# Guide to SATA Hard Disks Installation and RAID Configuration


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# *1. Guide to SATA Hard Disks Installation*

## 1.1 Serial ATA (SATA) Hard Disks Installation

Intel chipset supports Serial ATA (SATA) hard disks with RAID functions, including RAID 0, RAID 1, RAID 5, RAID 10 and Intel Rapid Storage. Please read the RAID configurations in this guide carefully according to the Intel southbridge chipset that your motherboard adopts. You may install SATA hard disks on this motherboard for internal storage devices. This section will guide you how to create RAID on SATA ports.

# 2. Guide to RAID Configurations

## 2.1 Introduction of RAID

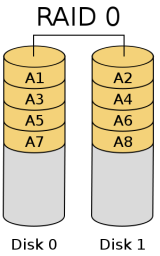
This motherboard adopts Intel southbridge chipset that integrates RAID controller supporting RAID 0 / RAID 1/ Intel Rapid Storage / RAID 10 / RAID 5 function with four independent Serial ATA (SATA) channels. This section will introduce the basic knowledge of RAID, and the guide to configure RAID 0 / RAID 1/ Intel Rapid Storage / RAID 10 / RAID 5 settings.

### RAID

The term “RAID” stands for “Redundant Array of Independent Disks”, which is a method combining two or more hard disk drives into one logical unit. For optimal performance, please install identical drives of the same model and capacity when creating a RAID set.

### RAID 0 (Data Striping)

RAID 0 is called data striping that optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. It will improve data access and storage since it will double the data transfer rate of a single disk alone while the two hard disks perform the same work as a single drive but at a sustained data transfer rate.

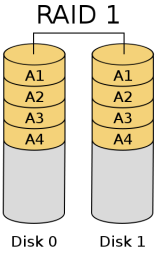



**WARNING!!**

Although RAID 0 function can improve the access performance, it does not provide any fault tolerance. Hot-Plug any HDDs of the RAID 0 Disk will cause data damage or data loss.

### RAID 1 (Data Mirroring)

RAID 1 is called data mirroring that copies and maintains an identical image of data from one drive to a second drive. It provides data protection and increases fault tolerance to the entire system since the disk array management software will direct all applications to the surviving drive as it contains a complete copy of the data in the other drive if one drive fails.

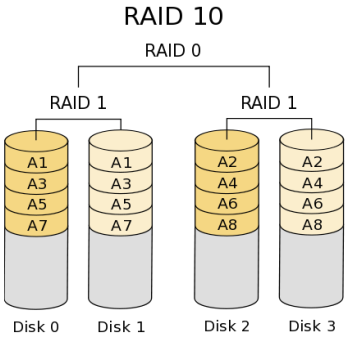


## Intel Rapid Storage

The Intel Rapid Storage technology supported allows you to create a RAID 0 and RAID 1 set using only two identical hard disk drives. The Intel Rapid Storage technology creates two partitions on each hard disk drive to create a virtual RAID 0 and RAID 1 sets. This technology also allows you to change the hard disk drive partition size without losing any data.

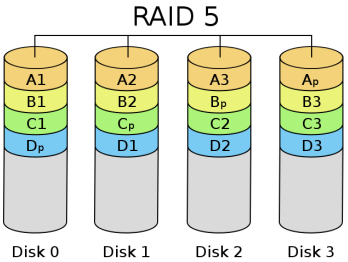
## RAID 10

RAID 10 is a striped configuration with RAID 1 segments whose segments are RAID 1 arrays. This configuration has the same fault tolerance as RAID 1, and has the same overhead for fault-tolerance as mirroring alone. RAID 10 achieves high input / output rates by striping RAID 1 segments. In some instances, a RAID 10 configuration can sustain multiple simultaneous drive failure. A minimum of four hard disk drives is required for this setup.



## RAID 5

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.



1. Please use two new drives if you are creating a RAID 0 (striping) array for performance. It is recommended to use two SATA drives of the same size. If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size for each drive. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the 80GB-drive becomes 60GB, and the total storage capacity for this RAID 0 set is 120GB.
2. You may use two new drives, or use an existing drive and a new drive to create a RAID 1 (mirroring) array for data protection (the new drive must be of the same size or larger than the existing drive). If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the RAID 1 set is 60GB.
3. Please verify the status of your hard disks before you set up your new RAID array.



**WARNING!!**

Please backup your data first before you create RAID functions. In the process you create RAID, the system will ask if you want to “Clear Disk Data” or not. It is recommended to select “Yes”, and then your future data building will operate under a clean environment.

### Intel Rapid Storage Technology for PCIe Storage Use cases

**Prerequisite:**

* The PCIe Storage device must be attached to remapable PCIe slot or PCIe M.2 connector.
* The PCIe Storage device must be AHCI-controller based.
* System must be in RAID mode.
* The system BIOS must use the Intel® Rapid Storage Technology UEFI drive option, Legacy OROM doesn’t support PCIe storage function.

## 2.3 Installing Windows® 10 64-bit With RAID Functions

If you want to install Windows® 10 64-bit OS on your SATA / SATA2 / SATA3 HDDs with RAID functions, please follow the procedures below.

**STEP 1: Setting the BIOS RAID Items**

After installing the hard disk drives, please set the necessary RAID items in the BIOS before setting your RAID configuration. Boot your system, and press <F2> key to enter BIOS setup utility. Go to **Advanced → Storage Configuration** and set **SATA Mode Selection** to [RAID]. Press <F10> to save the configuration changes and exit setup.

**STEP 2: Use ASRock Easy RAID Installer**

Easy RAID Installer can copy the RAID driver from a support CD to your USB storage device with just one simple click in UEFI setup. Please note that this feature is not available for all models.

A. Plug in your USB flash drive into a USB port.

B. Enter UEFI SETUP UTILITY → Tool and highlight "Easy RAID Installer". Press [Enter] to confirm the selection.

C. Follow the onscreen instruction to complete the process.

**STEP 3: Set RAID configuration**

Please refer to p.8 -17 of this document for instructions on how to set RAID configuration.

**STEP 4: Install Windows® 10 64-bit OS on your system.**

## 2.4 Configuring a RAID array

You can configure a RAID array using either UEFI Setup Utility or Intel® RAID BIOS setup utility, depending on the HDD capacity and the OS you are installing. Please refer to the table below to choose the corresponding RAID Utility.

| OS | Windows 7 | |
|---|---|---|
| HDD Capacity | **Over 2.2 TB** | **Under 2.2 TB** |
| Ultra Fast Boot | Not supported | Not supported |
| Option ROM Setting | UEFI SETUP UTILITY\Boot\ CSM [Launch Storage OpROM policy] = [UEFI only] | n/a |
| Required RAID Utility | UEFI Setup Utility | Intel® RAID BIOS setup utility |

| OS | Windows 10 / 8.1 / 8 | | | |
|---|---|---|---|---|
| HDD Capacity | **Over 2.2 TB** | **Under 2.2 TB** | **Over 2.2 TB** | **Under 2.2 TB** |
| Ultra Fast Boot | Enabled | Enabled | Disabled | Disabled |
| Option ROM Setting | n/a | n/a | UEFI SETUP UTILITY\ Boot\CSM [Launch Storage OpROM policy] = [UEFI only] | n/a |
| Required RAID Utility | UEFI Setup Utility | UEFI Setup Utility | UEFI Setup Utility | Intel® RAID BIOS setup utility |

### 2.4.1 Configuring a RAID array Using UEFI Setup Utility

**STEP 1:**

Enter the UEFI Setup Utility by pressing <F2> or <Del> right after you power on the computer.

**STEP 2:**

Go to **Boot → CSM** and set **Launch Storage OpROM policy** to [UEFI only].

**STEP 3:**

Go to **Advanced → Storage Configuration** and set **SATA Mode Selection** to [RAID], then press <F10> to save the configuration changes and exit setup. Then Enter **Intel(R) Rapid Storage Technology** in **Advanced** page.




**STEP 4:**

Select the option **Create RAID Volume** and press <Enter>.



**STEP 5:**

Key-in a a volume name and press <Enter>, or simply press <Enter> to accept the default name.




**STEP 6:**

Select your desired **RAID Level** and press <Enter>.



**STEP 7:**

Select the hard drives to be included in the RAID array and press <Enter>.




**STEP 8:**

Select a stripe size for the RAID array and press <Enter>.



**STEP 9:**

Select **Create Volume** and press <Enter> to start creating the RAID array.




If you want to delete a RAID volume, select the option **Delete** on the RAID volume info page and press <Enter>.




*Please note that the UEFI screenshots shown in this installation guide are for reference only. The actual screen may differ by model on the RAID volume info page and press <Enter>.

### 2.4.2 Configuring a PCIE SSD RAID Array Using UEFI Setup Utility

**Caution:**
Please use identical PCIE SSDs that are the same type and volume.

**STEP 1:**
Enter the UEFI Setup Utility by pressing <F2> or <Del> right after you power on the computer.

**STEP 2:**
Go to **Advanced → Storage Configuration** and set **SATA Mode Selection** to [RAID] and set **Launch Storage OpROM policy** to [UEFI only], then adjust the M.2 slots that you've installed PCIE SSDs to [Enabled]. Press <F10> to save the configuration changes and exit setup.



**STEP 3:**

Enter **Intel(R) Rapid Storage Technology** in **Advanced** page.




**STEP 4:**

Select the option **Create RAID Volume** and press <Enter>.



**STEP 5:**

Key-in a a volume name and press <Enter>, or simply press <Enter> to accept the default name.




**STEP 6:**

Select your desired **RAID Level** and press <Enter>.



**STEP 7:**

Select the hard drives to be included in the RAID array and press <Enter>.




**STEP 8:**

Select a stripe size for the RAID array and press <Enter>.



**STEP 9:**

Select **Create Volume** and press <Enter> to start creating the RAID array.



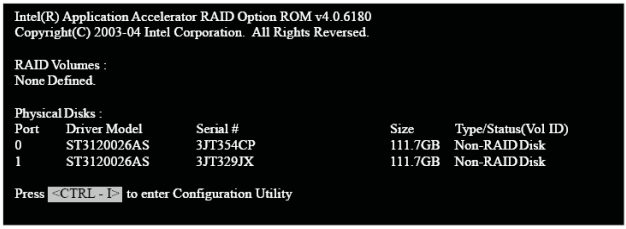

If you want to delete a RAID volume, select the option **Delete** on the RAID volume info page and press <Enter>.



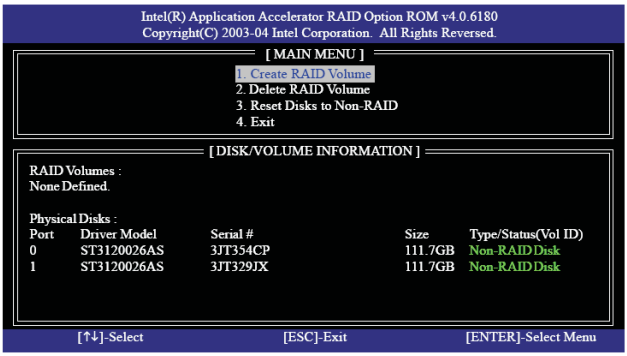

*Please note that the UEFI screenshots shown in this installation guide are for reference only. The actual screen may differ by model on the RAID volume info page and press <Enter>.

### 2.4.3 Configuring a RAID array Using Intel RAID BIOS

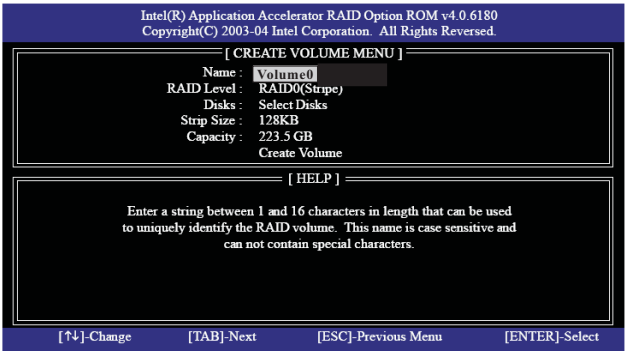
Reboot your computer. Wait until you see the RAID software prompting you to press <Ctrl+I>.



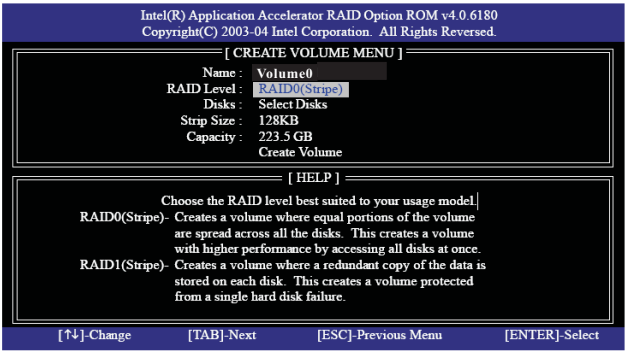

Press <Ctrl+I>. Then, the Intel RAID Utility - **Create RAID Volume** window appears.

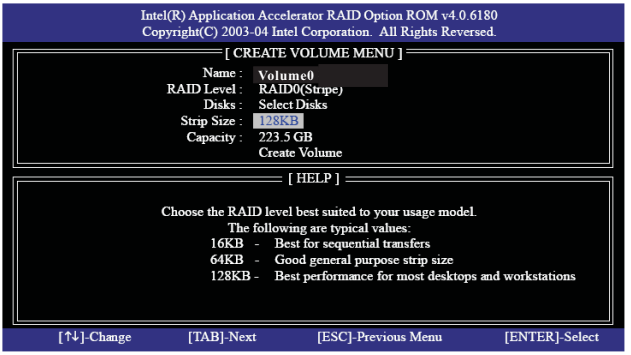



In the Create Volume Menu, under **Name** item, please key-in a unique name with 1-16 letters for your RAID volume then press <Enter>.



Use the up or down arrow keys to select your desired **RAID Level**. You may select RAID 0 (Stripe), RAID 1 (Mirror), RAID 5 or RAID 10 for your RAID level. Press <Enter>, and then you can select **Strip Size**.

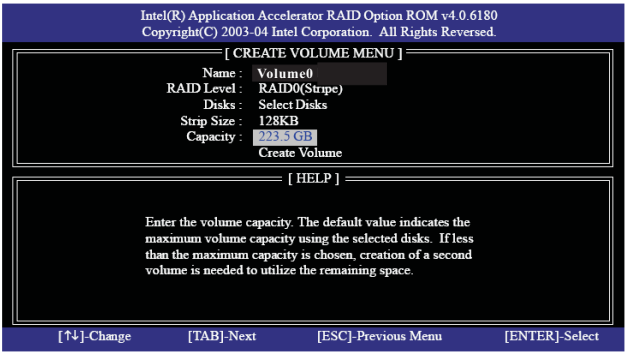


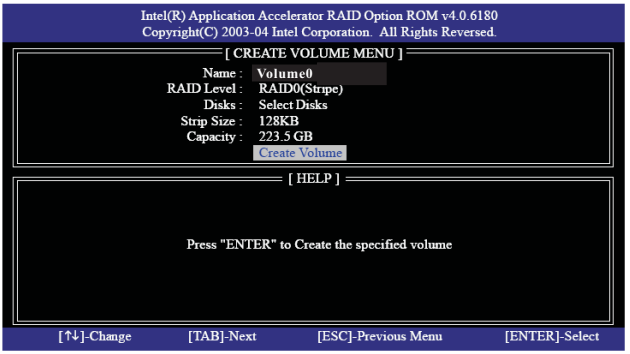

If you selected RAID 0 (Stripe), use the up or down keys to select the stripe size for your RAID 0 array then press <Enter>. The available values range from 8 KB to 128 KB. The default selection is 128 KB. The strip value should be chosen based on the planned drive usage.

- 8/16 KB - low disk usage
- 64 KB - typical disk usage
- 128 KB - performance disk usage

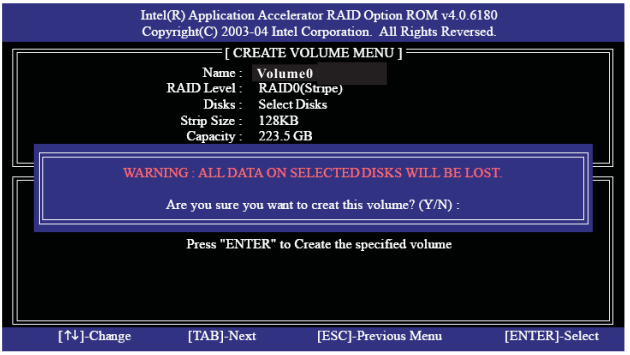
After you set disk block size, press <Enter> to set disk **Capacity**.



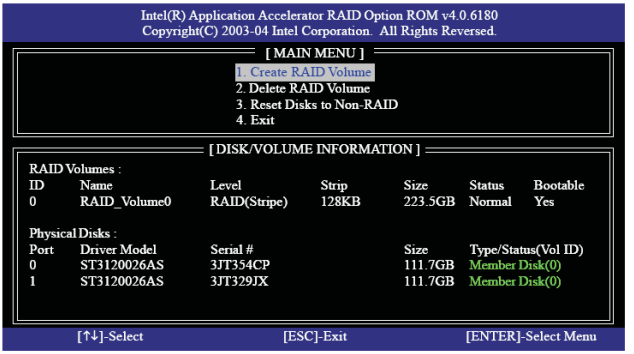

After setting up **Capacity**, please press <Enter>.




Press <Enter> under the **Create Volume** item. The utility prompts a confirmation message as below.



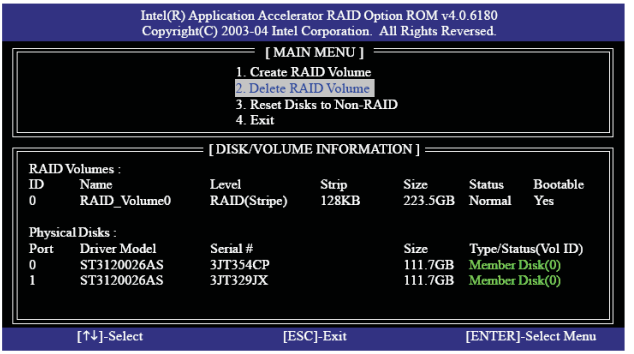
Press <Y> to complete the setup of RAID.




After the completion, you will see the detailed information about the RAID that you set up.

Please note that you are only allowed to create one RAID partition at a time under BIOS RAID environment. If you want to create an extra RAID partition, please use the RAID utility under Windows environment to configure RAID functions after you install OS.

If you want to delete a RAID volume, please select the option **Delete RAID Volume**, press <Enter>, and then follow the instructions on the screen.



## *3.* Installing Windows® on a HDD under 2TB in RAID mode

After the UEFI and RAID BIOS setup you may start installing **Windows® 10 64-bit** OS as usual.

## *4.* Installing Windows® on a HDD larger than 2TB in RAID mode

Windows® 10 does not support HDD's larger than 2TB. Please make sure to use **Windows® 10 64-bit.**

After the UEFI and RAID BIOS setup, please follow the steps below.

**STEP 1: Copy Intel® RAID drivers into a USB flash disk**

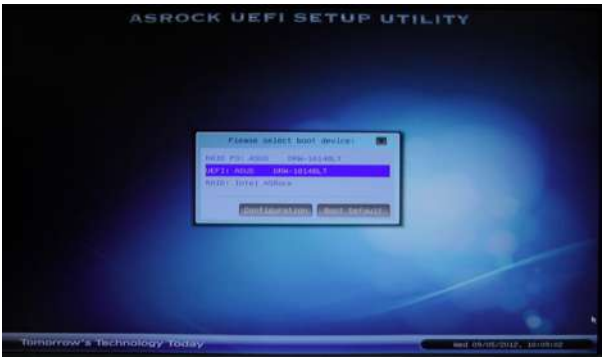
You can download the drivers from ASRock's website and unzip the files into a USB flash disk or copy the files from ASRock's motherboard support CD. (Please copy the files under the following directory:

32 bit: ..\i386\Win7_Intel..

64-bit: ..\AMD64\Win7-64_Intel..

**STEP 2: Install Windows® 10 64-bit OS**

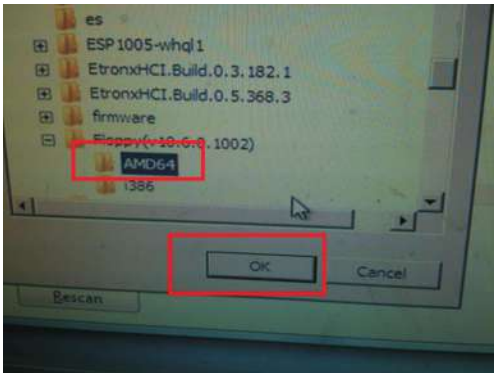
Press <F11> to launch boot menu at system POST and choose the item "UEFI:<Optical disk drive>" to boot.



Start Windows® Installation. When you see “Where do you want to install Windows?” page, please click “Load Driver”.




Plug the USB flash disk into your USB port; select “Browse” to find the RAID driver. Then choose the directory you have copied in the first step.




Please keep the USB flash disk installed until the system's first reboot. Continue to install the OS by following the instructions.

If you install Windows® 10 64-bit on a large hard disk (ex. Disk volume > 2TB), it may take more time to boot into Windows® or install driver/utilities. If you encounter this problem, you will need to follow the instructions below to fix this problem.

**Windows® 10 64-bit:**

A. Please request the hotfix KB2505454 through this link:
   http://support.microsoft.com/kb/2505454/
B. After installing Windows® 10 64-bit, install
   the hotfix kb2505454. (This may take a long time; >30 mins.)
C. Reboot your system. (It may take about 5 minutes to reboot.)
D. Windows® will install this hotfix then reboot by itself.
E. Please start to install motherboard drivers and utilities.