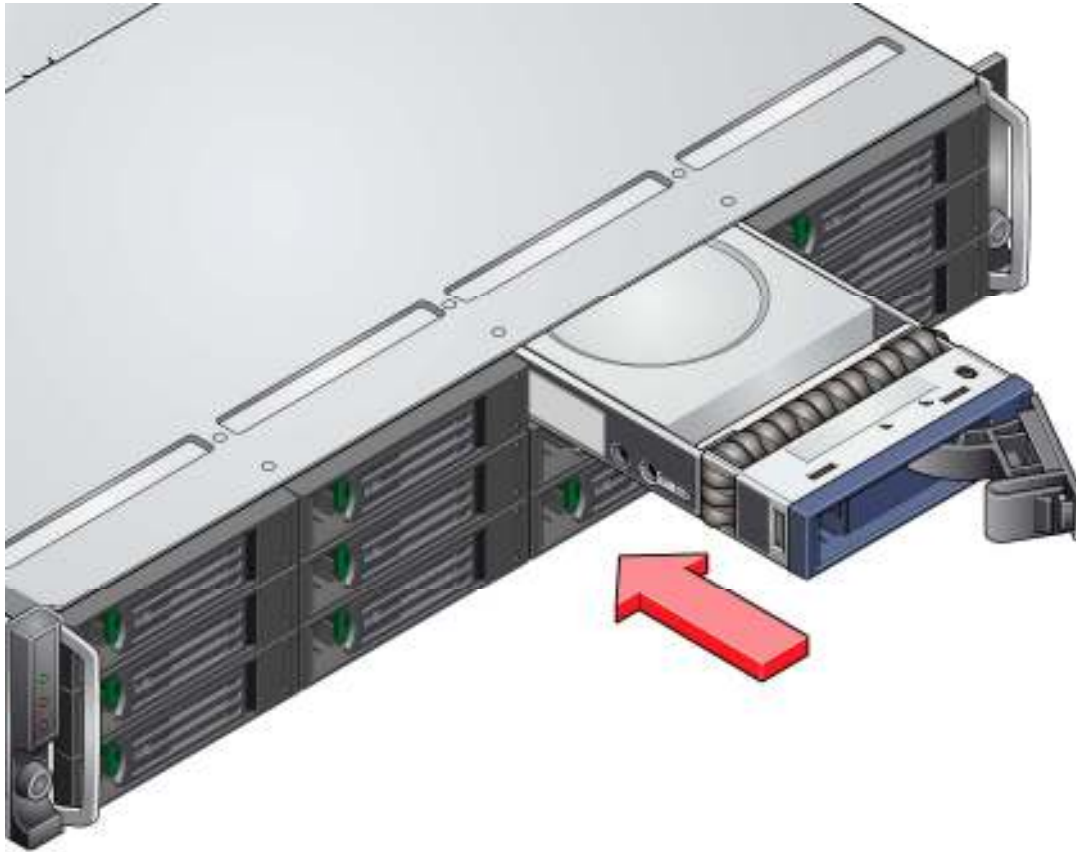
Figure 13. Hard Disk Drive Bays

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, and also has a safety locking mechanism to aid in the prevention of accidental removal of a drive. After the drive is inserted and latched, the locking feature is enabled by rotating the locking mechanism using the provided Torx* or "star" bit tool, such that the latch can not be depressed to remove the drive. To remove the drive, turn the locking mechanism until the latch can be depressed 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.

Figure 14. Hard Drive Carrier Assembly

5. System Interconnection

5.1 Chassis Internal Cables and Connector

The following cables and connectors are provided:

- Three SFF-8484 vertical four lane Serial ATA (SATA) cables ship with the Storage System SSR212CC. These cables support the twelve expansion drives and provide interconnect between the backplane and the two SATA HBA's.

5.2 I/O Panel Connectors

The Storage System SSR212CC provides an aperture for the rear I/O ports. The following are the I/O ports available:

- Two RJ-45 LAN connectors
- One RJ-45 Serial B Port
- One Stacked PS2 port for keyboard & mouse
- One DB15 video connector
- One USB 2.0 port

5.3   SATA HSBP Connectors

5.3.1   SATA 4-Lane Connector

The following table defines the pin-outs of the three SATA 4-Lane Drive Connectors. The first connector carries signals from drive 1 to 4, the second connector is connected to drives 5 to 8 and the third connector connects to drives 9 to 12.

Table 13. SATA 4-Lane Connector Pin-out

Pin	Signal Name	Pin	Signal Name
1	GND	17	HBA_ACT7
2	DRIVE4_PORT3	18	NC.
3	DRIVE4_PORT2	19	NC.
4	GND	20	GND
5	DRIVE4_PORT1	21	DRIVE6_PORT3
6	DRIVE4_PORT0	22	DRIVE6_PORT2
7	GND	23	GND
8	DRIVE5_PORT3	24	DRIVE6_PORT1
9	DRIVE5_PORT2	25	DRIVE6_PORT0
10	GND	26	GND
11	DRIVE5_PORT1	27	DRIVE7_PORT3
12	DRIVE5_PORT0	28	DRIVE7_PORT2
13	GND	29	GND
14	HBA_ACT4	30	DRIVE7_PORT1
15	HBA_ACT5	31	DRIVE7_PORT0
16	HBA_ACT6	32	GND
16	HBA_ACT2	32	GND

5.3.2   Interposer Connector

The following table defines the pin-outs of the Interposer Connector.

Table 14. Interposer Connector

Pin	Signal Name	Pin	Signal Name
1	POWER_SWITCH	2	GND
3	GND	4	GND
5	FAN_PWR_BANK2	6	GND
7	FAN_PWR_BANK2	8	GND
9	FAN_PWR_BANK2	10	GND
11	I2C_SCL_A	12	FAN_TACHO0
13	I2C_SDA_A	14	FAN_TACHO1
15	I2C_SCL_B	16	FAN_TACHO2
17	I2C_SDA_B	18	FAN_TACHO3
19	COM_TX	20	FAN_TACHO4
21	COM_CTS	22	FAN_TACHO5
23	COM_RX	24	FAN_TACHO6
25	COM_RTS	26	FAN_TACHO7
27	FAN_PWR_BANK1	28	GND
29	FAN_PWR_BANK1	30	GND
31	FAN_PWR_BANK1	32	GND
33	GND	34	GND
35	GND	36	GND

5.3.3   Power Connector

The following table defines the pin-outs of the 2x12 Power Connectors.

Table 15. Power Connector Pin-out

Pin	Signal Name	Pin	Signal Name
1	+12V	13	GND
2	+12V	14	GND
3	+12V	15	GND
4	+12V	16	GND
5	+12V	17	GND
6	+5V	18	GND
7	+5V	19	GND
8	+5V	20	GND
9	+3.3V	21	GND
10	+3.3V	22	GND
11	MUTE_L	23	PSU_FAIL_L
12	POWER_SWITCH	24	PSU_POK

5.3.4   Front Panel Connector

The following table defines the pin-outs of the 1x14 Front Panel connector.

Table 16. Front Panel Power Connector

Pin	Signal Name
1	GND
2	COM_CTS
3	COM_RX
4	COM_TX
5	COM_RTS
6	GND
7	+5V_OPS
8	+5V_OPS
9	I2C_SDA_OPS
10	I2C_SCL_OPS
11	LED1_OPS/SPARE1 (power)
12	LED2_OPS/SPARE2 (fault)
13	LED3_OPS/SPARE3 (ID)
14	GND

5.3.5   SATA Host I^{2}C Header

The following table defines the pin-outs of the two 3-pin SATA Host I^{2}C Headers.

Table 17. SATA Host I^{2}C Header Pin-out

Pin	Signal Name
1	I2C_SCL_A
2	GND
3	I2C_SDA_A
Pin	Signal Name
1	I2C_SCL_B
2	GND
3	I2C_SDA_B

6.   Regulatory Information

6.1 Product Regulation Requirements

 Intended Application – This product was evaluated as Information Technology Equipment (ITE), which may be installed in 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)
GB4943- CNCA Certification (China)

6.1.2 Product EMC Compliance – Class A Compliance

Note: <u>Legally</u> the product is required to comply with Class A emission requirements as it is intended for a commercial type market place. Intel targets 10db margin to Class A Limits

FCC /ICES-003 - Emissions (USA/Canada) Verification
CISPR 22 – Emissions (International)
EN55022 - Emissions (Europe)
EN55024 - Immunity (Europe)
EN61000-3-2 - Harmonics (Europe)
EN61000-3-3 - Voltage Flicker (Europe)
CE – EMC Directive 89/336/EEC (Europe)
VCCI Emissions (Japan)
AS/NZS 3548 Emissions (Australia / New Zealand)
BSMI CNS13438 Emissions (Taiwan)
GOST R 29216-91 Emissions (Russia)
GOST R 50628-95 Immunity (Russia)
Belarus License (Belarus)
Ukraine License (Ukraine)
RRL MIC Notice No. 1997-41 (EMC) & 1997-42 (EMI) (Korea)
GB 9254 - CNCA Certification (China)
GB 17625 - (Harmonics) CNCA Certification (China)

6.1.3 Certifications / Registrations / Declarations

UL Certification (US/Canada)
CE Declaration of Conformity (CENELEC Europe)
FCC/ICES-003 Class A Attestation (USA/Canada)
VCCI Certification (Japan)
C-Tick Declaration of Conformity (Australia)
MED Declaration of Conformity (New Zealand)
BSMI Certification (Taiwan)
GOST R Certification / License (Russia)
Belarus Certification / License (Belarus)
RRL Certification (Korea)
IRAM Certification (Argentina)
Ecology Declaration (International)
GB4943- CNCA Certification (China)

6.1.4 Component Regulation Requirement Need to Support System Level Certifications

Component Power Supplies must have the following certifications:

    UL, cUL
    German Bauart
    CNCA China Certification
    Ctick DOC
    BSMI DOC
    RRL License
    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.

6.1.5 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.

6.2 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.

X   Quantity limit of 0.1% by mass (1000 PPM) for:

    o   Lead

    o   Mercury

    o   Hexavalent Chromium

    o   Polybrominated Biphenyls Diphenyl Ethers (PBDE)

X   Quantity limit of 0.01% by mass (100 PPM) for:

    o   Cadmium

7.   Environmental Limits

7.1   System Office Environment

Table 18. Intel® Storage System SSR212CC 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	95%, non-condensing at 35 degrees celcius
Acoustic noise	7.0 BA (Rackmount) 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	2275 BTU/hour

7.2   System Environmental Testing

The system has been tested per the *Intel® Environmental Standards Handbook*, Intel document number 662394-03. 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 19. Intel® Storage System SSR212CC 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	92% Relative Humidity (RH) at +50 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
- Remove and replace a hard disk drive   0.5 minutes
- Remove and replace power supply   0.5 minutes
- Remove and replace fan assembly   1 minute
- Remove and replace SATA add-in cards   5 minutes
- Remove and replace baseboard   10 minutes

9. Calculated MTBF

The Mean Time Between Failures (MTBF) for the Storage System SSR212CC is calculated at 27,196 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 20. Intel® Storage System SSR212CC Component MTBF Numbers

Subassembly (System in 40 °C ambient air)	MTBF (hours)
System Board (SE7520JR2)	215,000
500 W Power Supply	126,710
Hot Swap SATA Backplane	1,126,100
Fan Tray & Interposer	35,143,386
Fans (5x)	236,340
Front Panel Ops board	53,037,303
SRCS28X SATA Eight Channel RAID adapter	470,000
Battery Backup Unit for SRCS28X SATA Eight Channel RAID adapter	1,800,000

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 x 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 x 10^{-6} Farads)
μS	Micro Second (1 x 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