

RAID Configuration Guide



E16322 Revised Edition V5 January 2020

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About this guide

This guide contains information that you need to create 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.

How this guide is organized

This guide contains the following parts:

Chapter 1: Intel[®] RAID Configuration

This chapter describes the Intel[®] RAID configurations and lists the setup procedures to create Intel[®] RAID configurations.

Chapter 2: AMD RAID Configuration

This chapter describes the AMD RAID configurations and lists the setup procedures to create AMD RAID configurations.

Where to find more information

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

Intel[®] RAID Configuration

1.1 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 1.2 Installing the RAID controller driver during Windows® 10 OS installation for details.

1.1.1 **BAID** 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.

Installing storage devices 1.1.2

The motherboard supports SATA hard disk drives 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 manual for details on installing storage devices to your motherboard.

1.1.3 Intel[®] Rapid Storage Technology in UEFI BIOS

To enter the Intel® Rapid Storage Technology in UEFI BIOS:

1. Enter the BIOS Setup during POST.



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

2. Go to Advanced > PCH Storage Configuration, then set SATA Mode Selection to [Intel RST Premium With Intel Optane System Acceleration (RAID)].



Due to chipset limitation, when SATA ports are set to RAID mode, all SATA ports run at RAID mode together.

- 3. Configure additional settings for your storage device and RAID configuration:
 - If you are using SATA storage devices, no additional settings are required. Please proceed to next step.
 - If you are using onboard M.2 cards, go to Advanced > PCH Storage Configuration, then set all the corresponding M.2 PCIE Storage RAID Support to [Enabled].
 - If you are using Hyper M.2 cards or PCIE SSDs, go to Advanced > CPU Storage Configuration, then set all the corresponding PCIE slots to [Hyper M.2 X16] or [PCIE X4 SSD Card] accordingly.



The Hyper M.2 card is purchased separately.

- Go to Boot > CSM (Compatibility Support Module), then set Launch CSM to [Disabled].
- 5. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
- Go to the Advanced > Intel(R) Rapid Storage Technology to display the Intel[®] Rapid Storage Technology menu.



Creating a RAID set

To create a RAID set:

1. From the Intel[®] Rapid Storage Technology menu, select **Create RAID Volume** and press <Enter>. The following screen appears:

UEFI BIOS Utility - Advanced Mode	a Control(F6) QEZ Tuning Wizard(F11) I Hot Keys
My Favorites Main Extreme Tweaker <u>Advan</u>	ced Monitor Boot Tool Exit 🛛 🖓 Hardware Monito
Advanced\Intel(R) Rapid Storage Technology\Create RAID Volume	СРО
	Frequency Temperatur 3700 MHz 33*C
Name:	Volume1 BCLK Core Voltage 100.0 MHz 1.040 V
RAID Level:	RAIDO(Stripe) - Ratio 37x
SATA 0.0, ST3160812AS 3LS0JYL8, 149.0GB	- Memory
SATA 0.2, ST3160812AS 9LS0BJ5H, 149.0GB	Frequency Voltage 2133 MHz 1.200 V
Strip Size:	Capacity 8192 MB
Capacity (MB):	0 Voltage

- 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.

UEFI BIOS Utility - Advanced Mode otc350011 10:24 [♥] ⊕ English □MyGavorite(F3) 沙 Qian Control(F6) ♡ tr Tuning Waard(F11) ⑦ Hot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
← Advanced\Intel(R) Rapid Storage Technology\Create RAID Volume	СРО
	Frequency Temperature 3700 MHz 32*C
Name: Volume1	BCLK Core Voltage 100.0 MHz 1.040 V
RAID Level: RAID0(Stripe) -	Ratio 37x
SATA 0.0, ST3160812AS 3LS0JYL8, 149.0GB	Memory
SATA 0.2, ST3160812AS 9LS0BJ5H, 149.0GB	Frequency Voltage 2133 MHz 1.200 V
Strip Size:	Capacity 8192 MB
Capacity (MB):	Voltage

- 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

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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.

UEFI BIOS Utility - Advanced Mode					
05/25/2017 10:24 CEnglish MyFavorite(F3)	みQfan Control(F6) ♀	EZ Tuning Wizard(F11)	? Hot Keys		
My Favorites Main Extreme Tweaker	<u>Advanced</u> Monito	r Boot Too	Exit	🔄 Hardwa	are Monitor
← Advanced\Intel(R) Rapid Storage Technology\Create RAID	/olume			CPU	
				Frequency 3700 MHz	Temperature 33°C
Name:	Volu	ime1		BCLK 100.0 MHz	Core Voltage 1.040 V
RAID Level:	RAII	D0(Stripe)	-		
				37x	
	4KB				
SATA 0.0, ST3160812AS 3LS0JYL8, 149.0GB	8KB			Memory	
	166	B			Voltage
SATA 0.2, ST3160812AS 9LS0BJ5H, 149.0GB	64K	B		2133 MHz	1.200 V
	128	KB			
Strip Size:	16K	В	•	8192 MB	
Capacity (MB):	0			Voltage	
					+5V

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

UEFI BIOS Utility – Advanced Mode 05/25/2017 10:24 [¢] ⊕ English @MyFavorite(F3) みQfan Contro Thursday	ok(F6) 🛛 EZ Tuning Wizard(F11) 🗇 Hot Keys	
My Favorites Main Extreme Tweaker Advanced	Monitor Boot Tool Exit	Hardware Monitor
Name: RAID Level:	Volume1 RAID0(Stripe) -	CPU Frequency Temperature 3700 MHz 33°C BCLK Core Voltage
Select Disks: SATA 0.0, ST3160812AS 3LS0JYL8, 149.0GB SATA 0.2, ST3160812AS 01508154, 140.0GB	X •	100.0 MHz 1.040 V Ratio 37x
Strip Size:	Гаранананананананананананананананананана	Memory Frequency Voltage 2133 MHz 1.200 V
Capacity (MB):	305251	Capacity 8192 MB
> Create volume		Voltage +12V +5V 12.096 V 5.040 V

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>. The following screen appears:

UEFI BIOS Utility - Advanced Mode	み Qfan Control(F6) ♀EZ Tuning Wizard(F11)	ys
My Favorites Main Extreme Tweaker	Advanced Monitor Boot Tool Exit	Hardware Monitor
← Advanced\Intel(R) Rapid Storage Technology\RAID VOLU	ME INFO	CPU
RAID VOLUME INFO		Frequency Temperature 3700 MHz 33°C
		BCLK Core Voltage
≻ Delete		Ratio 37x
Name:		Memory
RAID Level:	RAID0(Stripe)	Frequency Voltage
		2133 MHz 1.200 V
		Conneity
		8192 MB
Bootable:		
		Voltage
SATA 0.0, ST3160812AS 3LS0JYL8, 149.0GB		+12V +5V
		12.192 V 5.040 V

 When the Delete item is selected, press <Enter>, then select Yes to delete the RAID volume and return to the Intel[®] Rapid Storage Technology menu, or select No to cancel.



1.1.4 Intel[®] Virtual Raid on CPU in UEFI BIOS

Some motherboards support Intel[®] Virtual Raid on CPU with RAID 0, RAID 1, RAID 5, and RAID 10 solution. RAID 0 can be created without a KEY module, while RAID 1, RAID 5, and RAID 10 requires a KEY module.



- The KEY module is purchased separately.
- The Hyper M.2 x16 card is purchased separately.
- Due to CPU behavior, CPU RAID functions with Intel[®] CPU RSTe only supports Intel[®] Core[™] X-series Processors (6-core or above) and Intel[®] SSD modules.
- Refer to section Motherboard layout in your motherboard's user manual for the location of the VROC_HW_KEY connector.



If you plan on using the CPU RAID configuration spanned across different PCIE slots as OS drives, please install the Hyper M.2 x16 cards into supported PCIE slots. Refer to section **Expansion slots** in your motherboard's user manual for more information on the PCIE slots.

To enter the Intel® Virtual Raid on CPU in UEFI BIOS:

1. Enter the BIOS Setup during POST.



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

- Go to Boot > CSM (Compatibility Support Module), then set Launch CSM to [Disabled].
- Go to the Advanced > CPU Storage Configuration, then set the PCIE slot(s) that you have installed the Hyper M.2 x16 card(s) or PCIE X4 SSD card(s) to [Hyper M.2 X16] or [PCIE X4 SSD Card] accordingly.
- 4. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
- Go to the Advanced > Intel(R) Virtual Raid on CPU to display the Intel[®] Virtual Raid on CPU menu.

UEFI BIOS Utility - Advanced Mode ©ennexity 13:03 [©] ⊕ English ⊟Myfavorite(F3) ∂v Qfan Controt(F6) ♀ Er Tuning Witand(Ff1) ☑ Hot Keys		/ /
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	G Hardw	are Monitor
Advanced/Intel(R) Virtual RAID on CPU/RAID VOLUME INFO/PHYSICAL DISK INFO/Reset to non-RAID/Intel VROC Managed VMD All Intel VMD Controllers	CPU Frequency 2800 MHz BCLK	Temperature 50°C Core Voltage
≻ Create RAID Volume	100.0 MHz	0.905 V
	Ratio 28x	
Non-RAID Physical Disks:	Mamoni	
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003M1P2BGN, 1.09TB	wemory	
Port 1, VMD0, INTEL SSDPEDMW400G4 SN:CVCQ4393009B400AGN, 372.6GB	2133 MHz	1.200 V
	Capacity 8192 MB	Vol_CHCD 1.200 V

Creating a RAID set

To create a RAID set:

1. From the Intel[®] Virtual Raid on CPU menu, select **Create RAID Volume** and press <Enter>. The following screen appears:

UEFI BIOS Utility - Advanced Mode					
06/16/2017 13:03 English MyFavorite(F3)	🖓 Qfan Control(F6) 🛛 🖓 EZ Tu	ining Wizard(F11)	Hot Keys		
My Favorites Main Extreme Tweaker	Advanced Monitor	Boot Tool	Exit	🔄 Hardwa	re Monitor
 Advanced\Intel(R) Virtual RAID on CPU\RAID VOLUME INFO Managed VMD\Create RAID Volume 	\PHYSICAL DISK INFO\Reset t	o non-RAID\Intel VRC)c		
				2800 MHz	50°C
Name:	Volume)		100.0 MHz	0.904 V
RAID Level:	RAID0(S	tripe)	-	Ratio 28x	
Enable RAID spanned over VMD Controllers:			-		
				Memory	
				Frequency	Vol_CHAB
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003M	1P2BGN, 1.09TB		- I	2133 MHZ	1.200 V
				Capacity 8102 MB	Vol_CHCD
Port 1, VMD0, INTEL SSDPEDMW400G4 SN:CVCQ4393009B	400AGN, 372.6GB		I	OT SZ WID	1.200 V
				Voltage	
Strip Size:	128KB		-		

- 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. When the Enable RAID spanned over VMD Controllers item is selected, press <Enter> and select X to enable this function.
- Under Select Disks, press <Enter> and select X for the disks you want to include in the RAID set.

UEFI BIOS Utility – Advanced Mode	EZ Tuning Wizard(F11) I Hot Keys
My Favorites Main Extreme Tweaker Advanced Monito	or Boot Tool Exit 🖓 Hardware Monitor
← Advanced/Intel(R) Virtual RAID on CPU/RAID VOLUME INFO/PHYSICAL DISK INFO/Res Managed VMD/Create RAID Volume Create RAID Volume	set to non-RAID\Intel VROC CPU Frequency Temperature 2800 MHz SOC REL K Core Monteen
Name: Volu	ume0 100.0 MHz 0.904 V
RAID Level:	DD(Stripe) - Ratio 28x
Enable RAID spanned over VMD Controllers: X	
	Frequency Vol_CHAB
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003M1P2BGN, 1.09TB X	2133 MHz 1.200 V
Port 1, VMD0, INTEL SSDPEDMW400G4 SN:CVCQ4393009B400AGN, 372.6GB	Capacity Vol_CHCD 8192 MB 1.200 V
Strip Size:	Voltage 3KB • +12V +5V

- 6. 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

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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.

UEFI BIOS Utility - Advanced Mode		
06/16/2017 13:04 🗢 English 🗐 MyFavorite(F3) 🗞 Qfan Control(F6)	EZ Tuning Wizard(F11) I Hot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> M	lonitor Boot Tool Exit	Hardware Monitor
Name:	Volume0	
RAID Level:	RAID0(Stripe) -	Frequency Temperature 2800 MHz 50°C
Enable RAID spanned over VMD Controllers:	× •	BCLK Core Voltage 100.0 MHz 0.905 V
	4KB	Ratio
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003M1P2BGN, 1.09TB	8КВ 16КВ	
Port 1, VMD0, INTEL SSDPEDMW400G4 SN:CVCQ4393009B400AGN, 372.6GB	32KB	Memory
	128KB	Frequency Vol_CHAB 2133 MHz 1.200 V
Strip Size:	128KB -	
Capacity (MB):	724944	8192 MB 1.200 V
		Voltage
Create Volume		

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

veril BIOS Utility - Advanced Mode و(16,62017 13:04 [¢] ⊕ English @ Myfavortix(F3) كo (fan Control(F6) وt Tuning Weard(F11) ⑦ Hot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
Name: Volume0	
RAID Level:	Frequency Temperature 2800 MHz 50°C
Enable RAID spanned over VMD Controllers:	BCLK Core Voltage 100.0 MHz 0.905 V
	Ratio 28x
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003M1P2BGN, 1.09TB X	
Port 1, VMD0, INTEL SSDPEDMW400G4 SN:CVCQ4393009B400AGN, 372.6GB X	Memory
	Frequency Vol_CHAB 2133 MHz 1.200 V
Strip Size: 128KB 👻	Capacity Vol_CHCD
Capacity (MB): 724944	8192 MB 1.200 V
	Voltage
➤ Create Volume	+12V +5V
	11.904 V 5.000 V

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[®] Virtual Raid on CPU menu, select the RAID volume you want to delete and press <Enter>. The following screen appears:

UEFI BIOS Utility - Advanced Mode		
06/16/2017 13:05 English MyFavorite(F3)	& Qfan Control(F6)	
My Favorites Main Extreme Tweaker	Advanced Monitor Boot Tool Exit	Hardware Monitor
← Advanced\Intel(R) Virtual RAID on CPU\RAID VOLUME IN Managed VMD\RAID VOLUME INFO	IFO\PHYSICAL DISK INFO\Reset to non-RAID\Intel VROC	СРО
		2800 MHz 50°C
		BCLK Core Voltage 100.0 MHz 0.905 V
≻ Delete		Ratio 28x
		Memory
		Frequency Vol_CHAB
		2133 MHz 1.200 V
		Capacity Vol_CHCD
		8192 MB 1.200 V
		Voltage
Port 0, VMD0, INTEL SSDPEDMW012T4 SN:CVCQ5162003	3M1P2BGN, 1.09TB	+12V +5V

2. When the **Delete** item is selected, press <Enter>, then select **Yes** to delete the RAID volume and return to the Intel[®] Virtual Raid on CPU menu, or select **No** to cancel.

UEFI BIOS Utility – Advanced Mode	1
06/16/2017 13:05 C III Biglish MyFavorite(F3) & Qfan Control(F6) 🛛 EZ Tuning Wizard(F11) 🖸 Hot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
Advanced/Untel(R) Virtual RAID on CPU/RAID VOLUME INFO\PHYSICAL DISK INFO\Delete\Intel VROC Managed VMDRAID VOLUME INFO\Delete Delete Delete Delete the RAID volume? ALL DATA ON VOLUME WILL BE LOSTI	CPU Frequency Temperature 2800 MHz 50°C BCLK Core Voltage 100.0 MHz 0.905 V Ratio
▶ Yae	
> No	Memory
, NU	Frequency Vol_CHAB 2133 MHz 1.200 V
	Capacity Vol_CHCD 8192 MB 1.200 V
	Voltage

1.1.5 Intel[®] Rapid Storage Technology Option ROM utility

To enter the Intel® Rapid Storage Technology Option ROM utility:

- 1. Turn on the system.
- 2. During POST, press <Ctrl> + <I> to display the utility main menu.

Intel(R) Rapid Copyright(C) 20	l Storage Techn 03-14 Intel Co	ology - Optic rporation. Al:	n - v10.5.1.1070 1 Rights Reserved.
 Create RAII Delete RAII Reset Disk: 	[MAIN D Volume D Volume s to Non-RAID	MENU] 4. Recover 5. Acceler 6. Exit	ry Volume Options ration Options
RAID Volumes: None defined. Physical Devices: Port Device Model 0 ST3160812AS 1 ST3160812AS 3 ST3160812AS	DISK/VOLUME Serial # 9LSOHJA4 9LSOF4HL 3LSOJYL8 9LSOBJ5H	Size 149.0GB 149.0GB 149.0GB 149.0GB	Type/Status(Vol ID) Non-RAID Disk Non-RAID Disk Non-RAID Disk Non-RAID Disk
[↑↓]-Select	[ESC]-E:	xit	[ENTER]-Select Menu

The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.



The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

Creating a RAID set

To create a RAID set:

1. From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears:

Intel(R) Rapid St Copyright(C) 2003-1	orage Technology - Op 4 Intel Corporation.	tion - v10.5.1.1070 All Rights Reserved.
RAII Stri Ca	CREATE VOLUME MEI Name: Volume 0) Level: Disks: .p Size: .pacity: Sync: Create volume	10]
Enter a unique volume and is 16 characters	[HELP]	special characters
[₁]-Select	[ESC]-Exit	[ENTER]-Select Menu

- 2. Enter a name for the RAID set and press <Enter>.
- 3. When the RAID Level item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.
- 4. When the Disks item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The SELECT DISKS screen appears:

Port	Device Model	Sorial #	Size	Status
0	ST3160812AS	9LSOHJA4	149.0GB	Non-RAID Disk
1	ST3160812AS	9LSOF4HL	149.0GB	Non-RAID Disk
2	ST3160812AS	3LS0JYL8	149.0GB	Non-RAID Disk
	ST3160812AS	9LSOBJ5H	149.0GB	Non-RAID Disk
	Select 2 to		creating th	ne volume.

- Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.
- Use the up/down arrow key to select the 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.

- 7. When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
- 8. When the **Create Volume** item is selected, press <Enter>. The following warning message appears:



 Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the CREATE VOLUME menu.

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 utility main menu, select **2. Delete RAID Volume** and press <Enter>. The following screen appears:

Name Level Drives Capacity Status Bootable Volume0 RAID0 (Stripe) 2 298.0GB Normal Yes [HELP]				VOLUME M	ENII	
[HELP]	Name Volume0	Level RAIDO (Drive Stripe) 2	s Capac 298.0	ity Status GB Normal	Bootable Yes
	D	eleting a WARNI (This	volume will ; NG: ALL DISK does not app:	HELP] ceset the DATA WIL Ly to Reco	disks to non- L BE DELETED. Svery volumes)	RAID.

2. Use the up/down arrow key to select the RAID set you want to delete, and then press <Delete>. The following warning message appears:



 Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the DELETE VOLUME menu.

Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

1. From the utility main menu, select **6. Exit**, then press <Enter>. The following warning message appears:



2. Press <Y> to exit or press <N> to return to the utility main menu.

1.2 Installing the RAID controller driver during Windows[®] 10 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.

If you plan on using the CPU RAID configuration spanned across different PCIE slots as OS drives, please install the Hyper M.2 x16 cards to the supported PCIE slots. Refer to section **Motherboard layout** in your motherboard's user manual for more information on the PCIE slots.

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

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



3. Click Load Driver.

5

Drive 0 Partition 1: System Reserved	250 0 MAP		
	530.0 100	88.0 MB	System
Drive 0 Partition 2	148.7 GB	139.6 GB	Primary
h 🗙 Delete	Eormat	₩ N <u>e</u> w	
	nive 0 Partition 2	n X Detes Scornat	n X Delete Z Ecount & Nov

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



- If you have only one optical drive installed in your system, eject the Windows OS installation disc and replace it with the motherboard Support DVD.
- If you do not have an optical drive, you can use another computer with an optical drive to copy the RAID driver from the support DVD to a USB flash drive.



- 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**.



If you have ejected the Windows OS installation disc in a previous step, ensure to replace the motherboard Support DVD with the Windows OS installation disc.

	Name	Total size	Free space	Туре
P	Drive 0 Partition 1: System Reserved	350.0 MB	88.0 MB	System
-	Drive 0 Partition 2	148.7 GB	139.6 GB	Primary
e Rafi	arh 🗙 Dalaba	C Format	Jie New	

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

AMD RAID Configuration



2.1 RAID configurations

If your motherboard supports RaidXpert2 Configuration Utility, you can create Volume, RAIDABLE, RAID 0, RAID 1, or RAID 10 (depends on system licensing) 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 **2.2 Installing the RAID controller driver during Windows[®] 10 OS installation** for details.

2.1.1 RAID definitions

Volume provides the ability to link-together storage from one or several disks, regardless of the size of the space on those disks. This configuration is useful in scavenging space on disks unused by other disks in the array. This configuration does not provide performance benefits or data redundancy, disk failure will result in data loss.

RAIDABLE arrays (also known as RAID Ready) are a special type of Volume (JBOD) that allows the user to add more storage space or create a redundant array after a system is installed. RAIDABLE arrays are created using Option ROM, UEFI, or rcadm.



The ability to create RAIDABLE arrays may vary per system.

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 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.

2.1.2 Installing storage devices

The motherboard supports SATA hard disk drives 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 manual for details on installing storage devices to your motherboard.

2.1.3 RaidXpert2 Configuration Utility in UEFI BIOS

To enter the RaidXpert2 Configuration Utility in UEFI BIOS:

1. Enter the BIOS Setup during POST.



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

2. Go to Advanced > SATA Configuration, then set SATA Mode to [RAID].



Due to chipset limitation, when SATA ports are set to RAID mode, all SATA ports run at RAID mode together.

- 3. Configure additional settings for your storage device and RAID configuration:
 - If you are using SATA storage devices, no additional settings are required. Please proceed to next step.
 - If you are setting up an NVMe RAID set, go to Advanced > SATA Configuration (or Advanced > AMD PBS), then set NVMe RAID mode to [Enabled].
 - If you are using Hyper M.2 x16 card(s), go to Advanced > Onboard Devices Configuration, then set the corresponding PCIE slot(s) to [PCIe RAID Mode].



The Hyper M.2 x16 card is purchased separately.

- Go to Boot > CSM (Compatibility Support Module), then set Launch CSM to [Disabled].
- 5. Save your changes and exit the BIOS Setup, then enter the BIOS Setup again.
- 6. Go to Advanced > RaidXpert2 Configuration Utility to display the RaidXpert2 Configuration Utility menu.

UEFI BIOS Utility - Advanced Mode	Qfan Control(F6) Q EZ Tuning Wizard(F1) ? Hot Keys	
My Favorites Main Extreme Tweaker <u>Ad</u>	<u>vanced</u> Monitor Boot T	ool Exit I	Hardware Monitor
← Advanced\RAIDXpert2 Configuration Utility			
 Controller Management 		F	requency Temperature 1475 MHz 50°C
≻ Array Management			
 Physical Disk Management 		1	00.0 MHz 1.417 V
		F	tatio 14.75 x

Creating a RAID set

To create a RAID set:

1. From the RaidXpert2 Configuration Utility menu, go to **Array Management** > **Create Array** to enter the Create Array menu. The following screen appears:

UEFI BIOS Utility - Advanced Mode 1222/2017 14:16 [©] = English I MyRivering(3) 30 Qfan Control(16) Qfz Tuning Weard(11) 21 Hot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
← Advanced\RAIDXpert2 Configuration Utility\Create Array	
Select RAID Level: Volume -	Frequency Temperature 3500 MHz 44°C
Select Physical Disks	
Configure Array Parameters:	100.0 MHz 1.417 V
	Ratio
Array Size Unit:	
	Memory
Read Cache Policy:	
Write Cache Policy: Write Back Cache 👻	2133 MHz 1.220 V
► Create Array	Capacity Vol_CHCD 4096 MB 1.220 V

- When the Select RAID Level item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.
- 3. When the **Select Physical Disks** item is selected, press <Enter> to enter the Select Physical Disks menu. The following screen appears:

UEFI BIOS Utility - Advanced Mode	
12/22/2017 14:17 C English MyFavorite(F3) & Qfan Control(F6) Ez Tuning Wizard(F11) Phot Keys	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
← Advanced\RAIDXpert2 Configuration Utility\Select Physical Disks\Select Physical Disks	
Select Media Type:	Frequency Temperature 3400 MHz 44°C
Physical Disk 1:1:0, NVMe, 255.9 GB, Ready On Off	
Physical Disk 2:1:0, NVMe, 255.9 GB, Ready On Off	100.0 MHz 1.417 V
Check All	Ratio 34.0 x
Uncheck All	Memory Frequency Vol CHAB
	2133 MHz 1.220 V
➤ Apply Changes	Capacity Vol_CHCD
	1.220 V

4. Toggle the physical disks that you want to include in the RAID set to **On**, then select **Apply Changes** and press <Enter> to complete selection.

- 5. When the **Array Size:** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
- 6. When the **Array Size Unit:** item is selected, press <Enter> to select the size unit for the RAID array, and then press <Enter>.
- 7. When the **Read Cache Policy:** item is selected, press <Enter> to select the read policy for the RAID array, and then press <Enter>.
- 8. When the **Write Cache Policy:** item is selected, press <Enter> to select the write policy for the RAID array, and then press <Enter>.
- 9. When the **Create Array** item is selected, press <Enter> to create the RAID volume and return to the Array Management menu.

UEFI BIOS Utility - Advanced Mode	≫ Ofan Control(F6)		(F11) P Hot Keys		//
Friday 14.17 • • • • • • •					
My Favorites Main Extreme Tweaker	Advanced Mo	onitor Boot	Tool Exit	🔄 Hardw	are Monitor
← Advanced\RAIDXpert2 Configuration Utility\Create Array					
				Frequency 3400 MHz	Temperature 46°C
➤ Select Physical Disks				BCLK	Core Voltage
Configure Array Parameters:				100.0 Miliz	
Array Size:		510812		Ratio 34.0 x	
Array Size Unit:		MB (MegaBytes)	•		
				Memory	
Read Cache Policy:		Read Cache	-		
Write Cache Policy:		Write Back Cache	-	2133 MHz	1.220 V
≻ Create Array				Capacity	Vol_CHCD
				4096 MB	1.220 V

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 RaidXpert2 Configuration Utility menu, go to **Array Management** > **Delete Array** to enter the Delete Array menu. The following screen appears:

UEFI BIOS Utility - Advanced Mode	11
04/09/2018 16:43 Carlish 🗇 MyFavorite(F3) 🖉 Qfan Control(F6) 🖓 EZ Tuning Wizard(F11) 🛛 Search(F9)	
My Favorites Main Extreme Tweaker <u>Advanced</u> Monitor Boot Tool Exit	Hardware Monitor
← Advanced\RAIDXpert2 Configuration Utility\Delete Array	
Array 1, Volume, 318.8 GB, Normal On Off	Frequency Temperature 3400 MHz 51°C
Check All	BCLK Core Voltage 100.0 MHz 1.427 V
Uncheck All	Ratio 34.0 x
≻ Delete Array(s)	Memory
	2133 MHz 1.200 V
	Capacity 4096 MB

- 2. Toggle the array(s) that you want to delete to **On**.
- 3. When the **Delete Array(s)** item is selected, press <Enter>, toggle the **Confirm** item to **On**, then select **YES** to delete the RAID volume, or select **NO** to cancel.



2.2 Installing the RAID controller driver during Windows[®] 10 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.

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

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

3. Click Load Driver.

	Name	Total size	Free space	Туре
9	Drive 0 Partition 1: System Reserved	350.0 MB	88.0 MB	System
	Drive 0 Partition 2	148.7 GB	139.6 GB	Primary



DO NOT delete any of the partitions or format the NVMe devices. Doing so will delete the AMD-RAID metadata and the desired RAID level will be deleted.

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



- If you have only one optical drive installed in your system, eject the Windows OS installation disc and replace it with the motherboard Support DVD.
- If you do not have an optical drive, you can use another computer with an optical drive to copy the RAID driver from the support DVD to a USB flash drive.



- 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 (rcbottom.inf) from the list and click **Next**. The available drives will temporary disappear.
- 7. Repeat steps 3 to 5 and select the RAID controller driver (rcraid.inf) from the list and click **Next**. The available drives will reappear.
- 8. Repeat steps 3 to 5 and select the RAID controller driver (rccfg.inf) from the list and click **Next**. The AMD-RAID Virtual Disk will appear.
- 9. Select the drive to install Windows and click Next.



If you have ejected the Windows OS installation disc in a previous step, ensure to replace the motherboard Support DVD with the Windows OS installation disc.

	Name	Total size	Free space	Туре
	Drive 0 Partition 1: System Reserved	350.0 MB	88.0 MB	System
0	Drive 0 Partition 2	148.7 GB	139.6 GB	Primary
	~~~			

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

