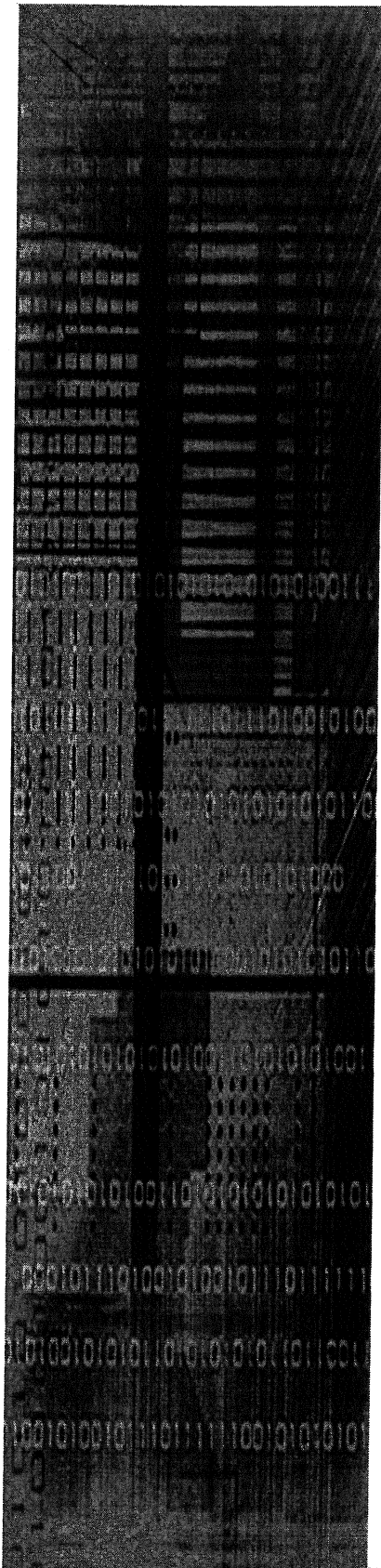




Remote Battery Mounting Application Note

9550SXU
9650SE
9690SA

Table of Contents

Introduction	3
Description of StorSave	3
Standard BBU Mounting Provisions.....	4
9550SXU and 9650SE - SATA	4
9690SA - SAS.....	5
Alternate Locations for Battery Pack.....	8
Using Battery board extension.....	8
Creating Alternate mounting PCB.....	10
Special Considerations in Alternate Mounting	11
Air Flow.....	11
Access	11
Field Replaceable Spare.....	11
Warranty	11
Appendix A - Ordering Part Numbers	12
Appendix B - BATT-SPARE-02 Specifications.....	12

Table of Figures

Figure 1	SATA Battery Option Components	4
Figure 2	Battery Mounting Board	5
Figure 3	Snapping Battery Pack to Mounting Board.....	5
Figure 4	Alternate Battery Locations on Battery Mounting Board.....	6
Figure 5	Shortened Battery Mounting Board.....	7
Figure 6	Battery Extension Cable	8
Figure 7	Using adhesives to secure battery mounting board	8
Figure 8	Using tie wraps in the existing mounting holes	9
Figure 9	Using screws to secure to another portion of chassis.....	9
Figure 10	Battery Pack Mounting Dimensions	10

Introduction

The use of write cache on all RAID controllers necessitates the addition of a battery to compensate for the volatile nature of the SDRAM cache memory used. In AMCC products the battery serves the additional purpose of triggering the StorSave feature which can result in significant performance improvements.

Unfortunately, batteries have inherent temperature limitations imposed by their internal chemistry. Restricting the location of the battery (say to being mounted on the RAID Controller) can in some cases limit a system's overall temperature specification. Mounting the battery on the RAID Controller may also force a storage system to be shut down for the routine maintenance task of replacing the battery at the end of its normal life.

Preserving the performance benefits of StorSave, increasing the temperature range of the system and providing improved access and up-time may all be accomplished for some installations by mounting the battery in a location remote from the RAID Controller. This application note addresses this alternative as provided in the AMCC Remote Battery Backup Module (BBU-MODULE-04).

Description of StorSave

The Battery Backup Unit (BBU) protects the write data in the controller cache and cache metadata for up to 72 hours in the event of a power failure. When system power is restored the cache metadata is used by the firmware to complete writing the data that is being held in the controller cache.

In order to maintain the benefit of many disk drive features (generally in the area of command execution optimization) disk drive cache must be kept on, leaving the potential problem of lost write data in the disk drive cache if power fails. A simple solution offered by others is to recommend that the user disable drive write cache and suffer the performance reduction. AMCC 3ware 9000 controllers employ a more sophisticated technique that has been developed to retain full data protection and maintain the performance benefits of both controller and drive caching via journaling. The payoff is seen in greatly improved performance for the same level of data protection compared to the competition.

Standard BBU Mounting Provisions

The implementation of the StorSave feature and the preservation of the controller write cache data is accomplished in identical electronic and software terms in the 9550SXU, 9650SE and 9690SA product lines. All products use the same BBU Control Module and field replaceable, hot pluggable Battery Pack. The BBU Control Module always mounts on the RAID Controller, but it is possible to remotely mount the Battery Pack, which contains several Lithium Ion battery cells and an internal temperature monitoring thermistor.

9550SXU and 9650SE - SATA

In 9000 Series SATA applications the Battery Backup Option consists of two parts. The BBU Control Module is a small daughter PC board assembly (AMCC PN 701-3190-01). The Battery Pack assembly (AMCC PN 705-3070-00) and the control module are included in the BBU-MODULE-03 accessory and are mounted directly on the RAID Controller.

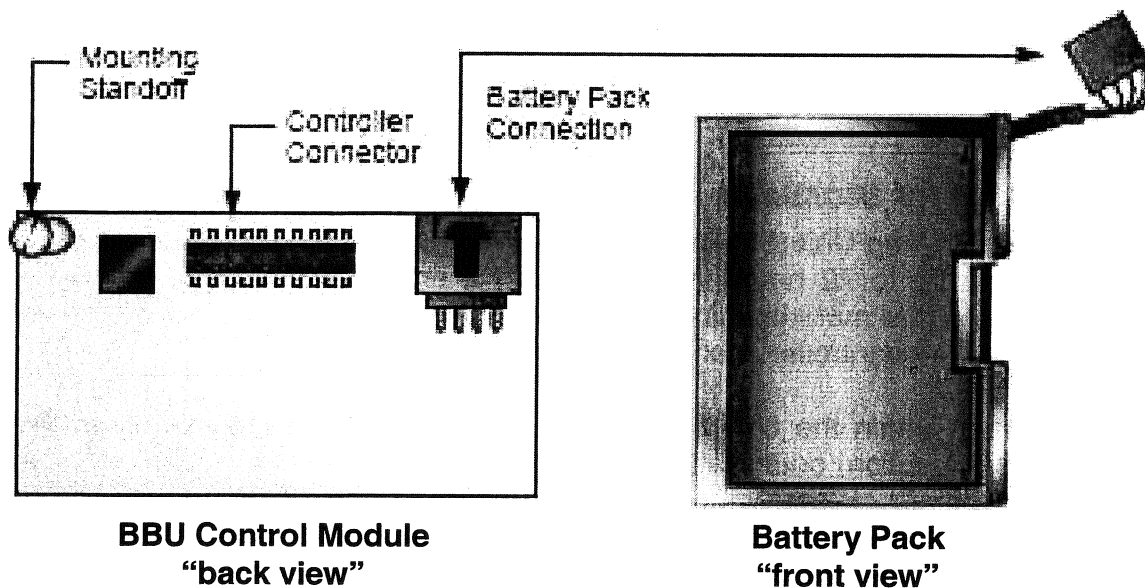


Figure 1 SATA Battery Option Components

The BBU Control Module is electrically connected via a 20 pin connector and held in place with a nylon standoff and nylon screw. The Battery Pack is snapped in place and retained by three latches that engage slots on the RAID controller and is electrically connected to the daughter board by a pigtail with a 4 pin connector. The Field Replaceable Unit (FRU) is the snap-in Battery Pack. It has its own ordering part number (see Appendix A).

9690SA - SAS

In 9690SA SAS applications the Battery Backup Option is electronically identical to its SATA based predecessors. It consists of the same two modules, connected in identically the same schematic way. The recommended battery FRU for SAS is the same as for SATA. This eases inventory management for customers utilizing both SAS and SATA controller technologies.

The BBU Control Module is connected and secured to the SAS RAID controller just as in the SATA case. The battery pack however is snapped into a Battery Mounting PCB that is secured to the back of the enclosure by a standard PC mounting bracket. The card is mounted on a Full Height mounting bracket and an optional Low Profile bracket is also included as part of the Option. Both brackets are “vented” to allow maximum cooling air flow in the vicinity of the battery.

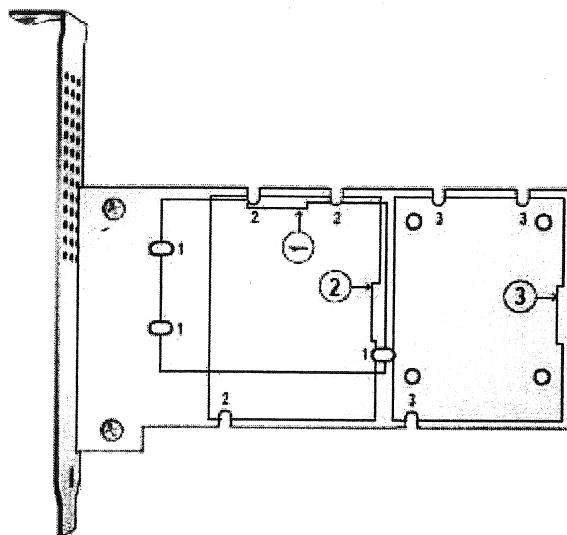


Figure 2 Battery Mounting Board

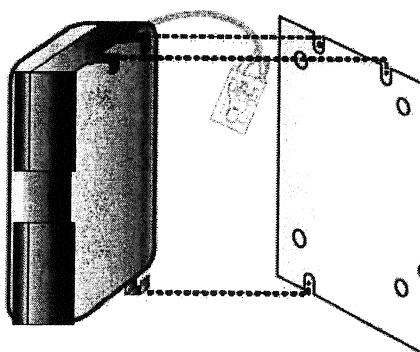


Figure 3 Snapping Battery Pack to Mounting Board

The Battery Mounting Board should be mounted in a slot that is easily accessible making any necessary replacement of the battery pack relatively easy for the user. Usually it is anticipated that this slot would be adjacent to the RAID Controller. To minimize the possibility of a mechanical interference from another element of the enclosure near that adjacent slot, three different mounting locations of the battery are provided on the Battery Mounting Board.

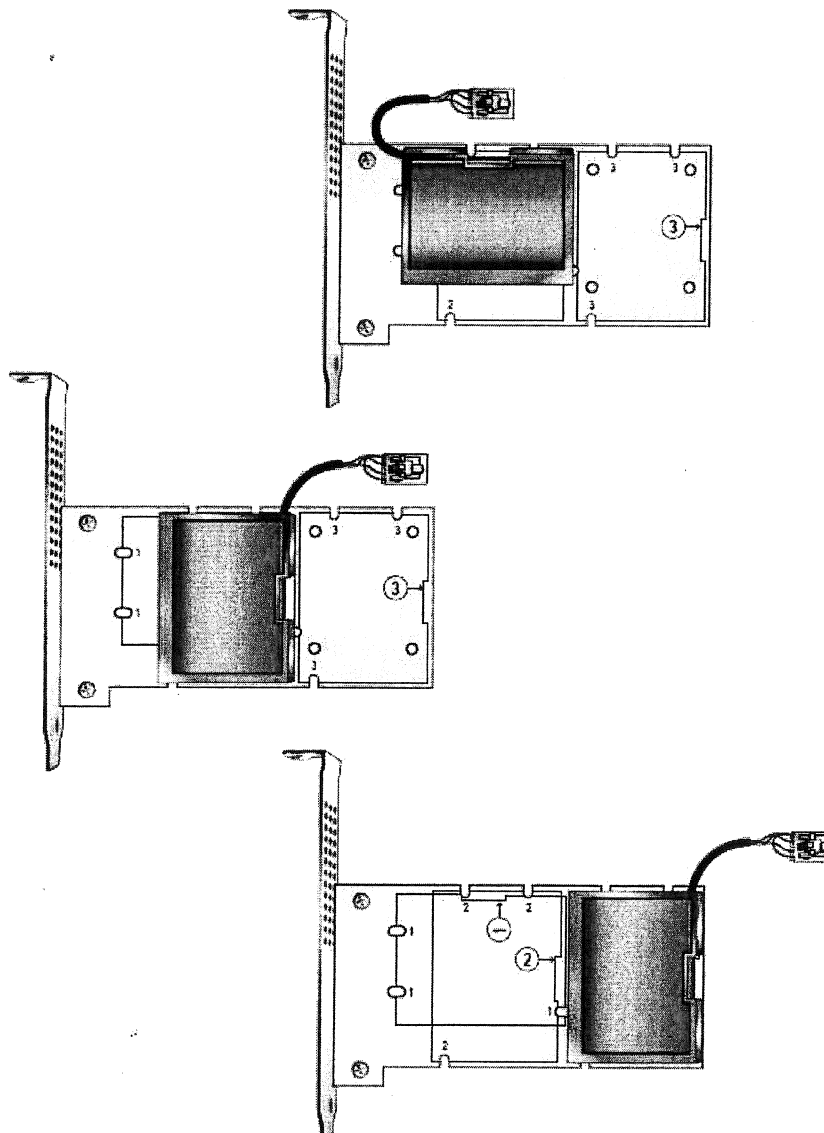


Figure 4 Alternate Battery Locations on Battery Mounting Board

It is also possible to mount two battery packs in the vertical orientation on one bracket assembly if the application includes two RAID controllers.

Should the Battery Mounting Board prove to be too long, the last position of the card may be snapped off of the main assembly along a pre-scored boundary. The removed segment may be discarded or incorporated into one of the alternative mounting schemes (see “Alternate Mounting Options for Battery Pack” below).

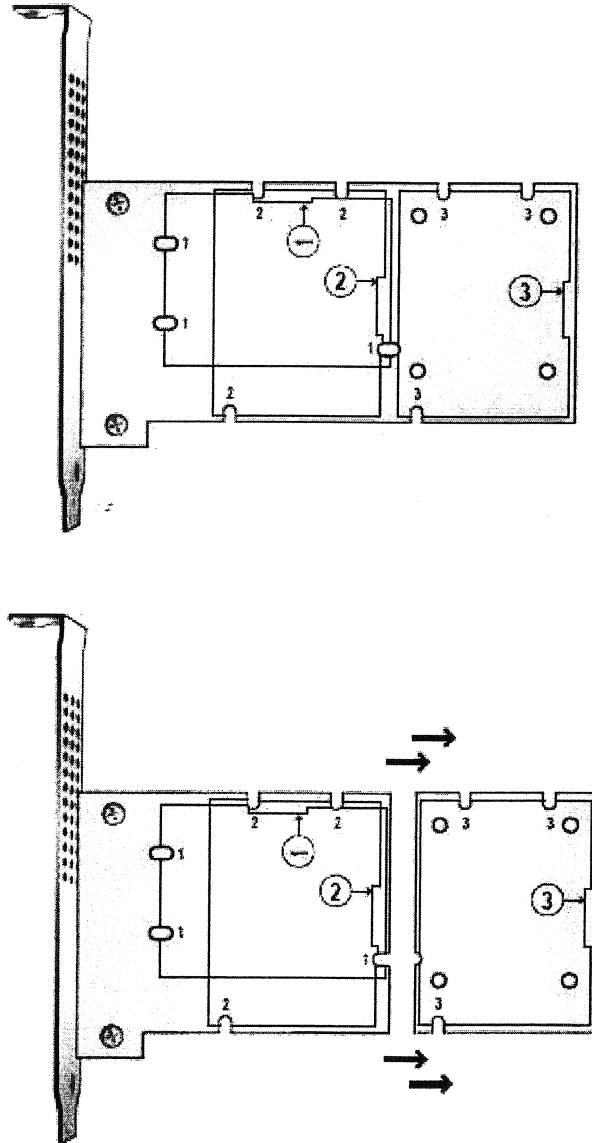


Figure 5 Shortened Battery Mounting Board

Should the battery not be able to be mounted in a PCI slot adjacent to the controller, a Battery Extension Cable (AMCC PN 150-3088-00) is included that allows the battery pack to be located up to 12 inches away from it's associated daughter board connector and RAID controller.



Figure 6 Battery Extension Cable

Alternate Locations for Battery Pack

In some applications, the availability of an unused PC mounting bracket location may not be available. Battery accessibility for easy replacement may also require the battery pack to be located away from the PCI slots altogether. In those cases it is possible to mount the battery pack in another location. Electrically, any location supported by the 12 inch length of the extension cable is acceptable.

Using Battery board extension

Mechanically, the separated Battery mounting board segment may be use to provide “snap in” mounting for the battery pack in a number of alternative mounting schemes. Perhaps the simplest is to attach the Battery mounting board segment to an appropriate chassis location with an adhesive, “double stick” tape, or a “hook and eye” fastener. Be sure to check for clearance for the battery pack’s tabs that extend behind the mounting board itself. See Figure 7.

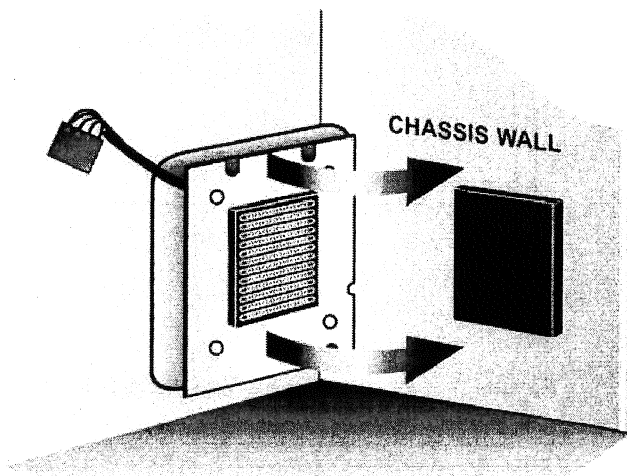


Figure 7 Using adhesives to secure battery mounting board

Another easy way to attach the battery mounting board to a portion of the chassis is with tie wraps. See Figure 8.

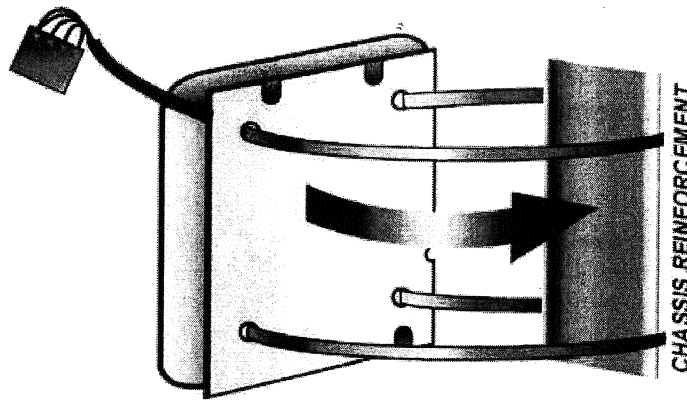


Figure 8 Using tie wraps in the existing mounting holes

The battery mounting board can be attached to the chassis with 4ea, #4 machine screws, providing a more solid mounting. The screw heads must be less than 0.1 inch high to allow the battery module to snap into place. The battery mounting board must also be spaced off of the mounting surface by at least 0.1 inches by washers to allow the battery snaps to engage behind the mounting board.

Figure 9 includes a hole drilling template. Be sure that if this Application Note was downloaded and locally printed that the holes are spaced as labeled. Alternatively, the battery mounting board can be used as a template directly.

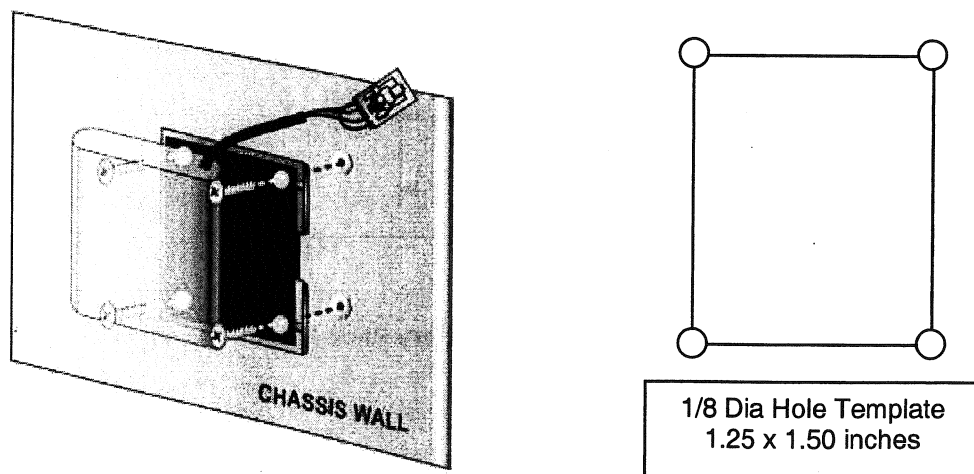


Figure 9 Using screws to secure to another portion of chassis

Creating Alternate mounting PCB

Preserving the easy “snap-in” mounting feature of the battery pack may be maintained by including the following slot pattern in any custom PCBA. The PCBA solution should use 0.062 inch thick PC board material in an appropriate location near the RAID Controller and have no components located in the Battery Pack Footprint area.

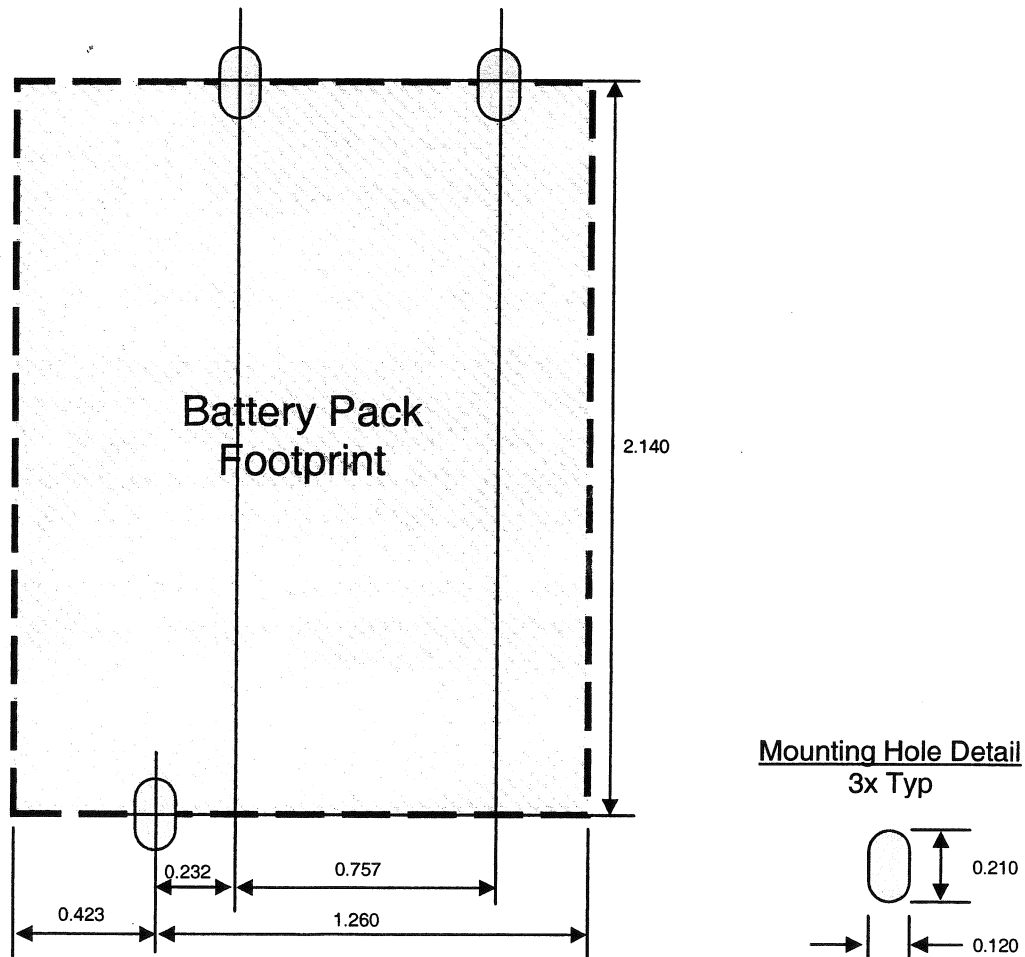


Figure 10 Battery Pack Mounting Dimensions

Special Considerations in Alternate Mounting

Air Flow

In the RAID Controller application, the battery is continuously being charged. To prevent damage to the battery cells, the battery pack has a maximum temperature specification of 45°C during charging. The internal thermistor reports the temperature of the battery pack to the BBU circuitry and to AMCC 3DM2 management software. Exceeding this temperature will cause the BBU circuitry to stop charging the battery. If the temperature continues to exceed the specification, the battery will eventually discharge, limiting its ability to retain the proper data in cache over time. Should a power failure occurring during this condition, data integrity could be threatened. In general, this implies that the battery be located away from any stagnant air or significant sources of heat.

Access

One desirable attribute of alternative mounting of the battery is the ability to provide convenient access to it that may not exist for the controller itself. The battery pack is hot pluggable, independent of the controller. In normal service, the battery is likely to have a life expectancy shorter than the controller. End of life is most easily determined through 3DM2 management software by choosing **Monitor>Battery Backup** from the menu bar (see Alarms and Battery Backup in the controllerUser Guide).

Field Replaceable Spare

The standard mounting location and all the alternate mounting options are supported by the same spare FRU (see Appendix A).

Warranty

AMCC's battery pack warranty is one year. The BBU Module circuitry warranty is the same as the RAID controller.

Extended exposure to operating temperatures above 45°C will shorten the battery life and void the warranty on the battery pack.



Appendix A - Ordering Part Numbers

<u>Description</u>	<u>9550SXU, 9650SE¹</u>	<u>9690SA</u>
Battery Backup Unit	BBU-MODULE-03 or BBU-MODULE-04	N/A BBU-MODULE-04
Battery Pack	BATT-SPARE-02	BATT-SPARE-02

Notes:

1. BBU-MODULE-03 is recommended for 9550SXU and 9650SE typical applications. BBU-MODULE-04 is recommended for those applications where maximum air temperature at the RAID Controller exceeds the battery limit or an alternate access scheme is required.

Appendix B - BATT-SPARE-02 Specifications

Battery Type	Lithium Ion Battery Pack Assy with thermistor
Capacity, nominal	1660 MAh
Min (discharged)	75%
Voltage, nominal	3.7 Volts
Max (charging)	4.2 Volts
Min (discharged)	3.0 Volts
Short Circuit Current Protection	Yes
Connectors	Molex 50-57-9404
Mating Connector	Molex 70107-0003
Temperature, Storage	-20°C to 60°C
Charging	0°C to 45°C
Dis-charging	-10°C to 60°C