Thunderbolt™ Product

ARC-4320T2

(Thunderbolt 2 to 6Gb/s SAS Adapter)

Quick Start Guide

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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-4320T2 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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1. Hardware Installation

This section describes how to install the ARC-4320T2 Thunderbolt 2 to SAS host computer and disks.

1.1 Before You First Installing

Thanks for purchasing the ARC-4320T2 as your SAS expansion adapter. The following manual gives simple step-by-step instructions for installing and configuring the ARC-4320T2 SAS expansion adapter.

Unpack
Unpack and install the hardware in a static-free environment. ARC-4320T2 SAS expansion adapter is packed inside an anti-static bag between two sponge sheets. Remove it and inspect it for damage. If the ARC-4320T2 appears damaged, or if any items of the contents listed below are missing or damaged, please contact your dealer or distributor immediately.

Checklist
• 1 x ARC-4320T2 SAS expansion adapter
• 1 x Installation CD – containing driver, relative software, an electronic version of this manual and other related manual
• 1 x Thunderbolt cable (1m)
• 1 x Power cord

System Requirements
• Computer with Thunderbolt connector
• Mac OS X 10.8.5 or higher
• Windows 7&8

"For Windows PC: the Thunderbolt certified device driver must be installed before plugging in the device for it to function properly"

HARDWARE INSTALLATION

1.2 Summary of ARC-4320T2 Setup Steps

● For Mac OS X

Step 1. Physically Install the Hardware (Chapter *1.4.2*)
1. Connect power cord.
2. Connect Thunderbolt cable.

Step 2. Install the ArcSAS Software Package (Chapter *1.4.2.1*)
1. Download the install_arcsas installer from the website at "*http://www.areca.com.tw/support/s_thunderbolt/4320T2_mac.htm*".
2. Double-click on the install_arcsas zipped file.
3. Double-click on the install_arcsas icon on the Finder.
4. Follow the installer on-screen steps to complete the installation.

Step 3. Format Devices (Chapter *1.4.2.2*)
1. Mac OS X recognizes that a new disk is available.
2. Follow the Disk Utility on-screen steps to initialize and partition your unit.
3. Icons for each new partition show up on your desktop.
4. They are now ready to use.

● For Windows

Step 1. Creating the Driver Diskettes (Chapter *1.4.3.1*)

Step 2. Installing Controller on an Existing Windows (Chapter *1.4.3.2*)
1. Installing the driver from software CD or downloading the latest version drivers from the website at "*http://www.areca.com.tw/support/s_thunderbolt/4320T2_win.htm*".
2. Follow the steps to complete the installation.

Step 3. Uninstall Controller from Windows (Chapter *1.4.3.3*)
1. Click "Start" ==> right-click "Computer" and select "Manage".
2. Click "Disk Management" in the left pane.
3. Scroll down to the bottom of the middle pane. Windows will display a list of new drives attached to your system with a

label such as "Disk 1" or "Disk 2", etc.

4. Right-click on the drive you want to partition and then again to format it.

5. Once it's formatted, Windows automatically assigns the next available drive letter to it and then it will appear in Windows Explorer.

6. They are now ready to use.

1.3 SAS Expansion Adapter Box View

The following diagram is the SAS expansion adapter front view and rear view.

Front View
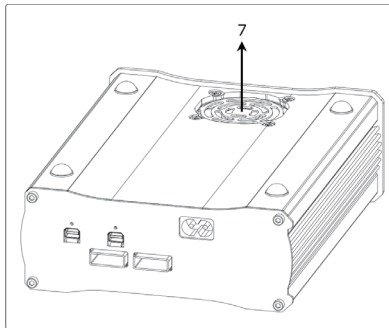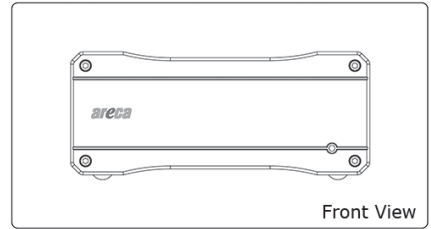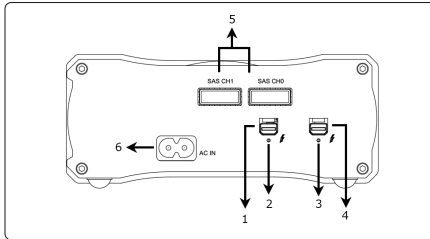
Rear View
1. Thunderbolt Port1
2. Thunderbolt Port1 Link LED
3. Thunderbolt Port2
4. Thunderbolt Port2 Link LED
5. 6Gb/s SAS ports
6. Power Connector
7. System Fan

The following table describes the ARC-4320T2 SAS expansion adapter Thunderbolt port link LED behavior.

Thunderbolt Ports Link LED	Status
Green light	1. Lit indicates SAS expansion adapter is powered and maintained the daisy chain with other Thunderbolt devices. 2. Blinking (5 times/sec) that indicates SAS expansion adapter is in sleep mode. 3. Blinking (1 time/sec) that indicates SAS expansion adapter is powered down and maintained the daisy chain with other Thunderbolt devices.
Amber light	There is a proper DisplayPort connection on that Thunderbolt port.
Red light	There is a proper DisplayPort to DVI connection on that Thunderbolt port.

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1.4 Setting Up SAS Expansion Adapter

Setting up your ARC-4320T2 involves these main steps:
• Physically Install the ARC-4320T2 with JBOD or Drive Box
• Install the ArcSAS Software

Details about these steps are described in the following sections.

1.4.1 Physically Install ARC-4320T2 and Drives

Please follow the steps below in order they are given to ensure that your ARC-4320T2 connected on your Thunderbolt computer.

Step 1. Installing the JBOD or Drive Box

The following figure shows how to connect the external Mini SAS SFF-8088 cable from the 6Gb/s SAS expansion adapter that has external connectors to the external drive boxes or drive enclosures (please follow the user manual of drive box or enclosure to install disks and cables).
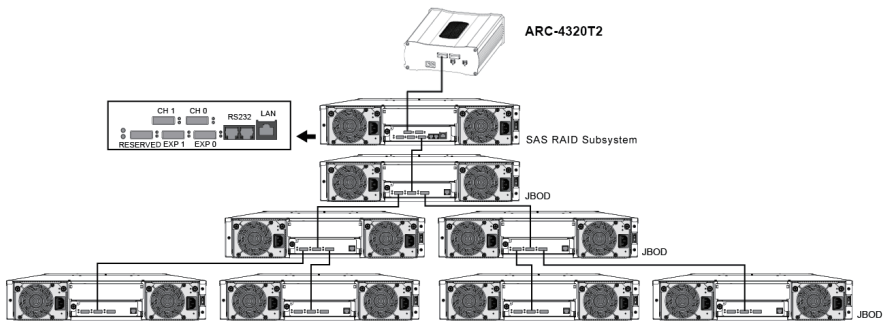

Figure 2-6, External connector to a drive box or drive enclosure

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Step 2. Connecting Thunderbolt Ports

Thunderbolt connectors are provided on the back of the ARC-4320T2 for connecting the array to Thunderbolt host and next Thunderbolt devices. There are two Thunderbolt connectors on the rear of ARC-4320T2. You can plug-in two host ports.

1. Direct connection to a Thunderbolt technology capable computer.
2. Daisy chaining Thunderbolt capable devices and displays.

• Thunderbolt Computer Port Connection

By installing Thunderbolt technology capable computer and ARC-4320T2 Thunderbolt port using the Thunderbolt cable which is included in your Thunderbolt capable computer. Then connect ARC-4320T2 and Thunderbolt technology capable computer port as shown below:
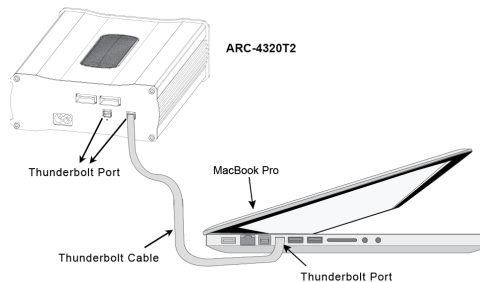

Figure 2-6, Connecting to Thunderbolt computer

• Daisy Chain Topologies

A single Thunderbolt technology daisy chain can have seven devices, including the computer. Connect the cable to one of the interface ports on the back of your ARC-4320T2 and to your Thunderbolt capable computer. The additional port may be used to daisy chain compatible computer peripherals, such as hard drives, monitors, and much more. A single Thunderbolt port supports hubs as well as a daisy chain of up to seven Thunderbolt devices on, including the Thunderbolt capable computer.
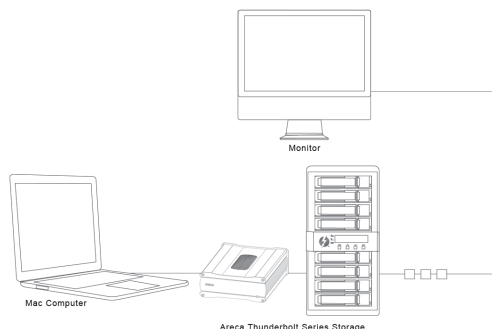
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Figure 2-7, Thunderbolt Computer Daisy Chain

Step 3. Connecting ARC-4320T2 Power

To power the ARC-4320 SAS expansion adapter:

1. Using the included power cord, connect this power cord to a grounded electronical outlet and to the ARC-4320T2.

2. ARC-4320T2 will automatically turn on when host computer power on status is received from the thunderbolt cable.
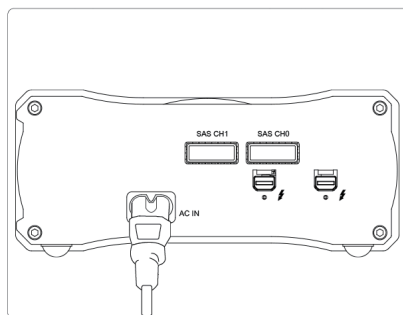

Figure 2-8, Connecting the Power to Adapter

3. ARC-4320T2 automatically turns off when the computer to which it is attached sleeps or is disconnected.

When you are finished installing the ARC-4320T2, you can set up the connected devices.

1.4.2 Mac Users

### 1.4.2.1 Install the ArcSAS Software

This section describes detailed instructions for installing the Mac driver & utility for the ARC-4320T2 on your Apple Thunderbolt capable machine. You must have administrative level permissions to install Mac OS X driver & utility. This can be done in just a few steps!

1. Download the install_arcsas installer from the website at "*http://www.areca.com.tw/support/s_thunderbolt/4320T2. htm*", the file name begins with "install_arcsas" followed by the version control or insert the ARC-4320T2 software CD in the CD-ROM drive.

2. Double-click on the zipped file that comes from the website or resides at <CDROM>\packages\MacOS to add the installer on the Finder.

3. Launch the installer by double-clicking the install_arcsas on the Finder. The ArcSAS Installer opens. Click on the "**Next**" button to begin the installation.

4. The ArcSAS Installer opens. Click on the "**Next**" button to begin the installation.
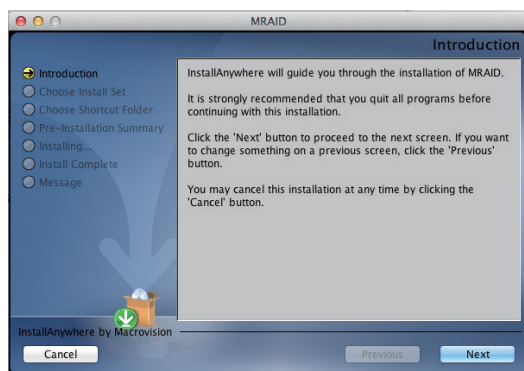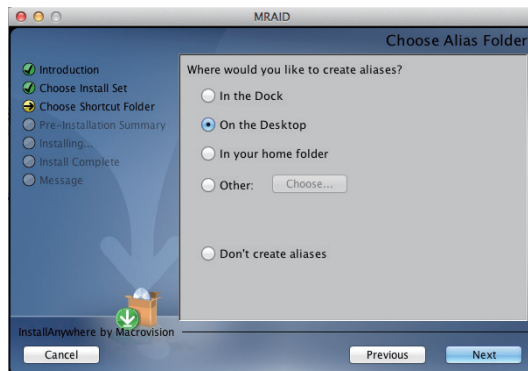
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5. On the Choose Install Set screen, click on an icon to install special components and click on the "**Next**" button to continue.
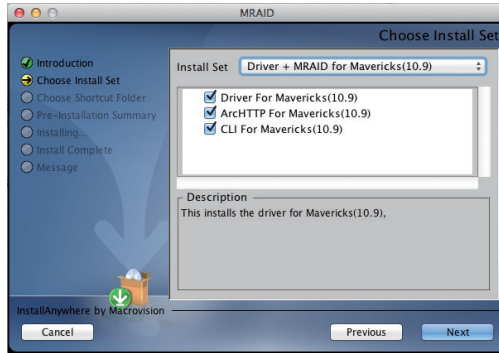
• **Driver** is required for the operating system to be able to inter-act with the ARC-4320T2 SAS expansion adapter.

• **CLI (Command Line Interface)** provides the functionality available in Host_BIOS setup manager through a Command Line Interface. You can set up and manage SAS expansion adapter inline. CLI performs many tasks at the command line. For CLI function, please refer to Chapter 3 of the user manual.

6. On the Choose Alias Folder screen, click on an icon to choose where you like to create aliases and click on the "**Next**" button to continue.

7. On the Pre-Installation Summary screen, review your installation setting and click on the "**Install**" button to continue. If you want to change any of your installation setting, click on the "**Previous**" button.
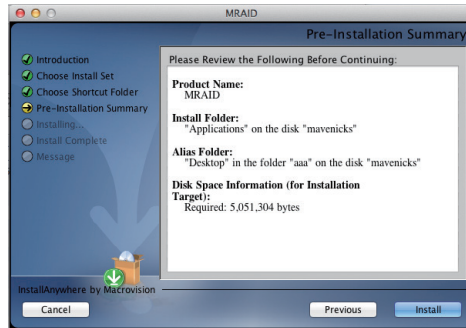
8. A program bar appears that measures the progress of the driver installation.
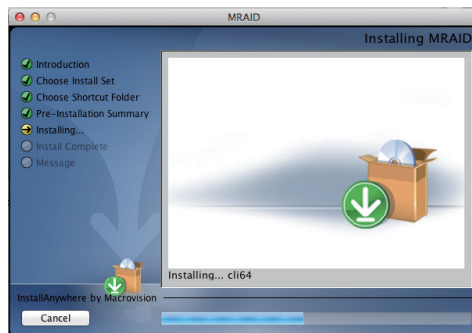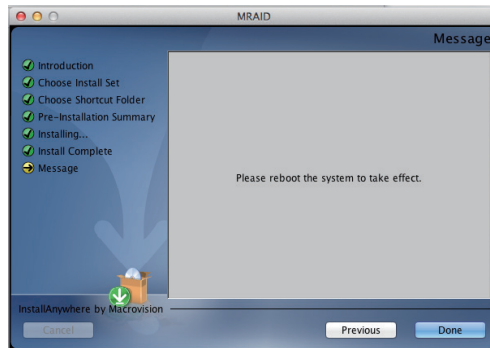

9. When this screen shows, you have completed the driver installation and click on the "**Next**" button to continue.

10. After installation is completed, click on the "**Done**" button to reboot your computer in order to complete installation.

11. A reboot is required to complete the installation.

There is one "ARCSAS" icon showing on your desktop. Double-click on the "ARCSAS" icon to locate your CLI program file folder.

1.4.2.2 Format Devices

When you reboot the Mac machine, the Mac OS X recognizes that a new disk is avail, and displays a message asking what you next want to do. If the message does not show up, start the "Disk Utility" manually from the "Finder", use the "Go" menu and open the "Utilities" folder. Double-click on the "Disk Utility" program. Follow the on-screen prompts to create a volume set and to assign a disk drive letter.

To initialize and partition your unit

1. When the Disk Utility window opens, find and select the desired drive in the sidebar that represents your SAS host adapter and click on the "**Partition**" button.

2. In the Partition Layout column, click on the "**Current**" to show the drop-down menu and select the number of partitions that you want your SAS host adapter to have. Each partition will appear as a separate drive on your computer.
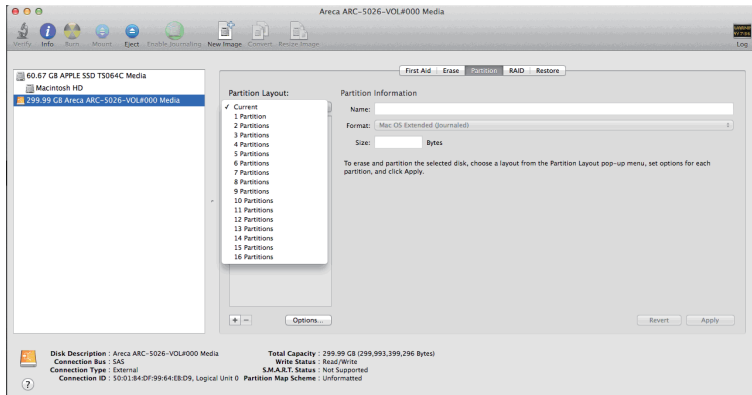
3. Specify your Partition Information, Option setting and click on the "**Apply**" button.
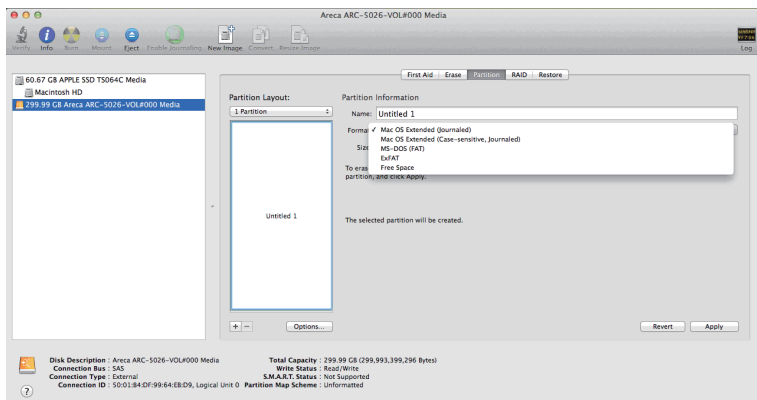
If you're not sure which format to use, choose Mac OS X Extended (Journaled).

4. When a message asks you to confirm you want to partition the disk, click on the "**Partition**" button. This may take a couple of minutes, depending on the size of the drives in your SAS host adapter. When the partitioning is complete, icons for each new partition show up on your desktop. They are now ready to use.

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1.4.3 Windows Users

This chapter describes how to install the ARC-4320T2 device driver to your Windows operation system. The installation procedures use the following terminology:

Installing SAS host adapter into an existing operating system

The computer has an existing operating system installed and the ARC-4320T2 is being installed as a secondary controller.

Have all required system hardware and software components on hand before proceeding with the setup and installation.
Materials required:

• ARC-4320T2 software CD
• ARC-4320T2 host adapter

1.4.3.1 Creating the Driver Diskettes

The software CD disc shipped with the ARC-4320T2.

If you do not have the software CD disc with the package, contact your local dealers or you can also download the latest version drivers for Windows 8/Server 2012/7 and Mac Pro from the Areca web site at http://www.areca.com.tw

These driver diskettes are intended for use with new operating system installations. For Windows 8/Server 2012/7, you can copy the Windows driver file to USB device and installed from it. Determine the correct kernel version and identify which diskette images contain drivers for that kernel. If the driver file ends in .img, create the appropriate driver diskette using "dd" utility.

1.4.3.2 Installing Controller on an Existing Windows

The ARC-4320T2 can be used with Microsoft Windows 8/Server 2012/7 with StorPort Drivers.

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In this scenario, you are installing the controller in an existing Windows system. To install the driver:

1. Follow the instructions in Chapter 2, the Hardware Installation Chapter, to install the controller and connect the disk drives or enclosure.

2. Boot Windows and the OS will recognize the SAS host adapter and launch the "Found New Hardware Wizard", this guides you in installing the SAS host adapter driver.

3. The Windows will pop-up and provide a choice of how to proceed. so that you can choose a specific driver.

4. When the next screen queries the user about utilizing the currently installed driver, click on the "**Have Disk**" button.

5. Insert the SAS host adapter driver media to locate the correct path. Click on the "**Next**" button.

6. Windows automatically copies the appropriate driver files and rebuilds its driver database.

7. The summary screen appears; click on the "**close**" button.

8. Restart the computer to load the new drivers.

After you finish installing device driver, the following steps show how to make any new independent disks accessible to Windows.

(a). Click "**Start**" = => right-click "**Computer**" and select "**Manage**".

(b). Click "**Disk Management**" in the left pane.

(c). Scroll down to the bottom of the middle pane. Windows will display a list of new drives attached to your your system with a label such as "Disk 1" or "Disk 2", etc.

(d). Right-click on the drive you want to partition and then again to format it.

(e). Once it's formatted, Windows automatically assigns the next available drive letter to it and then it will appear in Windows Explorer.

1.4.3.3 Uninstall Controller from Windows

To remove the SAS host adapter driver from the Windows system, follow the instructions below.

1. Ensure that you have closed all applications and are logged in with administrative rights.

2. Open "Control Panel" and start the "Add/Remove Program" icon and uninstall and software for the SAS host adapter.

3. Go to "Control Panel" and select "System". Select the "Hardware" tab and then click the "Device Manager" button. In device manager, expand the "Storage controllers" section. Right click on the "ARECA(X86-32-STORPORT) SAS 6G PCI Host Adapter" and select "Uninstall".

4. Click **Yes** to confirm removing the SAS host adapter driver. The prompt to restart the system will then be displayed.

2. Specification

This section presents a brief overview of the Thunderbolt 2 to 6Gb/s SAS expansion adapter, ARC-4320T2 that is combined with ARC-4050T2 and ARC-1320 SAS host adapter.

2.1 Overview

Unleash Your Creativity Faster Than Ever

Thunderbolt 2 is full backward compatibility to the same cables and connectors used with today's Thunderbolt. It pushes speed to 20Gb/s and enables 4K video file transfer and display simultane-ously. ARC-4320T2 is equipped with dual Thunderbolt 2 ports for connecting to any Thunderbolt 2-enabled host such as the new Mac Pro, and offers an additional Thunderbolt 2 port for daisy-chaining other peripherals. The Thunderbolt daisy-chaining allows connec-tion of up to six devices, so customers can connect ARC-4320T2 for massive amounts of video storage with a single Thunderbolt connection to their host computer. ARC-4320T2 can meet the de-mand of users when working with rich, ultra-high resolution media through Thunderbolt 2 interface.

Enabling an Easy-to-Manage SAS Solution

The ARC-4320T2 SAS expansion adapter is a PCIe 2.0 x8 lanes 6Gb/s SAS bus low profile host adapter inside. The adapters bring the fastest available connections to SAS/SATA storage on any com-puter, and workstation with Thunderbolt 2 interface. ARC-4320T2 expansion adapter provide a blazing-fast storage connectivity solution with enhanced reliability and performance to support any application and tiered storage solution.

ARC-4320T2 6Gb/s expansion adapter is ideal for large capac-ity external storage RAID and no-RAID enclosure. ARC-4320T2 6Gb/s SAS expansion adapter is able to connect to SATA and SAS hard disk drives, allowing for tiered storage that optimizes costs and performance. SAS drives are optimal when speed and reli-ability are of the utmost concern while SATA drives are appropriate when capacity and cost are more important. System integrators

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can use the ARC-4320T2 to meet different storage infrastructure applications that support both SAS and SATA devices. API library for customer combines the ARC-4320T2 function code to its monitor utility. Device drivers are also supported for the major operating systems for compatibility with a full range of SAS peripherals including hard disk drives (HDDs), tape drives, tape autoloaders, solid state drives (SSDs) and removable media (DAS/JBOD).

2.2 Features

Hardware Specification
• Enables SAS connectivity on systems with a Thunderbolt 2 port
• Support up to 8 SAS Ports
• Up to 6Gb/s transfer rates per SAS port
• Support 1.5, 3.0 and 6 Gb/s SAS and SATA link rates
• Support a maximum 128 SAS/SATA devices using SAS expander
• Dual 20Gbps Thunderbolt 2 ports with DisplayPort and device daisy-chain support
• Thunderbolt cable included
• RoHS compliant

Serial Attached SCSI (SAS) 6Gb/s
• Serial Attached SCSI (SAS-2.0) compliant
• Supports Wide port (Any combination of x1, x2, and 4x)
• Supports Serial SCSI Protocol (SSP)
• Supports SAS Management Protocol (SMP)
• Supports Serial ATA Tunneling Protocol (STP)
• Hot-plug capability
• Staggered spin-up control

Easy Management
• Supports Command Line Interface (CLI)
• API library for customer to write monitor utility
• Enclosure management for external port via SAS expander

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Product Features

Form Factor	Mini Box
Host Connection	Two 20 Gb/s Thunderbolt Technology Ports
External Ports	2 x 6Gb/s SAS SFF-8088 ports
OS Support	Mac OS X 10.8.5, 10.9 (Mavericks) and later & Windows 7/8
Enclosure Management	Thunderbolt Port
Cooling Fan	1 * noiseless cooling fan
Operating Temperature	0 ~ 35 ˚C
Operation Humidity	5% ~ 95 %, Non-condensing
Power Supply/In/out	65W / 100-240V AC
Dimension (W x H x D)	4.97 x 2.13 x 6.35 in (150 x 64.4 x 191.7 mm)
Weight	2.64 lbs / 1.2Kg