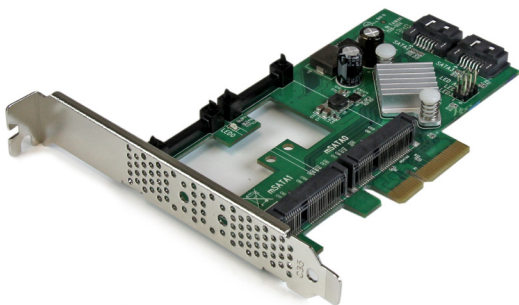


2x mSATA + 2x SATA PCIe SATA III 6Gbps RAID Controller Card with HyperDuo

PEXMSATA3422



*actual product may vary from photos

DE: Bedienungsanleitung - de.startech.com

FR: Guide de l'utilisateur - fr.startech.com

ES: Guía del usuario - es.startech.com

IT: Guida per l'uso - it.startech.com

NL: Gebruiksaanwijzing - nl.startech.com

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FCC Compliance 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 harmful 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. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by StarTech.com could void the user's authority to operate the equipment.

Industry Canada Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [B] est conforme à la norme NMB-003 du Canada.

CAN ICES-3 (B)/NMB-3(B)

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Introduction

Packaging Contents

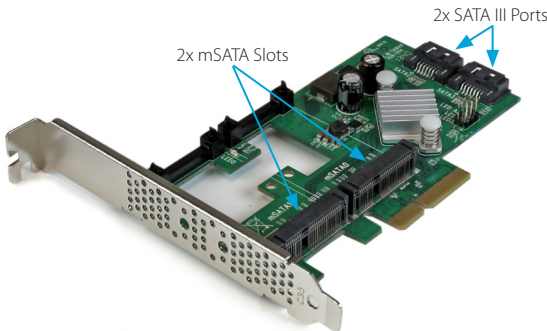
- 1x PCIe mSATA/SATA Controller Card
- 1x Low-Profile Bracket
- 1x Driver CD
- 1x Instruction Manual

System Requirements

- PCI Express enabled computer with an available PCI Express x4 slot
- Windows® 8 / 8.1 (32/64bit), 7 (32/64), Vista (32/64), XP (32/64), Windows Server® 2012, 2008 R2, 2003, Mac OS® 10.6 and up (Tested up to 10.9), Linux 3.5

Product Overview

Product Diagram



LED and PIN Header LED

LED / Header	Status
LED0/LED1 - mSATA Green LEDs	On: Drive is linked Blinking: Accessing the drive
LED2/LED3 - SATA LED Pin Headers	On: Drive is linked Blinking: Accessing the drive
LED All - LED Pin Header	On: When any one of the 4 drives is linked Blinking: When any one of the 4 drives is accessing

Installation

mSATA SSD Installation

WARNING!

SSD Drives and storage adapters require careful handling. If you are not careful with your SSD Drive, lost data may result. Always handle your drive with caution. Be sure that you are properly grounded by wearing an anti-static strap when handling computer components or discharge yourself of any static electricity build-up by touching a large grounded metal surface (such as the computer case) for several seconds.

1. Gently slide the mSATA connector on your mSATA SSD into the reciprocal connector / slot labeled mSATA0 on the controller card, line the “male” connector widths up on the SSD, with the slot widths on the controller card to ensure your SSD is inserted properly.
2. Once inserted, gently press the SSD down toward the black mounting bracket clips, until the drive clicks into place. The SSD has now been installed.
3. Repeat for a second mSATA SSD if desired, using the mSATA1 slot on the controller card.

Note: To remove a SSD, push the two black clips near the top of the drive toward each other while simultaneously gently lifting the SSD up at the clips/latch location, once released from the bracket clips, slide the drive out.

Hardware Installation

WARNING!

PCI Express cards, like all computer equipment, can be severely damaged by static electricity. Be sure that you are properly grounded before opening your computer case or touching your PCI Express card. StarTech.com recommends that you wear an anti-static strap when installing any computer component. If an anti-static strap is unavailable, discharge yourself of any static electricity build-up by touching a large grounded metal surface (such as the computer case) for several seconds. Also be careful to handle the PCI Express card by its edges and not the gold connectors.

1. Turn your computer off and any peripherals connected to the computer (i.e. Printers, external hard drives, etc.). Unplug the power cable from the rear of the power supply on the back of the computer and disconnect all peripheral devices.
2. Remove the cover from the computer case. See documentation for your computer system for details.
3. Locate an open PCI Express x4 slot and remove the metal cover plate on the rear of the computer case (Refer to documentation for your computer system for details).

Note: This card will work in PCI Express slots of additional lanes (i.e. x8, or x16 slots).

4. Gently insert the card into the open PCI Express slot and fasten the bracket to the rear of the case.

Note: If installing the card into a small form factor/low-profile desktop system, replacing the pre-installed standard-profile bracket with the included low-profile (half-height) installation bracket may be necessary.

5. Connect SATA cables from the SATA Ports on the card to the SATA Hard Drives inside your computer as desired.
6. Place the cover back onto the computer case.
7. Insert the power cable into the socket on the power supply and reconnect all other connectors removed in Step 1.

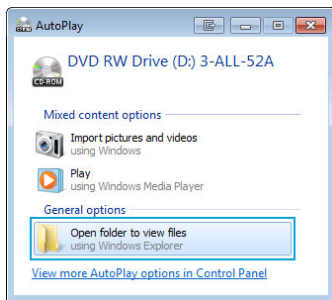
Driver Installation

Windows

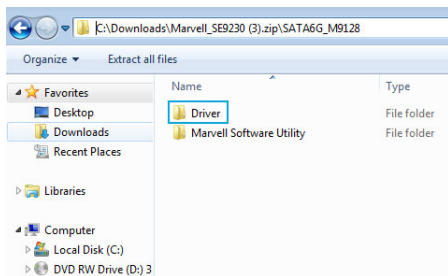
Note: The card may auto-install using native drivers, however it is recommended to use the procedure below to update to the latest driver version.

1. Upon starting Windows, if the *Found New Hardware* dialog appears on the screen, cancel/close the window.
2. Download the latest drivers from the **www.startech.com** website (recommended), applicable to the Operating System on the host computer that you are installing the card to, or insert the provided **Driver CD** into your computer's DVD/CD-ROM drive.

3. Select the **Open folder to view files** option from the *AutoPlay* Menu, if *AutoPlay* is disabled on your system, or if you have downloaded the driver, browse to your DVD/CD drive or to the downloaded driver location.



4. Run the **Setup/Install** ".exe" application within the *Driver* folder, to start the driver installation process.



5. Follow any on-screen instructions to complete the driver installation.

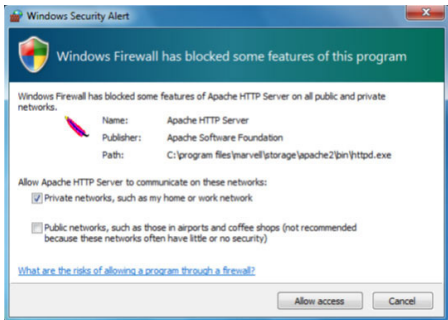
Note: You may be prompted to restart your system once installation is complete.

Management Utility Installation

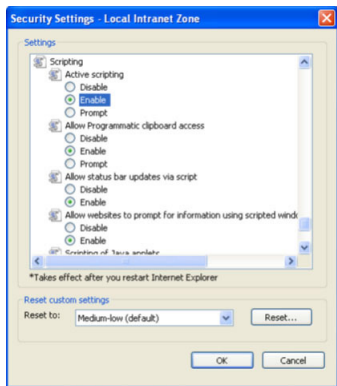
RAID and/or HyperDuo configuration can be accomplished either through the integrated card-BIOS utility, or through the Marvell Storage Utility (MSU). Details for installing the MSU are below.

To install the Marvell Storage Utility (MSU) in Windows:

1. Run the **MSU Setup/Install** ".exe" application located within *Marvell Software Utility* folder and follow the on-screen instructions. Select **Next** and accept the license agreement when prompted – the default installation options are recommended.
2. After installing the Apache2 HTTP Server (which is a built-in component of the installation package), the installation may trigger a Windows Security Alert on some versions of Windows, please allow access.

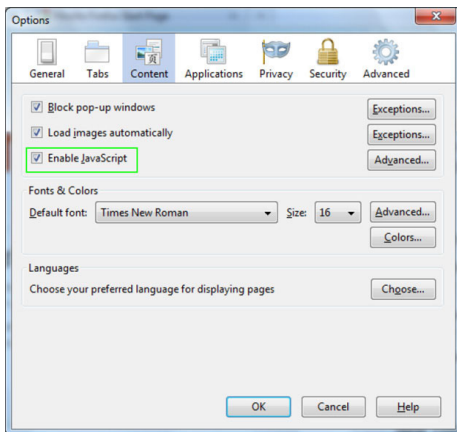


3. Before opening the MSU, verify that Active Scripting or JavaScript is enabled in the browser.
 - a. Internet Explorer
 - i. From the menu bar, select Tools > Internet Options.
 - ii. Select the "Security" tab, then "Local Intranet", then "Custom level".
 - iii. In the list of settings, scroll down to Scripting > Active scripting.
 - iv. Select "Enable", then click "OK" to confirm the selection.



b. Firefox

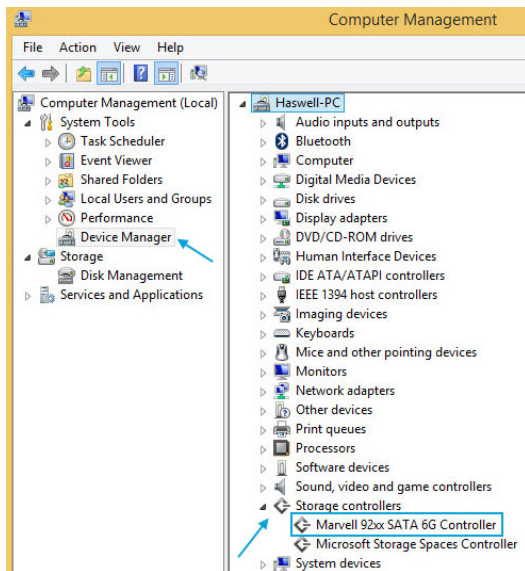
- i. From the menu bar, select Tools > Options
- ii. Select the "Content" tab and ensure that the "Enable JavaScript" option is checked (should be by default) – if it is not, select it and click "OK"



Verifying Installation

Windows

1. From the main desktop or start menu, open the *Device Manager* by right-clicking on **Computer**, and then selecting **Manage**. In the *Computer Management* window, select **Device Manager** from the left window panel. (For Windows 8.1, right-click on the **Start** button and click **Device Manager**).
2. Expand the *Storage controllers* section, on a successful install you should see the following device in the list with no exclamation points or question marks. You may right-click on the device and select *Properties* to further ensure it is installed and working correctly.

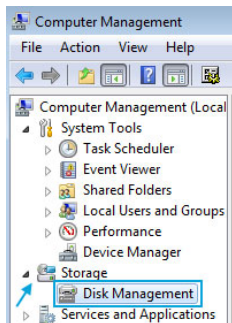
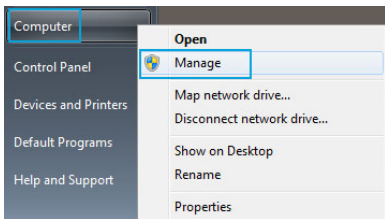


Note: Depending on your Operating System version, after a successful installation some users may notice a yellow icon next to *Marvell Console ATA Device* under the *Other Devices* category within the *Device Manager*. Device performance and operation is not affected by this notification. If you wish to remove this icon, ensure you have run the main driver **Setup/Install ".exe"** application within the *Driver folder*.

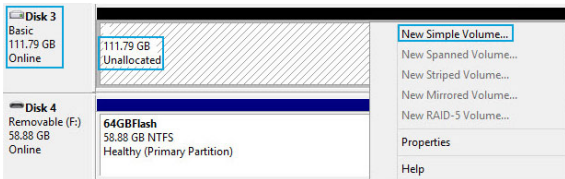
Hard Drive Initialization

If the mSATA SSD or SATA HDD is new or otherwise blank, it may need to be initialized and formatted before use. Follow the steps below in Windows to initialize the drive.

1. From the main desktop or start menu, right-click on **Computer** and then select **Manage**.
2. In the *Computer Management* window, select *Disk Management* from the left window panel.



3. A dialog window should automatically appear, asking you to initialize the drive. Depending on the version of Windows, it will give you the option of either creating an "MBR" or "GPT" disk. GPT (GUID partition) is not compatible with some older operating systems, while MBR is supported by newer and older operating systems.
4. Once initialized, locate the Disk that says it is "Unallocated" (check the listed hard drive capacity to confirm it's the correct hard drive) and then right-click in the section that says "Unallocated" and select "New Simple Volume" ("New Partition" in XP).



5. Follow the on-screen prompts to initialize the drive in the format of your choice.

Port Multiplier

Port Multiplier (PM) allows for multiple SATA drives (up to 4) to be connected to a single SATA host port. PM allows for easy, cost-effective storage scalability both inside and outside the PC or server. It is commonly used to connect a multi-drive SATA/eSATA hard drive enclosure/backplane using a single cable. This greatly expands the storage capabilities of the SATA controller beyond its normal port count.

Note: Only the two SATA ports on the card can use the Port Multiplier feature. Only one of these SATA ports can use the Port Multiplier feature at a time. The card supports up to 4 drives connected via Port Multiplier, and 7 drives total (including two mSATA SSD).

Mac OS does not support Port Multiplier.

Operation

RAID Configuration

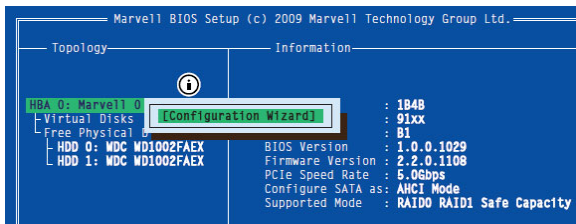
Card BIOS Method

WARNING! Creating a RAID virtual disk destroys all data on the physical disks included in the virtual disk set. Make sure to back up all data before continuing.

1. When prompted on startup, press **Ctrl+M** to enter the card BIOS utility

Press <Ctrl>+<M> to enter BIOS Setup or <Space> to continue_

2. Using the arrow keys to navigate, move to "HBA0: Marvell 0" and press **Enter** to select
3. Press **Enter** again to open the Configuration Wizard

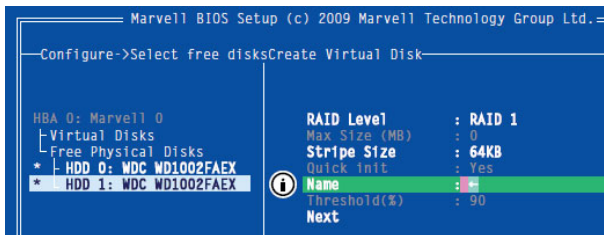


4. Use the arrow keys to scroll through the list of free physical disks to select the drives that will be part of the RAID set. Press Space to select/de-select a disk.

NOTE: When a disk is selected, an asterisk (*) appears to the left of the disk label.

5. After selecting the required disks, press Enter to continue.

1. The “Create Virtual Disk” configuration options appear in the “Information” pane (right-side), here you are able to select the RAID level and other configuration options:
 - a. Select 2 HDDs for RAID 0 or RAID 1
 - b. Select 3 HDDs for RAID 0
 - c. Select 4 HDDs for RAID 0

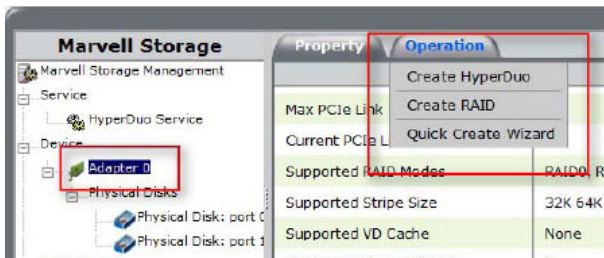


2. After configuring the virtual disk, highlight “Next” and press Enter. Press Y to confirm the creation of the virtual disk. It will now be listed in the Topology Pane (left).

Administration Console Method

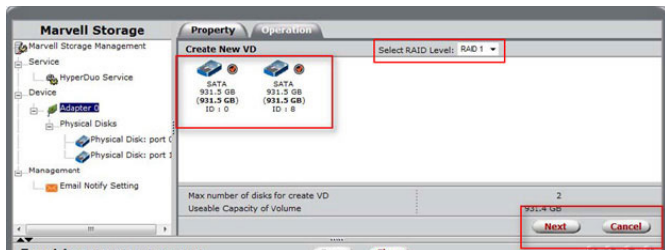
WARNING! Creating a RAID virtual disk destroys all data on the physical disks included in the virtual disk set. Make sure to back up all data before continuing.

1. From the left pane of main screen of the Marvell Storage Utility (MSU), select the adapter and hover the mouse over the “Operation” tab.
2. Select “Create RAID”

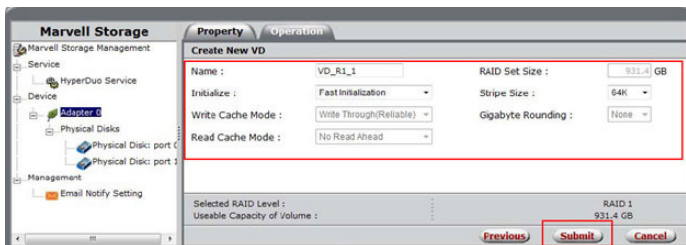


3. From the “Create new VD” screen that appears, click the “Select RAID Level” drop-down to choose the appropriate RAID type.

4. This will enable you to place a checkbox beside the disks that you would like to use as part of the RAID set. Once you have selected, click "Next" to confirm your selection.



5. You will now be presented with configuration options for your RAID set. Choose the appropriate options and select "Submit" to confirm your changes. Your virtual disk will then be visible in the left pane – the same properties can be accessed later by selecting your virtual disk from the left pane.



HyperDuo Configuration

HyperDuo offers the following two modes that you can configure using either of the procedures outlined in the following sections:

- Safe mode creates a virtual disk that is optimized for best fault tolerance – the frequently accessed files copied to the SSD for performance are also stored on the HDD. It is safe to use with hard drives that contain existing data. Virtual disks created in safe mode can also be partially rebuilt if the SSD fails, but not if the HDD fails.
- Capacity mode creates a virtual disk that is optimized for maximum utilization of the SSD – the frequently accessed files are moved to the SSD (not copied). Virtual disks created in capacity mode have better read and write performance than those created in safe mode. However, they cannot be rebuilt.

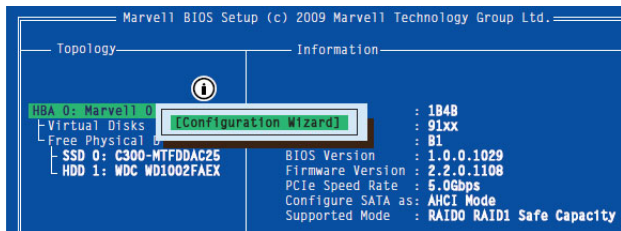
WARNING! Capacity mode is a data-destructive process. Please back up all data before using capacity mode.

Card BIOS Method

1. When prompted on startup, press Ctrl+M to enter the card BIOS utility

Press <Ctrl>+<M> to enter BIOS Setup or <Space> to continue_

2. Using the arrow keys to navigate, move to "HBA0: Marvell 0" and press **Enter** to select
3. Press **Enter** again to open the Configuration Wizard

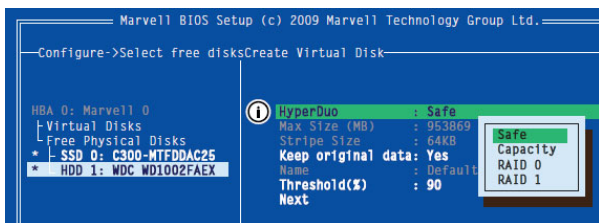


4. Use the arrow keys to scroll through the list of free physical disks to select the drives that will be part of the HyperDuo set. Press Space to select/de-select a disk.

NOTE: When a disk is selected, an asterisk (*) appears to the left of the disk label.

5. After selecting the required disks, press Enter to continue.
 6. The "Create Virtual Disk" configuration options appear in the "Information" pane (right-side), here you are able to select HyperDuo or RAID options.
- NOTE:** The default HyperDuo mode is Safe mode.
7. Highlight "Keep original data" and press Enter to select. Select Yes or No and press Enter.

WARNING! Selecting "No" will destroy all data on the disks included in the virtual disk set. Make sure to back up all data before continuing. The "Keep original data" option is disabled when you choose Capacity mode, as it is inherently data-destructive.



- After configuring the virtual disk, highlight "Next" and press Enter. Press Y to confirm the creation of the virtual disk. It will now be listed in the Topology Pane (left).

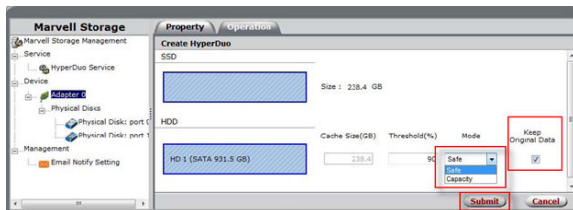
Administration Console Method

- From the left pane of main screen of the Marvell Storage Utility (MSU), select the adapter and hover the mouse over the "Operation" tab.
- Select "Create HyperDuo"

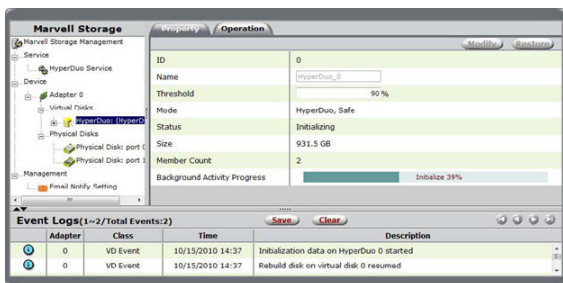


- Select either Safe mode or Capacity mode from the drop-down in the right pane. Click the "Submit" button once you have selected the appropriate options for your operation.

NOTE: If Safe mode is selected, you will have the option to select the checkbox marked "Keep Original Data" – this option is NOT available in Capacity mode, as it is inherently data-destructive.

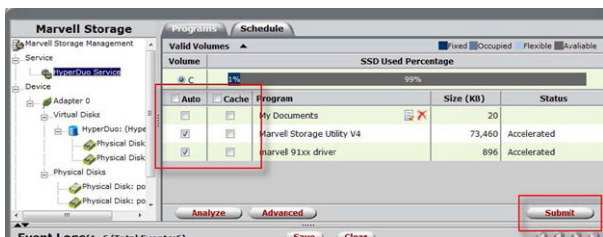


The newly created HyperDuo drive will then appear in the left pane and begin initializing. This can take up to 30 minutes to complete, and system performance may be slow during this period.

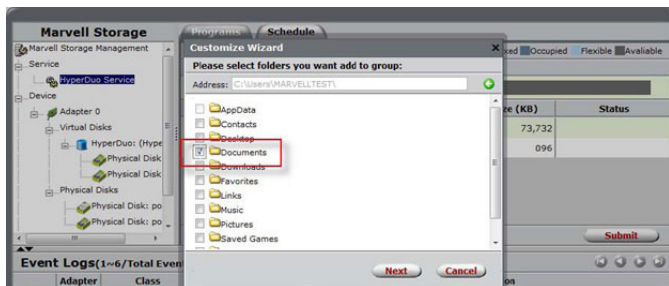


HyperDuo Management

1. From the left pane of the MSU, select "HyperDuo Service"
2. The right pane will then display available programs and folder that you can customize to one of the following optimization modes:
 - a. Check Auto to have the MSU manage the optimization of a folder or program automatically.
 - b. Check Cache to manually select a folder or program for optimization.
 - c. Check neither to specify that a folder or program should never be optimize



3. Select Submit to apply your changes, then select "OK" on the pop-up that follows.
4. If the folder you would like to optimize is not available, select "Advanced" from the "HyperDuo Service" pane.
5. The "Customize Wizard" will pop-up and allow you to select the desired folders.



Specifications

Ports	2x mSATA Slot, 2x SATA Ports
Interface	Mini SATA SATA
Bus Type	PCI Express
Card Type	Standard Profile (LP bracket incl.)
Port Style	Integrated on Card
Industry Standards	Serial ATA 3.0 specification PCI Express 2.0
Chipset ID	Marvell 9230
Connector Type(s)	1 - PCI Express x4 Male
Internal Ports	2 - mSATA (52 pin; Mini SATA) Slot Receptacle 2 - SATA (7 pin; Data) Plug
Type and Rate	SATA III (6 Gbps)
Port Multiplier	Yes
LBA Support	48-bit
RAID Support	RAID 0, 1
Operating Temperature	5°C to 50°C (41°F to 122°F)
Storage Temperature	-25°C to 70°C (-13°F to 158°F)
Humidity	20~80% RH
Dimensions (LxWxH)	115mm x 20mm x 120mm
Weight	55g
Compatible Operating Systems	Windows® 8 / 8.1 (32/64bit), 7 (32/64), Vista (32/64), XP (32/64), Windows Server® 2012, 2008 R2, 2003 Mac OS® 10.6 and up (Tested up to 10.9) Linux 3.5

*Port Multiplier is not supported in Mac OS

Technical Support

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For the latest drivers/software, please visit **www.startech.com/downloads**

Warranty Information

This product is backed by a two year warranty.

In addition, StarTech.com warrants its products against defects in materials and workmanship for the periods noted, following the initial date of purchase. During this period, the products may be returned for repair, or replacement with equivalent products at our discretion. The warranty covers parts and labor costs only. StarTech.com does not warrant its products from defects or damages arising from misuse, abuse, alteration, or normal wear and tear.

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