RocketRAID 600L/600LS

SATA 6Gb/s PCI-Express 2.0 RAID Host Adapters

User's Guide
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HighPoint Technologies, Inc.

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HighPoint RocketRAID 600L/600LS Series

HighPoint 2nd Generation SATA 6Gb/s PCI-E 2.0 RAID HBA's

HighPoint's RocketRAID 600L/600LS Series HBA's are the Industry's most affordable, high-performance, SATA 6Gb/s RAID HBA's, and are ideal for desktop PC's and workstations. These Second Generation SATA 6Gb/s host controllers utilize a PCI-Express 2.0 host bus interface, HighPoint's Industry-proven RAID engine, and support a wide-range of single-disk and RAID configurations including 0, 1, 5, 10 and JBOD.

RocketRAID 600L/600LS HBA's are fully backwards compatible with SATA 3Gb/s devices, PCI-Express 1.0 and 2.0 motherboards, and are compliant with major PC operating systems including Windows 8, and 7. Each RocketRAID 600L/600LS Series HBA's directly supports up to 4 SATA devices, and up to 20 when used in conjunction with port multiplier storage devices. For maximum performance, attach SATA hard drives and SSD's directly to the RocketRAID 600L/600LS's SATA and eSATA ports. To maximize storage capacity, use the RocketRAID 600L/600LS with port multiplier storage chassis and external disk enclosures. The HighPoint RAID Management Software provides a user friendly interface to create, manage and maintain your storage solutions.

RocketRAID 600L Series HBA Family:
- RocketRAID 640L - 4 SATA ports
- RocketRAID 642L - 2 SATA ports and 2 eSATA ports
- RocketRAID 644L - 4 eSATA ports
- RocketRAID 644LS - 1 Mini-SAS port

1 Features and Specifications

Hardware Specifications
- PCI Express 2.0 x4
- 4x SATA 6Gb/s Ports
- Industry standard SATA/eSATA/Mini-SAS connectors
- Directly supports 4 SATA devices / Up to 20 with port multiplier capable enclosure
- Backwards compatible with HighPoint SATA RAID HBA's
- Low Profile (RocketRAID 640L, RocketRAID 642L and RocketRAID 644LS) / Full Height (RocketRAID 644L)

Monitor, Alerts and LED Indicators
- Hard Drive LED Indicators (Activity and Failed)
- SMTP email notification for events and error reporting
- Alarm/Buzzer alerts for drive/array failure

Advanced RAID Features
- RAID 0, 1, 5, 10, 50, JBOD
- Redundant RAID Configuration for Array availability
- RAID Initialization Types - Background, Foreground, Quick Initialization and Keep Old Data
- Spin Down Idle Disk
- S.M.A.R.T Support
- Auto Rebuild on spare drive
- Hot-Plug and Hot-Swap support
- Larger than 2 TB drive support
- Bootable RAID Array support
- Write Back or Write Through Cache support
- User friendly Browser-based Management Interface
- Easy to use BIOS configuration Tool
- Linux Command Line Interface (CLI)-Scriptable configuration tool
- Hot key (Ctrl+H) boot-up RAID manager via BIOS
- Web browser-based RAID management software (Web GUI)
- Command Line Interface (CLI)

Operating System Support
- Windows Server 2012, 2008, 2003
- Windows 8, 7, Vista
- Major Linux Distributions
- FreeBSD
- Mac OS X

2 Physical Specifications

Dimensions:
RocketRAID 640L: 79mm x 65mm x 1.5mm (3.12" x 2.56" x 0.06")
RocketRAID 642L: 79mm x 67mm x 1.5mm (3.12" x 2.68" x 0.06")
RocketRAID 644L: 106mm x 79mm x 1.5mm (4.17" x 3.12" x 0.06")
RocketRAID 644LS: 79mm x 68mm x 1.5mm (3.12" x 2.68" x 0.06")

EMI:
FCC Part 15 Class B and CE

Thermal and Atmospheric Characteristics:
Work Temperature Range: +5°C ~ + 55°C
Relative Humidity Range: 5% ~ 60% non-condensing
Storage Temperature: -20°C ~ +80°C
MTBF: 920,585 Hours

Electrical Characteristics:

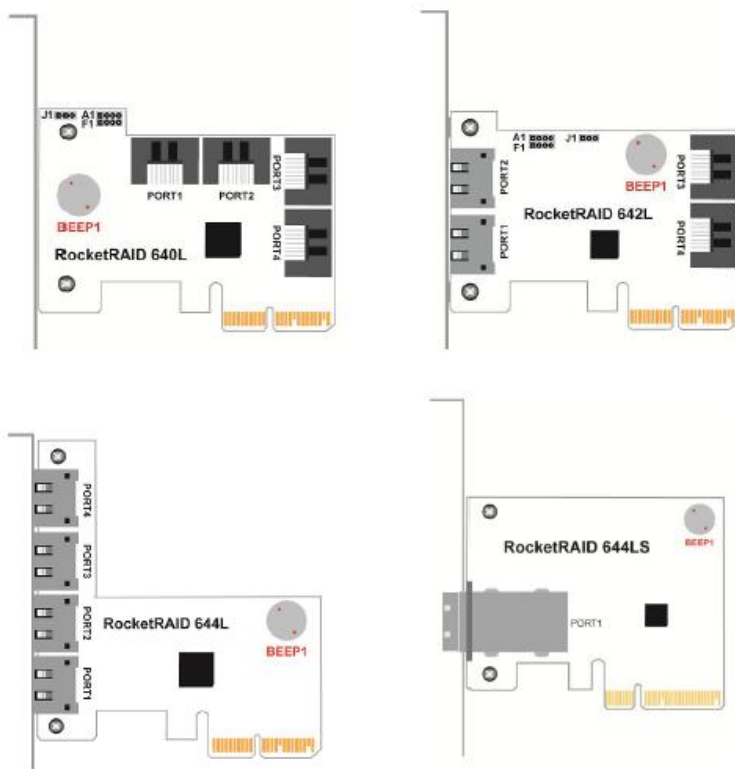| PCI-E	3.3V	12V
Power	4W Max	1W Max

3 Kit Contents

- RocketRAID 644L / 644LS / 642L / 640L HBA
- Quick Installation Guide
- Low Profile Bracket (RocketRAID 644LS, 642L and 640L)
- Two SATA 6Gb/s cables (RocketRAID 642L only), four SATA 6Gb/s cables (RocketRAID 640L only)

4 Hardware Description and Installation

4.1 RocketRAID 600L/600LS Host Adapter board layout

4.2 Connector and Jumper Description

Connector	RocketRAID 640L	RocketRAID 642L	RocketRAID 644L	RocketRAID 644LS
A1	Active LED PIN		N/A	
F1	Fail LED PIN		N/A	
J1	I2C Connector		N/A	
Beep 1	Alarm Buzzer			
Port Connector	SATA	SATA and eSATA	eSATA	Mini-SAS

Active/FAIL LED PIN connector:
A 1-Pin connection from the HBA to an LED on the chassis. For detailed LED connection requirements and display information, please refer to the FAQ:
http://www.highpoint-tech.com/websupport/kb_view_article_noauth.php?id=32

4.3 Installing the RocketRAID 600L/600LS Host Adapter

Note: Make sure the system is powered-off before installing the RocketRAID host adapter.

The RocketRAID 600L/600LS series HBA may include both standard and low-profile brackets. It may be necessary to attach the low-profile bracket in place of the standard bracket, depending upon the chassis design.
1. Open the system chassis and locate an unused PCI-E 2.0/1.0 (x4, x8, x16) slot (or 3.0, x16) slot.
2. Remove the PCI-E slot cover.
3. Gently insert the RocketRAID 600L/600LS HBA into the PCI-E slot, and secure the bracket to the system chassis.
4. After installing the adapter, attach the hard disks or backplane enclosure to the host adapter using the appropriate cables.
5. Close and secure the system chassis.

4.4 Verifying Installation

Once the host adapter and hard drives have been installed into the chassis, boot-up the system to verify that the hardware is properly recognized.

1. Power on the system. If the system detects the presence of the adapter, the RocketRAID BIOS Utility will be displayed during boot up.
2. Press "Ctrl+H" key combination to access the RocketRAID 600L/600LS adapter's BIOS Utility.

5. Using the RocketRAID 600L Series HBA

5.1 RocketRAID 600L HBA BIOS mode

The RocketRAID 600L HBA has two BIOS modes:
- Bootable BIOS:
  This is the default BIOS mode, and is required in order to boot from a drive or array hosted by the HBA.
- Non-Bootable:
  This mode is used for pure data storage. The system's boot drive cannot be hosted by the HBA.

5.2 BIOS configuration

1. Bootable BIOS Configuration:
- The HBA needs to have the bootable BIOS installed
- When booting up the system, press **CTRL** + **H** during the HighPoint RocketRAID splash screen to enter the BIOS RAID creation utility.
- Navigate to **Settings** using arrow keys.
- Press **Enter.**
- Press **Enter** again.
- Select the desired RAID array.
- You will return to the main screen once the **boot flag** is set

2. Non-Bootable BIOS Configuration:

The HBA must be updated using the Quick BIOS download. This mode is only suitable for Windows and Linux PC's. To update the BIOS:

- Install the HBA (no drives attached) and boot the operating system.
- Download the Quick BIOS and extract the compressed file to a directory of your choice.
- Open the WebGUI.
- Click the Physical page tab – there is a Firmware update check box towards the bottom of the page.
- Input the Quick BIOS file name and click **Submit** to start the firmware update.
  Note: Do not cancel the update process, or power down/restart the system until the update is complete. Doing so may damage the HBA.
- Shutdown and reboot the system. The HBA BIOS display should now be disabled, and the system should boot directly into the OS.
- If you are unable to use the WebGUI to update the Quick BIOS, please submit a support inquiry using our Online Web Support Portal. Support representatives will provide other methods to update the BIOS:
  http://www.highpoint-tech.com/websupport

  To get the Quick BIOS file associated with your card, please visit the product download page:
  http://www.highpoint-tech.com/USA_new/series_rr600-download.htm

  For any other BIOS boot related issues, please refer to the FAQ:
  http://www.highpoint-tech.com/websupport/kb_view_article_noauth.php?id=161

5.3 RocketRAID 600L/600LS BIOS Setting Utility

The RocketRAID 600L/600LS controller will display its BIOS screen during the system's boot process. The BIOS Utility will display information about hard drives attached to the adapter. Make sure all attached drives are detected by this utility. If any of the hard drive is not detected, power down the system and check the power and cable connections.

Press "Ctrl+H" key combination to access the RocketRAID 600L/600LS adapter's BIOS Utility.

5.3.1 BIOS Settings Overview

The RocketRAID 600L/600LS controller BIOS utility is an interface that provides management commands and controller related settings. Note: The following screenshots depict the RocketRAID 642L BIOS utility. However, all RocketRAID 600L/600LS models utilize the same interface.

5.3.2 Using the BIOS Utility

The following keys are utilized by the RocketRAID 600L/600LS BIOS utility:

Arrow keys – Use these to move between different menu items.
Enter – Open the selected toolbar command/execute the selected command.
Esc – Move back to the previous menu, cancel the selected operation, or exit the BIOS Utility.

5.3.3 BIOS Commands

Create: This command is used to open the RAID Creation menu.
Delete: This command will delete the selected RAID array.
Add/Remove Spare: This command is used to assign hard disks to function as spare disks. The controller is capable of using spare disks to automatically rebuild broken or faulted RAID arrays.

Settings: This command opens the settings menu (To selecting the boot disk/array, staggered drive spin up etc.)

View: This command is used to view hard disk and RAID information.

Initialize: This command is used to prepare disks for use with RAID arrays.   Disks must be initialized before they can be used to create arrays.

5.3.4 Creating RAID Arrays

Initializing Disks:

Before creating a RAID array, the disks must be initialized. Disk initialization writes necessary RAID configuration information to the hard disks. Select the Initialize command from the toolbar, and press Enter key.
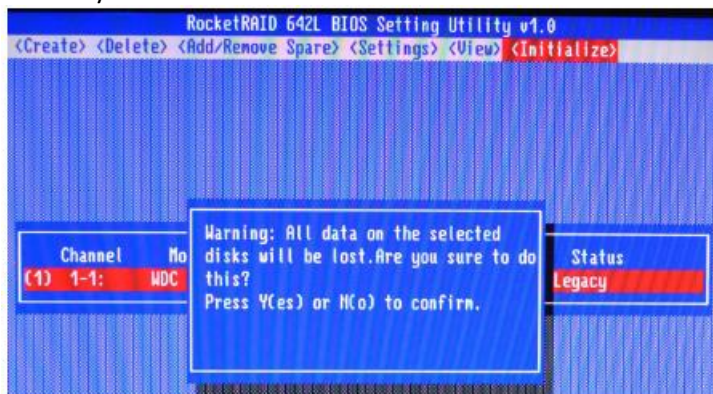
Highlight the target disks using the arrow keys, and then press the Enter key. A numeral will be displayed before each selected disk. Once all target disks have been selected, press ESC key. The utility will display a warning, and ask you to press Y (yes) to initialize, or N (no) to cancel. Once initialized, these disks can be used to create RAID arrays. These disks will be displayed as "Initialized" (under Status). *Warning: Initialization will destroy all pre- existing data on the selected hard disks. Only initialize disks that do not contain critical data.*

Create Arrays:
Select Create from the toolbar and press Enter key.

1. Use the arrow keys to select the RAID level and press Enter key.
2. Use the arrow keys to highlight the Array Name option and press Enter key. The array name dialogue box will appear. Use the keyboard to input a new Array Name, and press the Enter key.

Note: The Array Name command is optional – it is not necessary to name the array. The array can be named at a later time, and the name of the array can be changed at any time.

3. On the Create menu, use the arrow keys to highlight the Select Devices item and press Enter key. A device list will appear, and display all available hard disk drives.
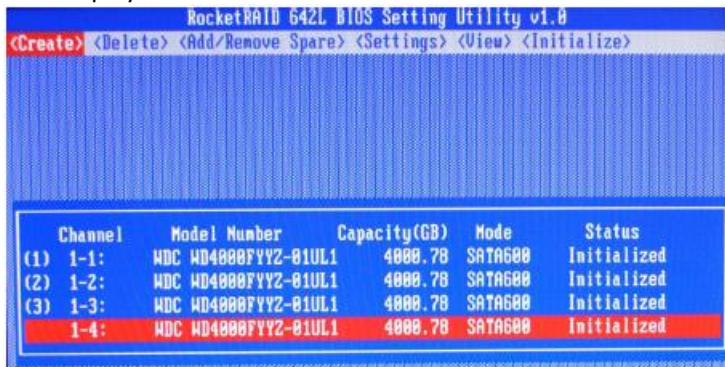
4. Highlight the target disks that you want to use, and press Enter key to select them. A numeral will be displayed before each selected disk. This number designates disk order. After all of the disks have been selected and press the ESC key to return to the Create Menu.

5. Next, Use the ↓ arrow key to highlight the Capacity(GB) option and press Enter key. The total available capacity will be displayed. Press Enter key if you wish to use all available space. If you wish to reserve disk space for additional arrays/single disks, use the keyboard to input the amount of space (in GB) you wish to set aside for this particular array, and press Enter key.
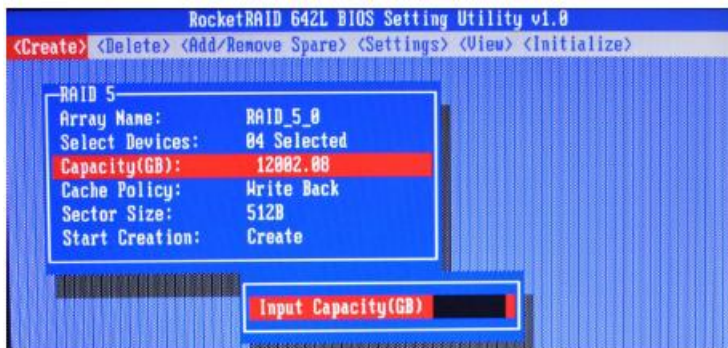
Note: Multiple arrays can be created using the same set of hard disk drives. The Capacity option allows you to set aside disk space that be used to create another array, set as a spare disk, or partitioned to act as a single disk (by the operating system).

6. For redundant RAID arrays (RAID 5, 50), select the Cache Policy:
   Write Back – Provides higher write performance for redundant RAID arrays. Data is at risk when there is a power failure, system kernel panic and un-responding abnormal conditions.
   Write Through – Writes directly to the disks (may reduce the risk of data loss during a critical failure, but at the cost of lower performance).

7. Sector Size – Also known as "Variable Sector Size". Use this option if you are using an older 32-bit Windows operating system. This allows older operating systems to support volumes over 2TB in size. Do not use if the operating system already supports large volumes (such as GPT).

8. To complete the creation procedure, use the arrow key to highlight the Start Creation item and press Enter key. The Window will show 2 options if create RAID 5: Background Initialize and No initialization.

Background initialization:

The RAID array is accessible while disk initialization is being performed.

A. This option will delete all content on the disks.

B. The initialization time will be longer when compared to "Foreground" but the logical drives can be used during the initialization process.

No initialization:

When you select the option, it will pop up the following warning window. Press the Y (yes) key to create the array, or N (no) key to cancel the creation process. If you press the Y, the BIOS will show the following window.

5.3.5 Delete Arrays

Highlight the Delete command from the toolbar, and press Enter key. The BIOS utility will display a list of available RAID arrays. Select the array you wish to delete, and press the Enter key.
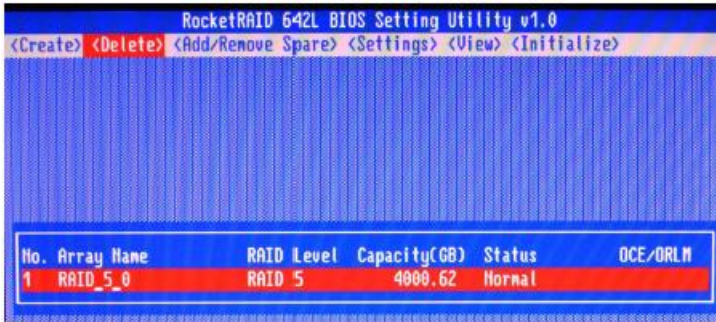
The utility will display a warning message. Press Y (yes) to delete the array, or select N (no) to cancel.
Warning: All data stored on the array will be lost – do not delete if the array contains critical data.

5.3.6 Add/Remove Spare Disks

This Add/Remove Spare command is used to assign a hard disk to act as a Spare Disk. Spare Disks are used to automatically rebuild Redundant RAID arrays (RAID 1, 5, 10) in the case of disk failure. As with creating RAID arrays, disks must be initialized before they can be used as spares. To set a hard disk to act as a Spare Disk, use the arrow keys to select the target disk from the list of initialized disks, and press Enter key. To remove the Spare Disk setting from a hard disk, highlight the spare disk, and press Enter key. Generally, single disks are designated to act as spares (disks that are not configured into RAID arrays). However, in some instances, disks that are members of RAID arrays may also be designated to act as a spare. If the disks in question are part of a RAID array that did not utilize the full available capacity at the time of creation, these disks may be used as spares.

5.3.7 Settings

To access the Settings menu, highlight the Settings command from the toolbar, and press Enter key. There are Select Boot Device and Parameter Setting options in the menu.

Select Boot Device:
Select which disk or array will act as the boot disk, if the motherboard BIOS instructs the card to act as the boot device.

Staggered Spin up:
The default value of this option is disabled. Enabling this setting will instruct the card to power up the hard disks, sequentially (one disk approximately every 2 seconds). Not all disk support this setting – consult the disk documentation for more information.
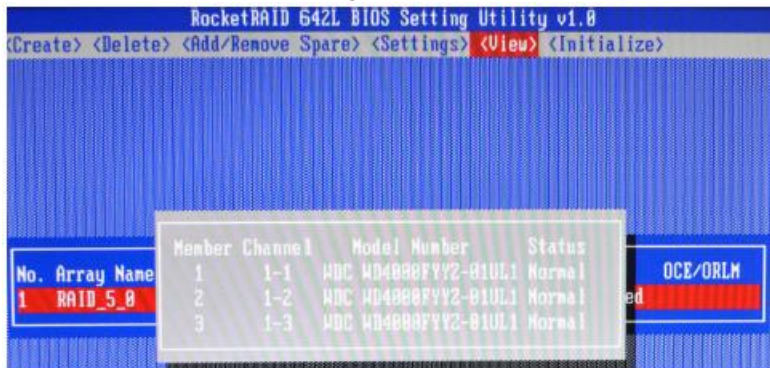
5.3.8 View

The View menu provides two options:
Devices – This option will display information for each disk hosted by the HBA.
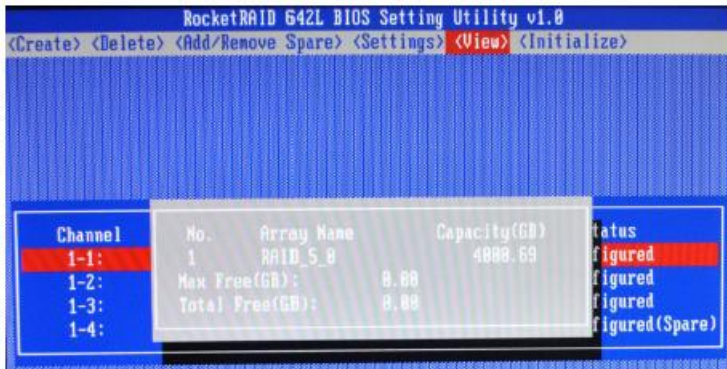
RAID Array – This option will display information about each RAID array hosted by the HBA. Highlight the target device and press Enter to view details about the configuration.
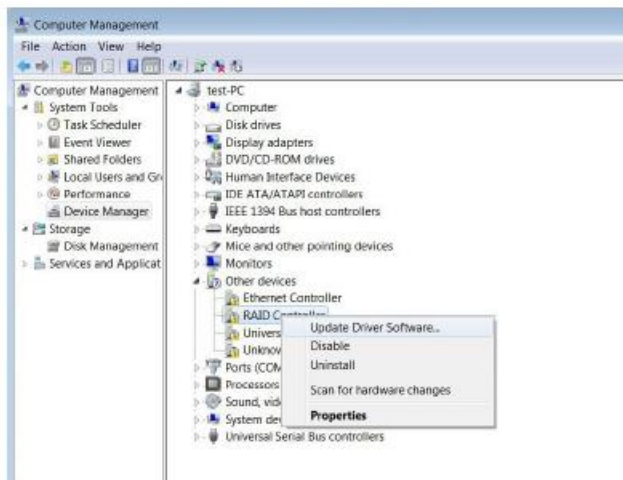

6 RocketRAID 600L/600LS Driver Installation

6.1 Driver installation - Microsoft Windows

Installing the driver for an existing Windows operating system

1. Install the RocketRAID 600L/600LS host adapter into the PC, then boot up the Windows operating system.
2. Windows will detect the RocketRAID 600L/600LS HBA and automatically search for the driver.
3. If Windows is unable to locate the driver, the following message will be displayed:
4. Device Manager will display the RocketRAID 600L/600LS HBA under "Other" devices, with a yellow "!" mark before the "RAID Controller" entry.
5. Download the driver from the HighPoint Website and using Windows Device Manager to install the driver.
6. Right-click the "RAID Controller" entry and select "Update Driver Software".

7. Select "Browse my computer for driver software" in the popup window.
8. Select the driver option that matches your operating system.
9. Follow the Installation Wizard's prompts to install the RocketRAID 600/600LS driver. Click "Close" to exit the Wizard and reboot once the driver has been successfully installed.
10. Once complete, the interface will notify you that the driver has been successfully installed. Click "OK" to reboot the system.
11. After rebooting the system, the RocketRAID 600L/600LS HBA will be recognized by Device Manager, and listed under "Storage Controllers".

Installing the driver during a fresh Windows OS installation
Please prepare a USB flash drive with the RocketRAID 600L Windows driver. The driver can be download from the HighPoint Website:
http://highpoint-tech.com/USA_new/series_rr600-download.htm
1. Boot from the Windows Installation DVD.
2. When the following window is displayed, please insert the USB flash drive with the RocketRAID 600L Windows driver.

3. Select "Load Driver".
4. Browse to the driver folder.
5. Select x32 or x64 according with your windows OS such as:
   \RR64xL\Windows\x64
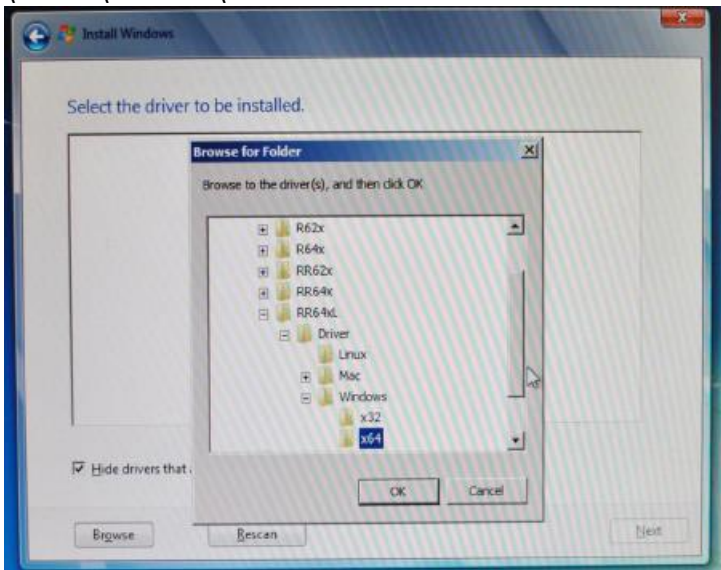
6. Follow the Installation Wizard's prompts to continue the installation process.
7. Windows should display the following entry after locating the driver. Click "Next" to install the RocketRAID 600L/600LS driver.

6.2 Driver installation -Linux and FreeBSD

Please refer to the Driver Installation Guide or README file included with the driver packages for more information.
Linux/FreeBSD driver packages can be download from HighPoint Website.
http://highpoint-tech.com/USA_new/series_rr600-download.htm

7 HighPoint Web RAID Management Software

The HighPoint RAID Management Software (WebGUI) provides RAID configuration and management features. The software can be download from HighPoint Website.
http://highpoint-tech.com/USA_new/series_rr600-download.htm

7.1 Installing / Uninstall the Web RAID Management Software - Microsoft Windows

Install the Web RAID Management Software
1. Extract the ZIP package. Click the Setup.exe icon to install the software.
2. Follow the Installation Wizard's prompts to install the HighPoint RAID Management interface.
3. Click the "Finish" button to complete the installation procedure.
4. To start the RAID Management Interface, double-click the "HighPoint RAID Management" icon that was placed on the desktop during the installation procedure.

Uninstall the Web RAID Management Software
1. Go to Start All Programs HighPoint RAID Management, click Uninstall HighPoint RAID Management.
2. Follow the Installation Wizard's prompts to uninstall the HighPoint RAID Management interface.

7.2 Installing / Uninstalling the Web RAID Management Software – Linux/FreeBSD

Install the Web RAID Management Software
The Web RAID Management software can be download from the HighPoint Website.
http://highpoint-tech.com/USA_new/series_rr600-download.htm

Please refer to the Web RAID Management Installation Guide or README file under the software package for the installation procedure.

7.3 Using the Web RAID Management Software

Please refer to the online help of "How to Use Web RAID Management Software":
http://www.highpoint-tech.com/help/

8 Customer Support

Thank you for purchasing the RocketRAID 600L/600LS SATA 6Gb/s RAID Host adapter. We appreciate your support, and welcome any questions, comments or product suggestions you may have.

If you encounter any problem while utilizing RocketRAID series host adapters, or have any questions about this or any other HighPoint Technologies, Inc. products, feel free to contact our Customer Support Department.

HighPoint Technologies, Inc. websites:
http://www.highpoint-tech.com/
http://www.hptmac.com

Web Support:
http://www.highpoint-tech.com/websupport/