INTRODUCTION

The PCI-Express SATA RAID controller card employs the Marvell HyperDuo technology to take the advantages of the rapid respond of a solid state drive (SSD) and the spacious capacity of a hard disk drive (HDD), to form an ultimate total solution for a high performance, cost effective and large storage system. HyperDuo uses an intelligent algorithm to automatically migrate the most frequent access data on the SSD, while all the rest of the data are safely kept on the hard disk. All these operations are managed by a Storage Utility which organizes the combination of these physical disks as a HyperDuo Virtual Disk and is totally transparent to users.

The controller card also offers a high performance hardware RAID 0/RAID 1 with SATA 6.0Gbps architecture solution to the desktop/consumer storage applications utilizing a native 2-Lane PCI Express 2.0 interface to the host controller board.

The orientation and position of SATA ports are well designed so that the cable wiring fits easily in computer chassis and those ports can be configured manually for internal / external HDD in some specific models.

FEATURES AND SPECIFICATION

General

- Based on Marvell PCI-Express 2.0 SATA 6Gbps controller
- 2-Lane PCI-Express 2.0 interface supports communication bandwidth up to 10.0Gbps
- Compliant with PCI-Express 2.0 Base Specification
- Unique Hard Drive Activity LED indicator circuit design: The LED blinks when there is read/write activity on any one of the hard drive connected to the motherboard or to this add-on card
- Supports Windows 7,Vista,XP,Server 2003/2008 32-/64-bit,Server 2008 R2, Linux and MAC OS

Serial-ATA (SATA) Interface

- Changeable SATA 6.0Gbps ports (internally, externally or their combination)
- Up to 4 SATA devices with point-to-point connectivity
- Compliant with Serial-ATA Specification 3.0
- Supports communication speed of 6.0Gbps, 3.0Gbps, and 1.5Gbps
- Supports Hardware RAID 0, 1,10 and JBOD
- HyperDuo mode supports Safe mode (Mirrored Protection) and Capacity mode(Cost-Optimized) to build a system with SSD and HDD hybrid
- Bootable
- Supports Native Command Queuing (NCQ)
- FIS based Port Multiplier
- Supports SATA port Hot-Plug
- Supports both Standard and Low profile

PACKAGE CONTENTS

- PCI-Express SATA RAID controller card x 1
- Driver CD x 1
- User's manual x 1
- Optional LED cable x 1

BEFORE INSTALLATION

- The user must have basic knowledge of installing an add-on card and its driver to a desktop PC. If you have any queries, please call your local dealer, or find somebody who is experienced in computer hardware installation.
- Motherboard with a free PCI-Express 2.0 slot (x4/ x8/ x16) and a supported operating system installed.

WARNING

Before installing and activating the controller card, please make sure you have a complete backup of your existing data from hard drives. Manufacturer is not responsible for data loss due to abuse, misuse, or neglect. Should you have any installation problem, please contact your dealer for assistance.

HARDWARE INSTALLATION

1. Turn off your computer and all external devices connected to it.
2. Disconnect your computer from the power sources.
3. Open the computer case. Refer to your computer user manual for more details.
4. Find an available PCI-Express 2.0 slot and remove the slot bracket. Save the bracket screw for later use.
5. Align the controller card horizontally with respect to the slot and insert it into the slot firmly and evenly. Take care not to force it into the slot. Once you have properly positioned the controller card into the slot, fasten it to the computer case with the screw you have just saved.
6. Mount the hard disk(s) on the computer case.
7. Connect the power cable to the hard disk(s).
8. Connect the SATA hard disk(s) to the controller card with the SATA cable(s).
9. Connect the computer case's front panel Hard Disk LED cable to pin header **JP9** (See **Figure 1**).
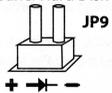

Figure 1

10. Connect the one end of the LED cable (optional) to pin header **JP10**, and the other end to your motherboard's HDD LED connector.
11. Secure the computer case and switch on your computer.

Port Configuration (Optional features)
There are some specific models in which you can change the SATA port on the card freely by changing the jumper header. Please refer to below table for jumper setting.

SATA Port \ Jumper	JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8
CN1					1-2	1-2	1-2	1-2
CN5					2-3	2-3	2-3	2-3
CN2	1-2	1-2	1-2	1-2				
CN6	2-3	2-3	2-3	2-3				

Note: All other combinations of jumper setting are invalid

Marvell BIOS Utility (MBU) for RAID/HyperDuo Setup
Warning: All the data on the hard disks connected to the controller card will be permanently erased in the following actions.
To create a RAID/HyperDuo virtual disk:
1. Power up your computer. Skip this section if you are not going to create a RAID/HyperDuo virtual disk.
2. Press the **[Ctrl] + [M]** key on the keyboard at the same time to enter the Marvell BIOS Utility(MBU).
3. Once the MBU is entered, scroll to **HBA0: Marvell 0** in the **Topology** pane by the up and arrow key on the keyboard and press **Enter**.
4. Choose **Configuration Wizard** and press **Enter** to start creating the RAID/HyperDuo virtual disk.
5. Select the free physical disks available by using the arrow keys to scroll through the disks and press **Space Bar**. After selecting all the disks needed, press **Enter** to continue.
6. Choose the RAID option:
   - RAID Level: RAID 0 – Striping
   - RAID 1 – Disk Mirroring
   - RAID 10 – Stripe of mirrors
   - Stripe Size: 32K, 64K
     - It defines the size of the single data block on the virtual disk. The larger the stripe size, the longer it takes to read and write data blocks on the physical disks. A large size is recommended for applications requiring large data transfers, e.g. audio, video and graphics. A smaller size is suitable for applications with smaller size files, e.g. emails and documents.
   - Name: any value for the users to input
     - Input a user defined identifier for the virtual disk.

7. Choose the HyperDuo option:
   - HyperDuo Mode: Safe – Mirrored Protection
     - Capacity – Cost-Optimized
   - Keep original data: Yes, No (Only available in Safe mode)
     - Preserve the data currently on your HDD or erase all data.
   - Threshold(%): 10-100 for the users to input
     - The number defines the percentage of your SSD the MBU uses to optimize performance. Default is 90.
8. Choose **Next** and press **[Y]** key to start creating the virtual disk.
9. Press **F10** and **[Y]** key to exit the MBU.

Note: A HyperDuo virtual disk must at least contain one SSD and one HDD.

To rebuild a virtual disk:
1. When a hard disk in a RAID 1 virtual disk or a SSD in a HyperDuo Safe mode virtual disk is defective or the data inside are corrupted, the Marvell BIOS Utility (MBU) will mark the virtual disk as **Degrade**.
2. Replace the defective hard disk/SSD with an identical hard disk/SSD or a hard disk/SSD which has a smaller size within the allowable value set for the virtual disk.
3. Press the **[Ctrl] + [M]** key on the keyboard at the same time to enter the MBU.
4. In the **Topology** pane, scroll to the Virtual Disks ID, press **Enter** and select the Rebuild option.
5. Select the available replacement hard disk/SSD to be rebuilt to by pressing **Space Bar** and then **Enter**.
6. Press **[Y]** key to start. The utility will show the rebuild status and the completed percentage. This will take a long time to finish the whole process and it depends on the size to be rebuilt.

Note: HyperDuo virtual disk created in Safe mode can be partially rebuilt if the SSD fails, but not if the HDD fails.

Marvell Storage Utility (MSU) for RAID/HyperDuo Setup
The Marvell Storage Utility (MSU) is a browser-based management utility for Marvell 88SE92xx controllers. It creates and manages a RAID or HyperDuo virtual disk using storage devices connected to the 88SE92xx controller.
1. Start Windows and insert the driver CD into the CD-ROM drive, assume drive D.
2. Browse to the following folder on the driver CD:
   - **D:\Marvell\88SE9230\Utility**
3. Run **MSUSetup.exe** to start utility installation.
4. Follow the on-screen instructions to install the MSU.
5. Double click the desktop shortcut for the MSU. When opening the MSU in some versions of Windows, Internet Explorer may detect a problem with the security certificate for the MSU web page. Select **Continue to this website (not recommended)** to continue opening the MSU.
6. Opening the MSU will take you to a login page. If you have no password, leave this field blank, and then click **Login**.
7. After entering the MSU user interface, select **Adapter**, which contains four physical disks, assume four physical disks are connected to the controller card.
8. Roll over the **Operation** tab and you will see **Create HyperDuo**, **Create RAID** and **Quick Create Wizard**.
9. To create a HyperDuo virtual disk, you should have at least one HDD and one/multiple SSD.
10. Select **Create HyperDuo**, and then select **Safe** mode or **Capacity** mode.
11. Check **Keep Original Data** to preserve the data currently on your HDD or uncheck it to erase all data. This option is only available in Safe mode.
12. Enter a number between 10 and 100 in the **Threshold (%)** field. The **Threshold (%)** number defines the percentage of your SSD the MSU uses to optimize performance. The default is 90.
13. Press **Submit**. The MSU displays the **Property** tab for the HyperDuo virtual disk and begins initialization. It takes up to some minutes to complete. System performance may slow during this period.
14. If you want to quickly create a HyperDuo virtual disk, select **Quick Create Wizard**.
15. Select **Safe** mode or **Capacity** mode, and then press **Submit**. The MSU will help you create the HyperDuo virtual disk automatically.
16. To create a RAID virtual disk, select **Create RAID**. Then select RAID level: **RAID0, RAID1 or RAID10**.
17. Choose enough available physical disks (RAID0 needs at least two physical disks, RAID1 just needs two physical disks, and RAID10 needs four physical disks), and press **Next**.

18. Enter the name for the virtual disk, or you can use the default name.
19. Select the **Initialization** method for the virtual disk.
20. Select the **Stripe Size** 32K or 64K for the virtual disk.
21. Press **Submit**. The MSU creates the virtual disk and displays the **Property** tab for the new virtual disk.
22. Restart your computer to use the virtual disk.

DRIVER INSTALLATION

Installing Driver for supported Windows Vista, Server 2008, Windows 7, Server 2008 R2 operating system:

1. Start Windows and insert the driver CD into the CD-ROM drive, assume drive D.
2. Windows will automatically detect the SATA card. Right-click **Marvell Console ATA Device** with yellow mark in the **Other Devices** and select **Update Driver Software.**
3. Select "**Browse my computer for driver software**".
4. Browse to the following folder on the driver CD according to your operating system:
   > **Windows Vista, Server 2008, Windows 7 32-bit:**
   D:\Marvell\88SE9230\Windows\storport\i386
   > **Windows Vista, Server 2008, Windows 7 64-bit and Server 2008 R2:**
   D:\Marvell\88SE9230\Windows\storport\amd64
5. Follow the on-screen instructions to install the driver.
6. After successful installation, the device is listed in the **Device Manager** as **Marvell Unify Configuration** (under **System devices**).

Installing Driver for supported Windows XP, Server 2003 operating system:

1. Start Windows and insert the driver CD into the CD-ROM drive, assume drive D.
2. Windows will automatically detect the SATA card. Select "**No, not this time**" and click the **Next** button to continue.
3. Select "**Install from a list or specific location (Advanced)**" and click on the **Next** button.
4. Browse to the following folder on the driver CD according to your operating system:
   > **Windows XP 32-bit and Server 2003 32-bit:**
   D:\Marvell\88SE9230\Windows\miniport\i386
   > **Windows XP 64-bit and Server 2003 64-bit:**
   D:\Marvell\88SE9230\Windows\miniport\amd64
5. Follow the on-screen instructions to install the driver.
6. After successful installation, the SATA controller is listed in the **Device Manager** as **Marvell 92xx SATA 6G Controller** (under **SCSI and RAID controllers**).
7. For this controller, an additional device **Marvell Console SCSI Processor Device** is detected. Select "**No, not this time**" and click the **Next** button to continue.
8. Select "**Install from a list or specific location (Advanced)**" and click on the **Next** button.
9. Browse to the following folder on the driver CD according to your operating system:
   > **Windows XP 32-bit and Server 2003 32-bit:**
   D:\Marvell\88SE9230\Windows\storport\i386
   > **Windows XP 64-bit and Server 2003 64-bit:**
   D:\Marvell\88SE9230\Windows\storport\amd64
10. Follow the on-screen instructions to install the driver.
11. After successful installation, the device is listed in the **Device Manager** as **Marvell Unify Configuration** (under **System devices**).
12. Once driver installation is completed, you can now connect your external devices to the SATA card. To install the driver for the external devices, please refer to the external device user's manuals.

Updating Drivers and Manual

The latest drivers, full version manual and last-minute changes document are available on the website below:

http://www.drivers-download.com

Search for the following Download Code from "Drivers Search":

Chipset	Description	Download Code
Marvell 88SE9230	PCI-Express to SATA 6Gbps RAID controller card	DL-0141401

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