Guide to SATA Hard Disks Installation and RAID Configuration

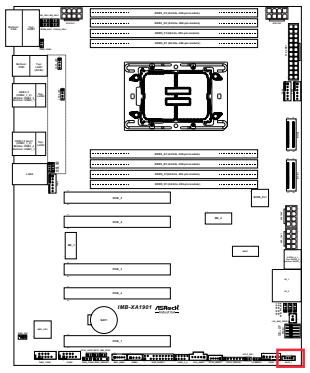
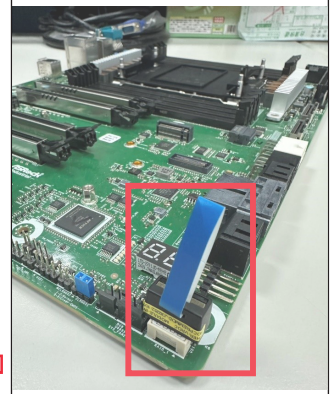
1. Guide to SATA Hard Disks Installation

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.

1.2 Before you Begin

To support Intel® Virtual RAID on CPU (Intel® VROC), an **Intel® VROC hardware key** is required. Before Configuring a RAID array, please insert the Intel® VROC hardware key into your motherboard. The location of the VROC header may vary depends on the motherboard you purchase, please refer to the jumpers and headers setting guide for more information.

Location of VROC header	Intel® VROC hardware key installed
	

2. *Guide to RAID Configurations*

2.1 Introduction of RAID

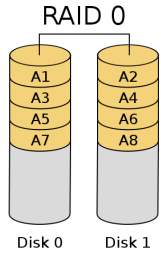
This motherboard adopts Intel southbridge chipset that integrates RAID controller supporting RAID 0 / RAID 1/ Intel Rapid Storage / RAID 10 / RAID 5 function with four independent Serial ATA (SATA) channels. This section will introduce the basic knowledge of RAID, and the guide to configure RAID 0 /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

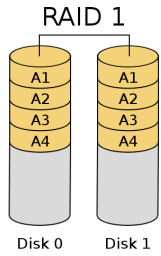


WARNING!!

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.

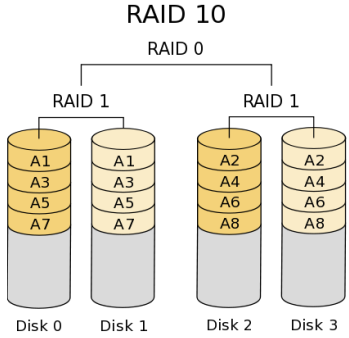


Intel Rapid Storage

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.

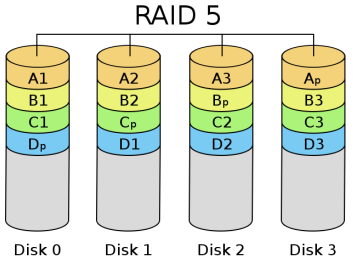
RAID 10

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.



2.2 RAID Configuration Precautions

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 → Enter VMD setup menu and set Enable VMD controller and Map this Root Port under VMD to [Enable]. 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 10			
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

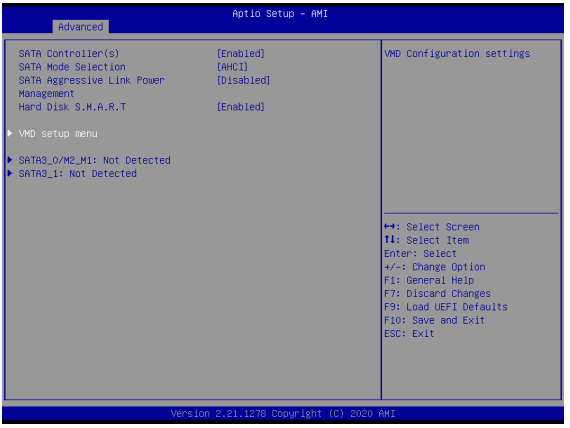
2.4.1 Configuring a RAID array Using UEFI Setup Utility

STEP 1:

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

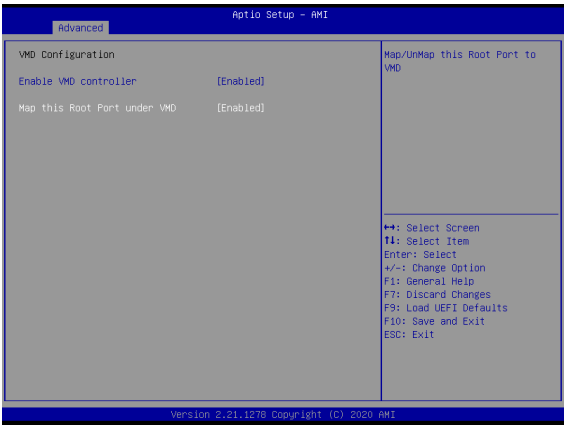
STEP 2:

Go to Advanced → Enter VMD setup menu.



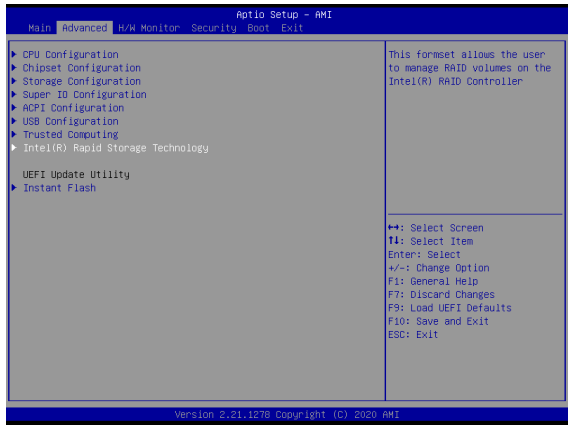
STEP 3:

Enable these two options: Enable VMD controller and Map this Root Port under VMD. Then press <F10> to save the configuration changes and exit setup.



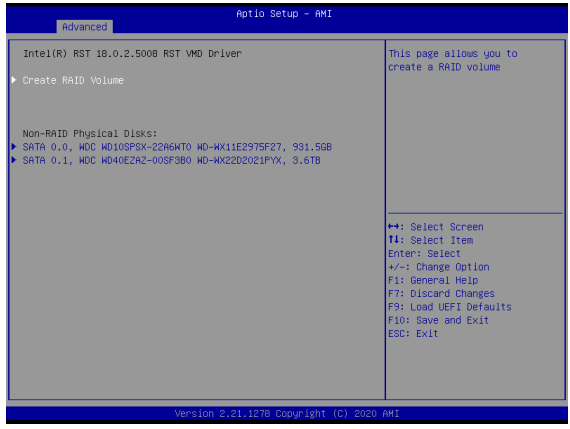
STEP 4:

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



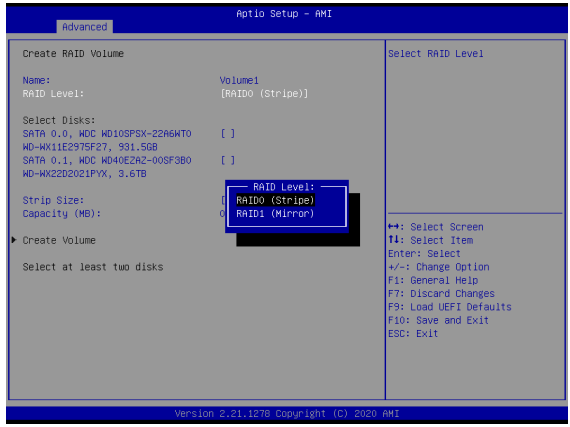
STEP 5:

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



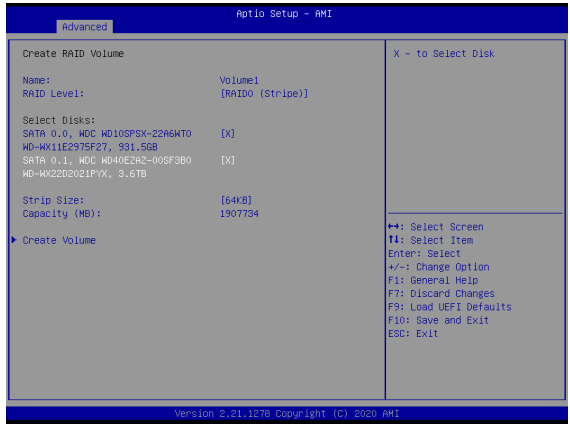
STEP 6:

Key-in a a volume name and press <Enter>, or simply press <Enter> to accept the default name. Select your desired RAID Level and press <Enter>.



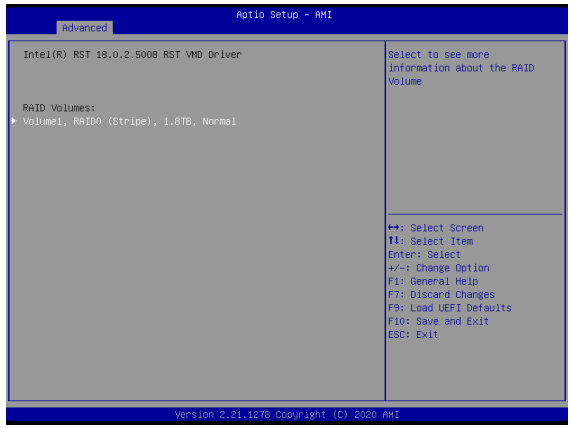
STEP 7:

Select the hard drives to be included in the RAID array and select a stripe size. Select Create Volume and press <Enter>.

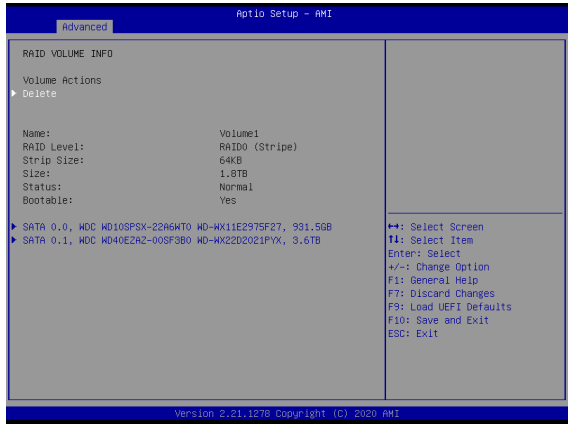


STEP 8:

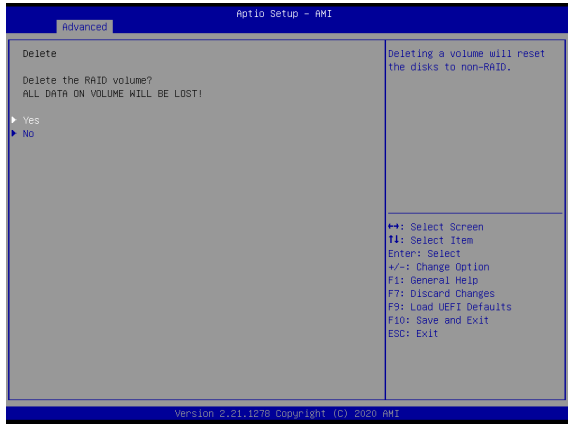
The RAID volume you just create is as following.



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



Click **Yes** to delete the RAID volume.



*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>.

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

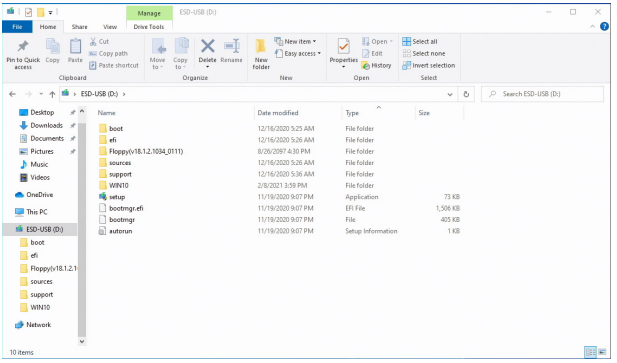
After the UEFI and RAID BIOS setup you may start installing **Windows® 10 64-bit** OS as usual.

4. Installing Windows® on a RAID volume

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

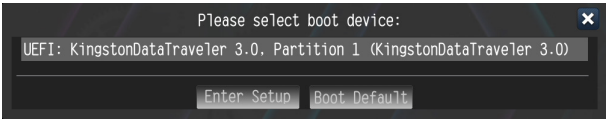
STEP 1:

Please download the drivers from our website (https://www.asrockind.com/) and unzip the files to a USB flash drive or copy the files from our motherboard support CD.



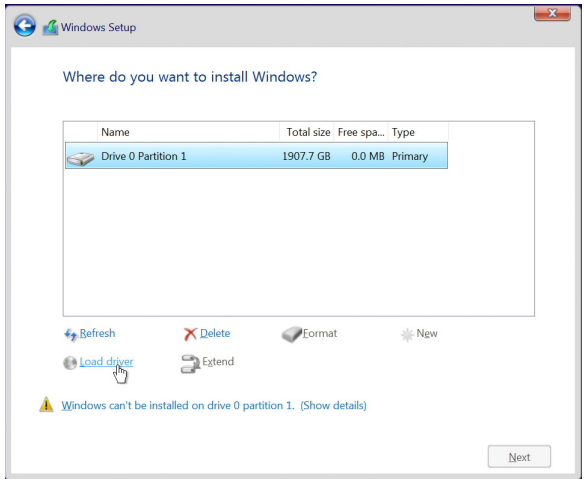
STEP 2:

Press <F11> at system POST to launch the boot menu and choose the item “UEFI: <Windows installation media>” to install Windows® 10 64-bit OS.



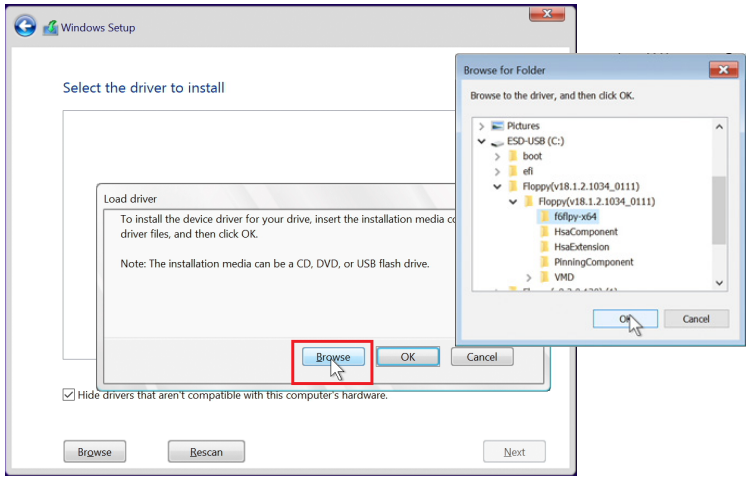
STEP 3 (If the drive that you plan to install Windows is available, please go to STEP 6):

If during the Windows installation process the target drive is not available, please click <Load Driver>.



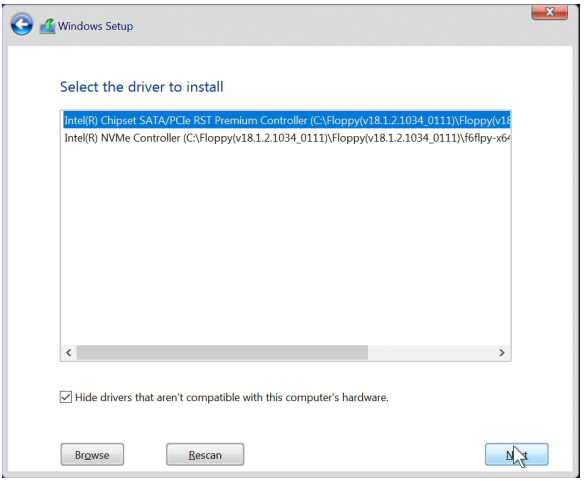
STEP 4:

Click <Browse> to find the driver on your USB flash drive.



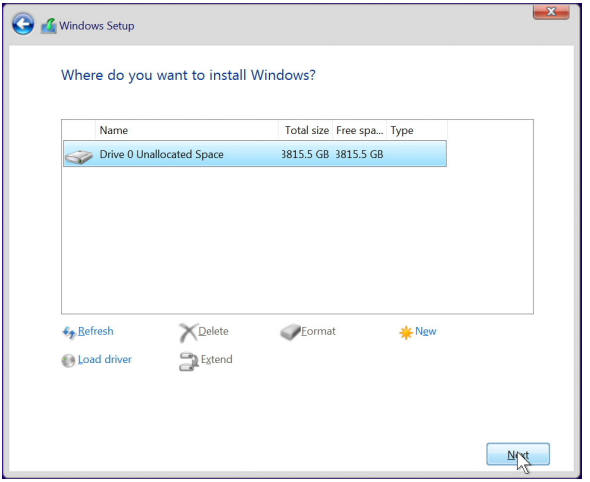
STEP 5:

Select “Intel(R) Chipset SATA/PCIe Premium Controller” and then click <Next>.



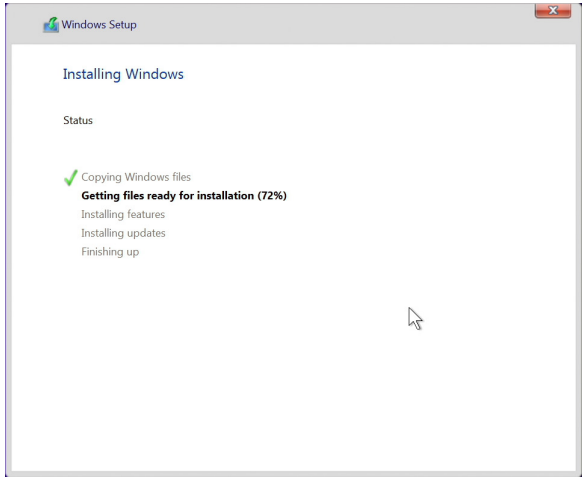
STEP 6:

Select unallocated space and then click <Next>.



STEP 7:

Please follow Windows' installation instructions to finish the process.



STEP 8:

After the Windows installation is finished, please install the Rapid Storage Technology driver and utility from our website (https://www.asrockind.com/).