

6Gb/s SAS RAID Cards

ARC-12x5 Series

(PCIe 3.0 to 6Gb/s SAS RAID Controllers)

Quick Start Guide

Version: 1.1

Issue Date: December, 2014

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FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Manufacturer's Declaration for CE Certification

We confirm ARC-12x5 series has been tested and found compliant with the requirements in the council directive relating to the EMC Directive 2004/108/EC. Regarding to the electromagnetic compatibility, the following standards were applied:

EN 55022: 2006, Class B
EN 61000-3-2: 2006
EN 61000-3-3: 1995+A1: 2001+A2: 2005

EN 55024:1998+A1:2001=A2:2003
IEC61000-4-2: 2001
IEC61000-4-3: 2006
IEC61000-4-4: 2004
IEC61000-4-5: 2005
IEC61000-4-6: 2006
IEC61000-4-8: 2001
IEC61000-4-11: 2004

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INTRODUCTION

1. Introduction

This section presents a brief overview of the 6Gb/s SAS RAID controller, ARC-1215-4x/ARC-1225-8x (PCIe 3.0 x8 external 6Gb/s SAS/SATA RAID controller), ARC-1215-4i/ARC-1225-8i (PCIe 3.0 x8 internal 6Gb/s SAS/SATA RAID controllers).

1.1 Overview

SAS 2.0 is designed for much higher speed data transfer than previous available and backward compatibility with SAS 1.0. The 6Gb/s SAS interface supports both 6Gb/s and 3Gb/s SAS/SATA disk drives for data-intensive applications and 6Gb/s or 3Gb/s SATA drives for low-cost bulk storage of reference data. The ARC-1215-4i/ARC-1225-8i support directly attach 4/8 SAS ports via 1/2 internal SFF-8087 connector. The ARC-1215-4x/ARC-1225-8x support directly attach 4/8 SAS ports via 1/2 external SFF-8088 connector. Each port on the SAS controllers supports SAS and/or SATA devices. Since there is no expander support on those boards, this can meet the customer inquiry SAS solution (using same enclosure) to replace SATA solution. The ARC-1215-4i/4x and ARC-1225-8i/8x RAID controllers only support directly attach to 4/8 SAS/SATA drives without supporting the expand function. The ARC-12x5 series default support 1GB on board ECC DDR3-1333 SDRAM memory.

The ARC-12x5-4i/8i RAID controllers are low-profile PCIe cards, ideal for 1U and 2U rack-mount systems without needing the expansion capability. These controllers utilize the same RAID kernel that has been field-proven in existing external RAID controller products, allowing Areca to quickly bring stable and reliable PCIe 3.0 6Gb/s SAS RAID controllers to the market.

Unparalleled Performance

The 6Gb/s SAS RAID controllers raise the standard to higher performance levels with several enhancements including new high performance dual core ROC Processor, a DDR3-1333 memory architecture and high performance PCIe 3.0 x8 lane host interface bus interconnection. The low profile controllers by default support

on-board 1G of ECC DDR3-1333 SDRAM memory. The optional battery backup module provides power to the cache if it contains data not yet written to the drives when power is lost. The test result is against overall performance compared to other 6Gb/s SAS RAID controllers. The powerful new ROC processors integrated 8 6Gb/s SAS ports on chip delivers high performance for servers and workstations.

Unsurpassed Data Availability

As storage capacities continue to rapidly increase, users need greater level of disk drive fault tolerance, which can be implemented without doubling the investment in disk drives. The RAID 6 can offer fault tolerance greater than RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data. The 6Gb/s SAS RAID controllers with extreme performance RAID 6 engine installed provide the highest RAID 6 feature to meet this requirement. The controller can concurrently compute two parity blocks and get very similar RAID 5 performance.

The 6Gb/s SAS RAID controllers can also provide RAID levels 0, 1, 1E, 3, 5, 6, 10, 30, 50, 60, Single Disk or JBOD for maximum configuration flexibility. Its high data availability and protection derives from the following capabilities: Online RAID Capacity Expansion, Array Roaming, Online RAID Level / Stripe Size Migration, Global Online Spare, Automatic Drive Failure Detection, Automatic Failed Drive Rebuilding, Disk Hot-Swap, Online Background Rebuilding, Instant Availability/Background Initialization, Auto Reassign Sector, Redundant Flash Image and Battery Backup Module. Greater than Two TB Support allows for very large volume set application in 64-bit environment such as data-mining and managing large databases.

Maximum Interoperability

The 6Gb/s SAS RAID controller support broad operating system including Windows 8/Server 2012(R2)/7/2008/Vista/XP/2003, Linux (Open Source), FreeBSD (Open Source), Solaris (Open Source), Mac, VMware and more, along with key system monitoring features such as enclosure management (Serial Bus & SGPIO) and SNMP function. Our products and technology are based on extensive

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testing and validation process; leverage Areca SAS or SATA RAID controller field-proven compatibility with operating systems, motherboards, applications and device drivers.

Easy RAID Management

The controllers contain an embedded McBIOS RAID manager that can access via hot key at M/B BIOS boot-up screen. This pre-boot McBIOS RAID manager can use to simplify the setup and management of RAID controller. The controller firmware also contains a browser-based McRAID storage manager which can be accessed through the Ethernet port or ArchHttp proxy server in Windows, Linux, FreeBSD and more environments. The McRAID storage manager allows local and remote to create and modify RAID set, volume set, and monitor RAID status from standard web browser. The Single Admin Portal (SAP) monitor utility can support one application to scan multiple RAID units in the network.

1.2 Features

Controller Architecture

- Dual Core RAID-on-Chip (ROC) 800 MHz processor
- PCIe 3.0 x8 lane host interface
- 1GB on-board DDR3-1333 SDRAM with ECC
- Write-through or write-back cache support
- Support up to 4/8 internal or 4/8 external 6Gb/s SAS ports
- ARC-1215-4i/4x supports up to 4 x 6Gb/s SAS/SATA HDDs
- ARC-1225-8i/8x supports up to 8 x 6Gb/s SAS/SATA HDDs
- Multi-adapter support for large storage requirements
- BIOS boot support for greater fault tolerance
- BIOS PnP (plug and play) and BBS (BIOS boot specification) support
- Support EFI BIOS for Mac Pro
- NVRAM for RAID event & transaction log
- Redundant flash image for controller availability
- Battery Backup Module (BBM) ready (optional)
- RoHS compliant

RAID Features

- RAID level 0, 1, 10(1E), 3, 5, 6, 30, 50, 60, Single Disk or JBOD

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- Multiple RAID 0 and RAID 10(1E) support (RAID 00 and RAID100)
- Multiple RAID selection
- Configurable stripe size up to 1024KB
- Support HDD firmware update
- Online array roaming
- Online RAID level/stripe size migration
- Online capacity expansion and RAID level migration simultaneously
- Online volume set growth
- Instant availability and background initialization
- Support global and dedicated hot spare
- Automatic drive insertion/removal detection and rebuilding
- Support for native 4K and 512 byte sector SAS and SATA devices
- Multiple pairs SSD/HDD disk clone function
- SSD automatic monitor clone (AMC) support
- Controller level hardware encryption support
- Support intelligent power management to save energy and extend service life

Monitors/Notification

- System status indication through global HDD activity/fault connector, individual activity/fault connector, LCD/I2C connector and alarm buzzer
- SMTP support for email notification
- SNMP support for remote manager
- Enclosure management (serial bus and SGPIO) ready

RAID Management

- Field-upgradeable firmware in flash ROM

In-Band Manager

- Hot key "boot-up" McBIOS RAID manager via M/B BIOS
- Web browser-based McRAID storage manager via ArchHttp proxy server for all operating systems
- Support Command Line Interface (CLI)
- API library for customer to write monitor utility
- Single Admin Portal (SAP) monitor utility

Out-of-Band Manager

- Firmware-embedded web browser-based McRAID storage manager, SMTP manager, SNMP agent and Telnet function via Ether-

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net port

- API library for customer to write monitor utility
- Support push button and LCD display panel (optional)

Operating System

- Windows 8/Server 2012/7/2008/Vista/XP/2003
- Linux
- FreeBSD
- VMware
- Solaris 10/11 x86/x86_64
- Mac OS 10.4.x or higher

(For latest supported OS listing visit <http://www.areca.com.tw>)

Important:

Be sure to update the ArcMSR.kext driver shipping with Mac OS X to V1.3.7 or later from the software CD or from the Areca website.

6Gb/s SAS RAID Controllers		
Model Name	ARC-1215-4i	ARC-1225-8i
I/O Processor	Dual Core RAID-on-Chip (ROC) 800 MHz Processor	
Form Factor	Low Profile: 64.4(H) x 169.5(L) mm	
Host Bus Type	PCIe 3.0 x 8 Lanes	
Driver Connector	1 x SFF-8087	2 x SFF-8087
Drive Support	4 x SAS/SATA	8 x SAS/SATA
RAID Level	0, 1, 10, 3, 5, 6, Single Disk or JBOD	0, 1, 10, 3, 5, 6, 30, 50, 60, Single Disk or JBOD
On-Board Cache	1GB on-board DDR3-1333 SDRAM with ECC	
Management Port	In-Band: PCIe Out-of-Band: BIOS, LCD (Optional) and LAN Port	
Enclosure Ready	Individual Activity/Faulty Header, Serial Bus and SGPIO	

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6Gb/s SAS RAID Controllers		
Model Name	ARC-1215-4x	ARC-1225-8x
I/O Processor	Dual Core RAID-on-Chip (ROC) 800 MHz Processor	
Form Factor	Low Profile: 64.4(H) x 169.5(L) mm	
Host Bus Type	PCIe 3.0 x 8 Lanes	
Driver Connector	1 x SFF-8088	2 x SFF-8088
Drive Support	4 x SAS/SATA	8 x SAS/SATA
RAID Level	0, 1, 10, 3, 5, 6, Single Disk or JBOD	0, 1, 10, 3, 5, 6, 30, 50, 60, Single Disk or JBOD
On-Board Cache	1GB on-board DDR3-1333 SDRAM with ECC	
Management Port	In-Band: PCIe Out-of-Band: BIOS and LCD (Optional)	
Enclosure Ready	External Serial Bus	

Note:

Low-profile bracket has included on the low profile board shipping package.

HARDWARE INSTALLATION

2. Hardware Installation

This section describes the procedures for installing the 6Gb/s SAS RAID controllers.

2.1 Before You First Installing

Thanks for purchasing the 6Gb/s SAS RAID controller as your RAID data storage subsystem. This user manual gives simple step-by-step instructions for installing and configuring the 6Gb/s SAS RAID controller. To ensure personal safety and to protect your equipment and data, reading the following information package list carefully before you begin installing.

Package Contents

If your package is missing any of the items listed below, contact your local dealers before you install. **(Disk drives and disk mounting brackets are not included)**

- 1 x 6Gb/s SAS RAID controller in an ESD-protective bag
- 1 x Installation CD – containing driver, relative software, an electronic version of this manual and other related manual
- 1 x Quick start guide
- 1 x Low-profile bracket

2.2 Board Layout

The controller can support a family included 8 ports models as well as 4/8 internal/external ports. This section provides the board layout and connector/jumper for the 6Gb/s SAS RAID controller.

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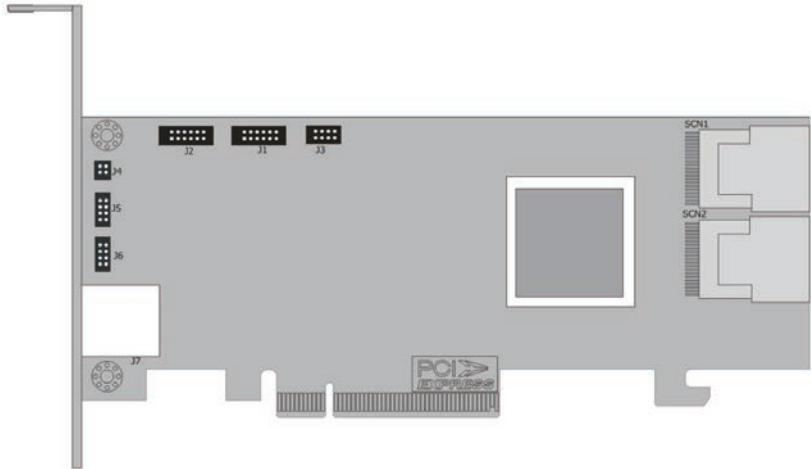


Figure 2-1, ARC-1215-4i/ARC-1225-8i Top View

Connector	Type	Description
1. (J7)	Ethernet Port	RJ45
2. (J6)	Individual Fault LED Header	4-pin header
3. (J5)	Individual Activity (HDD) LED Header	4-pin header
4. (J4)	Global Fault/Activity LED	4-pin header
5. (J2)	Battery Backup Module Connector	12-pin box header
6. (J1)	Manufacture Purpose Port	12-pin header
7. (J3)	I ² C/LCD Connector	8-pin header
8. (SCN1)	SAS 1-4 Ports (Internal)	SFF-8087
9. (SCN2)	SAS 5-8 Ports (Internal)	SFF-8087

Table 2-1, ARC-1215-4i/ARC-1225-8i connectors

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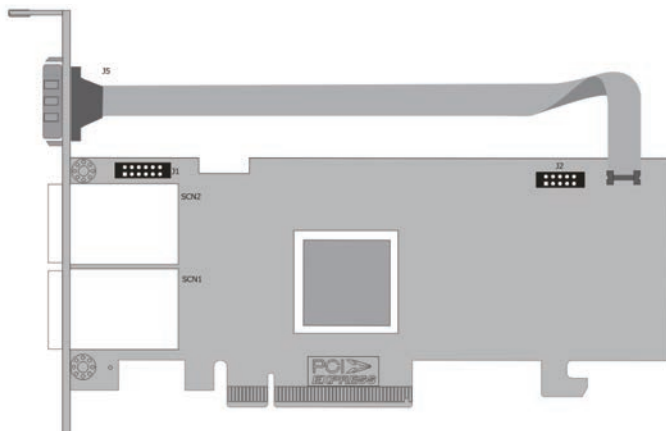


Figure 2-2, ARC-1215-4x/ARC-1225-8x

Connector	Type	Description
1. (J1)	Battery Backup Module Connector	12-pin box header
2. (J2)	Manufacture Purpose Port	10-pin header
3. (J5)	I ² C/LCD Connector	RS232 Male Connector
4. (SCN1)	SAS 1-4 Ports (External)	SFF-8088
5. (SCN2)	SAS 5-8 Ports (External)	SFF-8088

Table 2-2, ARC-1215-4x/ARC-1225-8x connectors

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Tools Required

An ESD grounding strap or mat is required. Also required are standard hand tools to open your system's case.

System Requirement

The 6Gb/s SAS RAID controller can be installed in a universal PCIe slot and requires a motherboard that:

ARC-1215-4i/4x and ARC-1225-8i/8x 6Gb/s SAS RAID controller requires:

- Comply with the PCIe 3.0 x8 lanes
It can work on the PCIe 3.0 x1, x4, x8, and x16 signal with x8 or x16 mechanical slot M/B.
- Backward-compatible with PCIe 1.0 x1, x4, x8, and x16 signal with x8 or x16 mechanical slot M/B.

Installation Tools

The following items may be needed to assist with installing the 6Gb/s SAS/SATA RAID controller into an available PCIe expansion slot.

- Small screwdriver
- Host system hardware manuals and manuals for the disk or enclosure being installed.

Personal Safety Instructions

Use the following safety instructions to help you protect your computer system from potential damage and to ensure your own personal safety.

- Always wear a grounding strap or work on an ESD-protective mat.
- Before opening the system cover, turn off power switches and unplug the power cords. Do not reconnect the power cords until you have replaced the covers.

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Electrostatic Discharge

Static electricity can cause serious damage to the electronic components on this 6Gb/s SAS RAID controller. To avoid damage caused by electrostatic discharge, observe the following precautions:

- Do not remove the 6Gb/s SAS RAID controller from its anti-static packaging until you are ready to install it into a computer case.
- Handle the 6Gb/s SAS RAID controller by its edges or by the metal mounting brackets at its each end.
- Before you handle the 6Gb/s SAS RAID controller in any way, touch a grounded, anti-static surface, such as an unpainted portion of the system chassis, for a few seconds to discharge any built-up static electricity.

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 you have replaced the covers.

2.3 Installation

Use the following instructions below to install a PCIe 3.0 6Gb/s SAS RAID controller.

Step 1. Unpack

Unpack and remove the PCIe 3.0 6Gb/s SAS RAID controller from the package. Inspect it carefully, if anything is missing or damaged, contact your local dealer.

Step 2. Power PC/Server Off

Turn off computer and remove the AC power cord. Remove the system's cover. For the instructions, please see the computer system documentation.

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Step 3. Install the PCIe 6Gb/s SAS RAID Cards

To install the 6Gb/s SAS RAID controller, remove the mounting screw and existing bracket from the rear panel behind the selected PCIe 3.0 slot. Align the gold-fingered edge on the card with the selected PCIe 3.0 slot. Press down gently but firmly to ensure that the card is properly seated in the slot, as shown in Figure 2-3. Then, screw the bracket into the computer chassis. ARC-12x5 series controllers require a PCIe 3.0 x8 slot for better performance.

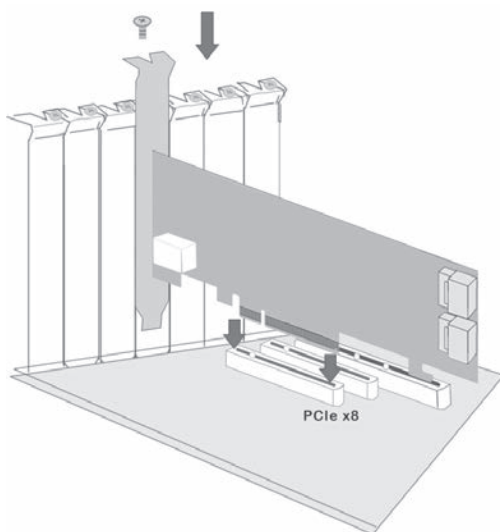


Figure 2-3, Insert into a PCIe Slot

Step 4. Mount the Drives

You can connect the SAS/SATA drives to the controller through direct cable and backplane solutions. In the direct connection, SAS/SATA drives are directly connected to 6Gb/s SAS RAID controller PHY port with SAS/SATA cables. The 6Gb/s SAS RAID controller can support up to 8 PHY ports. Remove the front bezel from the computer chassis and install the cages or SAS/SATA drives in the computer chassis. Loading drives to the drive tray if cages are installed. Be sure that the power is connected to either the cage backplane or the individual drives.

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In the backplane solution, SAS/SATA drives are directly connected to 6Gb/s SAS system backplane. The number of SAS/SATA drives is limited to the number of slots available on the backplane.

Step 5. Install SAS Cable

This section describes SAS cable how to connect on controller.

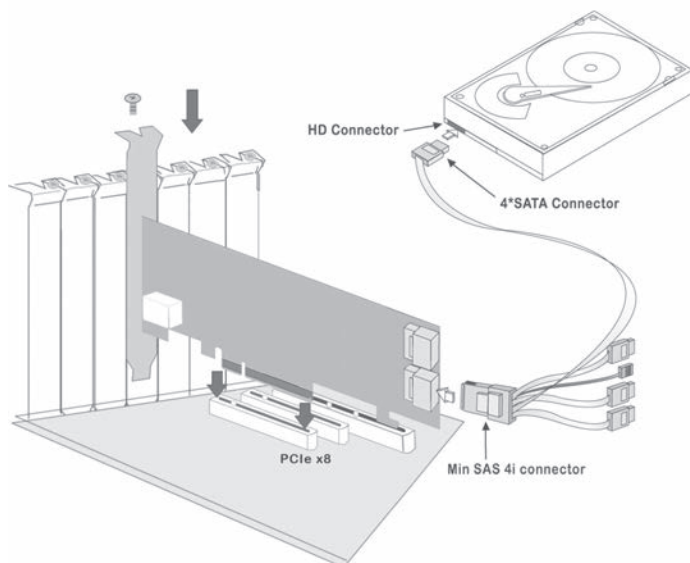


Figure 2-4, Connecting to HDD

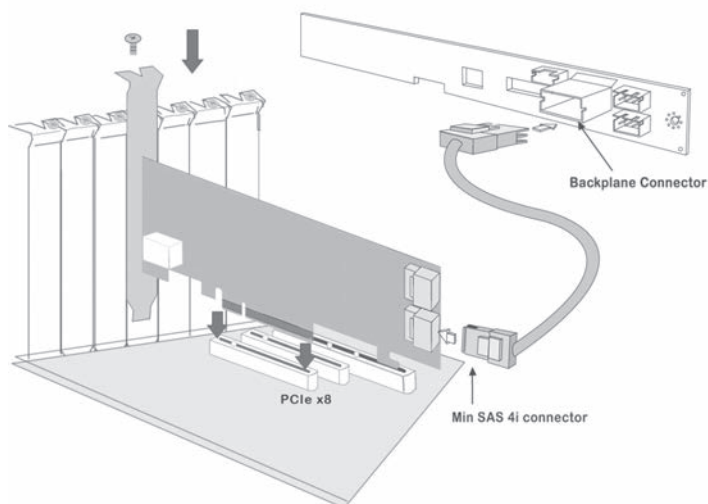


Figure 2-5, Connecting to Backplane

Step 6. Install the LED Cable (Optional)

The preferred I/O connector for server backplanes is the internal SFF-8087 connector. This connector has eight signal pins to support four SAS/SATA drives and six pins for the SGPIO (Serial General Purpose Input/Output) side-band signals. The SGPIO bus is used for efficient LED management and for sensing drive Locate status. See SFF 8485 for the specification of the SGPIO bus. For backplane without SGPIO supporting, Please refer to Section 2.4 LED cables for fault/activity LED cable installation.

LED Management: The backplane may contain LEDs to indicate drive status. Light from the LEDs could be transmitted to the outside of the server by using light pipes mounted on the SAS drive tray. A small microcontroller on the backplane, connected via the SGPIO bus to a 6Gb/s SAS RAID controller, could control the LEDs. Activity: blinking 5 times/second and Fault: solid illuminated

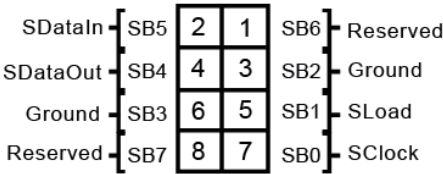
Drive Locate Circuitry: The location of a drive may be detected by sensing the voltage level of one of the pre-charge pins before and after a drive is installed.

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The following signals define the SGPIO assignments for the Min SAS 4i internal connector (SFF-8087) in the 6Gb/s SAS RAID controller.

PIN	Description	PIN	Description
SideBand0	SClock (Clock signal)	SideBand1	SLoad (Last clock of a bit stream)
SideBand2	Ground	SideBand3	Ground
SideBand4	SDataOut (Serial data output bit stream)	SideBand5	SDataIn (Serial data input bit stream)
SideBand6	Reserved	SideBand7	Reserved

The SFF-8087 to 4 SATA with sideband cable which follows SFF-8448 specification. The SFF-8448 sideband signals cable is reserved for the backplane with header on it. The following signal defines the sideband connector which can work with Areca sideband cable on its SFF-8087 to 4 SATA cable. The sideband header is located at backplane. For SGPIO to work properly, please connect Areca 8-pin sideband cable to the sideband header as shown below. See the table for pin definitions.



Sideband Pin Definitions

Note:

For latest release versions of drivers, please download from <http://www.areca.com.tw/support/main.htm>

Step 7. Adding a Battery Backup Module (Optional)

Please refer to Appendix B of the user manual for installing the BBM in your 6Gb/s SAS RAID controller.

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Step 8. Re-check Fault LED Cable Connections (Optional)

Be sure that the proper failed drive channel information is displayed by the fault LEDs. An improper connection will tell the user to “Hot Swap” the wrong drive. This can result in removing the wrong disk (one that is functioning properly) from the controller. This can result in failure and loss of system data.

Step 9. Power up the System

Thoroughly check the installation, reinstall the computer cover, and reconnect the power cord cables. Turn on the power switch at the rear of the computer (if equipped) and then press the power button at the front of the host computer.

Step 10. Install the Controller Driver

For a new system:

- Driver installation usually takes places as part of operating system installation. Please refer to Chapter 4 “Diver Installation” of the user manual for the detailed installation procedure.

In an existing system:

- To install the controller driver into the existing operating system. For the detailed installation procedure, please refer to the Chapter 4, “Diver Installation” of the user manual for the detailed installation procedure.

Step 11. Install ArchHttp Proxy Server

The 6Gb/s SAS RAID controller firmware has embedded the web-browser McRAID storage manager. ArchHttp proxy server will launch the web-browser McRAID storage manager. It provides all of the creation, management and monitor 6Gb/s SAS RAID controller status. Please refer to the Chapter 5 of the user manual for the detail ArchHttp Proxy Server Installation. For SNMP agent function, please refer to Appendix C of the user manual.

Step 12. Configure Volume Set

The controller configures RAID functionality through the McBIOS RAID manager. Please refer to Chapter 3 of the user manual, Mc-

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BIOS RAID Manager, for the detail. The RAID controller can also be configured through the McRAID storage manager with ArchHttp proxy server installed, LCD module (refer to LCD manual) or through on-board LAN port. For this option, please refer to Chapter 6 of the user manual, Web Browser-Based Configuration.

Step 13. Determining the Boot Sequences

For PC system:

6Gb/s SAS RAID controller is a bootable controller. If your system already contains a bootable device with an installed operating system, you can set up your system to boot a second operating system from the new controller. To add a second bootable controller, you may need to enter setup of motherboard BIOS and change the device boot sequence so that the new RAID controller heads the list. If the system BIOS setup does not allow this change, your system may be not configurable to allow the 6Gb/s SAS RAID controller to act as a second boot device.

For Intel-based Mac system:

Areca controller has supported the EFI BIOS on the PCIe 3.0 6Gb/s SAS RAID controller. You have other alternatively to add volumes on the Intel-based Mac bootable device listing. You can follow the following procedures to add 6Gb/s SAS RAID controller on the Mac bootable device listing.

1. Set the BIOS selection in System Controls: Advance Configuration to "EFI" option for Intel-based MacPro boot.
2. Download OS X Mavericks and DiskMaker X. Follow the DiskMaker X to make a bootable OS X Mavericks USB install drive.
3. Restart your Mac and after you hear the chime sound, press the Option (Alt) key until you see the option to choose the flash drive to boot from.
4. Follow the on-screen prompts to complete Areca Volume Upgrade and Clean Install of OS X Mavericks. Power up the Intel-based Mac and Areca volume will be added in the bootable device automatically.

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2.4 SAS Cables

You can connect the end devices to each other through direct cables or through the SAS expander/backplane connections. The 6Gb/s SAS RAID controller supports daisy-chain expansion up to 8 enclosures. The following is an example of some internal SAS/SATA cables and an external SAS cable.

2.4.1 Internal Min SAS 4i to SATA Cable

The Min SAS 4i to SATA cables are used for connection between the 6Gb/s SAS RAID controller internal connectors and connectors on the SAS/SATA disk drives or SAS/SATA connector backplane. The ARC-1215-4i/1225-8i has 1/2 Min SAS 4i (SFF-8087) internal connectors, each of them can support up to four SAS/SATA drives.

These controllers can be installed in a server RAID enclosure with standard SATA connectors backplane. The following diagram shows the picture of Min SAS 4i to 4*SATA cables. Backplane supports SGPIO header can leverage the SGPIO function on the 6Gb/s SAS RAID controller through the sideband cable.

The SFF-8448 sideband signals cable is reserved for the backplane with header on it.

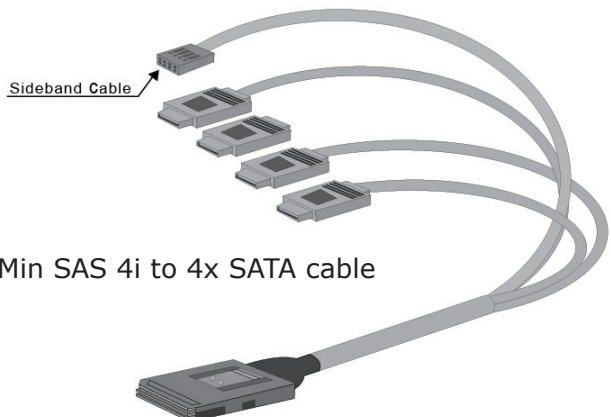


Figure 2-6, Internal Min SAS 4i to 4x SATA cable

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2.4.2 Internal Min SAS 4i to 4xSFF-8482 Cable

These controllers can be installed in a server RAID enclosure without a backplane. The kind of cable will attach directly to the SAS disk drives. The following diagram shows the picture of Min SAS 4i (SFF-8087) to 4xSFF-8482 cables.

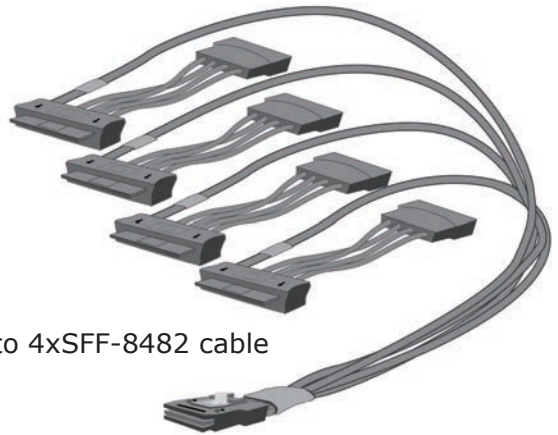


Figure 2-7, Min SAS 4i to 4xSFF-8482 cable

2.4.3 Internal Min SAS 4i (SFF-8087) to Internal Min SAS 4i (SFF-8087) cable

The 6Gb/s SAS RAID controllers have 1-2 Min SAS 4i internal SFF-8087 connectors, each of them can support up to four SAS/SATA signals. These controllers can be installed in a server RAID enclosure with Min SAS 4i internal connectors backplane. This Min SAS 4i cable has eight signal pins to support four SAS/SATA drives and six pins for the SGPIO (Serial General Purpose Input/Output) side-band signals. The SGPIO bus is used for efficient LED management and for sensing drive Locate status.

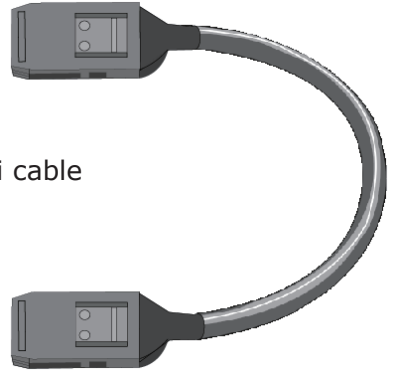


Figure 2-8, Min SAS 4i to Min SAS 4i cable

2.4.4 External Min SAS 4x Drive Boxes and Drive Expanders

The Min SAS 4x external cables are used for connection between the 6Gb/s SAS controller external connectors and connectors on the external drive boxes or drive expanders (JBOD). The 6Gb/s SAS controller has Min SAS 4x (SFF-8088) external connector, each of them can support up to four SAS/SATA signals.

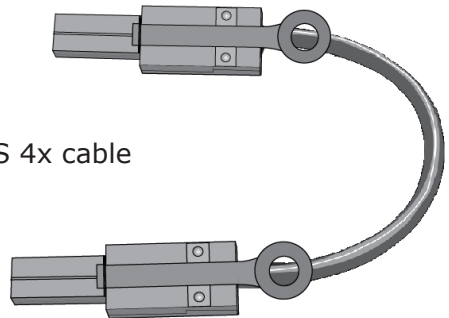


Figure 2-9, Min SAS 4x to Min SAS 4x cable

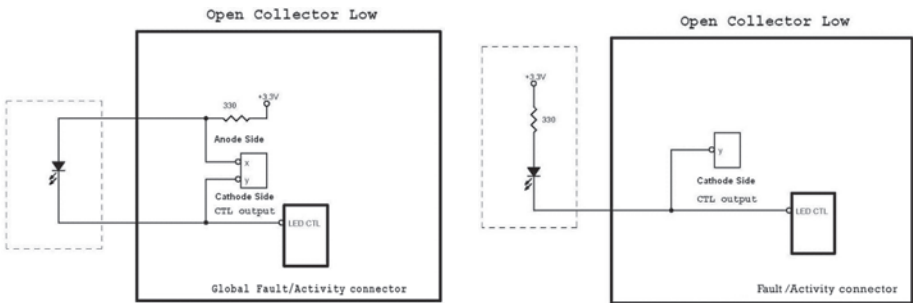
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2.5 LED Cables

There is no SGPIO supported in the most of old version SATA backplane. The 6Gb/s SAS controller also provides two kinds of alternative LED cable header to support the fault/activity status for those backplanes. The global indicator connector is used by the server global indicator LED.

The following electronics schematic is the 6Gb/s SAS RAID controller logical of fault/activity header. The signal for each pin is cathode (-) side.

The following diagrams and descriptions describe each type of connector.



Note:

A cable for the global indicator comes with your computer system. Cables for the individual drive LEDs may come with a drive cage, or you may need to purchase them.

A: Individual Activity/Fault LED and Global Indicator Connector

Most of the backplane has supported the HDD activity from the HDD. The 6Gb/s SAS RAID controller also provides the fault activity for fault LED. Connect the cables for the drive fault LEDs between the backplane of the cage and the respective connector on the 6Gb/s SAS RAID controller.

The following table is the fault LED signal behavior.

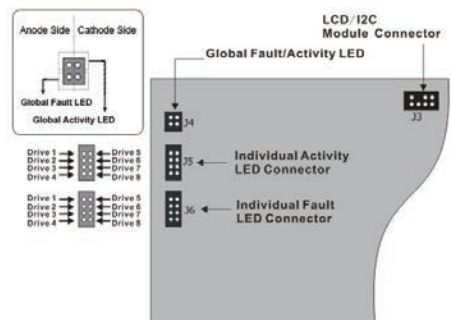
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LED	Normal Status	Problem Indication
Fault LED	<ol style="list-style-type: none"> When the fault LED is lit, there is no disk present. When the fault LED is not lit, then disk is present and status is normal. 	<ol style="list-style-type: none"> When the fault LED is blinking (2 times/sec), that disk drive has failed and should be hot swapped immediately. When the activity LED is lit and fault LED is fast blinking (10 times/sec) there is rebuilding activity on that disk drive.

If the system will use only a single global indicator, attach the LED to the two pins of the global activity/cache write-pending connector. The global fault pin pair connector is the overall fault signal. This signal will light up in any disk drive failure.

The following diagrams show all LEDs, connectors and pin locations.

Figure 2-10, ARC-1215-4i/1225-8i LED Indicator Connector



B: Areca Serial Bus Connector

You can also connect the Areca interface to a proprietary SAS/SATA backplane enclosure. This can reduce the number of activity LED and/or fault LED cables. The I²C interface can also cascade to another SAS/SATA backplane enclosure for the additional channel status display.

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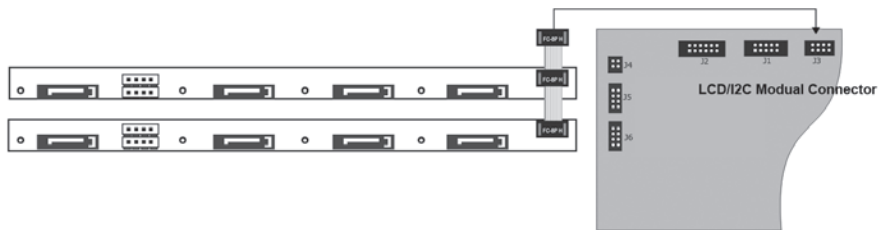
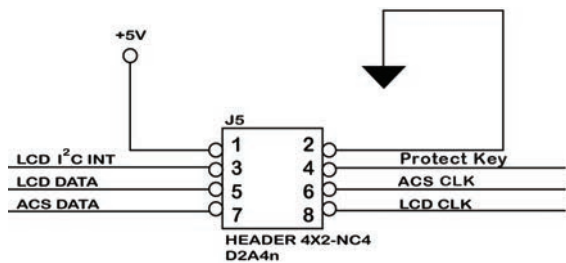


Figure 2-11, Serial Bus Connector for SATA Backplane.

The following picture and table is the serial bus signal name description for LCD & fault/activity LED.

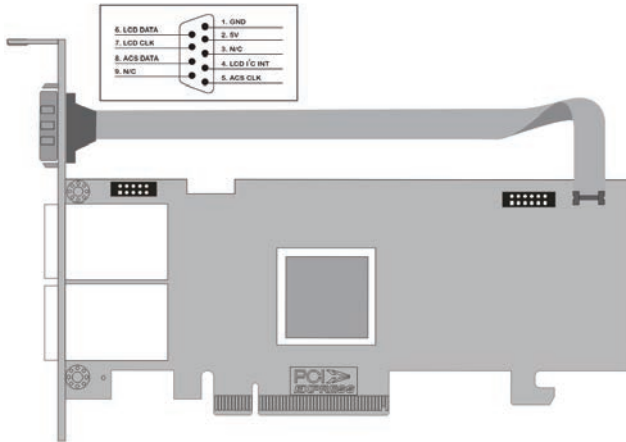


PIN	Description	PIN	Description
1	Power (+5V)	2	GND
3	LCD Module Interrupt	4	Protect Key
5	LCD Module Serial Data	6	Fault/Activity Clock
7	Fault/Activity Serial Data	8	LCD Module Clock

C: External Serial Bus Connector

You also can connect the external serial bus interface on the ARC-1215-4x and ARC-1225-8x to a proprietary SAS backplane enclosure. This signal provide the drive status information including activity/fault LED. The following picture is the external serial bus signal name description for LCD & fault/activity LED on ARC-1215-4x and ARC-1225-8x.

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PIN	Description	PIN	Description
		1	GND
6	LCD Module Serial Data	2	Power (+5V)
7	LCD Module Clock	3	N/C
8	Fault/Activity Serial Data (ACS)	4	LCD Module Interrupt
9	N/C	5	Fault/Activity CLK (ACS)

2.5 Hot-plug Drive Replacement

The RAID controller supports the ability of performing a hot-swap drive replacement without powering down the system. A disk can be disconnected, removed, or replaced with a different disk without taking the system off-line. The RAID rebuilding will be processed automatically in the background. When a disk is hot swap, the RAID controller may no longer be fault tolerant. Fault tolerance will be lost until the hot swap drive is subsequently replaced and the rebuild operation is completed.

2.5.1 Recognizing a Drive Failure

A drive failure can be identified in one of the following ways:

- 1). An error status message lists failed drives in the event log.
- 2). A fault LED illuminates on the front of RAID subsystem if failed drives are inside.

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2.5.2 Replacing a Failed Drive

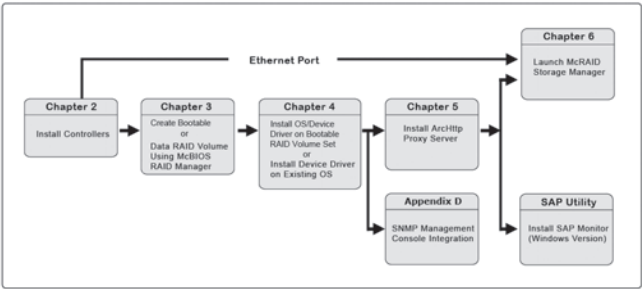
With RAID subsystem drive tray, you can replace a defective physical drive while your computer is still operating. When a new drive has been installed, data reconstruction will be automatically started to rebuild the contents of the disk drive. The controller always uses the smallest hotspare that “fits”. If a hotspare is used and the defective drive is exchanged on-line, the new inserted HDD will automatically assign as a hotspare HDD.

Note:

The capacity of the replacement drives must be at least as large as the capacity of the other drives in the raid set. Drives of insufficient capacity will be failed immediately by the RAID controller without starting the “Automatic Data Rebuild”.

2.6 Summary of the installation

The flow chart below describes the installation procedures for 6Gb/s SAS RAID controllers. These procedures include hardware installation, the creation and configuration of a RAID volume through the McBIOS/McRAID manager, OS installation and installation of 6Gb/s SAS RAID controller software.



The table below shows the software components that configure and monitor the 6Gb/s SAS RAID controllers.

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Configuration Utility	Operating System Supported
McBIOS RAID Manager	OS-Independent
McRAID Storage Manager (Via Ethernet port)	OS-Independent
McRAID Storage Manager (Via ArchHTTP proxy server)	Windows, Linux, FreeBSD, Solaris and Mac OS X
ArchHTTP Proxy Server	Windows, Linux, FreeBSD, Solaris and Mac OS X
CLI Utility	Windows, Linux, FreeBSD, Solaris and Mac OS X
SNMP Manager Console Integration	Windows, Linux, FreeBSD and Solaris
SAP Monitor (Single Admin Portal to scan for multiple RAID units in the net- work, via ArchHTTP proxy server)	Windows

McRAID Storage Manager

Before launching the firmware-embedded web browser, McRAID storage manager through the PCIe bus, you need first to install the ArchHTTP proxy server on your server system. If you need additional information about installation and start-up of this function, see the McRAID Storage Manager section in Chapter 6 of the user manual.

ArchHTTP Proxy Server

ArchHTTP has to be installed for GUI RAID console (McRAID storage manager) to run. It is used to launch the web browser McRAID storage manager. It also runs as a service or daemon in the background that allows capturing of events for mail and SNMP traps notification. If you need additional information about installation and start-up of this function, see the ArchHTTP Proxy Server Installation section in Chapter 5 of the user manual.

CLI Utility

CLI (Command Line Interface) lets you set up and manage RAID controller through a command line interface. CLI performs many tasks at the command line. You can download CLI manual from Areca website or software CD <CDROM>\DOCS directory.

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SNMP Manager Console Integration

There are two ways to transport SNMP data on the 6Gb/s SAS RAID controller: in-band PCIe host bus interface or out-of-band built-in LAN interface. Enter the "SNMP Tarp IP Address" option on the firmware-embedded SNMP configuration function for user to select the SNMP data agent-side communication from the out-of-band built-in LAN interface. To use in-band PCIe host bus interface, keep blank on the "SNMP Tarp IP Address" option.

● Out of Band-Using LAN Port Interface

Out-of-band interface refers to transport SNMP data of 6Gb/s SAS controllers from a remote station connected to the controller through a network cable. Before launching the SNMP manager on the client, you need firstly to enable the firmware-embedded SNMP agent function and no additional agent software inquired on your server system. If you need additional information about installation and start-up this function, see the section 6.8.4 "SNMP Configuration" of the user manual.

● In-Band-Using PCIe Host Bus Interface

In-band interface refers to management of the SNMP data of 6Gb/s SAS controllers from a PCIe host bus. In-band interface is simpler than out-of-band interface for it requires less hardware in its configuration. Since the 6Gb/s SAS RAID controller is already installed in the host system, no extra connection is necessary. Just load the necessary in-band Areca SNMP extension agent for the controllers. Before launching the SNMP agent in the sever, you need first to enable the firmware-embedded SNMP community configuration and install Areca SNMP extension agent in your server system. If you need additional information about installation and start-up the function, see the SNMP Operation & Installation section in the Appendix D of the user manual.

Single Admin Portal (SAP) Monitor

This utility can scan for multiple RAID units on the network and monitor the controller set status. For additional information, see the utility manual (SAP) in the packaged CD or download it from the web site <http://www.areca.com.tw>.