Installation Guide

3ware®9750 SATA+SAS RAID Controller Card

Version 10.0
Supports 9750-4I and 9750-8I Models

PN: 45412-00, Rev. A
November 2009

Document Description

Document 45412-00, Rev. A, November 2009.
This document will remain the official reference source for all revisions and releases of this product until rescinded by an update.

Disclaimer

It is the policy of LSI Corporation to improve products as new technology, components, software, and firmware become available. LSI reserves the right to make changes to any products herein at any time without notice. All features, functions, and operations described herein may not be marketed by LSI in all parts of the world. In some instances, photographs and figures are of equipment prototypes. Therefore, before using this document, consult your LSI representative for information that is applicable and current. LSI DOES NOT ASSUME ANY RESPONSIBILITY OR LIABILITY FOR THE USE OF ANY PRODUCTS DESCRIBED HEREIN EXCEPT AS EXPRESSLY AGREED TO IN WRITING BY LSI.

LSI products are not intended for use in life-support appliances, devices, or systems. Use of any LSI product in such applications without written consent of the appropriate LSI officer is prohibited.

Proprietary Rights Notice

This document contains proprietary information of LSI Corporation. The information contained herein is not to be used by or disclosed to third parties without the express written permission of an officer of LSI.

License Restriction

The purchase or use of an LSI Corporation product does not convey a license under any patent, copyright, trademark, or other intellectual property right of LSI or third parties.

Copyright Notice

Trademark Acknowledgments

LSI, the LSI logo design, 3ware®, StorSwitch®, and 3DM® are all registered trademarks of LSI Corporation. The StorSave and StreamFusion are all trademarks of LSI. Linux® is a registered trademark of Linus Torvalds in the United States, other countries, or both. Windows® is a registered trademark of Microsoft Corporation in the United States and other countries. SUSE® is a registered trademark of Novell, Inc. Firefox® is a registered trademark of the Mozilla Foundation. Red Hat® is a registered trademark of Red Hat, Inc. PCI Express® is a registered trademark of PCI-SIG®. Safari® is a registered trademark of Apple Inc., registered in the U.S. and other countries. All other brand and product names may be trademarks of their respective companies.

Table of Contents

About this Guide

Congratulations on your purchase of the 3ware® 9750 SATA+SAS Raid Controller Card. This guide tells you how to install it.

Chapter	Description
1 Getting Started	Overview of the 3ware SATA+SAS controller card and important safety factors to keep in mind during installation.
2 Installing the 9750 SATA+SAS Controller Card	How to install the 3ware 9750 SATA+SAS controller card.
3 9750 Controller Card Specifications	Specifications for the 9750 controller card.

The following additional documentation is available for your 3ware SATA+SAS RAID controller card on the CD that came with your controller. It is also available through the LSI Download Center at http://www.lsi.com/channel/ChannelDownloads.

- *3ware SATA+SAS RAID Controller Card Software User Guide, Version 10.0*
- *3ware SATA+SAS RAID Controller Card CLI Guide, Version 10.0*

The 3ware HTML Bookshelf is an HTML version of the Software User Guide and the CLI Guide, combined as one resource. It is only available on your 3ware CD, in the /doc/3wareHTMLBookshelf folder.

Online help is also available when you are using 3DM®2 (3ware Disk Manager).

Additional support information is available in the LSI Knowledge Base (eSupport), at https://selfservice.lsi.com/service/main.jsp.

Chapter 1. Getting Started

The 3ware® 9750 SATA+SAS RAID controller card provides these features:

- Support for up to 96 SAS and/or SATA devices
- RAID 6 with simultaneous parity generation to maximize performance.
- 8th-generation StorSwitch® switch fabric for maximum controller output.
- StreamFusion™ optimization of RAID 5 and RAID 6 disk accesses to maximize application performance under heavy loads.
- StorSave™ Battery Backup Unit (BBU) with write journaling to optimize data protection and performance (BBU must be purchased separately, see Note on page 9).
- RAID levels 0, 1, 5, 6, 10, 50, and Single Disk
- Up to 6 Gbps per port data transfer rates
- Support for 3 Gbps and 6 Gbps, SATA and SAS, Hard Disk Drive (HDD) and Solid State Disk (SSD) technologies.
- Onboard ECC DDRII SDRAM

Contents of this Package

If you purchased a full retail kit with cables, the following items are included:

- One of the following 3ware 9750 SATA+SAS RAID controller cards:
  - 9750-4I (one internal 4x wide port)
  - 9750-8I (two internal 4x wide ports)

- This document, *3ware 9750 SATA+SAS RAID Controller Card Installation Guide*
- 3ware CD-ROM with driver, software, and additional documentation
- Appropriate cables for your 3ware 9750 models.
  - Model 9750-4I: (one internal 4 lane SATA+SAS cable)
  - Model 9750-8I: (two internal 4 lane SATA+SAS cables)

9750 Controller Card Models

Figure 1. Layout of the 4-Port 3ware 9750-4I SATA+SAS RAID Controller Card

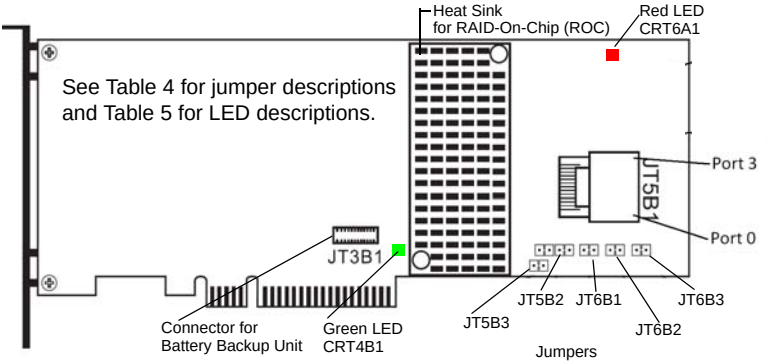
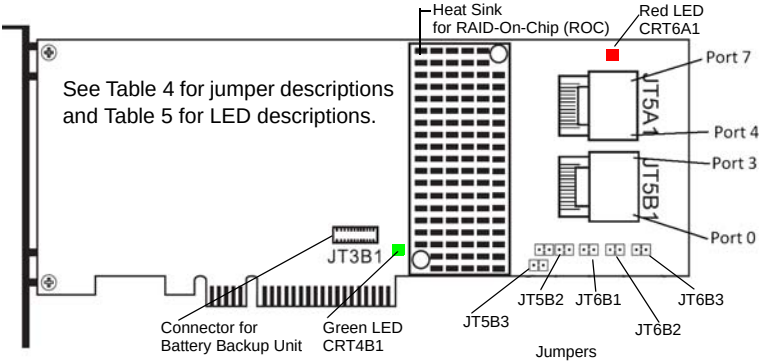


Figure 2. Layout of the 8-Port 3ware 9750-8I SATA+SAS RAID Controller Card



Cables

Important: You should only use LSI 3ware certified cables with your LSI 3ware RAID controller. Using an incorrect cable can result in drives that are not detected. The appropriate cables are included with your controller. If you must replace a cable, see the list of available cables and associated part numbers at http://www.lsi.com/channel/products/raid_controllers/accessories/cables.

Internal SFF-8087 cable

Use with the internal connectors of the 9750-8I or 9750-4I 3ware RAID controller.

Figure 3. Typical Internal SFF-8087 Cable

System Requirements

Motherboard and Slot Requirements

A workstation-class or server-class motherboard with an x8 or x16 lane PCI-Express Gen 2.0 or 1.0 slot. For a list of supported systems, access the LSI website at http://www.lsi.com/channel/support/marketing_resources, through the Data & Interoperability tab.

Enclosure Requirements

In order to attach more than four drives per connector, enclosures with expanders are required.

In order to use enclosure support services, such as locating a drive by blinking an LED or notification of a rebuild, the enclosure needs to support SES (SCSI Enclosure Services). For a list of supported chassis and enclosures, access the LSI website at: http:/ www.lsi.com/channel/support/marketing_resources, through the Data & Interoperability tab.

Internal backplane connector: Internal SFF-8087 connector

Drive Requirements

SAS and/or SATA drives can be used with the 3ware 9750 RAID controller.

SATA drives must meet SATA-2 (3.0 Gbps) standards and/or SATA-3 (6.0 Gbps) standards and also be included on the list of supported drives on the interoperability list.

SAS drives must meet SAS (3.0 Gbps and 6.0 Gbps) standards and also be included on the list of supported drives on the interoperability list.

For a list of supported drives, access the LSI website at http://www.lsi.com/channel/support/marketing_resources, through the Data & Interoperability tab.

Operating System Requirements

3ware 9750 RAID controller may be used with the following operating systems for Intel and AMD 32-bit and 64-bit x86 based motherboards:

- Microsoft Windows Server 2003 (SP-2) and 2008
- Microsoft Windows Vista and Windows 7
- Red Hat Enterprise Linux
- openSUSE Linux

- SUSE Linux Enterprise Server
- Fedora Core Linux
- Other Linux distributions based on open source Linux 2.6 kernel.

For the latest supported operating systems, see the current Release Notes at http://www.lsi.com/channel/ChannelDownloads, and the file versions.txt, available on the 3ware release CD.

Other Requirements

- Adequate air flow and cooling
- Adequate power supply for drives
- 3DM 2 (3ware Disk Manager 2), a browser-based application used to configure and maintain RAID units, is compatibile with (but not required) one of the following browsers:
  - Internet Explorer 5.5 and later
  - Mozilla Firefox 1.2 and later
  - Safari

  In addition:
  - JavaScript must be enabled
  - Cookies must be enabled

For best viewing, screen resolution should be 1024 x 768 or greater, with 16-bit color or greater.

Safety Information

To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read this information and observe all warnings and precautions in this guide before installing or maintaining your computer.

The 3ware 9750 RAID controller card should be installed by technically qualified persons. If you are uncomfortable opening a computer system and conforming to standard ESD (electrostatic

discharge) practices, you should have a computer technician perform the installation.

Site Selection

The product is designed to operate as a component to a computer system. The environment that is provided for the system must be:

- Clean, dry, and free of airborne particles (other than normal room dust).
- Well-ventilated and away from sources of heat including direct sunlight and radiators.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- Provided with a properly grounded wall outlet.
- Provided a product main power disconnect or sufficient space to access the power supply cord(s), because they serve as the product's main power disconnect.

Warning. We recommend you plug your system into a surge suppressor or UPS (uninterruptible power supply) and during an electrical storm, we recommend disconnecting all phone, network, and power cables.

Personal Safety When Installing the 9750 Card in Your Computer

Warning! High voltages may be found inside computer equipment.
Before installing any of the hardware in this package or removing the protective covers of any computer equipment, turn off power switches and disconnect power cords. Do not reconnect the power cords until the hardware is installed and the system cover is closed.

Protecting Equipment and Data

Heat Sink Warning. Do not replace the factory-installed heat sink shipped with the 3ware 9750 SATA+SAS controller cards. Replacing the heat sink will alter thermal characteristics and cooling requirements and may cause the controller to fail. Replacing the factory-installed heat sink will void the warranty.

Back up your data! Creating or deleting disk arrays destroys existing files on the member drives. If your drives contain valuable data, back them up and save the data elsewhere before attaching the drives to the controller.

ESD (Electrostatic Discharge) Precautions

To avoid damaging computer components and accessories when installing or removing the 3ware RAID controller card, follow standard electrostatic discharge (ESD) precautions:

- When your computer case is open and its internal parts are exposed, do not touch any internal part unnecessarily.
- Always wear a grounded strap or work on an ESD-protective mat.
- Do not remove the 3ware SATA+SAS controller card from its protective bag until you are properly grounded.
- Handle the 3ware RAID controller card by its edges or by the metal bracket.
- Do not touch any pin, contact, lead or component on the 3ware RAID controller card.

Installation Considerations

Air Flow, Cable Length, and Routing Space

Adequate airflow and ventilation are particularly important for 3ware 9750 RAID controller card. The on-board heat sink collects heat, and must have adequate airflow in order to disburse it. It is important that the cables do not obstruct the air flow or prevent proper ventilation of the system.

Warning. Do not operate the 9750 controller card with system cover removed, as this may disrupt proper airflow.

Selecting the Slot in Which to Install the Controller

Consider these factors when deciding on the slot in which to insert the controller:

- 3ware 9750 RAID controller card must be installed in PCI Express x8 or x16 slots.

  Warning! Do **NOT** insert the 9750 controller card into a PCI-X slot. Doing so could potentially damage the board or the system, and void the warranty.

  Note: Some low-cost motherboards have a single PCI Express slot which is reserved for a video card. These slots cannot accommodate a 3ware 9750 SATA+SAS controller card or other PCI-E device.

- Cable routing may be easier if you install the 3ware RAID controller card next to an open slot.

Things to Watch Out For During Installation of the RAID Controller

Be careful when installing the 3ware SATA+SAS controller card into your system. **Excessive force can damage the board or your system.**

Be sure to follow the installation instructions in “Chapter 2. Installing the 9750 SATA+SAS Controller Card” on page 9.

Chapter 2. Installing the 9750 SATA+SAS Controller Card

Tools You Need

You will need the following tools during installation:

- An ESD grounding strap or mat
- A Phillips screwdriver

Before You Start

3ware 9750 SATA+SAS controller cards can be installed in a standard enclosure or in an enclosure with a backplane.

1 Be sure to read “Safety Information” on page 5 in Chapter 1.

2 If you have a Battery Backup Unit (BBU), install it before proceeding.

Note – For more information about installing the BBU directly to the 9750 Controller, refer to the LSI document, “MegaRAID iBBU07 Intelligent Battery Backup Unit Quick Installation Guide ”. Use the search feature located at: http://www.lsi.com/channel/ChannelDownloads, to find the referenced LSI document. Search for iBBU07, click on the link for the iBBU07 Quick Installation Guide (QIC).

The remote mounting option mentioned in the BBU installation Guide is not supported on the 9750 controller card.

3 If your enclosure is low-profile, unscrew the full height bracket from the 3ware 9750 SATA+SAS controller card and replace it with the included low-profile bracket, using the same screws.

4 If appropriate, set the PM2 (power management) jumper on the disk drives, to enable staggered spinup. Check the

documentation that came with your disk drives to see whether this is required.

5 SATA-2 hard drives are sometimes shipped from the manufacturer with the transfer rate set to 1.5 Gbps. If this is the case for your drives, you may need to remove a jumper or run a software utility to change the transfer rate to 3.0 Gbps. Please check with your hard drive manufacturers documentation or website on how to set the transfer rate to 3.0 Gbps.

Install the Controller in the Computer

1 If the computer is running, shut it down. Turn off power to the computer and disconnect the power cord from the outlet.

2 Make sure you are properly grounded. (For details about ESD precautions, see page 7.)

3 Open the computer case according to the manufacturer's instructions.

4 Locate the PCI Express slot you want to use for the 3ware 9750 SATA+SAS controller card.

For a discussion of which slot to use, see "Selecting the Slot in Which to Install the Controller" on page 8.

5 Remove the metal filler bracket for the slot.

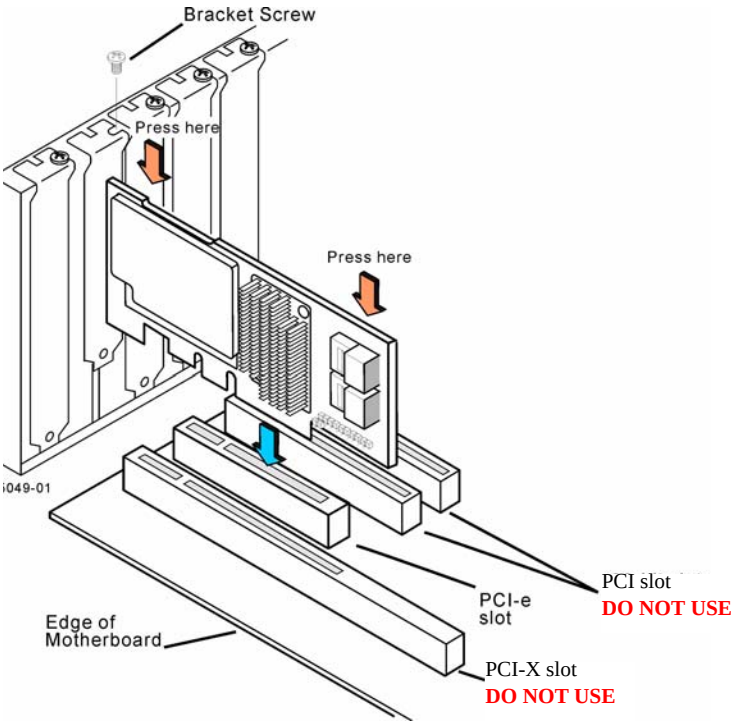
Save this screw; it will be used to secure the 3ware 9750 SATA+SAS controller after you have seated it in the slot.

6 Position the card in the PCI Express slot so that the contacts will mate with the grooves in the slot, and all pins make proper contact with the PCI Express slot pins when pushed into place.

7 Press down gently on the edge of the 3ware RAID controller directly above the PCI Express slot until it is fully seated.

Warning! Make sure you select a PCI Express (PCI-e) slot, not a PCI or PCI-X slot, see Figure 4. Inserting a 9750 into a PCI or PCI-X slot could potentially damage the board or system, and void the warranty of either the 9750 or the motherboard. If you are uncertain about which slot to use, see the documentation for your system's motherboard.

Figure 4. Inserting Controller Into PCI Express Slot



Note: The configuration of the enclosure may not be the same as shown Figure 4.

8 Check that the 3ware SATA+SAS controller's metal bracket covers the hole in the case and secure the bracket with the screw that was used to secure the filler bracket in step 5.

9 When you tighten the screw on the bracket to the enclosure, make sure the card is not slanted in any direction; otherwise the card will not work properly.

Attach the Cables to Your Controller

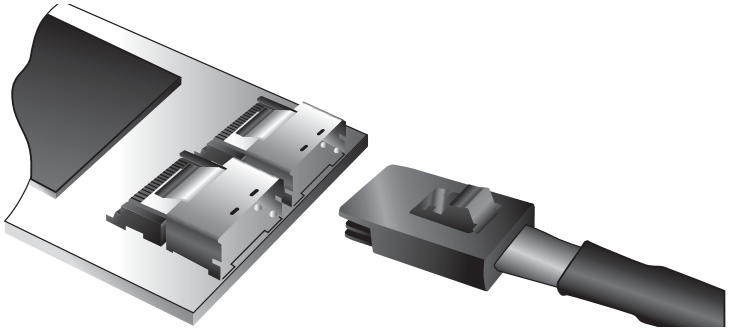
Internal Connectors

The 9750-8I, and 9750-4I controller cards have internal connectors and use the SFF-8087 cable.

- Insert the SFF-8087 cable plug into the 4 lane connector on the controller.

  When the cable is inserted correctly, you will feel it click into place.

Figure 5. Connecting a typical Internal 4 lane SATA+SAS Cable with an SFF-8087 Connector to the Controller Card



Connect the Cables to Backplanes

- After installing your 3ware RAID controller and making cable connections, connect the other end of the cables to an interior backplane.

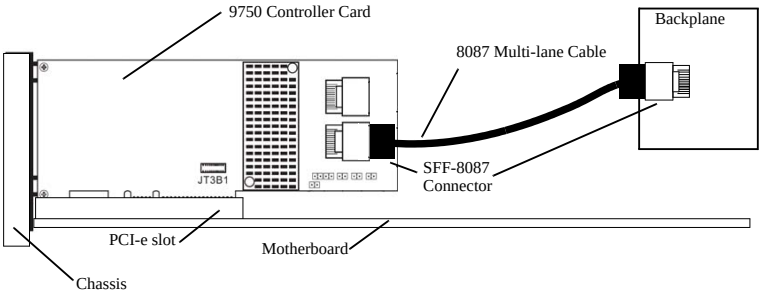
  Internal Backplane Connection

  An interior connection to a backplane in the same enclosure as the RAID controller will use the SFF-8087 connector.

Note: If your backplane has individual connections for each drive, or if you do not have a backplane, you can directly connect up to 4 drives per internal connector through use of a breakout cable.

- Connect the other end of the SFF-8078 multi-lane cable to the connector on the backplane.

Figure 6. Connecting the Controller to the Backplane



Note: Figure 6 is for reference only. System connection may not be the same as shown in this illustration.

Finishing Up the SATA+SAS Controller Card Installation

After you have installed the controller in the computer and attached appropriate cables to the controller and drives, complete the following steps to complete the hardware installation.

Check Installation and Close the Case

1. Verify that the cables do not interfere with the operation of any other components in the case or block the flow of cooling air.
2. Close the case and reconnect the power cables.

Configure Your SATA+SAS Arrays

Turn to “First Time RAID Configuration” and “Configuring Units” in *3ware SAS/SATA RAID Controller Card Software User Guide, Version 10.0* for information about configuring RAID arrays. The user guide is included on the 3ware CD that came with your controller. It is also available from the LSI website at: http://www.lsi.com/channel/ChannelDownloads.

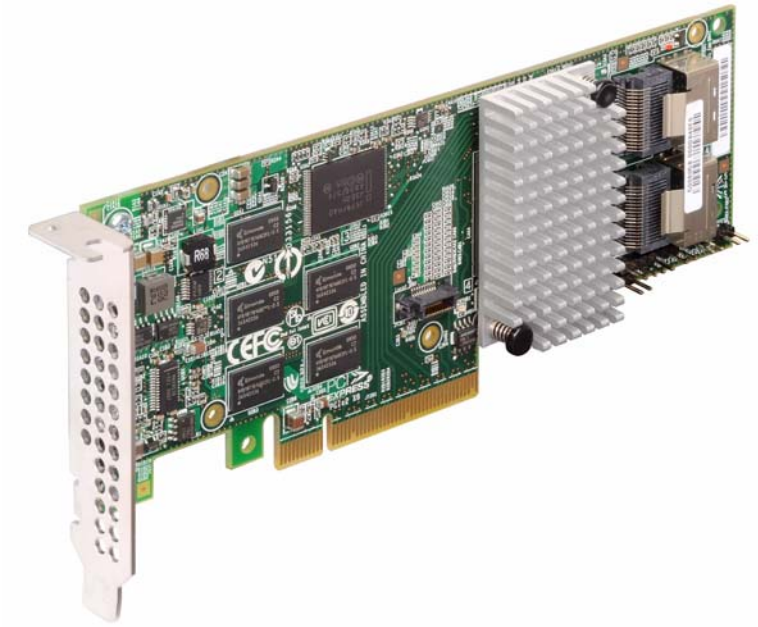
Chapter 3. 9750 Controller Card Specifications

Physical Dimensions

The 9750 SATA+SAS RAID controller card size is as follows:

Height: 68.91 mm (2.713 inches)

Length: 167.64 mm (6.6 inches)



Environmental Specification

The 9750 SATA+SAS RAID Controller card environmental requirements are listed in Table 1.

Table 1: Controller Environmental Specification

Specification	Operating	Non-Operating
Temperature	■ +10°C to +60 °C without optional battery backup unit ■ 0°C to +40 °C with optional battery backup unit	■ -30°C to +80 °C without optional battery backup unit ■ 0°C to +45 °C with optional battery backup unit
Humidity	5% to 90% RH, noncondensing, 40 °C max, 27 °C max wet bulb, 16 hour dwells at extreme	93% RH, noncondensing, 40 °C max, 120 hours
Altitude	3200 m at 40 °C, 4 hour dwell	12,200 m at 0°C, 4 hour dwell
Vibration	0.25 G in all axes swept for 5-500-5 Hz, 5 sweeps in all at 1 octave/min	1.2 G in all axes swept for 5-500-5 Hz, 5 sweeps in all at 1 octave/min
Shock	5.5 G, 11 ms half-sine, 10± shocks in x-, y-, and z-axes	33 G, 11 ms half-sine, 3± shocks in x-, y-, and z-axes
Airflow	At least 200 linear feet per minute (LFPM)	N/A

Caution! Do not operate the 9750 Controller Card at any time without proper cooling.

Fault Tolerance

Table 2 lists the fault tolerance features for the 9750 RAID controller.

Table 2: Fault Tolerance Features

Specification	9750 RAID Controller
Support for SMART[1]	Yes
Optional battery backup unit for cache memory	Optional LSI iBBU07 battery backup unit. < 3.7 V/1350 mAH battery pack; up to 72 hours of data retention for 512 Mbytes
Drive failure detection	Automatic
Drive rebuild using hot spares	Automatic
Parity generation and checking	Yes
RAID Levels 1, 5, 6, 10, 50	Yes

1. The Self Monitoring Analysis and Reporting Technology (SMART) detects up to 70 percent of all predictable drive failures. In addition, SMART monitors the internal performance of all motors, heads, and drive electronics.

Electrical Characteristics

All power is supplied to the controller through the PCI Express 3.3 V rails and the 12 V rail. Onboard switching regulator circuitry operating from the 3.3 V rails and the 12 V rail provide the necessary voltages. The following states determine the typical current consumption of the 9750 controller card:

- State 1: During a hard reset
- State 2: During a disk stress test
- State 3: While sitting idle at the DOS prompt

The supply voltages are 12 V ± 8 percent (from PCI edge connector only) and 3.3 V ± 9 percent (from PCI edge connector only). Table 3 lists the power supply for the controller for each of the three states at the different voltages.

Table 3: Power Supply for the 9750 Controller

PCI Edge Connector	State 1	State 2	State 3
3.3 V supply	330 mA	330 mA	330 mA
12 V supply	1.00 A	1.81 A	1.53 A
3.3 V auxiliary supply	30 mA	30 mA	30 mA

+12 V is used in the charging circuitry for the optional battery pack on the optional iBBU battery-backed daughter card. If the iBBU daughter card is mounted, the following power consumption figures apply: During fast charging of the battery pack: 230 mA rise in +12 V supply current.

Jumpers and Connectors for the 9750 Controller

Table 4 describes the jumpers and connectors on the 9750 RAID Controller Card. See Figure 1 for the 9750-4I controller card layout. See Figure 2 for the 9750-8I controller card layout.

Table 4: Jumper and Connector Descriptions

Jumper/ Connector	Type	Description
JT3B1	Battery Backup Unit (BBU) connector	20-pin connector Connects the optional Intelligent Battery Backup Unit (LSI iBBU07) directly to the controller.
JT5A1	4 Lane SATA+SAS connector *Not available on 9750-4I*	Connects the cable from the controller to SATA+SAS drive or backplane. *Not available on 9750-4I*
JT5B1	4 Lane SATA+SAS connector	Connects the cable from the controller to SATA+SAS drive or backplane.
JT5B2	Reserved for LSI use only	4-pin connector *Reserved for LSI use only.*
JT5B3	Set factory defaults connector	2-pin connector Returns the board settings to the defaults set in the factory. *Jumper should not be present during normal operation.*
JT6B1	*Reserved for LSI use only*	2-pin connector *Jumper should not be present during normal operation.* *Reserved for LSI use only.*

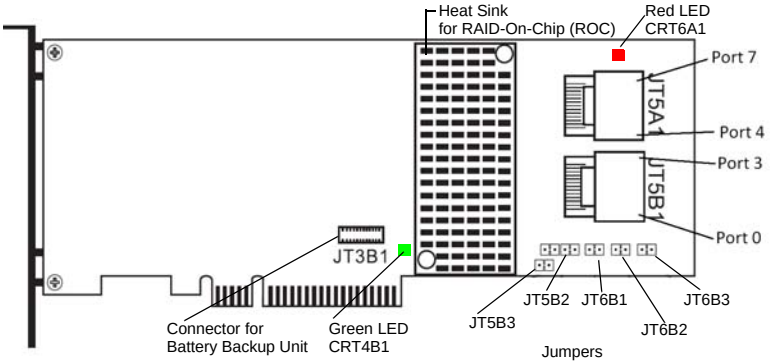
Table 4: Jumper and Connector Descriptions (cont'd)

Jumper/ Connector	Type	Description
JT6B2	Global Drive Fault header	2-pin connector Connects to an external LED that indicates whether a drive is in a fault condition.
JT6B3	SATA+SAS Activity LED header	2-pin connector Connects to an external LED that indicates drive activity.

LEDs on 9750 Controller Card

The 9750 SATA+SAS RAID Controller Card has two LEDs that are visible. Figure 7 shows the internal connectors and LEDs.

Figure 7. 9750-8I Internal Connectors and LEDs



The different states of the LEDs are listed in Table 5.

Table 5: Red LED and Green LED States

State	Meaning
Green LED (CRT4B1)[1]	**Indicates LSISAS2108 RAID-on-chip (ROC) ASIC is operating normally**
Off	The ROC ASIC is not operating normally.
On[1]	The ROC ASIC is operating normally.
Red LED (CRT6A1)	**Error status signal**
Off	Indicates that there is no system error.
On	Indicates that there is a system error.

1. LED only blinks green when there are drives attached and data is being read or written.

Technical Certifications

The design and implementation of the 3ware 9750 SATA+SAS RAID controller card minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The 9750 SATA+SAS RAID controller show the following marks and certifications:

- CE mark
- C-Tick mark
- FCC Self-Certification logo
- Canadian Compliance Statement
- Korean MIC
- Taiwan BSMI
- Japan VCCI
- CISPR Class B

The following hardware is compliant with CSA C22.2 No.60950-1, UL 60950-1 First Edition-listed accessory, Agency model # 25239

- 3ware 9750-8I SATA+SAS RAID Controller Card
- 3ware 9750-4I SATA+SAS RAID Controller Card

Appendix: Technical Support

For support, troubleshooting tips, frequently asked questions, software releases, and compatibility information related to LSI 3ware RAID controllers, refer to:

- LSI 3ware support page at: http://www.lsi.com/channel/support.
- LSI 3ware Knowledge Base (eSupport), at: https://selfservice.lsi.com/service/main.jsp.
- LSI 3ware software downloads, at: http://www.lsi.com/channel/ChannelDownloads.
- LSI 3ware documentation, at: http://www.lsi.com/channel/ChannelDownloads.
- LSI 3ware compatibility lists, at: http://www.lsi.com/channel/support/marketing_resources.

LSI offers 24 hour/7 days a week phone tech support.

- North America: 800-633-4545
- International: 00-800-5745-6442
  The International phone number does not require country specific access codes.

If you have a question regarding technical support, sales support, the LSI Reseller Partner Program or anything else, simply fill in the form at http://www.lsi.com/channel/ContactUs, and the appropriate contact will get back to you as soon as possible.