RAID Configuration Guide (INTEL)

Motherboard

E21331
Revised Edition V3
October 2022

Contents

About this guide

This guide contains information that you need to create Intel® RAID configurations. You can create different RAID configurations based on your motherboard chipset and software.

The screenshots in this guide are for reference only. The screenshots may vary with models, but the configurations steps are similar.

Where to find more information

The ASUS website (www.asus.com) provides updated information on ASUS hardware and software products.

Intel® RAID configurations

If your motherboard supports Intel® Rapid Storage Technology, you can create RAID 0, RAID 1, RAID 5 or RAID 10 configurations.

If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section **6. Installing the RAID controller driver during Windows® 10 and Windows® 11 OS installation** for details.

1. RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

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.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

2. Installing storage devices

The motherboard supports SATA mode storage devices and PCIE SSD storage devices. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

Refer to Chapter 2 in your motherboard's user guide for details on installing storage devices to your motherboard.

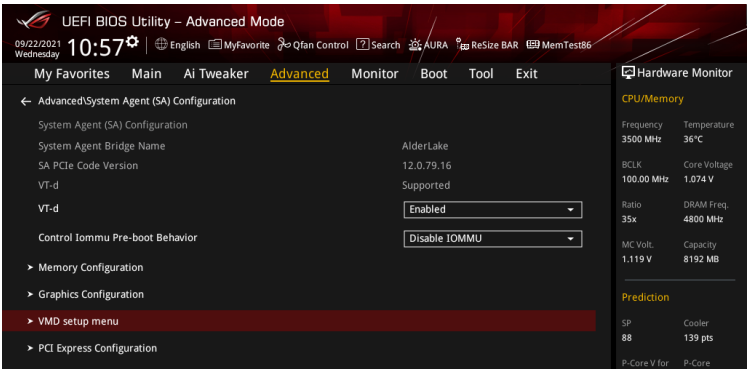
3. Creating a SATA RAID set in UEFI BIOS

You can create a RAID set with SATA mode M.2 modules and SATA SSD/HDD.

1. Enter the BIOS Setup during POST.

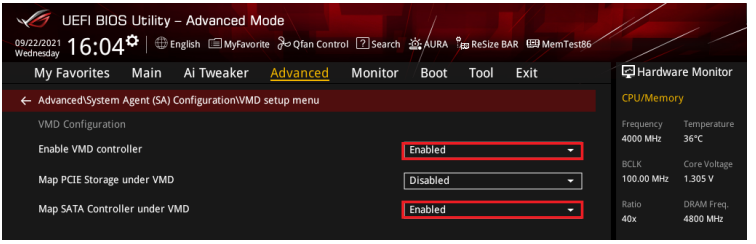
Refer to Chapter 3 in your motherboard's user guide for details on entering and navigating through the BIOS Setup.

2. Go to **Advanced** > **System Agent (SA) Configuration** > **VMD Setup Menu**.



3. In the VMD setup menu, set **Enable VMD controller** and **Map SATA Controller under VMD** to **[Enabled]**, and set **Map PCIE Storage under VMD** to **[Disabled]**.

SATA RAID support varies between different motherboard models. Make sure to check the product specification for more information.



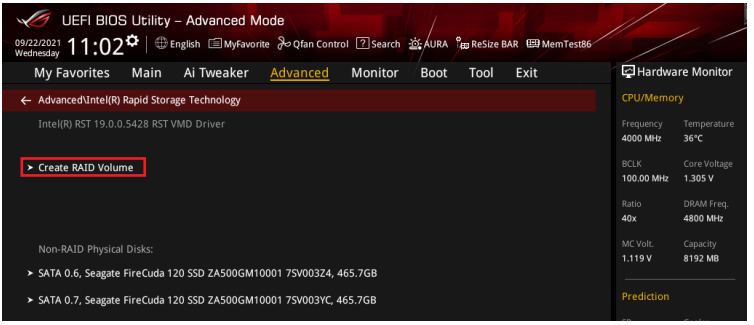
4. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.

5. Go to **Advanced** > **Intel(R) Rapid Storage Technology** to display the Intel® Rapid Storage Technology menu.

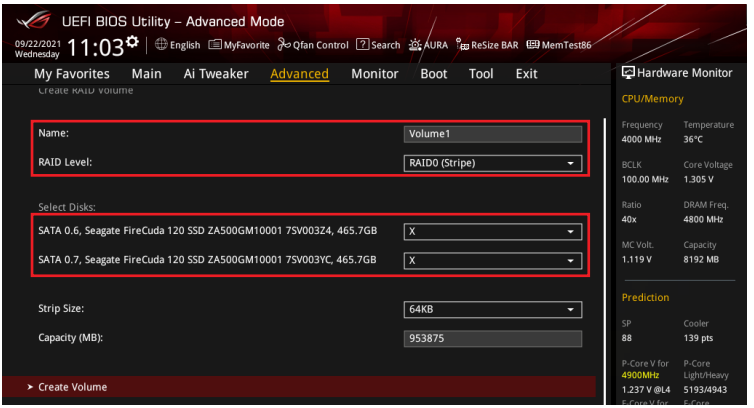
3.1 Creating a RAID set

To create a RAID set:

1. From the Intel® Rapid Storage Technology menu, select **Create RAID Volume** and press <Enter>.



2. When the **Name** item is selected, enter a name for the RAID set and press <Enter>.
3. When the **RAID Level** item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.
4. Under **Select Disks**, press <Enter> and select **X** for the disks you want to include in the RAID set.

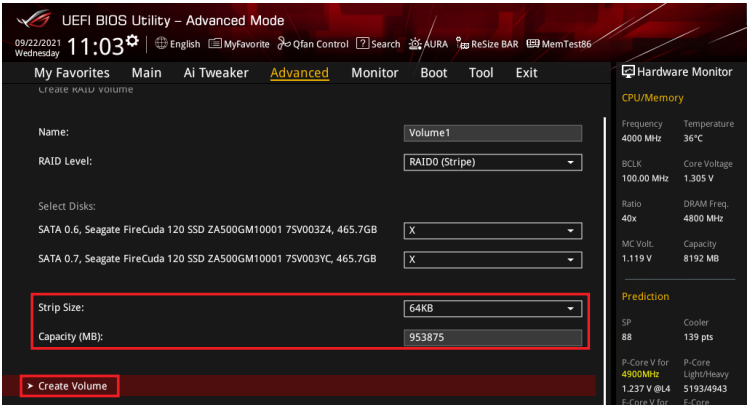


5. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:

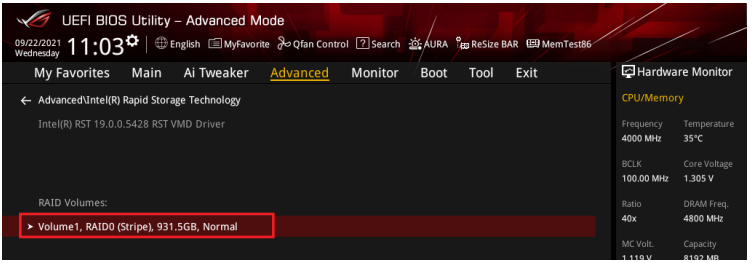
   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.

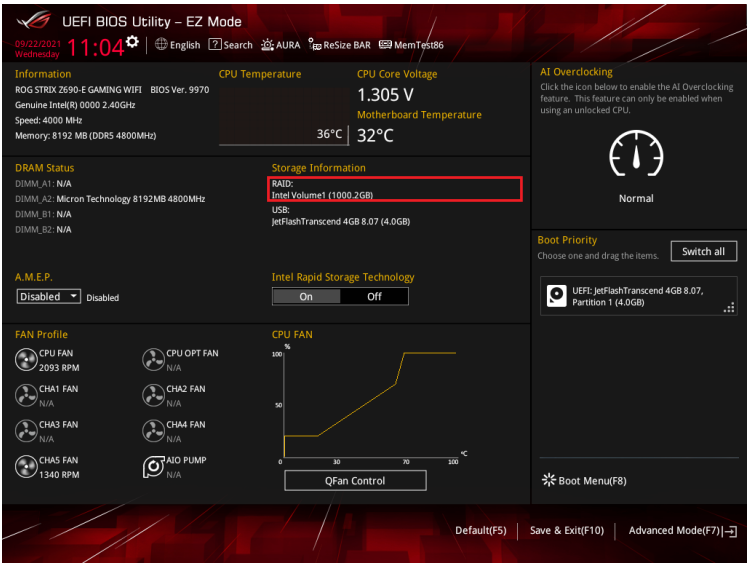
6. When the **Capacity (MB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
7. When the **Create Volume** item is selected, press <Enter> to create the RAID volume and return to the Intel® Rapid Storage Technology menu.



8. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
9. The RAID volume should appear in the **Intel(R) Rapid Storage Technology** menu.



And also appear in the **EZ Mode** menu.

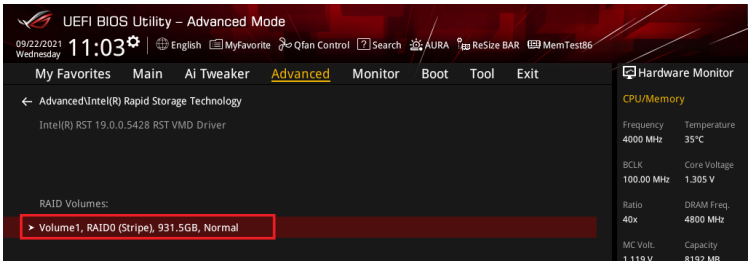


3.2 Deleting a RAID set

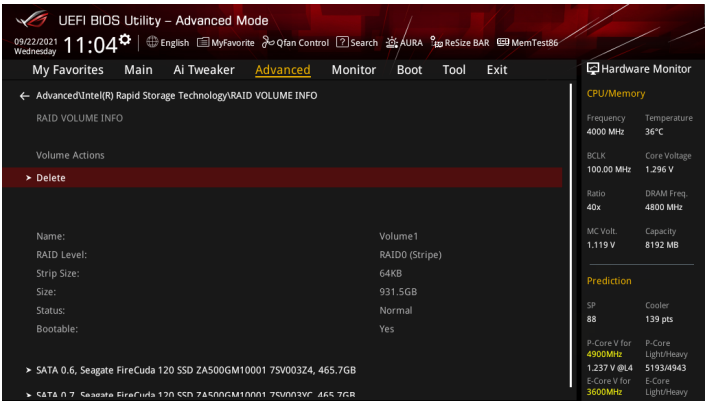
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

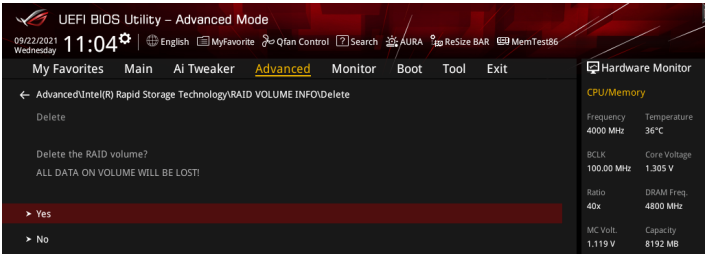
1. From the Intel® Rapid Storage Technology menu, select the RAID volume you want to delete and press <Enter>.



2. Select the **Delete** item and press <Enter>.



3. Select **Yes** to delete the RAID volume and return to the Intel® Rapid Storage Technology menu, or select **No** to cancel.



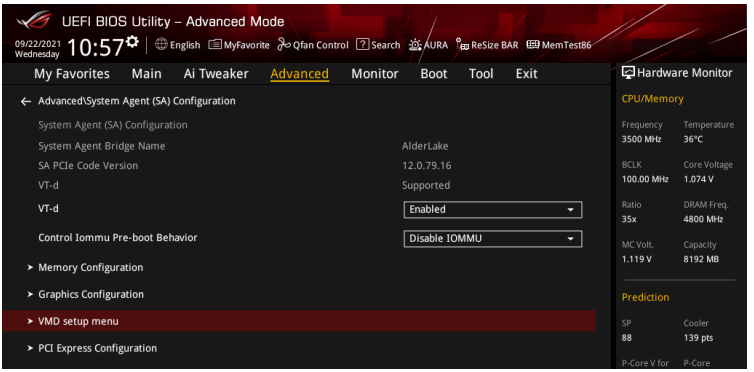
4. Creating an NVMe RAID set with onboard M.2 modules in UEFI BIOS

- You can create a RAID set with the following setups:
  - NVMe SSDs from the CPU.
  - NVMe SSDs from the PCH.
  - NVMe SSDs from the CPU and PCH.
  - Third-party storage devices.
- PCIe RAID support varies between different motherboard models. Make sure to check the product specification for more information.

1. Enter the BIOS Setup during POST.

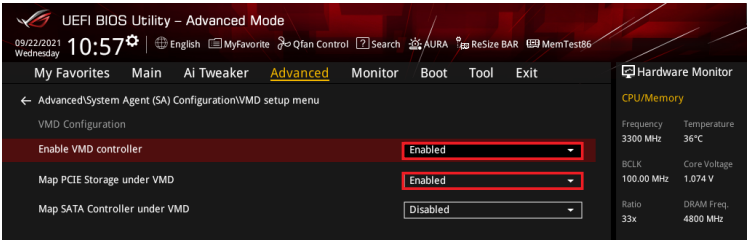
Refer to Chapter 3 in your motherboard's user guide for details on entering and navigating through the BIOS Setup.

2. Go to **Advanced** > **System Agent (SA) Configuration** > **VMD Setup Menu**.



3. In the VMD setup menu, set **Enable VMD controller** and **Map PCIE Storage under VMD** to **[Enabled]**, and set **Map SATA Controller under VMD** to **[Disabled]**.

NVMe RAID support varies between different motherboard models. Make sure to check the product specification for more information.



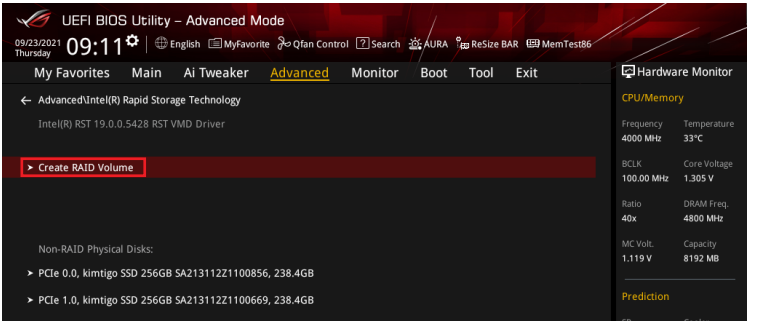
4. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.

5. Go to **Advanced** > **Intel(R) Rapid Storage Technology** to display the Intel® Rapid Storage Technology menu.

4.1 Creating a RAID set

To create a RAID set:

1. From the Intel® Rapid Storage Technology menu, select **Create RAID Volume** and press <Enter>.

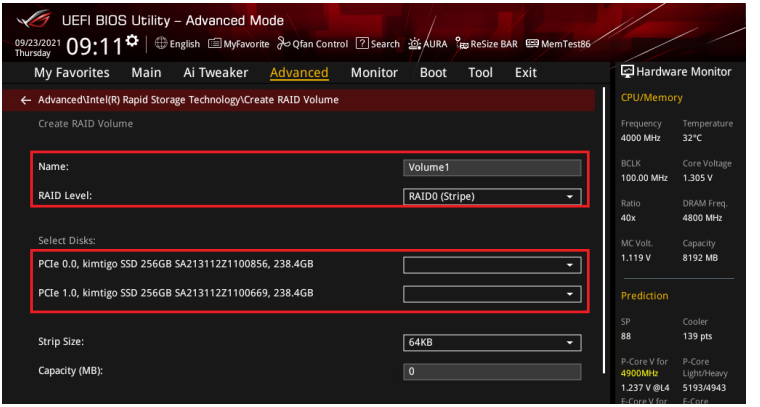


2. When the **Name** item is selected, enter a name for the RAID set and press <Enter>.

3. When the **RAID Level** item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.

4. Under **Select Disks**, press <Enter> and select **X** for the disks you want to include in the RAID set.

Only full SATA or full NVMe RAID is supported, different interfaces of RAID cannot be created, such as half NVMe and half RAID.

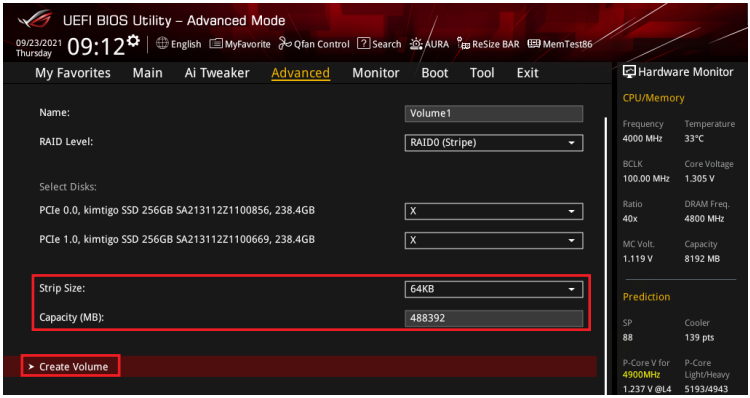


5. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:

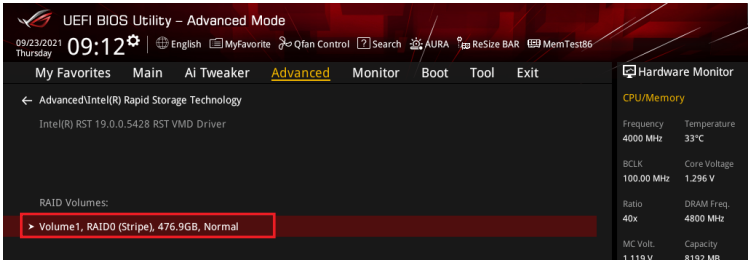
   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.

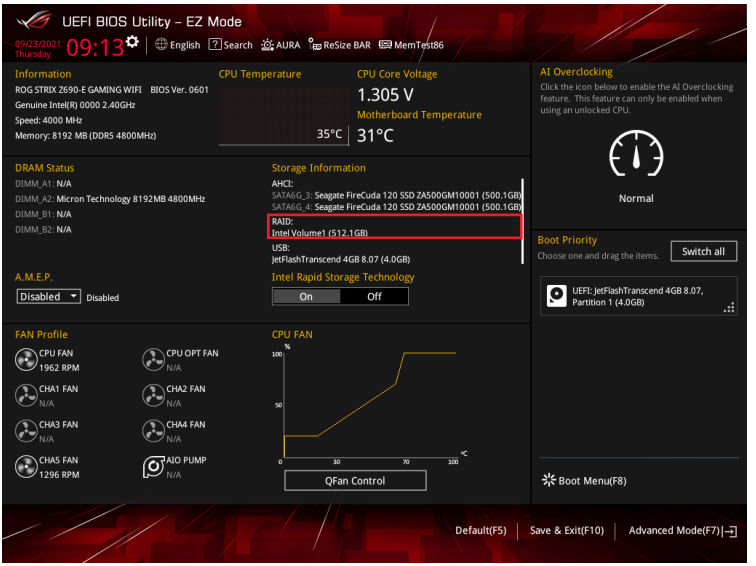
6. When the **Capacity (MB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
7. When the **Create Volume** item is selected, press <Enter> to create the RAID volume and return to the Intel® Rapid Storage Technology menu.



8. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
9. The RAID volume should appear in the **Intel(R) Rapid Storage Technology** menu.



And also appear in the **EZ Mode** menu.

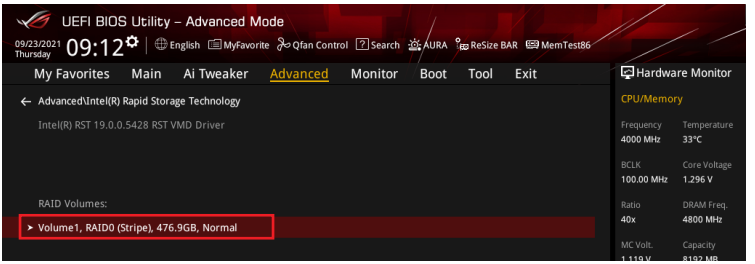


4.2 Deleting a RAID set

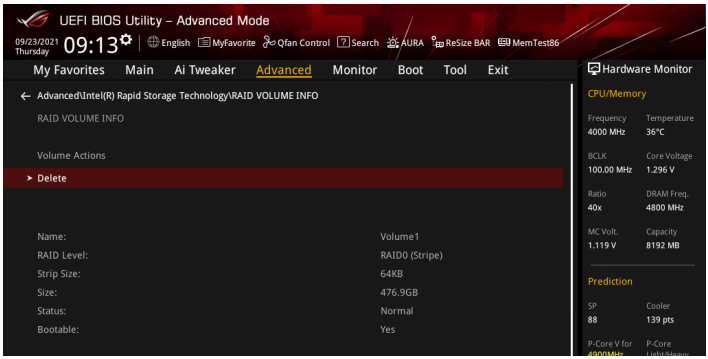
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

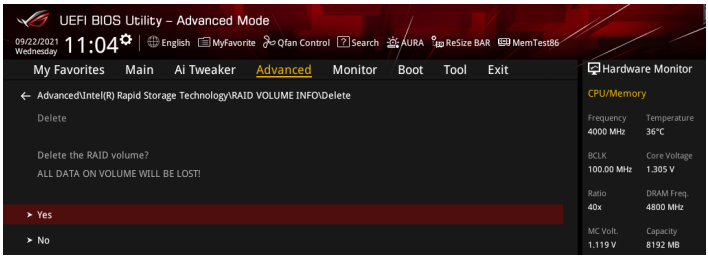
1. From the Intel® Rapid Storage Technology menu, select the RAID volume you want to delete and press <Enter>.



2. Select the **Delete** item and press <Enter>.



3. Select **Yes** to delete the RAID volume and return to the Intel® Rapid Storage Technology menu, or select **No** to cancel.



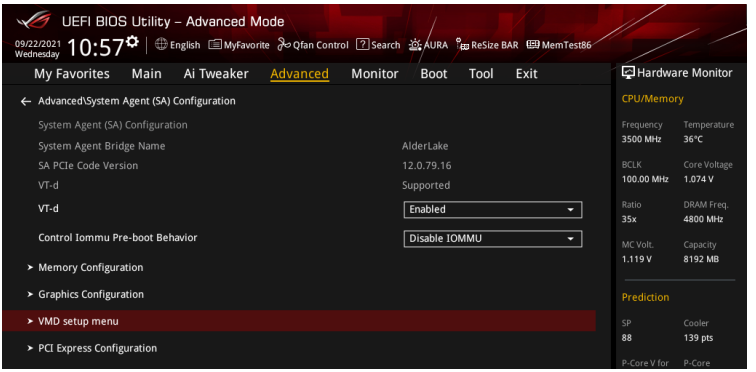
5. Creating an NVMe RAID set with expansion M.2 card in UEFI BIOS

Some BIOS options may differ, but the steps remain the same.

1. Enter the BIOS Setup during POST.

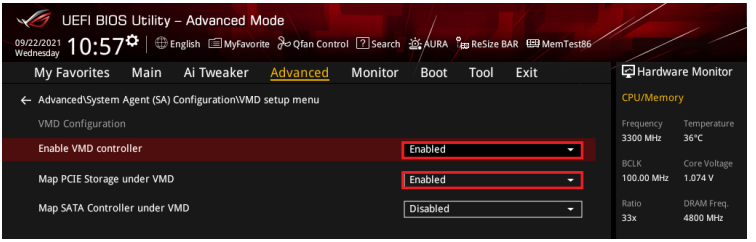
Refer to Chapter 3 in your motherboard's user guide for details on entering and navigating through the BIOS Setup.

2. Go to **Advanced** > **System Agent (SA) Configuration** > **VMD Setup Menu**.



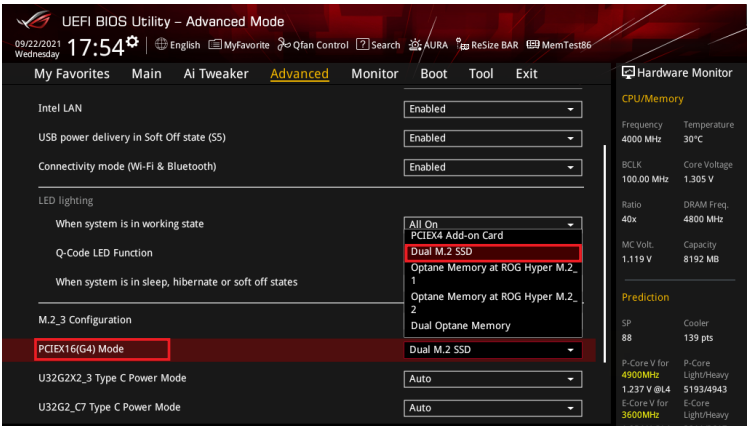
3. In the VMD setup menu, set **Enable VMD controller** and **Map PCIE Storage under VMD** to **[Enabled]**, and set **Map SATA Controller under VMD** to **[Disabled]**.

NVMe RAID support varies between different motherboard models. Make sure to check the product specification for more information.

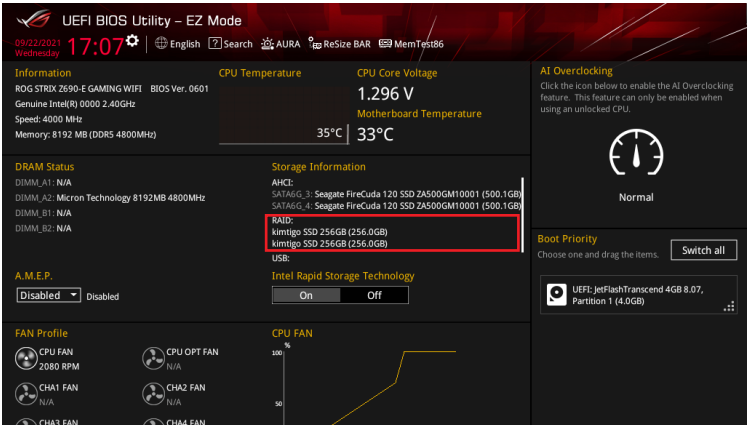


4. Go to **Advanced** > **Onboard Devices Configuration**, and set the PCIEX16 configuration as **[Dual M.2]**.

- Please refer to the support site or your motherboard's user guide for more information on the Hyper M.2 card configurations.
- The PCIEX16 configuration option may differ between models, please refer to the actual BIOS of your motherboard for the correct item.



4. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again. You may check if the Hyper M.2 card and installed M.2 modules have been properly recognized in **EZ mode**.

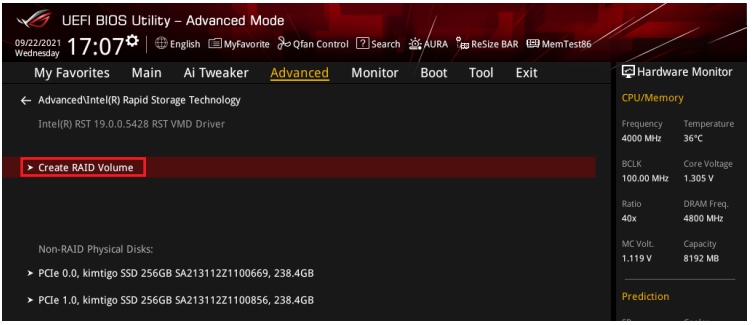


5. Go to **Advanced** > **Intel(R) Rapid Storage Technology** to display the Intel® Rapid Storage Technology menu.

5.1 Creating a RAID set

To create a RAID set:

1. From the Intel® Rapid Storage Technology menu, select **Create RAID Volume** and press <Enter>.



2. When the **Name** item is selected, enter a name for the RAID set and press <Enter>.
3. When the **RAID Level** item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.
4. Under **Select Disks**, press <Enter> and select **X** for the disks you want to include in the RAID set.

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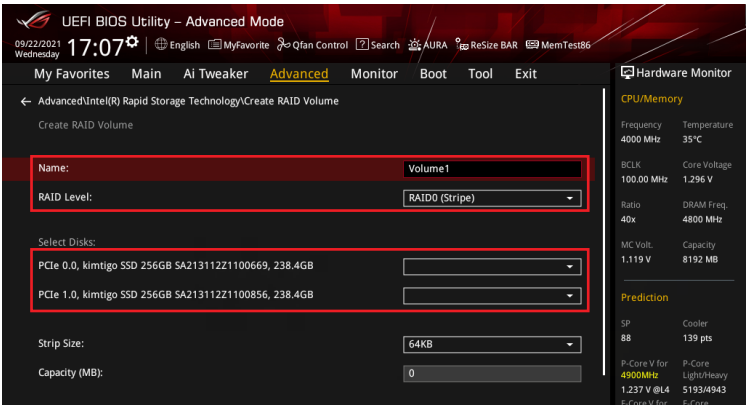


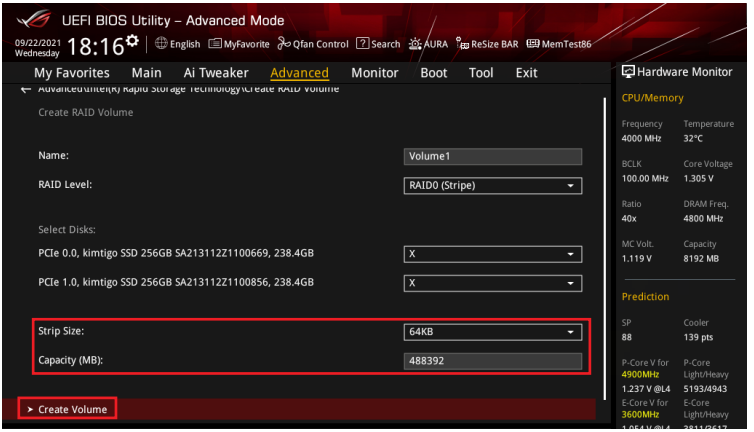
5. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:

   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

We recommend a lower strip size for server systems, and a higher strip size for multimedia computer systems used mainly for audio and video editing.

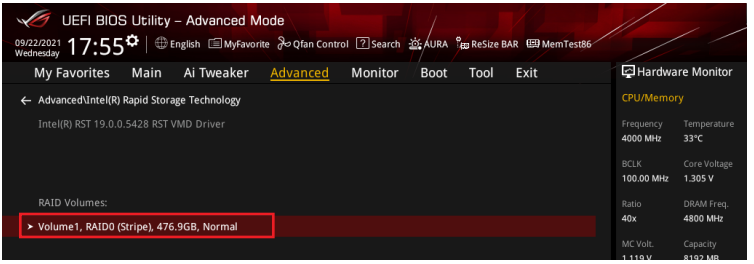
6. When the **Capacity (MB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

7. When the **Create Volume** item is selected, press <Enter> to create the RAID volume and return to the Intel® Rapid Storage Technology menu.

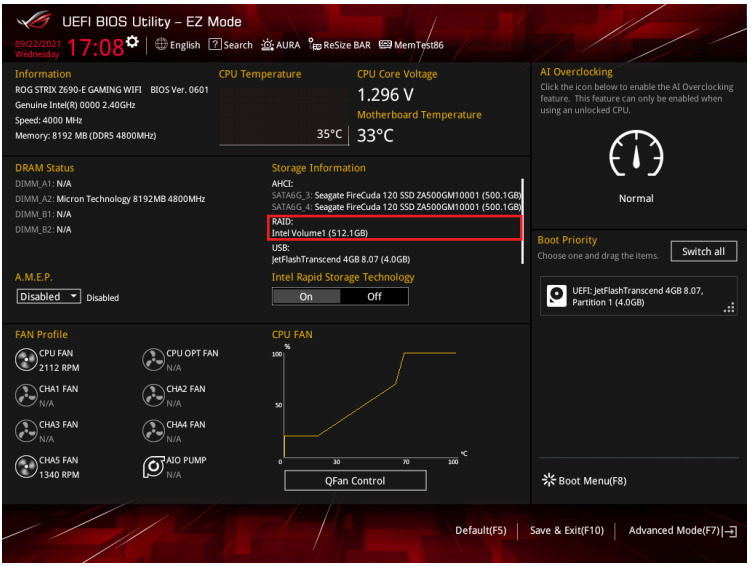


8. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.

9. The RAID volume should appear in the **Intel(R) Rapid Storage Technology** menu.



And also appear in the **EZ Mode** menu.

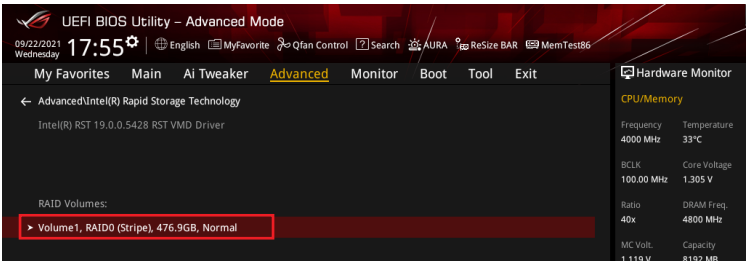


5.2 Deleting a RAID set

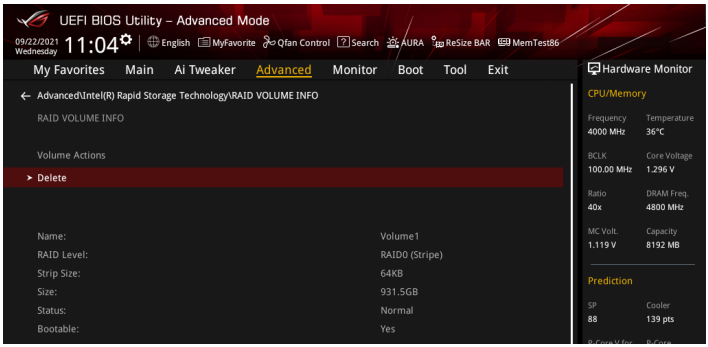
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

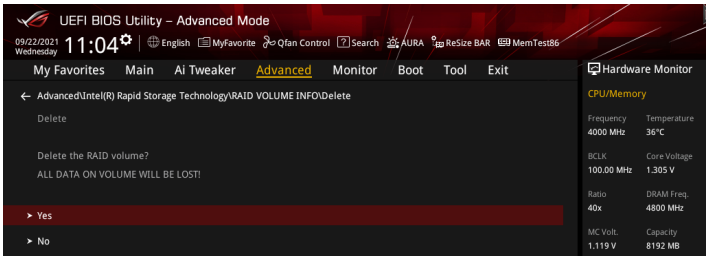
1. From the Intel® Rapid Storage Technology menu, select the RAID volume you want to delete and press <Enter>.



2. Select the **Delete** item and press <Enter>.



3. Select **Yes** to delete the RAID volume and return to the Intel® Rapid Storage Technology menu, or select **No** to cancel.



6. Installing the RAID controller driver during Windows® 10 or Windows® 11 OS installation

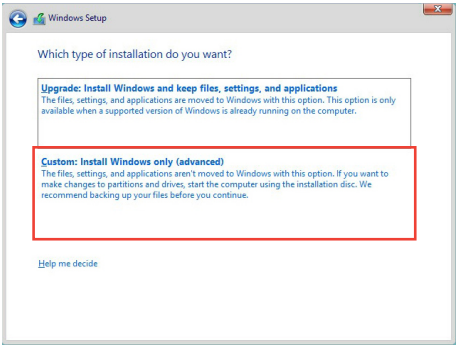
After creating the RAID sets, you are now ready to install an operating system to the independent drives or bootable array. This part provides the instructions on how to install the RAID controller drivers during OS installation.

The steps and screenshots are for reference only and may change with newer Windows updates.

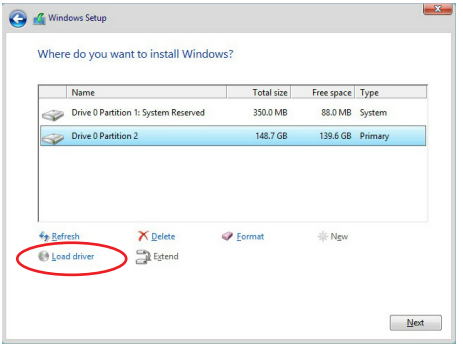
If you created a SATA RAID set, you will not be able to use the optical drive connected to a SATA port before the RAID driver is loaded.

To install the RAID controller driver when installing Windows® 10 or Windows® 11 OS:

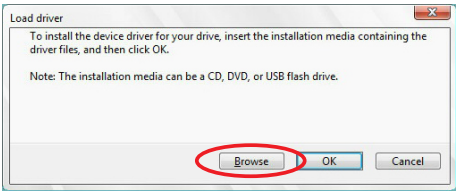
1. Boot the computer using the Windows® 10 OS or Windows® 11 installation disc or drive. Follow the screen instructions to start installing Windows®.
2. When prompted to choose a type of installation, click **Custom: Install Windows only (advanced)**.



3. Click **Load Driver**.



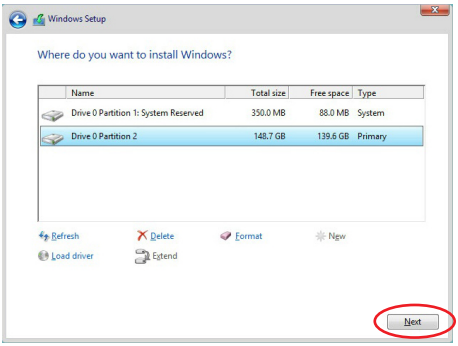
4. A message appears, reminding you to insert the installation media containing the driver of the RAID controller driver. Click **Browse** to continue.



5. Locate the driver in the corresponding folder of the Support DVD or the USB flash drive with RAID driver, then click **OK** to continue.

6. Select the RAID controller driver you need from the list and click **Next**.

7. When the system finishes loading the RAID driver, select the drive to install Windows and click **Next**.



8. Setup then proceeds with the OS installation. Follow screen instructions to complete.