



# **ROG STRIX**

# **B360-H**

# **GAMING**

**BIOS Manual**

**Motherboard**

E14016  
First Edition  
March 2018

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# BIOS Setup

## 1.1 Knowing BIOS



The new ASUS UEFI BIOS is a Unified Extensible Interface that complies with UEFI architecture, offering a user-friendly interface that goes beyond the traditional keyboard-only BIOS controls to enable a more flexible and convenient mouse input. You can easily navigate the new UEFI BIOS with the same smoothness as your operating system. The term "BIOS" in this user manual refers to "UEFI BIOS" unless otherwise specified.

BIOS (Basic Input and Output System) stores system hardware settings such as storage device configuration, processor and memory settings, advanced power management, and boot device configuration that are needed for system startup in the motherboard CMOS. In normal circumstances, the default BIOS settings apply to most conditions to ensure optimal performance. **DO NOT change the default BIOS settings** except in the following circumstances:

- An error message appears on the screen during the system bootup and requests you to run the BIOS Setup.
- You have installed a new system component that requires further BIOS settings or update.



Inappropriate BIOS settings may result to instability or boot failure. **We strongly recommend that you change the BIOS settings only with the help of a trained service personnel.**



- When downloading or updating the BIOS file, rename it as **B360HGAM.CAP** for this motherboard.
- BIOS settings and options may vary due to different BIOS release versions. Please refer to the latest BIOS version for settings and options.

## 1.2 BIOS setup program

Use the BIOS Setup to update the BIOS or configure its parameters. The BIOS screen include navigation keys and brief onscreen help to guide you in using the BIOS Setup program.

### Entering BIOS at startup

To enter BIOS Setup at startup, press <Delete> or <F2> during the Power-On Self Test (POST). If you do not press <Delete> or <F2>, POST continues with its routines.

### Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+<Delete> simultaneously.
- Press the reset button on the system chassis.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first two options.

After doing either of the three options, press <Delete> key to enter BIOS.



- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
- If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu or press hotkey <F5>. See section 1.10 Exit menu for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See your motherboard manual for information on how to erase the RTC RAM.
- The BIOS setup program does not support Bluetooth devices.

### BIOS menu screen

The BIOS Setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from **Setup Mode** in **Boot menu** or by pressing the <F7> hotkey.

## 1.2.1 EZ Mode

The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance, mode and boot device priority. To access the Advanced Mode, select **Advanced Mode** or press the <F7> hotkey for the advanced BIOS settings.



The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in section **Boot menu** for details.

Displays the CPU/motherboard temperature, CPU voltage output, CPU/chassis/power fan speed, and SATA information

Selects the display language of the BIOS setup program

Searches by BIOS item name, enter the item name to find the related item listing

Turns the RGB LED lighting or functional LED on or off

UEFI BIOS Utility – EZ Mode  
03/12/2018 00:00<sup>\*</sup> English Search(F9) AURA ON/OFF(F4)

Information CPU Temperature CPU Core Voltage  
ROG STRIX B360-H GAMING BIOS Ver. 0234  
Genuine Intel® CPU 0000 @ 2.90GHz  
Speed: 2900 MHz  
Memory: 4096 MB (DDR4 2133MHz)  
33°C 0.944 V  
Motherboard Temperature 23°C

DRAM Status SATA Information  
DIMM\_A1: N/A  
DIMM\_A2: N/A  
DIMM\_B1: N/A  
DIMM\_B2: SK Hynix 4096MB 2133MHz  
SATA6G\_1: N/A  
SATA6G\_2: N/A  
SATA6G\_3: N/A  
SATA6G\_4: N/A  
SATA6G\_5: N/A  
SATA6G\_6: N/A

X.M.P. Intel Rapid Storage Technology  
Disabled On Off

FAN Profile CPU FAN 865 RPM CHA1 FAN N/A  
CHA2 FAN N/A CPU OPT FAN N/A

AIO PUMP N/A

CPU FAN % 0 50 100  
0 30 70 100 °C  
QFan Control

EZ System Tuning  
Click the icon below to apply a pre-configured profile for improved system performance or energy savings.  
Normal

Boot Priority  
Choose one and drag the items. Switch all  
UEFI: SYSTEM USB Flash Disk 1.00 (7639MB)

Default(F5) Save & Exit(F10) Advanced Mode(F7) Search on FAQ

Enables or disables the Intel Rapid Storage Technology support

Displays the CPU Fan's speed. Click the button to manually tune the fans

Loads optimized default settings

Saves the changes and resets the system

Click to go to Advanced mode

Search on the FAQ

Click to display boot devices

Selects the boot device priority



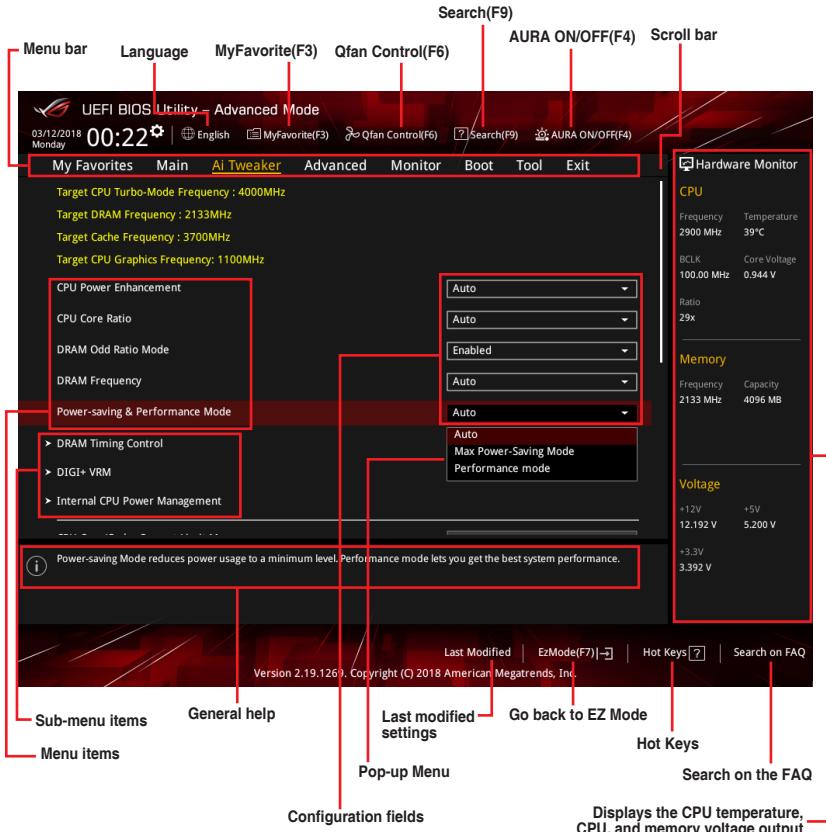
The boot device options vary depending on the devices you installed to the system.

## 1.2.2 Advanced Mode

The Advanced Mode provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the Advanced Mode. Refer to the following sections for the detailed configurations.



To switch from EZ Mode to Advanced Mode, click **Advanced Mode(F7)** or press the <F7> hotkey.



## Menu bar

The menu bar on top of the screen has the following main items:

<b>My Favorites</b>	For saving the frequently-used system settings and configuration
<b>Main</b>	For changing the basic system configuration
<b>Ai Tweaker</b>	For changing the processor and memory-related settings
<b>Advanced</b>	For changing the advanced system settings
<b>Monitor</b>	For displaying the system temperature, power status, and changing the fan settings.
<b>Boot</b>	For changing the system boot configuration
<b>Tool</b>	For configuring options for special functions
<b>Exit</b>	For selecting the exit options and loading default settings

## Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (My Favorites, Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

## Submenu items

An arrow sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

## Language

This button above the menu bar contains the languages that you can select for your BIOS. Click this button to select the language that you want to display in your BIOS screen.

## My Favorites (F3)

This button above the menu bar shows all BIOS items in a Tree Map setup. Select frequently-used BIOS settings and save it to MyFavorites menu.



Refer to section 1.3 My Favorites for more information.

## QFan Control (F6)

This button above the menu bar displays the current settings of your fans. Use this button to manually tweak the fans to your desired settings.



Refer to section 1.2.3 QFan Control for more information.

## Search (F9)

This button allows you to search by BIOS item name, enter the item name to find the related item listing.

## **AURA (F4)**

This button allows you to turn the RGB LED lighting or functional LED on or off.

- [ON] All AURA effects will be enabled. (Default mode)
- [OFF] All AURA effects will be disabled.
- [Stealth Mode] Functional LEDs (Qcode and HDD\_LED) will be disabled along with all AURA effects.

## **Search on FAQ**

Move your mouse over this button to show a QR code, scan this QR code on your mobile device to connect to the BIOS FAQ web page of the ASUS support website. You can also scan the following QR code:



## **Hot keys**

This button above the menu bar contains the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

## **Scroll bar**

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

## **General help**

At the bottom of the menu screen is a brief description of the selected item. Use <F12> key to capture the BIOS screen and save it to the removable storage device.

## **Configuration fields**

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

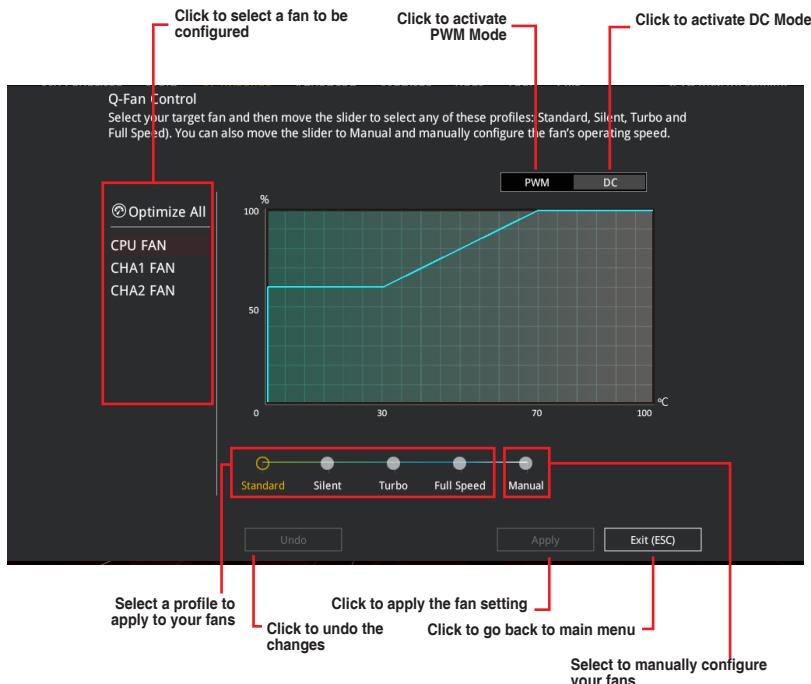
A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

## **Last Modified button**

This button shows the items that you last modified and saved in BIOS Setup.

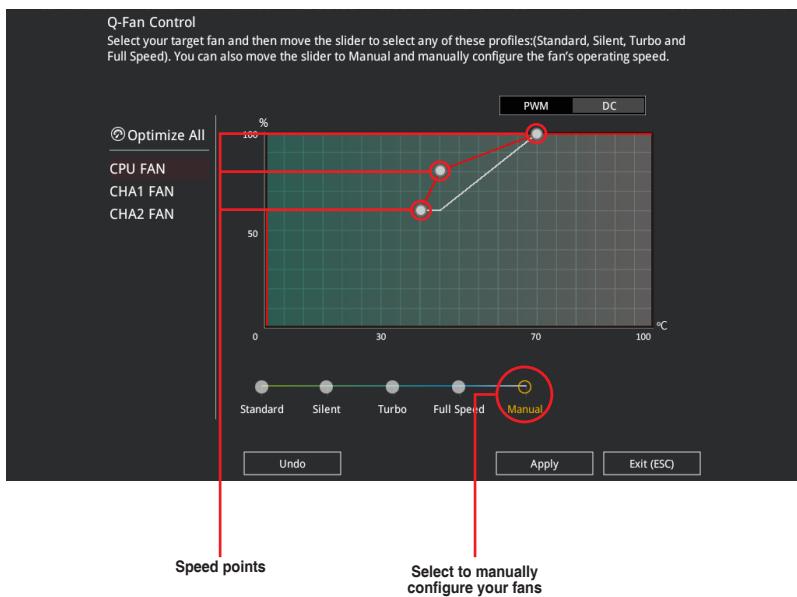
### 1.2.3 QFan Control

The QFan Control allows you to set a fan profile or manually configure the operating speed of your CPU and chassis fans.



## Configuring fans manually

Select **Manual** from the list of profiles to manually configure your fans' operating speed.

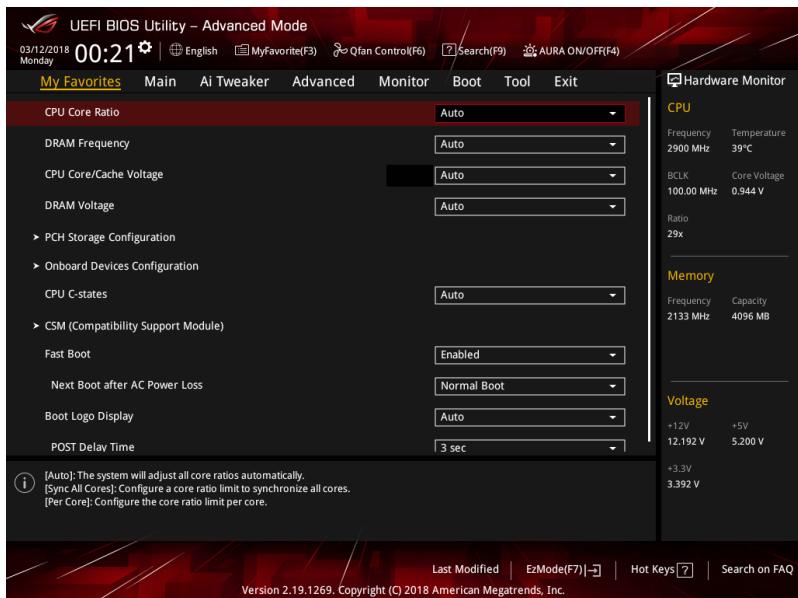


To configure your fans:

1. Select the fan that you want to configure and to view its current status.
2. Click and drag the speed points to adjust the fans' operating speed.
3. Click **Apply** to save the changes then click **Exit (ESC)**.

## 1.3 My Favorites

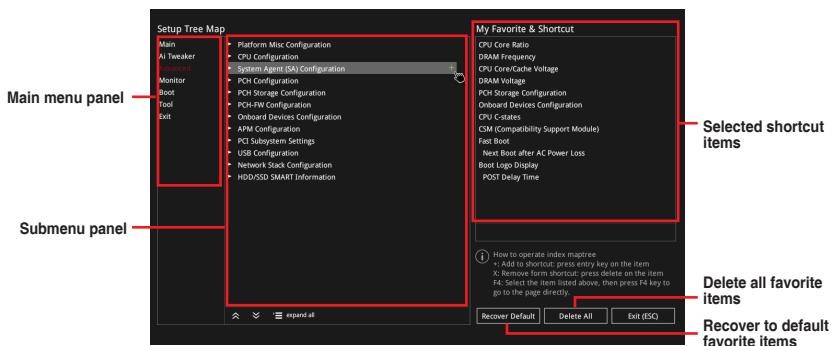
My Favorites is your personal space where you can easily save and access your favorite BIOS items. You can personalize this screen by adding or removing items.



## Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click  (F3)MyFavorite from the BIOS screen to open Setup Tree Map screen.
2. On the Setup Tree Map screen, select the BIOS items that you want to save in My Favorites screen.



3. Select an item from main menu panel, then click the submenu that you want to save as favorite from the submenu panel and click  or press <Enter> on your keyboard.

4. Click **Exit (ESC)** or press <Esc> key to close Setup Tree Map screen.
5. Go to My Favorites menu to view the saved BIOS items.

## 1.4 Main menu

The Main menu screen appears when you enter the Advanced Mode of the BIOS Setup program. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.

UEFI BIOS Utility – Advanced Mode  
03/12/2018 Monday 00:21 ⓘ English MyFavorite(F3) QFan Control(F6) Search(F9) AURA ON/OFF(F4)

**Main** My Favorites Ai Tweaker Advanced Monitor Boot Tool Exit

**BIOS Information**

BIOS Version	0234 x64
Build Date and Time	02/26/2018
LED EC Version	AUMA0-E8K4-0101
ME FW Version	12.0.0.1062
PCH Stepping	A1

**Processor Information**

Brand String	Genuine Intel(R) CPU 0000 @ 2.90GHz
CPU Speed	2900 MHz
Total Memory	4096 MB
Memory Frequency	2133 MHz

**System Language** English

**System Date** 03/12/2018

**System Time** 00:21:32

**Access Level** Administrator

Choose the system default language

**Hardware Monitor**

**CPU**

Frequency	Temperature
2900 MHz	39°C

**BCLK** Core Voltage

100.00 MHz	0.944 V
------------	---------

**Ratio**  
29x

**Memory**

Frequency	Capacity
2133 MHz	4096 MB

**Voltage**

+12V	+5V
12.192 V	5.200 V

+3.3V  
3.392 V

## Security

The Security menu items allow you to change the system security settings.

UEFI BIOS Utility – Advanced Mode  
03/12/2018 Monday 00:21 ⓘ English MyFavorite(F3) QFan Control(F6) Search(F9) AURA ON/OFF(F4)

**Main** My Favorites MainSecurity Ai Tweaker Advanced Monitor Boot Tool Exit

**MainSecurity**

← MainSecurity

**Password Description**

If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup.  
If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup.  
In Setup the User will have Administrator rights.  
The password length must be in the following range:

Minimum length	3
Maximum length	20

**Administrator Password** Not Installed

**User Password** Not Installed

**Administrator Password**

**User Password**

**Hardware Monitor**

**CPU**

Frequency	Temperature
2900 MHz	40°C

**BCLK** Core Voltage

100.00 MHz	0.944 V
------------	---------

**Ratio**  
29x

**Memory**

Frequency	Capacity
2133 MHz	4096 MB

**Voltage**



- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **1.1.6 Jumpers** in your motherboard user manual for information on how to erase the RTC RAM via the Clear CMOS jumper.
- The Administrator or User Password items on top of the screen show the default **[Not Installed]**. After you set a password, these items show **[Installed]**.

## **Administrator Password**

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

### **To set an administrator password:**

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Re-type to confirm the password then select **OK**.

### **To change an administrator password:**

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Re-type to confirm the password then select **OK**.

To clear the administrator password, follow the same steps as in changing an administrator password, but leave other fields blank then select **OK** to continue. After you clear the password, the **Administrator Password** item on top of the screen shows **[Not Installed]**.

## **User Password**

If you have set a user password, you must enter the user password for accessing the system. The User Password item on top of the screen shows the default **[Not Installed]**. After you set a password, this item shows **[Installed]**.

### **To set a user password:**

1. Select the **User Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Re-type to confirm the password then select **OK**.

### **To change a user password:**

1. Select the **User Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Re-type to confirm the password then select **OK**.

To clear the user password, follow the same steps as in changing a user password, but leave other fields blank then select **OK** to continue. After you clear the password, the **User Password** item on top of the screen shows **[Not Installed]**.

## 1.5 Ai Tweaker menu

The Ai Tweaker menu items allow you to configure the processor and memory-related settings.

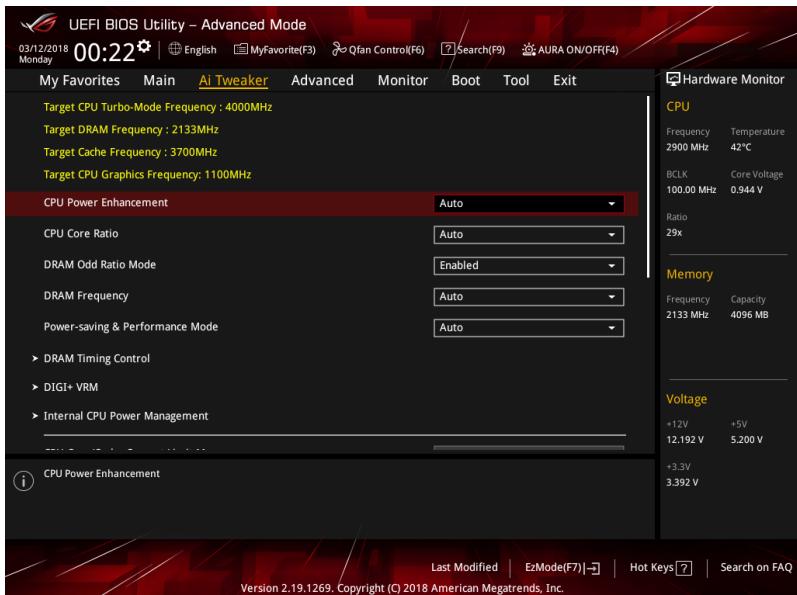


Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



The configuration options for this section vary depending on the CPU and DIMM model you installed on the motherboard.

Scroll down to display other BIOS items.



### CPU Power Enhancement

[Auto] This item allows you to maximize the processor performance optimized by ASUS core ratio settings.

[Disabled] This item allows you to set to default core ratio settings.

### CPU Core Ratio

This item allows you to set the CPU core ratio limit per core or synchronize automatically to all cores. Configuration options: [Auto] [Sync All Cores] [Per Core]



When the CPU Core Ratio is set to [Sync All Cores] or [Per Core], the following item appears.

### **1-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 1-Core Limit value that must be higher than or equal to the 2-Core Ratio Limit.



---

When the CPU Core Ratio is set to [Per Core], the following items appears.

---

### **2-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 2-core ratio limit that must be higher than or equal to the 3-core ratio limit.



---

If you assign a value for 2-Core Ratio Limit, do not set the 1-Core Ratio Limit to [Auto].

---

### **3-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 3-core ratio limit that must be higher than or equal to the 4-core ratio limit.



---

If you assign a value for 3-Core Ratio Limit, do not set the 1-Core Ratio Limit and 2-Core Ratio Limit to [Auto].

---

### **4-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 4-core ratio limit that must be higher than or equal to the 5-core ratio limit.



---

If you assign a value for 4-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, and 3-Core Ratio Limit to [Auto].

---

### **5-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 5-core ratio limit that must be higher than or equal to the 6-core ratio limit.



---

If you assign a value for 5-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, and 4-Core Ratio Limit to [Auto].

---

### **6-Core Ratio Limit**

Enter [Auto] to apply the CPU default Turbo Ratio setting or manually assign a 6-core ratio limit that must be lower than or equal to the 5-core ratio limit.



---

If you assign a value for 6-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, and 5-Core Ratio Limit to [Auto].

---

## **DRAM Odd Ratio Mode**

This item allows you to enable or disable availability of odd DRAM ratios for improved granularity. Configuration options: [Enabled] [Disabled]

## **DRAM Frequency**

This item allows you to set the memory operating frequency. The configurable options vary with the BCLK (base clock) frequency setting. Select the auto mode to apply the optimized setting. Configuration options: [Auto] [DDR4-800MHz] - [DDR4-8533MHz]

## **Power-saving & Performance Mode**

Power-saving & Performance Mode lets you configure the power usage to boost or enhance system performance.

- |                         |  |
|-------------------------|--|
| [Auto]                  | Automatically adjusts the power usage based on the system load.          |
| [Max Power-Saving Mode] | Enables all power-saving settings for maximum energy-saving condition    |
| [Performance Mode]      | Disables all power-saving settings to achieve a high system performance. |

## **DRAM Timing Control**

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.



Changing the values in this menu may cause the system to become unstable! If this happens, revert to the default settings.

---

### **Primary Timings**

#### **DRAM CAS# Latency**

Configuration options: [Auto] [1] – [31]

#### **DRAM RAS# to CAS# Delay**

Configuration options: [Auto] [1] – [31]

#### **DRAM RAS# ACT Time**

Configuration options: [Auto] [1] – [63]

#### **DRAM Command Rate**

Configuration options: [Auto] [1N] [2N] [3N] [N:1]

### **Secondary Timings**

#### **DRAM RAS# to RAS# Delay L**

Configuration options: [Auto] [1] – [15]

#### **DRAM RAS# to RAS# Delay S**

Configuration options: [Auto] [1] – [15]

#### **DRAM REF Cycle Time**

Configuration options: [Auto] [1] – [1023]

**DRAM Refresh Interval**

Configuration options: [Auto] [1] – [65535]

**DRAM WRITE Recovery Time**

Configuration options: [Auto] [1] – [31]

**DRAM READ to PRE Time**

Configuration options: [Auto] [1] – [15]

**DRAM FOUR ACT WIN Time**

Configuration options: [Auto] [1] – [63]

**DRAM WRITE to READ Delay L**

Configuration options: [Auto] [1] – [15]

**DRAM WRITE to READ Delay S**

Configuration options: [Auto] [1] – [15]

**DRAM CKE Minimum Pulse Width**

Configuration options: [Auto] [0] – [15]

**DRAM Write Latency**

Configuration options: [Auto] [1] – [31]

**Skew Control****ODT RTT WR (CHA)**

Configuration options: [Auto] [0 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [255 DRAM Clock]

**ODT RTT PARK (CHA)**

Configuration options: [Auto] [0 DRAM Clock] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock]

**ODT RTT NOM (CHA)**

Configuration options: [Auto] [0 DRAM Clock] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock]

**ODT RTT WR (CHB)**

Configuration options: [Auto] [0 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [255 DRAM Clock]

**ODT RTT PARK (CHB)**

Configuration options: [Auto] [0 DRAM Clock] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock]

**ODT RTT NOM (CHB)**

Configuration options: [Auto] [0 DRAM Clock] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock]

**ODT\_READ\_DURATION**

Configuration options: [Auto] [0] - [7]

**ODT\_READ\_DELAY**

Configuration options: [Auto] [0] - [7]

**ODT\_WRITE\_DURATION**

Configuration options: [Auto] [0] - [7]

**ODT\_WRITE\_DELAY**

Configuration options: [Auto] [0] - [7]

**Data Rising Slope**

Configuration options: [Auto] [0] - [15]

**Data Rising Slope Offset**

Configuration options: [Auto] [0] - [1]

**Cmd Rising Slope**

Configuration options: [Auto] [0] - [15]

**Cmd Rising Slope Offset**

Configuration options: [Auto] [0] - [1]

**Ctl Rising Slope**

Configuration options: [Auto] [0] - [15]

**Ctl Rising Slope Offset**

Configuration options: [Auto] [0] - [1]

**Clk Rising Slope**

Configuration options: [Auto] [0] - [15]

**Clk Rising Slope Offset**

Configuration options: [Auto] [0] - [1]

**Data Falling Slope**

Configuration options: [Auto] [0] - [15]

**Data Falling Slope Offset**

Configuration options: [Auto] [0] - [1]

**Cmd Falling Slope**

Configuration options: [Auto] [0] - [15]

**Cmd Falling Slope Offset**

Configuration options: [Auto] [0] - [1]

**Ctl Falling Slope**

Configuration options: [Auto] [0] - [15]

**Ctl Falling Slope Offset**

Configuration options: [Auto] [0] - [1]

**Clk Falling Slope**

Configuration options: [Auto] [0] - [15]

**Clk Falling Slope Offset**

Configuration options: [Auto] [0] - [1]

## RTL IOL Control

### DRAM RTL INIT Value

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHA DIMM0 Rank0)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHA DIMM0 Rank1)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHA DIMM1 Rank0)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHA DIMM1 Rank1)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHB DIMM0 Rank0)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHB DIMM0 Rank1)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHB DIMM1 Rank0)

Configuration options: [Auto] [0] - [127]

### DRAM RTL (CHB DIMM1 Rank1)

Configuration options: [Auto] [0] - [127]

### DRAM IOL (CHA DIMM0 Rank0)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHA DIMM0 Rank1)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHA DIMM1 Rank0)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHA DIMM1 Rank1)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHB DIMM0 Rank0)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHB DIMM0 Rank1)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHB DIMM1 Rank0)

Configuration options: [Auto] [0] - [15]

### DRAM IOL (CHB DIMM1 Rank1)

Configuration options: [Auto] [0] - [15]

## IO Latency offset

### CHA IO\_Latency\_offset

Configuration options: [Auto] [0] - [127]

### CHB IO\_Latency\_offset

Configuration options: [Auto] [0] - [127]

## IO Latency RFR delay

### CHA RFR delay

Configuration options: [Auto] [0] - [127]

### CHB RFR delay

Configuration options: [Auto] [0] - [127]

## Memory Training Algorithms

### Early Command Training

Configuration options: [Enabled] [Disabled]

### SenseAmp Offset Training

Configuration options: [Enabled] [Disabled]

### Early ReadMPR Timing Centering 2D

Configuration options: [Enabled] [Disabled]

### Read MPR Training

Configuration options: [Enabled] [Disabled]

### Receive Enable Training

Configuration options: [Enabled] [Disabled]

### Jedec Write Leveling

Configuration options: [Enabled] [Disabled]

### Early Write Time Centering 2D

Configuration options: [Enabled] [Disabled]

### Early Read Time Centering 2D

Configuration options: [Auto] [Enabled] [Disabled]

### Write Timing Centering 1D

Configuration options: [Enabled] [Disabled]

### Write Voltage Centering 1D

Configuration options: [Enabled] [Disabled]

### Read Timing Centering 1D

Configuration options: [Enabled] [Disabled]

### DIMM ODT Training

Configuration options: [Auto] [Enabled] [Disabled]

### Max RTT\_WR

Configuration options: [ODT Off] [120Ohms]

### DIMM RON Training

Configuration options: [Enabled] [Disabled]

### Write Drive Strength/Equalization 2D

Configuration options: [Enabled] [Disabled]

### Write Slew Rate Training

Configuration options: [Enabled] [Disabled]

**Read ODT Training**

Configuration options: [Enabled] [Disabled]

**Read Equalization Training**

Configuration options: [Enabled] [Disabled]

**Read Amplifier Training**

Configuration options: [Enabled] [Disabled]

**Write Timing Centering 2D**

Configuration options: [Enabled] [Disabled]

**Read Timing Centering 2D**

Configuration options: [Enabled] [Disabled]

**Command Voltage Centering**

Configuration options: [Enabled] [Disabled]

**Write Voltage Centering 2D**

Configuration options: [Enabled] [Disabled]

**Read Voltage Centering 2D**

Configuration options: [Enabled] [Disabled]

**Late Command Training**

Configuration options: [Auto] [Enabled] [Disabled]

**Round Trip Latency**

Configuration options: [Auto] [Enabled] [Disabled]

**Turn Around Timing Training**

Configuration options: [Enabled] [Disabled]

**Rank Margin Tool**

Configuration options: [Enabled] [Disabled]

**Memory Test**

Configuration options: [Enabled] [Disabled]

**DIMM SPD Alias Test**

Configuration options: [Enabled] [Disabled]

**Receive Enable Centering 1D**

Configuration options: [Enabled] [Disabled]

**Retrain Margin Check**

Configuration options: [Enabled] [Disabled]

**Write Drive Strength Up/Dn independently**

Configuration options: [Enabled] [Disabled]

**Third Timings****tRDRD\_sg**

Configuration options: [Auto] [0] - [63]

**tRDRD\_dg**

Configuration options: [Auto] [0] - [63]

**tRDWR\_sg**

Configuration options: [Auto] [0] - [63]

**tRDWR\_dg**

Configuration options: [Auto] [0] - [63]

**tWRWR\_sg**

Configuration options: [Auto] [0] - [63]

**tWRWR\_dg**

Configuration options: [Auto] [0] - [63]

**tWRRD\_sg**

Configuration options: [Auto] [0] - [127]

**tWRRD\_dg**

Configuration options: [Auto] [0] - [63]

**tRDRD\_dr**

Configuration options: [Auto] [0] - [63]

**tRDRD\_dd**

Configuration options: [Auto] [0] - [63]

**tRDWR\_dr**

Configuration options: [Auto] [0] - [63]

**tRDWR\_dd**

Configuration options: [Auto] [0] - [63]

**tWRWR\_dr**

Configuration options: [Auto] [0] - [63]

**tWRWR\_dd**

Configuration options: [Auto] [0] - [63]

**tWRRD\_dr**

Configuration options: [Auto] [0] - [63]

**tWRRD\_dd**

Configuration options: [Auto] [0] - [63]

**TWRPRE**

Configuration options: [Auto] [0] - [127]

**TRDPRE**

Configuration options: [Auto] [0] - [15]

**tREFIX9**

Configuration options: [Auto] [0] - [127]

**OREF\_RI**

Configuration options: [Auto] [0] - [255]

## **Misc.**

### **MRC Fast Boot**

Allows you to enable, disable or automatically set the MRC fast boot.

Configuration options: [Auto] [Enabled] [Disabled]

### **DRAM CLK Period**

Configuration options: [Auto] [1] – [58]

### **Memory Scrambler**

Set this item to enable or disable memory scrambler support.

Configuration options: [Enabled] [Disabled]

### **Channel A DIMM Control**

Allows you to enable or disable the Channel A DIMM slots.

Configuration options: [Enable Both DIMMS] [Disable DIMM0] [Disable DIMM1]  
[Disable Both DIMMS]

### **Channel B DIMM Control**

Allows you to enable or disable the Channel B DIMM slots.

Configuration options: [Enable Both DIMMS] [Disable DIMM0] [Disable DIMM1]  
[Disable Both DIMMS]

### **MCH Full Check**

Enable this item to enhance the stability of your system. Disable this item to enhance the DRAM performance. Configuration options: [Auto] [Enabled] [Disabled]

### **Training Profile**

Configuration options: [Auto] [Standard Profile] [User Profile]

### **DLLBwEn**

Configuration options: [Auto] [1] - [7]

### **SPD Write Disable**

Configuration options: [TRUE] [FALSE]

## **DIGI + VRM**

### **CPU Load-line Calibration**

Load-line is defined by Intel® specification and affects CPU power voltage. The CPU working voltage decreases proportionally to CPU loading. Higher load-line calibration could get higher voltage and good processor performance, but increases the CPU and VRM thermal conditions. Select from levels 1 to 7 to adjust the load-line slope.

Configuration options [Auto] [Default] [Level 1] - [Level 7]



---

The actual performance boost may vary depending on your CPU specification.

---



---

DO NOT remove the thermal module. The thermal conditions should be monitored.

---

## CPU Current Capability

This item allows you to set the shut off current limit for external voltage regulator. A higher setting will allow the voltage regulator to supply more current while a lower setting will cause the voltage regulator to shut off the system when the supplied current is higher than the set value. Configuration options: [Auto] [100%] [110%] [120%] [130%] [140%]



Configure higher values under a high CPU loading for extra power support.

## CPU VRM Switching Frequency

This item affects the VRM transient response speed and the component thermal production. Select [Manual] to configure a higher frequency for a quicker transient response speed. Configuration options: [Auto] [Manual]



DO NOT remove the thermal module. The thermal conditions should be monitored.



The following item appears only when you set the **CPU VRM Switching Frequency** to [Manual].

### Fixed CPU VRM Switching Frequency (KHz)

This item allows you to set a higher frequency for a quicker transient response speed. Use the <+> or <-> to adjust the value. The values range from 250 KHz to 500 KHz with an interval of 50 KHz.



Do not remove the thermal module when the manual mode is selected. The thermal conditions should be monitored. The following item appears only when the **CPU VRM Switching Frequency** is set to [Auto].

## CPU Power Duty Control

DIGI + VRM Duty control adjusts the current and thermal conditions of every component's phase.

- [T. Probe] Select to maintain the VRM thermal balance.
- [Extreme] Select to maintain the current VRM balance.

## CPU Power Phase Control

This item allows you to set the power phase control of the CPU.

- [Auto] Automatically set the phase control mode.
- [Standard] The phase control will be based on the CPU command.
- [Extreme] Set to the full phase mode.



DO NOT remove the thermal module when setting this item to [Extreme]. The thermal conditions should be monitored.

## CPU VRM Thermal Control

This item allows you to adjust the temperature limit of the CPU VRM.

Configuration options: [Auto] [Enabled] [Disabled]

## CPU Graphics Load-Line Calibration

Load-line is defined by Intel VRM specification and affects the GT power voltage. The GT working voltage will decrease proportionally depending on the GT loading. Higher levels of the load-line calibration can get a higher voltage and a better processor performance but increases the GT and VRM thermal. Select from level 1 to 7 to adjust the GT power voltage from 0% to 100%. Configuration options: [Auto] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5] [Level 6] [Level 7]



The boosted performance may vary depending on the GT specification. Do not remove the thermal module.

## CPU Graphics Current Capability

Allows you to configure the total power range, and extends the processor frequency range simultaneously. Configuration options: [Auto] [100%] [110%] [120%] [130%] [140%]



Choose a higher value under a high GT loading for extra power support.

## CPU Graphics VRM Switching Frequency

This item affects the GT transient response speed and the component thermal production. Select [Manual] to configure a higher frequency for a quicker transient response speed. Configuration options: [Auto] [Manual]



DO NOT remove the thermal module. The thermal conditions should be monitored.



The following item appears only when you set the GT VRM Switching Frequency to [Manual].

### Fixed CPU Graphics Switching Frequency (KHz)

This item allows you to set a higher frequency for a quicker transient response speed. Use the <+> and <-> keys to adjust the value. The values range from 250KHz to 500KHz with a 50KHz interval.

## CPU Graphics Power Duty Control

This item adjusts the current of every VRM phase and the thermal conditions of every component's phase.

[T. Probe] Select to maintain the VRM thermal balance.

[Extreme] Select to maintain the current VRM balance.

## CPU Graphics Power Phase Control

This item allows you to set the power phase control of the CPU Graphics. Configuration options: [Auto] [Standard] [Extreme]



DO NOT remove the thermal module.

## **Internal CPU Power Management**

The subitems in this menu allow you to set the CPU ratio and features.

### **Intel(R) SpeedStep(tm)**

Allows the operating system to dynamically adjust the processor voltage and cores frequency to decrease the average power consumption and decrease average heat production. Configuration options: [Auto] [Enabled] [Disabled]

### **Turbo Mode**

Allows you to enable your processor cores to run faster than the base operating frequency when it is below power, current and specification limit.

Configuration options: [Disabled] [Enabled]

### **Turbo Mode Parameters**



---

The following items appear only when you set the Turbo Mode to **[Enabled]**.

---

#### **Long Duration Package Power Limit**

Also known as the power limit 1 in Watts. The default value will be the TDP (thermal design power). The turbo ratio can be maintained for a duration to exceed the TDP for the maximum system performance. Configuration options: [Auto] [1] - [4095]

#### **Package Power Time Window**

Also known as the power limit 1 in seconds. The value indicates the maintained duration for the turbo ratio to exceed TDP (thermal design power). Configuration options: [Auto] [1] - [127]

#### **Short Duration Package Power Limit**

Also known as the power limit 2 in Watts. It is the second power limit to provide a rapid protection when the package power exceed power limit 1. The default setting is 1.25 times the power limit 1. According to Intel, the platform must be capable of supporting the duration for up to 10 msec when the turbo ratio exceeds the power limit 2. The ASUS motherboards can support the duration for a longer time. Configuration options: [Auto] [1] - [4095]

### **IA AC Load Line**

This item allows you to set the AC loadline defined in 1/100 mOhms. Use the <+> and <-> keys to adjust the value. Configuration options: [Auto] [0.01] - [62.49]

### **IA DC Load Line**

This item allows you to set the DC loadline defined in 1/100 mOhms. Use the <+> and <-> keys to adjust the value. Configuration options: [Auto] [0.01] - [62.49]

## **CPU Core/Cache Voltage**

Configures the mode of Voltage fed to the cores of the processor. Configuration options: [Auto] [Manual Mode] [Offset Mode]



---

The following items appear only when you set the **CPU Core/Cache Voltage** to **[Manual Mode]**.

---

## CPU Core Voltage Override

Allows you to configure the CPU Core voltage. Configuration options: [Auto] [0.600V] - [1.700V]



The following items appear only when you set the **CPU Core/Cache Voltage** to **[Offset Mode]**.

### Offset Mode Sign

- [+] To offset the voltage by a positive value.
- [−] To offset the voltage by a negative value.

## CPU Core Voltage Offset

This item allows you to configure the CPU core voltage offset value. Configuration options: [Auto] [0.005V] - [0.635V]

## DRAM Voltage

Configuration options: [Auto] [1.20V] [1.25V] [1.35V] [1.40V]

## CPU System Agent Voltage

Configuration options: [Auto] [1.050V] - [1.150V]

## CPU Graphics Voltage

This item allows you to configure the mode of voltage fed to the CPU Graphics Voltage.

Manual mode allows user-defined values. Offset mode modifies values by SVID.

Configuration options: [Auto] [Manual Mode] [Offset Mode]



The following item appears only when you set the **CPU Graphics Voltage** to **[Manual Mode]**.

## CPU Graphics Voltage Override [Auto]

This item allows you to configure the CPU Graphics Voltage Override. Use the <+> or <-> keys to adjust the value. The values range from 0.600V to 1.700V with a 0.005V interval.



The following item appears only when you set the **CPU Core Voltage Mode** to **[Offset Mode]**.

### Offset Mode Sign

- [+] To offset the voltage by a positive value.
- [−] To offset the voltage by a negative value.

## CPU Graphics Voltage Offset

This item allows you to configure the CPU Graphics Voltage Offset. Use the <+> or <-> keys to adjust the value. The values range from 0.005V to 0.635V with a 0.005V interval.

## PCH Core Voltage

Configuration options: [Auto] [1.050V] - [1.150V]

## DRAM REF Voltage Control

### DRAM CTRL REF Voltage

Configures the DRAM reference voltage on the control lines. The reference voltage will be the DRAM voltage times the configured value. Configuration options: [Auto] [0.39500] - [0.63000]

### DRAM DATA REF Voltage on CHB

Configures the DRAM reference voltage on the data lines of channel B. The reference voltage will be the DRAM voltage times the configured value. Configuration options: [Auto] [0.39500] - [0.63000]

### DRAM DATA REF Voltage on CHA DIMM0 Rank0 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHA DIMM0 Rank1 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHA DIMM1 Rank0 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHA DIMM1 Rank1 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHB DIMM0 Rank0 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHB DIMM0 Rank1 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHB DIMM1 Rank0 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

### DRAM DATA REF Voltage on CHB DIMM1 Rank1 BL0-7

Configures the DRAM Data REF Voltage.

Configuration options: [Auto] [0] - [63]

## 1.6 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.



Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

UEFI BIOS Utility – Advanced Mode  
03/12/2018 Monday 00:22 | English | MyFavorite(F3) | Qfan Control(F6) | Search(F9) | AURA ON/OFF(F4)

My Favorites Main Ai Tweaker **Advanced** Monitor Boot Tool Exit

Hardware Monitor

**CPU**

Frequency	Temperature
2900 MHz	40°C

BCLK Core Voltage  
100.00 MHz 0.944 V

Ratio  
29x

**Memory**

Frequency	Capacity
2133 MHz	4096 MB

**Voltage**

+12V	+5V
12.192 V	5.200 V

+3.3V  
3.392 V

Last Modified | EzMode(F7) | Hot Keys | Search on FAQ  
Version 2.19.1269. Copyright (C) 2018 American Megatrends, Inc.

## 1.6.1 Platform Misc Configuration

The items in this menu allow you to configure the platform-related features.

UEFI BIOS Utility – Advanced Mode  
01/01/2017 | English | MyFavorite(F3) | QFan Control(F6) | Search(F9) | AURA ON/OFF(F4)  
Sunday 03:01

My Favorites Main Ai Tweaker Advanced Monitor Boot Tool Exit

Advanced\Platform Misc Configuration

Platform Misc Configuration

PCI Express Native Power Management: Disabled

PCH - PCI Express

PCH DMI ASPM: Disabled

ASPM: Disabled

L1 Substates: Disabled

PCI Express Clock Gating: Enabled

SA - PCI Express

DMI Link ASPM Control: Disabled

PEG - ASPM: Disabled

**Hardware Monitor**

**CPU**

Frequency	Temperature
2900 MHz	41°C
BCLK	Core Voltage
100.00 MHz	0.944 V
Ratio	29x

**Memory**

Frequency	Capacity
2133 MHz	4096 MB

**Voltage**

+12V	+5V
12.192 V	5.200 V

### PCI Express Native Power Management

This item allows you to enhance the power saving feature of PCI Express and perform ASPM operations in the operating system. Configuration options: [Disabled] [Enabled]



The following item appears only when you set the PCI Express Native Power Management to **[Enabled]**.

#### Native ASPM

Configuration options: [Auto] [Enabled] [Disabled]

### PCH - PCI Express

#### PCH DMI ASPM

This item allows you to control the Active State Power Management on both NB (NorthBridge) side and SB (SouthBridge) side of the DMI Link. Configuration options: [Disabled] [Enabled]

#### ASPM

This item allows you to select the ASPM state for energy-saving conditions. Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

#### L1 Substates

This item allows you to configure PCI Express L1 Substates settings. Configuration options: [Disabled] [L1.1] [L1.1 & L1.2]

#### PCI Express Clock Gating

This item allows you to enable or disable PCI Express Clock Gating. Configuration options: [Disabled] [Enabled]

## SA - PCI Express

### DMI Link ASPM Control

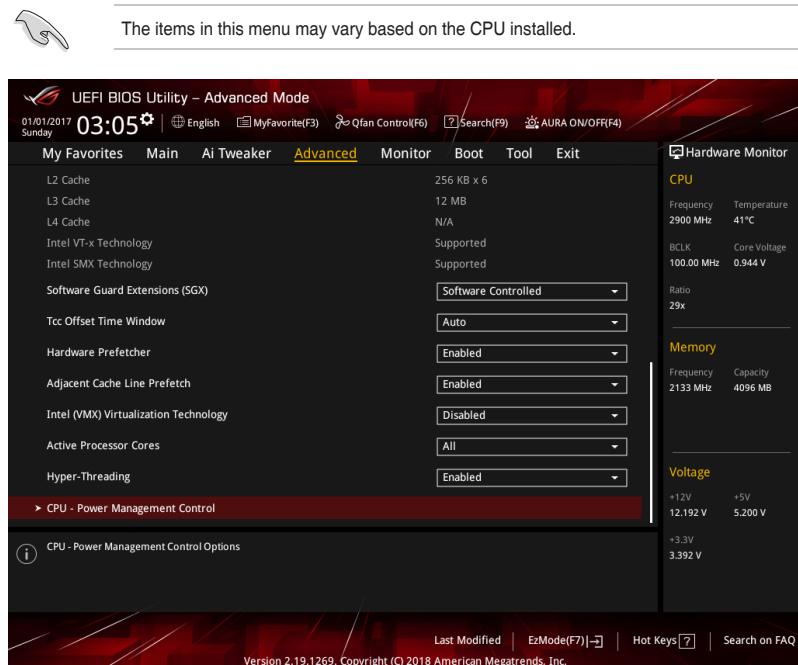
This item allows you to control the Active State Power Management on both CPU and PCH (platform controller hub) Both DMI link ASPM control items of the CPU and PCH sides must be enabled for the ASPM to take effect. Configuration options: [Disabled] [L0sL1]

### PEG - ASPM

This item allows you to select the ASPM state for energy-saving conditions, or use the ASUS optimized energy saving profile. Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

## 1.6.2 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.



### Software Guard Extensions (SGX)

This item allows you to enable or disable Software Guard Extensions (SGX). Configuration options: [Disabled] [Software Controlled]

## Tcc Offset Time Window

This item allows you to set the TCC Offset Time Window for Running Average Temperature Limit (RATL) feature. RATL allows setting an average max thermal temperature.

Temperatures within the time window can get higher than the temperature threshold but only the average is used to cause frequency clipping. Configuration options: [Auto] [Disabled] [5 ms] - [448 sec]

## Hardware Prefetcher

This item allows the CPU to prefetch commands and data in the L2 cache, reduces the DRAM loading time and improves the system performance. Configuration options: [Disabled] [Enabled]

## Adjacent Cache Line Prefetch

This item allows the mid level cache (L2) to prefetch adjacent cache lines, reducing the DRAM loading time and improves the system performance. Configuration options: [Disabled] [Enabled]

## Intel (VMX) Virtualization Technology

When set to [Enabled], a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. Configuration options: [Disabled] [Enabled]

## Active Processor Cores

This item allows you to select the number of CPU cores to activate in each processor package. Configuration options: [All] [1] [2] [3] [4] [5]

## Hyper-Threading

This item allows you to enable or disable the Hyper-Threading for logical processor threads. Configuration options: [Enabled] [Disabled]

## CPU - Power Management Control

This item allows you to manage and configure the CPU's power.

### Intel(R) SpeedStep(tm)

This item allows more than two frequency to be supported.

Configuration options: [Auto] [Enabled] [Disabled]

### Intel(R) Speed Shift Technology

This item allows you to disable or enable Intel(R) Speed Shift Technology support. When enabled, CPPC v2 interface allows hardware controlled P-states.

Configuration options: [Enabled] [Disabled]

### Turbo Mode

This item allows you to automatically set the CPU cores to run faster than the base operating frequency when it is below the operating power, current and temperature specification limit. Configuration options: [Enabled] [Disabled]

### CPU C-states

This item allows you to set the power saving of the CPU states. Configuration options: [Auto] [Disabled] [Enabled]



---

The following items appear only when you set the CPU C-states to [Enabled].

---

### **Enhanced C-States**

When enabled, CPU will switch to minimum speed when all cores enter C-State. Configuration options: [Enabled] [Disabled]

### **CPU C6 Report**

This item allows you to disable or enable the CPU C6 report to the operating system. Configuration options: [Enabled] [Disabled]

### **CPU C7 Report**

This item allows you to disable or enable the CPU C7 report to the operating system. Configuration options: [CPU C7] [CPU C7s] [Disabled]

### **CPU C8 Report**

This item allows you to disable or enable the CPU C8 report to the operating system. Configuration options: [Enabled] [Disabled]

### **CPU C9 Report**

This item allows you to disable or enable the CPU C9 report to the operating system. Configuration options: [Enabled] [Disabled]

### **CPU C10 Report**

This item allows you to disable or enable the CPU C10 report to the operating system. Configuration options: [Enabled] [Disabled]

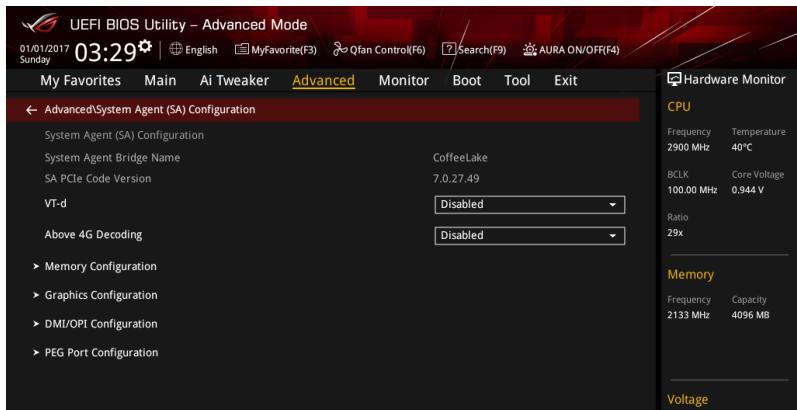
### **Package C State Limit**

This item allows you to set the C-state limit for the CPU package. Configuration options: [C0/C1] [C2] [C3] [C6] [C7] [C7s] [C8] [C9] [C10] [Cpu Default] [Auto]

### **CFG Lock**

This item allows you to disable or enable the CFG Lock. Configuration options: [Enabled] [Disabled]

## 1.6.3 System Agent (SA) Configuration



### VT-d

Allows you to enable virtualization technology function on memory control hub.

Configuration options: [Enabled] [Disabled]

### Above 4G Decoding

Allows you to enable or disable the 4G decoding for 64-bit devices when the system supports the 64-bit PCI decoding. Configuration options: [Enabled] [Disabled]

### Memory Configuration

Allows you to configure the memory configuration parameters.

#### Memory Remap

Set this item to [Enabled] to support DRAM address remapping for 64-bit operating systems. Configuration options: [Enabled] [Disabled]

### Graphics Configuration

Allows you to select a primary display from CPU, PCIE and PCI graphical devices.

#### Primary Display

Allows you to select the primary display from CPU, PCIE and PCI graphics devices Configuration options: [Auto] [CPU Graphics] [PCIE]

#### iGPU Multi-Monitor

This item allows you to empower both integrated and discrete graphics devices for the multi-monitor output. The CPU graphics shared system memory size is fixed at 64 MB. Configuration options: [Disabled] [Enabled]

#### DVMT Pre-Allocated

Allows you to select the DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device. Configuration options: [32M] [64M] [96M] ~ [1024M]

#### RC6 (Render Standby)

Allows you to enable or disable render standby support. Configuration options: [Disabled] [Enabled]

## DMI/OPI Configuration

This item allows you to control various DMI (direct media interface) functions.

### DMI Max Link Speed

This item allows you to set DMI speed. Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

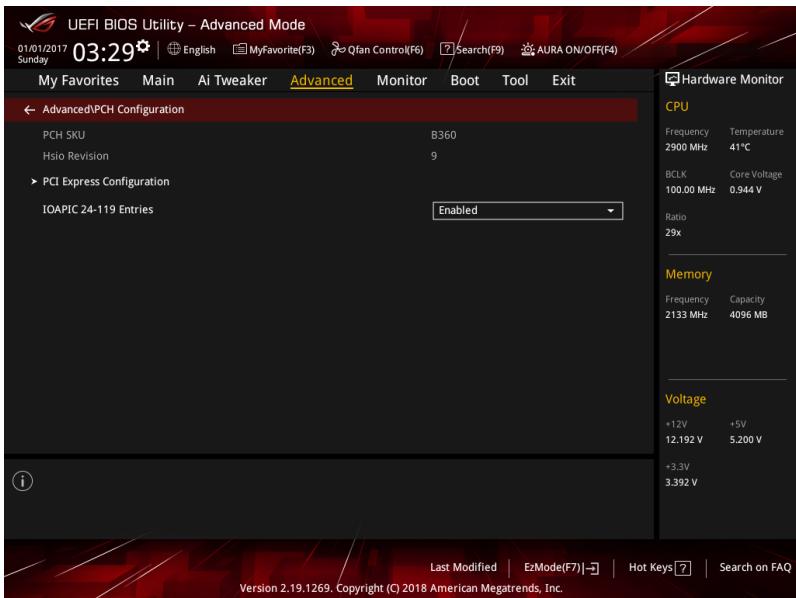
## PEG Port Configuration

This item allows you to configure the PEG Port settings.

### PCIE16\_1 Link Speed

This item allows you to configure the PCIE16\_1 slot. Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

## 1.6.4 PCH Configuration



### PCI Express Configuration

This item allows you to configure the PCI Express slots.

#### PCIe Speed

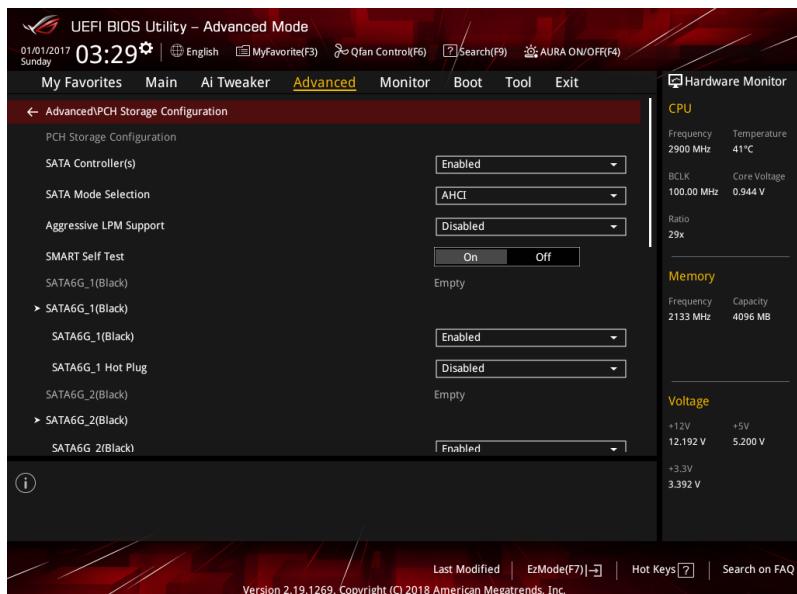
This item allows your system to automatically select the PCI Express port speed. Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

#### IOAPIC 24-119 Entries

This item allows you to enable/disable the IOAPIC 24-119 Entries. IRQ24-119 may be used by PCH devices. Disabling those interrupts may cause certain devices to fail. Configuration options: [Enabled] [Disabled]

## 1.6.5 PCH Storage Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **Empty** if no SATA device is installed to the corresponding SATA port. Scroll down to display the other BIOS items.



### SATA Controller(s)

This item allows you to enable or disable the SATA Device.  
Configuration options: [Disabled] [Enabled]



The following item appears only when you set the **SATA Controller(s)** to **[Enabled]**.

### SATA Mode Selection

This item allows you to set the SATA operation mode. Configuration options: [AHCI] [Intel RST With Intel Optane System Acceleration]

### Aggressive LPM Support

This item allows you to enable or disable PCH entering link power state aggressively  
Configuration options: [Disabled] [Enabled]

### SMART Self Test

SMART (Self-Monitoring, Analysis and Reporting Technology) is a monitoring system that shows a warning message during POST (Power-on Self Test) when an error occurs in the hard disks. Configuration options: [On] [Off]

## SATA6G\_1(Black) - SATA6G\_6(Black)

### SATA6G\_1(Black) - SATA6G\_6(Black)

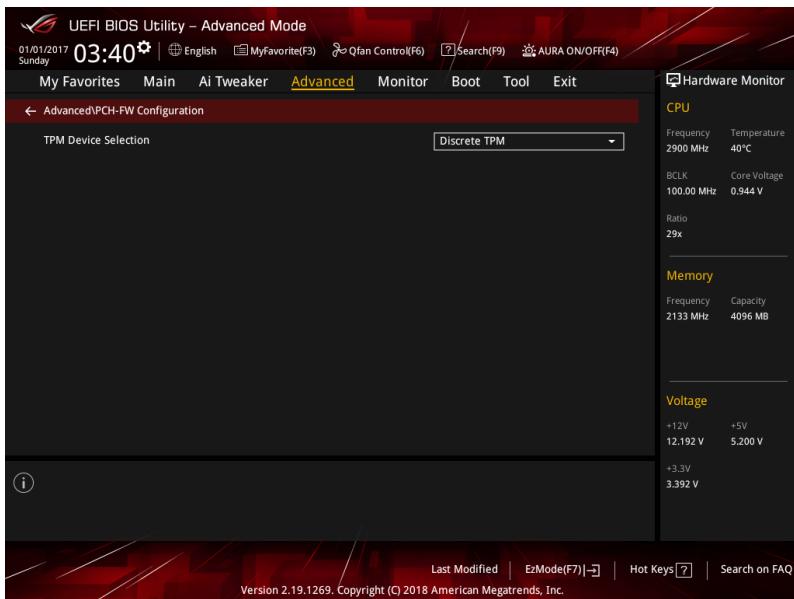
This item allows you to enable or disable the selected SATA port. Configuration options: [Disabled] [Enabled]

### Hot Plug

These items appears only when the SATA Mode Selection is set to [AHCI] and allows you to enable or disable SATA Hot Plug Support. Configuration options: [Disabled] [Enabled]

## 1.6.6 PCH-FW Configuration

This item allows you to configure the firmware TPM.



### TPM Device Selection

This item allows you to select the TPM device. Configuration options: [Discrete TPM] [Firmware TPM]

## 1.6.7 Onboard Devices Configuration

The items in this menu allow you to switch between PCIe Lanes and configure onboard devices.

Scroll down to view the other BIOS items.



### HD Audio

This item allows you to use the Azalia High Definition Audio Controller. Configuration options: [Disabled] [Enabled]



The following items appear only when you set the HD Audio Controller item to [Enabled].

### DVI Port Audio

This item allows you to enable or disable DVI Port Audio. Configuration options: [Disabled] [Enabled]

### SupremeFX LED Lighting [Breathing Mode]

Allows you to set the behavior of the audio LED. Configuration options: [Disabled] [Still Mode] [Breathing Mode]

### Intel LAN Controller

This item allows you to enable or disable the Intel(R) LAN controller. Configuration options: [Disabled] [Enabled]



The following item appears only when you set the Intel LAN Controller to [Enabled].

### **Intel PXE Option ROM**

This item allows you to enable or disable the PXE Option Rom of the Intel LAN controller. Configuration options: [Disabled] [Enabled]

### **LED lighting**

#### **When system is in working state**

This item allows you to turn the RGB LED lighting on or off when the system is in the working state. Configuration options: [On] [Off]

### **USB power delivery in Soft Off state (S5)**

[Enabled] The USB port will provide power to your devices even when the system is in Power State S5

[Disabled] Disables this function.

### **M.2\_1 Configuration**

[Auto] Auto-detects the device mode of the M.2\_1 slot. If a SATA device is detected, SATA6G\_2 will be disabled.

[SATA] Only supports SATA devices on the M.2\_1 slot. SATA6G\_2 cannot be used in this mode.

[PCIE] Only supports PCIE devices on the M.2\_1 slot.

### **PCIEX16\_2 Configuration**

[Auto] Automatically detects the devices installed. When both PCIe x1\_3 and PCIe x1\_4 slots are occupied, PCIe x16\_2 slot runs at x2 mode. When there are no devices installed on both PCIe x1\_3 and PCIe x1\_4 slots, PCIe x16\_2 slot runs at x4 mode.

[X4 mode] PCIe x16\_2 slot runs at x4 mode. PCIe x1\_3 and PCIe x1\_4 slots are disabled.

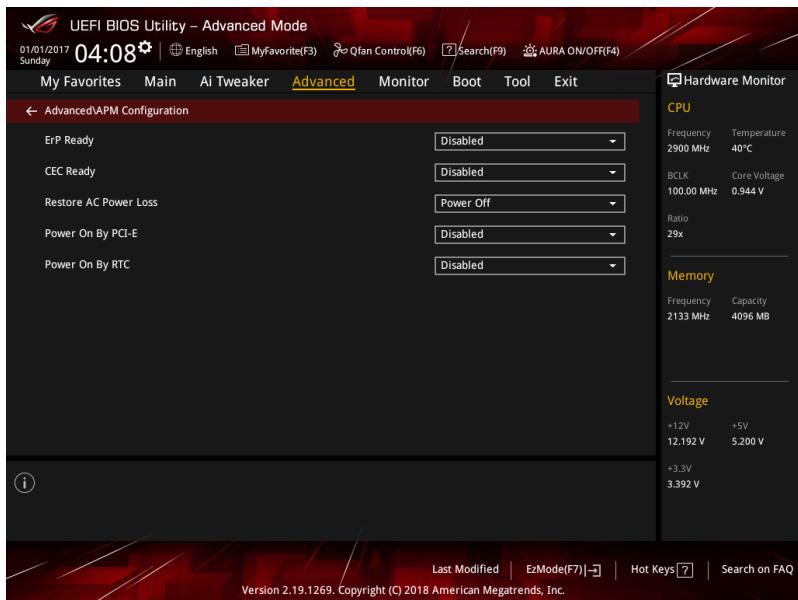
### **PCIEX1\_1 & PCIEX1\_2 Select**

[Auto] Automatically detects the devices installed. When both PCIe x1\_1 and PCIe x1\_2 slots are occupied, only the device installed in the PCIe x1\_1 slot can be detected.

[PCIe x1\_1] Allocates all bandwidth to the PCIe x1\_1 slot. Only the device installed in the PCIe x1\_1 slot can be detected. The PCIe x1\_2 slot will be disabled.

[PCIe x1\_2] Allocates all bandwidth to the PCIe x1\_2 slot. Only the device installed in the PCIe x1\_2 slot can be detected. The PCIe x1\_1 slot will be disabled.

## 1.6.8 APM Configuration



### ErP Ready

This item allows you to switch off some power at S4+S5 or S5 to get the system ready for ErP requirement. When set to [Enabled], all other PME options are switched off. Configuration options: [Disabled] [Enabled (S4+S5)] [Enabled (S5)]

### CEC Ready

Enable this option to allow your system to comply with the CEC (California Energy Commission) regulations and save more power under S0 state. Configuration options: [Disabled] [Enabled]

### Restore AC Power Loss

This item allows your system to go to ON state, OFF state, or both states after an AC power loss. When setting your system to [Last State], it goes to the previous state before the AC power loss. Configuration options: [Power Off] [Power On] [Last State]

### Power On By PCI-E

This item allows you to enable or disable the Wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.

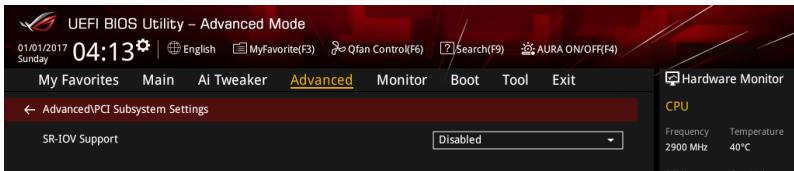
Configuration options: [Disabled] [Enabled]

### Power On By RTC

This item allows you to enable or disable the RTC (Real-Time Clock) to generate a wake event and configure the RTC alarm date. When enabled, you can set the days, hours, minutes, or seconds to schedule an RTC alarm date.

Configuration options: [Disabled] [Enabled]

## 1.6.9 PCI Subsystem Settings

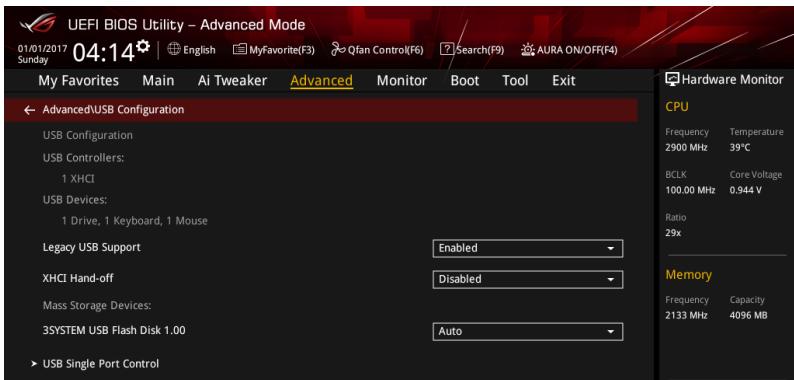


### SR-IOV Support

This item allows you to enable or disable the Single Root IO Virtualization support if your system has SR-IOV capable PCIe devices.

## 1.6.10 USB Configuration

The items in this menu allow you to change the USB-related features.



The **Mass Storage Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

### Legacy USB Support

- [Enabled] Your system supports the USB devices in legacy operating systems.
- [Disabled] Your USB devices can be used for BIOS setup only and cannot be recognized in the boot devices list.
- [Auto] Your system automatically detects the presence of USB devices at startup. If any USB devices are detected, the legacy USB support is enabled.

### XHCI Hand-off

- [Enabled] Enables the support for operating systems without an XHCI hand-off feature.
- [Disabled] Disables the XHCI Hand-off support.

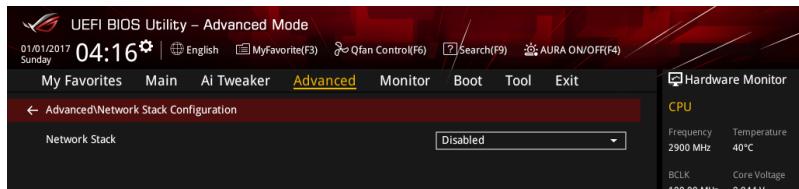
## USB Single Port Control

This item allows you to enable or disable the individual USB ports.



Refer to section 1.1.2 Motherboard layout in your user manual for the location of the USB ports.

## 1.6.11 Network Stack Configuration



### Network stack

This item allows you to disable or enable the UEFI network stack.

Configuration options: [Disable] [Enable]



The following item appears only when you set the **Network Stack** to **[Enabled]**.

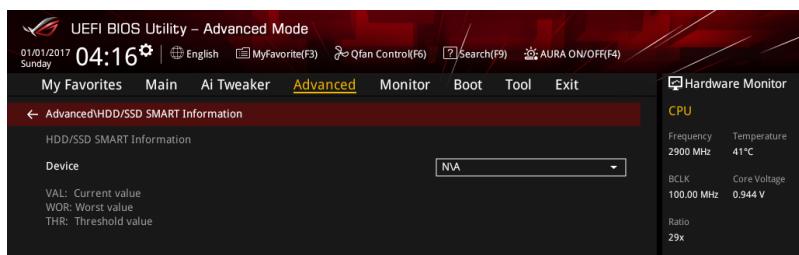
### Ipv4/Ipv6 PXE Support

This item allows you to enable or disable the Ipv4/Ipv6 PXE wake event.

Configuration options: [Disabled] [Enabled]

## 1.6.12 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.



NVM Express devices do not support SMART information.

## 1.7 Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.

Scroll down to display the other BIOS items.



### CPU Temperature, Motherboard Temperature, PCH temperature, T\_Sensor Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the CPU, motherboard, PCH, and T\_Sensor temperatures. Select [**Ignore**] if you do not wish to display the detected temperatures.

### CPU Fan Speed, CPU Optional Fan, Chassis Fan 1-2 Speed, AIO pump Speed [xxxx RPM]

The onboard hardware monitor automatically detects and displays the CPU fan, CPU optional fan, chassis fan, and AIO pump speed in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows N/A. Select [**Ignore**] if you do not wish to display the detected speed.

### CPU Core Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage [x.xxxx V]

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select [**Ignore**] if you do not want to detect this item.

## Q-fan Configuration

### Q-fan Tuning

Click this item to automatically detect the lowest speed and configure the minimum duty cycle for each fan.

### CPU Q-Fan Control

This item allows you to set the CPU Q-Fan operating mode.

- [Auto] Detects the type of CPU fan installed and automatically switches the control modes.
- [PWM Mode] Enables the CPU Q-Fan Control feature in PWM mode for 4-pin CPU fan.
- [DC Mode] Enables the CPU Q-Fan Control feature in DC mode for 3-pin CPU fan.
- [Disabled] Disables the Q-Fan Control.



---

The following items appear only when you set the **CPU Q-Fan Control** to **[Auto]**, **[PWM Mode]**, and **[DC Mode]**.

---

### CPU Fan Step Up/Down Time

This item allows you to set the CPU Fan Step Up/Down Time. Configuration options: [0 sec] [2.1 sec] [2.8 sec] [3.6 sec] [4.2 sec] [5.0 sec] [6.3 sec] [8.5 sec] [12 sec] [25 sec]

### CPU Fan Speed Low Limit

This item allows you to set the low limit warning for CPU Fan speed. Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

### CPU Fan Profile

This item allows you to set the appropriate performance level of the CPU fan.

- [Standard] Set to make the CPU fan adjust automatically depending on the CPU temperature.
- [Silent] Set to minimize the fan speed for quiet CPU fan operation.
- [Turbo] Set to achieve maximum CPU fan speed.
- [Manual] Set to assign the detailed fan speed control parameters.



---

The following items appear only when you set the **CPU Fan Profile** to **[Manual]**.

---

### CPU Upper Temperature

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The CPU fan will operate at the maximum duty cycle when the CPU temperature is higher than the limit.

### CPU Fan Max. Duty Cycle(%)

Use the <+> and <-> keys to adjust the maximum CPU fan duty cycle. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

### CPU Middle Temperature

Use the <+> and <-> keys to adjust the CPU middle temperature.

### CPU Fan Middle Duty Cycle(%)

Use the <+> or <-> keys to adjust the CPU fan middle duty cycle.

### CPU Lower Temperature

Use the <+> or <-> keys to adjust the lower limit of the CPU temperature. The CPU fan will operate at the minimum duty cycle when the CPU temperature is lower than the limit.

### CPU Fan Min. Duty Cycle(%)

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. When the CPU temperature is lower than the lower limit, the CPU fan will operate at the minimum duty cycle.

## Chassis Fan(s) Configuration

### Chassis Fan 1-2 Q-Fan Control

This item allows you to set the chassis fan operating mode.

- [Auto] Detects the type of chassis fan installed and automatically switches the control modes.
- [PWM Mode] Enables the Chassis Fan Q-Fan Control feature in PWM mode for 4-pin chassis fan.
- [DC Mode] Enables the Chassis Fan Q-Fan Control feature in DC mode for 3-pin chassis fan.
- [Disabled] Disables the Q-Fan control.

### Chassis Fan 1-2 Q-Fan Source

The assigned fan will be controlled according to the selected temperature source.

Configuration options: [CPU] [MotherBoard] [PCH] [T\_SENSOR] [Multiple Sources]



For Multiple Sources, select up to three temperature sources and the fan will automatically change based on the highest temperature.

### Chassis Fan 1-2 Step Up/Down Time

This item allows you to set the Chassis Fan Step Up/Down Time. Configuration options: [0 sec] [12 sec] [25 sec] [51 sec] [76 sec] [102 sec] [127 sec] [153 sec] [178 sec] [204 sec]

### Chassis Fan 1-2 Fan Speed Low Limit

This item allows you to disable or set the chassis fan warning speed. Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

### Chassis Fan 1-2 Profile

This item allows you to set the appropriate performance level of the chassis fan.

- [Standard] Sets to [Standard] to make the chassis fan automatically adjust depending on the chassis temperature.
- [Silent] Sets to [Silent] to minimize the fan speed for quiet chassis fan operation.
- [Turbo] Sets to [Turbo] to achieve maximum chassis fan speed.
- [Manual] Sets to [Manual] to assign detailed fan speed control parameters.



---

The following items appear only when you set **Chassis Fan 1-2 Profile** to [Manual].

---

#### **Chassis Fan 1-2 Upper Temperature**

Use the <+> or <-> keys to adjust the upper limit of the Chassis Fan 1-2 temperature. The Chassis Fan 1-2 will operate at the maximum duty cycle when the temperature source is higher than the limit.

#### **Chassis Fan 1-2 Max. Duty Cycle (%)**

Use the <+> or <-> keys to adjust the maximum Chassis Fan 1-2 duty cycle. When the temperature source reaches the upper limit, the Chassis Fan 1-2 will operate at the maximum duty cycle.

#### **Chassis Fan 1-2 Middle Temperature**

Use the <+> or <-> keys to adjust the middle limit of the Chassis Fan 1-2 temperature.

#### **Chassis Fan 1-2 Middle. Duty Cycle (%)**

Use the <+> or <-> keys to adjust the Chassis Fan 1-2 middle duty cycle.

#### **Chassis Fan 1-2 Lower Temperature**

Use the <+> or <-> keys to adjust the lower limit of the Chassis Fan 1-2 temperature. The Chassis Fan 1-2 will operate at the minimum duty cycle when the temperature source is lower than the limit.

#### **Chassis Fan 1-2 Min. Duty Cycle(%)**

Use the <+> or <-> keys to adjust the minimum Chassis Fan 1-2 duty cycle. When the temperature source is under the limit, the Chassis Fan 1-2 will operate at the minimum duty cycle.

### **AIO Pump Control**

[Disabled]	Disable the AIO Pump control feature.
[Auto]	Detects the type of AIO Pump installed and automatically switches the control modes.
[DC mode]	Enable the AIO Pump control in DC mode for 3-pin chassis fan.
[PWM mode]	Enable the AIO Pump control in PWM mode for 4-pin chassis fan.



---

The following items appear only when you set the **AIO Pump Control** to [Auto], [DC mode] or [PWM mode].

---

#### **AIO Pump Upper Temperature**

Use the <+> or <-> keys to adjust the upper limit of the AIO Pump temperature.

#### **AIO Pump Max. Duty Cycle (%)**

Use the <+> or <-> keys to adjust the maximum AIO Pump duty cycle. When the CPU temperature reaches the upper limit, the AIO Pump will operate at the maximum duty cycle.

#### **AIO Pump Middle Temperature**

Use the <+> or <-> keys to adjust the middle limit of the AIO Pump temperature.

#### **AIO Pump Middle. Duty Cycle (%)**

Use the <+> or <-> keys to adjust the maximum AIO Pump duty cycle. When the CPU temperature reaches the upper limit, the AIO Pump will operate at the maximum duty cycle.

#### **AIO Pump Lower Temperature**

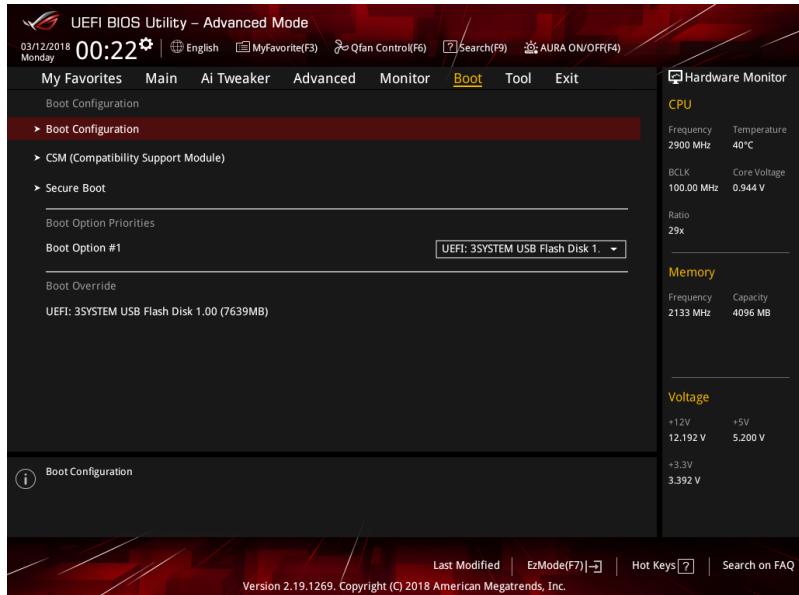
Use the <+> or <-> keys to adjust the lower limit of the AIO Pump temperature. The AIO Pump will operate at the minimum duty cycle when the temperature is lower than the limit.

#### **AIO Pump Min. Duty Cycle(%)**

Use the <+> or <-> keys to adjust the minimum AIO Pump duty cycle. When the CPU temperature is under the limit, the AIO Pump will operate at the minimum duty cycle.

## 1.8 Boot menu

The Boot menu items allow you to change the system boot options.



### Boot Configuration

#### Fast Boot

- [Disabled] Allows your system to go back to its normal boot speed.  
[Enabled] Allows your system to accelerate the boot speed.



The following items appear only when you set the **Fast Boot** to [Enabled].

#### Next Boot after AC Power Loss

- [Normal Boot] Returns to normal boot on the next boot after an AC power loss.  
[Fast Boot] Accelerates the boot speed on the next boot after an AC power loss.

#### Boot Logo Display

- [Auto] Sets the boot logo to display during POST.  
[Full Screen] Sets the boot logo display in full screen during POST.  
[Disabled] Disables the boot logo display during POST.



---

The following item appears only when you set the **Boot Logo Display** to **[Auto]** and **[Full Screen]**.

---

### Post Delay Time

This item allows you to select a desired additional POST waiting time to easily enter the BIOS Setup. You can only execute the POST delay time during normal boot. Configuration options: [0 sec] - [10 sec]



---

This feature only works when set under normal boot.

---



---

The following item appears only when you set the **Boot Logo Display** to **[Disabled]**.

---

### Post Report

This item allows you to select a desired POST report waiting time. Configuration options: [1 sec] - [10 sec] [Until Press ESC]

## Bootup NumLock State

This item allows you to enable or disable power-on state of the NumLock. Configuration options: [On] [Off]

## Wait For ‘F1’ If Error

This item allows your system to wait for the <F1> key to be pressed when error occurs. Configuration options: [Disabled] [Enabled]

## Option ROM Messages

- [Force BIOS] The third-party ROM messages will be forced to display during the boot sequence.
- [Keep Current] The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

## Interrupt 19 Capture

- [Enabled] Execute the trap right away.
- [Disabled] Execute the trap during legacy boot.

## Setup Mode

[Advanced Mode] This item allows you to go to Advanced Mode of the BIOS after POST.

[EZ Mode] This item allows you to go to EZ Mode of the BIOS after POST.

## **CSM (Compatibility Support Module)**

This item allows you to configure the CSM (Compatibility Support Module) items to fully support the various VGA, bootable devices and add-on devices for better compatibility.

### **Launch CSM**

- |            |   |
|------------|---|
| [Enabled]  | For better compatibility, enable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode. |
| [Disabled] | Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.                          |



---

The following items appear only when you set the Launch CSM to [Enabled].

---

### **Boot Device Control**

This item allows you to select the type of devices that you want to boot. Configuration options: [UEFI and Legacy OPROM] [Legacy OPROM only] [UEFI only]

### **Boot from Network Devices**

This item allows you to select the type of network devices that you want to launch. Configuration options: [Ignore] [Legacy only] [UEFI only]

### **Boot from Storage Devices**

This item allows you to select the type of storage devices that you want to launch. Configuration options: [Ignore] [Legacy only] [UEFI only]

### **Boot from PCI-E/PCI Expansion Devices**

This item allows you to select the type of PCIe/PCI expansion devices that you want to launch. Configuration options: [Ignore] [Legacy only] [UEFI only]

## **Secure Boot**

This item allows you to configure the Windows® Secure Boot settings and manage its keys to protect the system from unauthorized access and malwares during POST.

### **OS Type**

- |                     |  |
|---------------------|--|
| [Windows UEFI Mode] | This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS. |
| [Other OS]          | Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.  |

## **Key Management**

### **Install Default Secure Boot keys**

This item allows you to immediately load the default Security Boot keys, Platform key (PK), Key-exchange Key (KEK), Signature database (db), and Revoked Signatures (dbx). When the default Secure boot keys are loaded, the PK state will change from Unloaded mode to loaded mode.

### **Clear Secure Boot keys**

This item appears only when you load the default Secure Boot keys. This item allows you to clear all default Secure Boot keys.

### **Save all Secure Boot variables**

This item allows you to save all the Secure Boot keys to a USB storage device.

### **PK Management**

The Platform Key (PK) locks and secures the firmware from any permissible changes. The system verifies the PK before your system enters the OS.

#### **Save to file**

This item allows you to save the PK to a USB storage device.

#### **Set New key**

This item allows you to load the downloaded PK from a USB storage device.

#### **Delete key**

This item allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.

Configuration options: [Yes] [No]



---

The PK file must be formatted as a UEFI variable structure with time-based authenticated variable.

---

### **KEK Management**

The Key Exchange Keys (KEK) manages the Signature database (db) and Forbidden Signature database (dbx).



---

Key Exchange Keys (KEK) refers to Microsoft® Secure Boot Key-Enrollment Key (KEK).

---

#### **Save to file**

This item allows you to save the KEK to a USB storage device.

#### **Set New key**

This item allows you to load the downloaded KEK from a USB storage device.

#### **Append Key**

This item allows you to load the additional KEK from a storage device for an additional db and dbx loaded management.

#### **Delete key**

This item allows you to delete the KEK from your system.

Configuration options: [Yes] [No]



---

The KEK file must be formatted as a UEFI variable structure with time-based authenticated variable.

---

## DB Management

The Authorized Signatures (db) lists the signers or images of UEFI applications, operating system loaders, and UEFI drivers that you can load on the single computer.

### Save to file

This item allows you to save the db to a USB storage device.

### Set New key

This item allows you to load the downloaded db from a USB storage device.

### Append Key

This item allows you to load the additional db from a storage device for an additional db and dbx loaded management.

### Delete key

This item allows you to delete the db file from your system.

Configuration options: [Yes] [No]



---

The db file must be formatted as a UEFI variable structure with time-based authenticated variable.

---

## DBX Management

The Forbidden Signature database (dbx) lists the forbidden images of db items that are no longer trusted and cannot be loaded.

### Save to file

This item allows you to save the dbx to a USB storage device.

### Set New key

This item allows you to load the downloaded dbx from a USB storage device.

### Append Key

This item allows you to load the additional dbx from a storage device for an additional db and dbx loaded management.

### Delete key

This item allows you to delete the dbx file from your system.

Configuration options: [Yes] [No]



---

The dbx file must be formatted as a UEFI variable structure with time-based authenticated variable.

---

## Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.



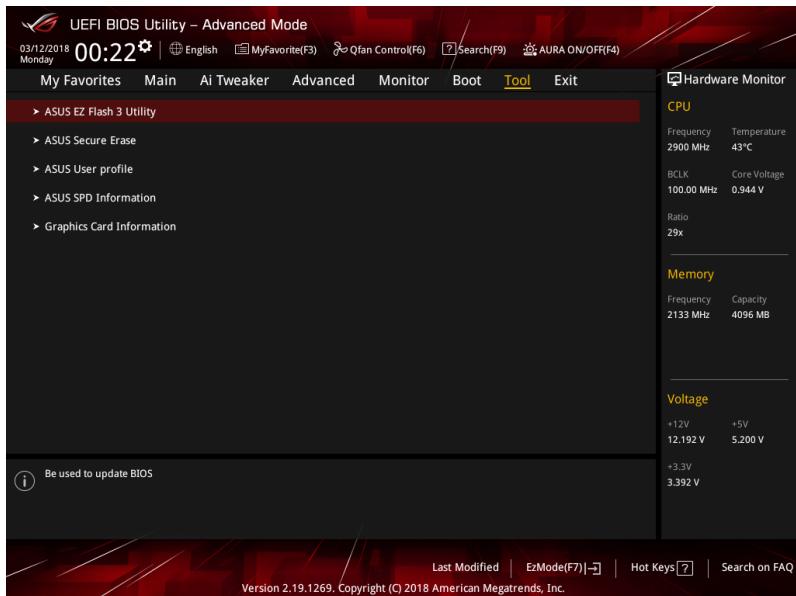
- 
- To access Windows® OS in Safe Mode, press <F8> after POST.
  - To select the boot device during system startup, press <F8> when ASUS Logo appears.
-

## Boot Override

These item displays the available devices. The number of device items that appear on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

## 1.9 Tool menu

The Tool menu items allow you to configure options for special functions. Select an item then press <Enter> to display the submenu.



### 1.9.1 ASUS EZ Flash 3 Utility

This item allows you to run ASUS EZ Flash 3. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice.



---

For more details, refer to section 1.11.2 ASUS EZ Flash 3.

---

## 1.9.2 Secure Erase

SSD speeds may lower over time as with any storage medium due to data processing. Secure Erase completely and safely cleans your SSD, restoring it to factory performance levels.

To launch Secure Erase, click **Tool > Secure Erase** on the Advanced mode menu.



- The time to erase the contents of your SSD may take a while depending on its size. Do not turn off the system during the process.
- Secure Erase is only supported on Intel SATA port. For more information about Intel SATA ports, refer to section **1.1.2 Motherboard layout** in your user manual.

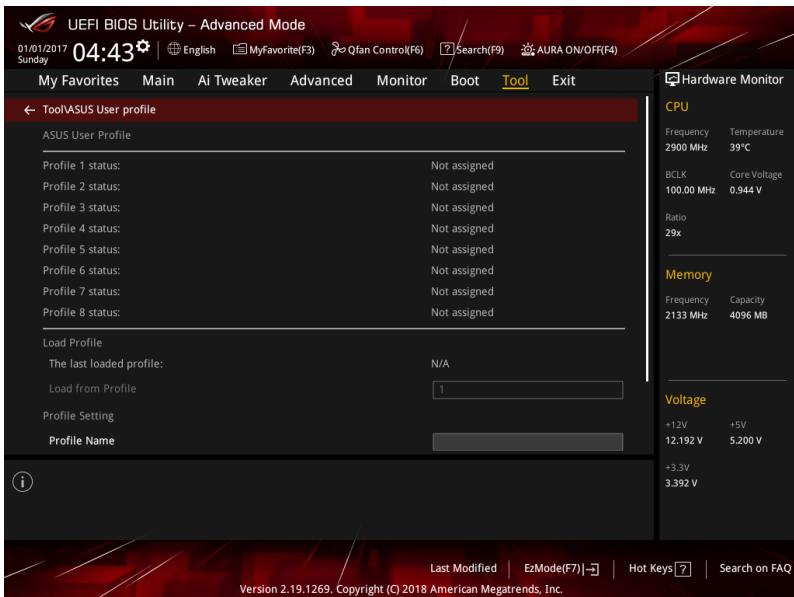


### Status definition:

- Frozen.** The frozen state is the result of a BIOS protective measure. The BIOS guards drives that do not have password protection by freezing them prior to booting. If the drive is frozen, a power off or hard reset of your PC must be performed to proceed with the Secure Erase.
- Locked.** SSDs might be locked if the Secure Erase process is either incomplete or was stopped. This may be due to a third party software that uses a different password defined by ASUS. You have to unlock the SSD in the software before proceeding with Secure Erase.

## 1.9.3 ASUS User Profile

This item allows you to store or load multiple BIOS settings.



### Load from Profile

This item allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your BIOS settings, press <Enter>, and then select **Yes**.



- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

### Profile Name

This item allows you to key in a profile name.

### Save to Profile

This item allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

### Load/Save Profile from/to USB Drive

This item allows you to load or save profile from your USB drive, load and save profile to your USB drive.

## 1.9.4 ASUS SPD Information

This item allows you to view the DRAM SPD information.

The screenshot shows the UEFI BIOS Utility interface. The top bar displays the date (01/01/2017), time (04:43), language (English), and various control keys. The main menu includes My Favorites, Main, Ai Tweaker, Advanced, Monitor, Boot, Tool (highlighted in yellow), and Exit. The sub-menu under Tool is "Tool\ASUS SPD Information". The main panel displays detailed SPD information for DIMM\_B2, including Manufacturer (SK Hynix), Module Size (4096MB), Maximum Bandwidth (2133MHz), Type (DDR4), Part Number (HMA45UUGMFR8N-TF), Serial Number (1052b0da), Product Week/Year (28/2014), and SPD Ext. The ASUS Checksum is 502d. A table lists JEDEC ID values for various timing parameters like tRCD, tRP, tRAS, and tRC. On the right side, there are two sections: "Hardware Monitor" showing CPU and Memory temperatures, and "Memory" showing capacity (4096 MB) and frequency (2133 MHz). Below these are "Voltage" settings for +12V, +5V, +3.3V, and 3.392 V.

## 1.9.5 Graphics Card Information

This item displays the information and recommended configuration for the PCIE slots that the graphics card is installed in your system.

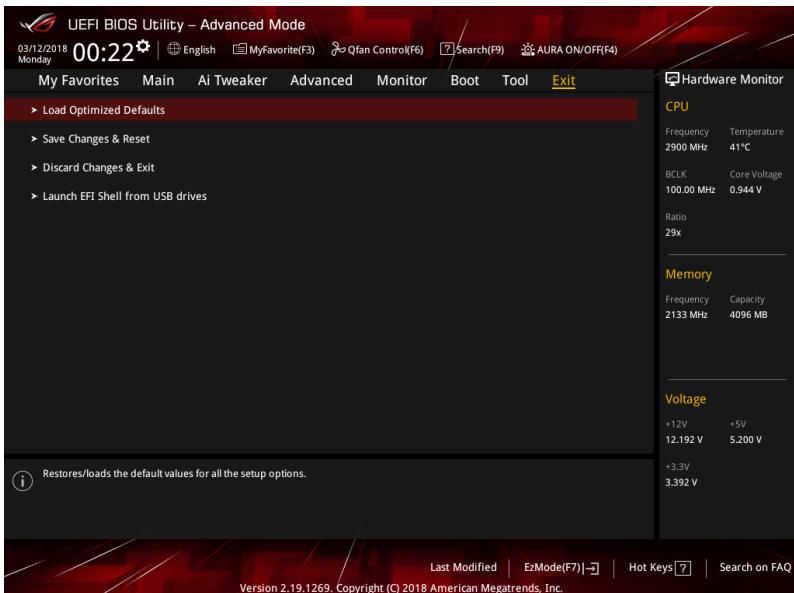
The screenshot shows the UEFI BIOS Utility interface. The top bar displays the date (01/01/2017), time (04:43), language (English), and various control keys. The main menu includes My Favorites, Main, Ai Tweaker, Advanced, Monitor, Boot, Tool (highlighted in yellow), and Exit. The sub-menu under Tool is "Tool\Graphics Card Information". The left panel shows "GPU Post" and "GOP/VBOS Status". The right panel displays a message "Select a valid GPU". On the right side, there is a "Hardware Monitor" section showing CPU and GPU temperatures, frequencies, and core voltages.

### GPU Post

This item displays the information and recommended configuration for the PCIE slots that the graphics card is installed in your system.

## 1.10 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items. You can access the EZ Mode from the Exit menu.



### Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press **<F5>**, a confirmation window appears. Select **OK** to load the default values.

### Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press **<F10>**, a confirmation window appears. Select **OK** to save changes and exit.

### Discard Changes & Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press **<Esc>**, a confirmation window appears. Select **Yes** to discard changes and exit.

### Launch EFI Shell from USB drives

This option allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available filesystem devices.

## 1.11 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility, and performance. However, BIOS updating is potentially risky. If there is no problem using the current version of BIOS, DO NOT manually update the BIOS. Inappropriate BIOS updating may result to system's failure to boot. Carefully follow the instructions in this chapter to update your BIOS when necessary.



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Visit <http://www.asus.com> to download the latest BIOS file for this motherboard.

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The following utilities allow you to manage and update the motherboard BIOS setup program.

1. EZ Update: Updates the BIOS in Windows® environment.
2. ASUS EZ Flash 3: Updates the BIOS using a USB flash drive.
3. ASUS CrashFree BIOS 3: Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.

### 1.11.1 EZ Update

The EZ Update is a utility that allows you to update the motherboard BIOS in Windows® environment.



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- EZ Update requires an Internet connection either through a network or an ISP (Internet Service Provider).
  - This utility is available in the support DVD that comes with the motherboard package.
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## 1.11.2 ASUS EZ Flash 3

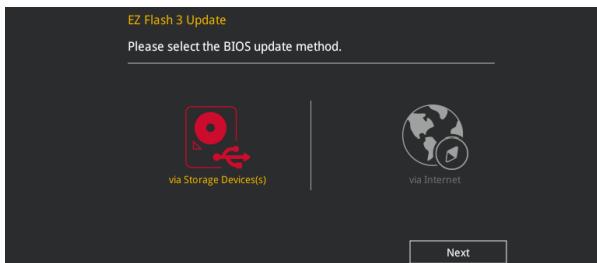
ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or an OS-based utility.



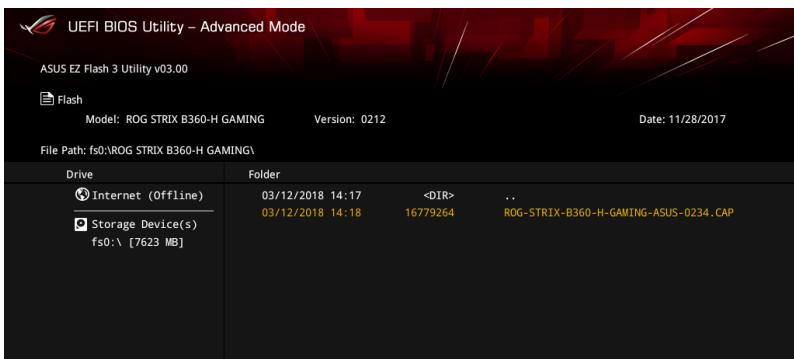
Updating through the Internet varies per region and Internet conditions. Check your local Internet connection before updating through the Internet.

### To update the BIOS by USB:

1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select **ASUS EZ Flash 3 Utility** and press <Enter>.
2. Insert the USB flash disk that contains the latest BIOS file to the USB port.
3. Select **via Storage Device(s)**.



4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
5. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.





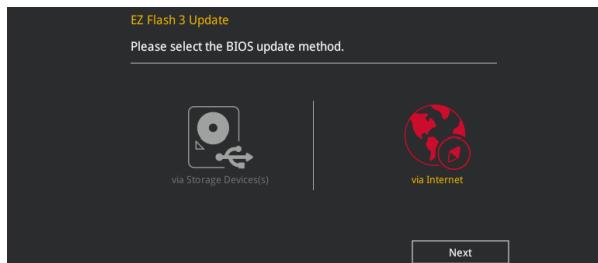
- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



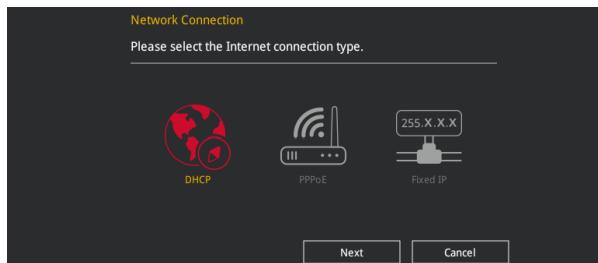
Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section **1.10 Exit Menu** for details.

### To update the BIOS by Internet:

1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select **ASUS EZ Flash 3 Utility** and press <Enter>.
2. Select **via Internet**.



3. Press the Left/Right arrow keys to select an Internet connection method, and then press <Enter>.



4. Follow the onscreen instructions to complete the update.
5. Reboot the system when the update process is done.



Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section **1.10 Exit Menu** for details.

### 1.11.3 ASUS CrashFree BIOS 3

The ASUS CrashFree BIOS 3 utility is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.



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The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at <https://www.asus.com/support/> and save it to a USB flash drive.

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#### Recovering the BIOS

##### To recover the BIOS:

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 3 automatically.
4. The system requires you to enter BIOS Setup to recover the BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.



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DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!

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