

**ROG STRIX
H370-F
GAMING**

BIOS Manual



Motherboard

E14175
First Edition
May 2018

Copyright© 2018 ASUSTeK COMPUTER INC. All Rights Reserved.

No part of this manual, including the products and software described in it, may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form or by any means, except documentation kept by the purchaser for backup purposes, without the express written permission of ASUSTeK COMPUTER INC. ("ASUS").

Product warranty or service will not be extended if: (1) the product is repaired, modified or altered, unless such repair, modification or alteration is authorized in writing by ASUS; or (2) the serial number of the product is defaced or missing.

ASUS PROVIDES THIS MANUAL "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ASUS, ITS DIRECTORS, OFFICERS, EMPLOYEES OR AGENTS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGES FOR LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE OR DATA, INTERRUPTION OF BUSINESS AND THE LIKE), EVEN IF ASUS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES ARISING FROM ANY DEFECT OR ERROR IN THIS MANUAL OR PRODUCT.

SPECIFICATIONS AND INFORMATION CONTAINED IN THIS MANUAL ARE FURNISHED FOR INFORMATIONAL USE ONLY, AND ARE SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE, AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY ASUS. ASUS ASSUMES NO RESPONSIBILITY OR LIABILITY FOR ANY ERRORS OR INACCURACIES THAT MAY APPEAR IN THIS MANUAL, INCLUDING THE PRODUCTS AND SOFTWARE DESCRIBED IN IT.

Products and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are used only for identification or explanation and to the owners' benefit, without intent to infringe.

Offer to Provide Source Code of Certain Software

This product contains copyrighted software that is licensed under the General Public License ("GPL"), under the Lesser General Public License Version ("LGPL") and/or other Free Open Source Software Licenses. Such software in this product is distributed without any warranty to the extent permitted by the applicable law. Copies of these licenses are included in this product.

Where the applicable license entitles you to the source code of such software and/or other additional data, you may obtain it for a period of three years after our last shipment of the product, either

(1) for free by downloading it from <https://www.asus.com/support/>

or

(2) for the cost of reproduction and shipment, which is dependent on the preferred carrier and the location where you want to have it shipped to, by sending a request to:

ASUSTeK Computer Inc.
Legal Compliance Dept.
15 Li Te Rd.,
Beitou, Taipei 112
Taiwan

In your request please provide the name, model number and version, as stated in the About Box of the product for which you wish to obtain the corresponding source code and your contact details so that we can coordinate the terms and cost of shipment with you.

The source code will be distributed WITHOUT ANY WARRANTY and licensed under the same license as the corresponding binary/object code.

This offer is valid to anyone in receipt of this information.

ASUSTeK is eager to duly provide complete source code as required under various Free Open Source Software licenses. If however you encounter any problems in obtaining the full corresponding source code we would be much obliged if you give us a notification to the email address gpl@asus.com, stating the product and describing the problem (please DO NOT send large attachments such as source code archives, etc. to this email address).

Contents

1.1	Knowing BIOS	4
1.2	BIOS setup program	5
1.2.1	Advanced Mode	6
1.2.2	EZ Mode.....	9
1.2.3	QFan Control.....	10
1.2.4	EZ Tuning Wizard	12
1.3	My Favorites	14
1.4	Main menu	16
1.5	Ai Tweaker menu.....	18
1.6	Advanced menu	33
1.6.1	Platform Misc Configuration	34
1.6.2	CPU Configuration	35
1.6.3	System Agent (SA) Configuration	37
1.6.4	PCH Configuration	39
1.6.5	PCH Storage Configuration.....	39
1.6.6	PCH-FW Configuration	41
1.6.7	Onboard Devices Configuration.....	41
1.6.8	APM Configuration	43
1.6.9	USB Configuration	44
1.6.10	Network Stack Configuration.....	46
1.6.11	HDD/SSD SMART Information	46
1.6.12	Intel(R) Rapid Storage Technology.....	46
1.6.13	Intel(R) Ethernet Connection (7) I219-V - 00:0C:6E:00:00:42	47
1.7	Monitor menu	48
1.8	Boot menu	56
1.9	Tool menu.....	61
1.9.1	ASUS EZ Flash 3 Utility	61
1.9.2	Secure Erase	62
1.9.3	ASUS User Profile.....	63
1.9.4	ASUS SPD Information	64
1.9.5	Graphics Card Information	64
1.10	Exit menu	65
1.11	Updating BIOS.....	66
1.11.1	EZ Update	66
1.11.2	ASUS EZ Flash 3.....	67
1.11.3	ASUS CrashFree BIOS 3.....	69

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, overclocking 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 **SH370FG.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 section **Jumpers** in your user 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 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.



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

The screenshot displays the BIOS Advanced Mode interface. The top bar includes the date and time (Sat 9/20/18 14:55), language (English), and navigation shortcuts (MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), Search(F9), and AURA ON/OFF(F4)). The main menu bar shows options: My Favorites, Main, **Ai Tweaker**, Advanced, Monitor, Boot, Tool, and Exit. The left sidebar lists configuration fields: Target CPU Turbo-Mode Frequency (4000MHz), Target DRAM Frequency (2133MHz), Target Cache Frequency (3700MHz), AI Overclock Tuner (Auto), CPU Power Enhancement (Auto), CPU Core Ratio (Auto), DRAM Odd Ratio Mode (Enabled), DRAM Frequency (Auto), Power-saving & Performance Mode (Auto), DRAM Timing Control, DIGI+ VRM, and Internal CPU Power Management. The right sidebar shows the Hardware Monitor with CPU (Frequency: 2800 MHz, Temperature: 32°C, BCLK: 100.00 MHz, Core Voltage: 0.944 V, Ratio: 28x) and Memory (Frequency: 2133 MHz, Voltage: 1.200 V, Capacity: 4096 MB) sections. The bottom status bar includes Version 2.19.1269, Copyright (C) 2018 American Megatrends, Inc., Last Modified, EzMode(F7) [-], Hot Keys [7], and Search on FAQ. Red lines and labels point to various elements: Configuration fields, Pop-up Menu, Menu bar, Language, MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), Search(F9), Scroll bar, AURA ON/OFF(F4), Menu items, General help, Last modified settings, Go back to EZ Mode, Hot Keys, Search on the FAQ, and a note about manual/XMP mode.

Configuration fields

Pop-up Menu

Menu bar

Language

MyFavorite(F3)

Qfan Control(F6)

EZ Tuning Wizard(F11)

Search(F9)

Scroll bar

AURA ON/OFF(F4)

Menu items

General help

Last modified settings

Go back to EZ Mode

Hot Keys

Search on the FAQ

Displays a quick overview of the system status

Hardware Monitor

CPU

Frequency	Temperature
2800 MHz	32°C
BCLK	Core Voltage
100.00 MHz	0.944 V
Ratio	
28x	

Memory

Frequency	Voltage
2133 MHz	1.200 V
Capacity	
4096 MB	

Voltage

+12V	+5V
12.288 V	5.080 V
+3.3V	
3.408 V	

Version 2.19.1269. Copyright (C) 2018 American Megatrends, Inc.

Last Modified

EzMode(F7) [-]

Hot Keys [7]

Search on FAQ

[Manual]: When the manual mode is selected, BCLK(base clock) frequency can be assigned manually.

[XMP]: When XMP(extreme memory profile) mode is selected, BCLK frequency and memory parameters will be optimized automatically.

Menu bar

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

My Favorites	For saving the frequently-used system settings and configuration.
Main	For changing the basic system configuration
Ai Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Monitor	For displaying the system temperature, power status, and changing the fan settings.
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Exit	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

A greater than 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.

Q-Fan 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.

EZ Tuning Wizard(F11)

This button above the menu bar allows you to view and tweak the overclocking settings of your system. It also allows you to change the motherboard's SATA mode from AHCI to RAID mode.



Refer to section **1.2.4 EZ Tuning Wizard** for more information.

Search (F9)

This button allows you to search for BIOS items by entering its 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 (Q-Code and HDD_LED) and all AURA effects will be disabled.

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:



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.

Hot keys

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

Last Modified button

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

1.2.2 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.



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

The screenshot shows the UEFI BIOS Utility - EZ Mode interface. The top bar includes the date and time (05/04/2018 Friday 16:08), language (English), and navigation icons for EZ Tuning Wizard (F11), Search (F9), and AURA ON/OFF (F4). The main area is divided into several sections: Information (showing system details like ROG STRIX H370-F GAMING, BIOS Ver. 0602, CPU, and Memory), CPU Temperature (32°C), CPU Core Voltage (0.944 V), Motherboard Temperature (27°C), DRAM Status, SATA Information, X.M.P. (Disabled), FAN Profile (showing CPU FAN at 3924 RPM), Intel Rapid Storage Technology (On/Off), CPU FAN graph, QFan Control, EZ System Tuning (Normal), Boot Priority (UEFI: JetFlashTranscend 4GB 8.07, Partition 1 (3830MB)), and a Boot Menu (F8). The bottom bar contains Default (F5), Save & Exit (F10), Advanced Mode (F7) with a right arrow, and Search on FAQ.

Labels and callouts in the image:

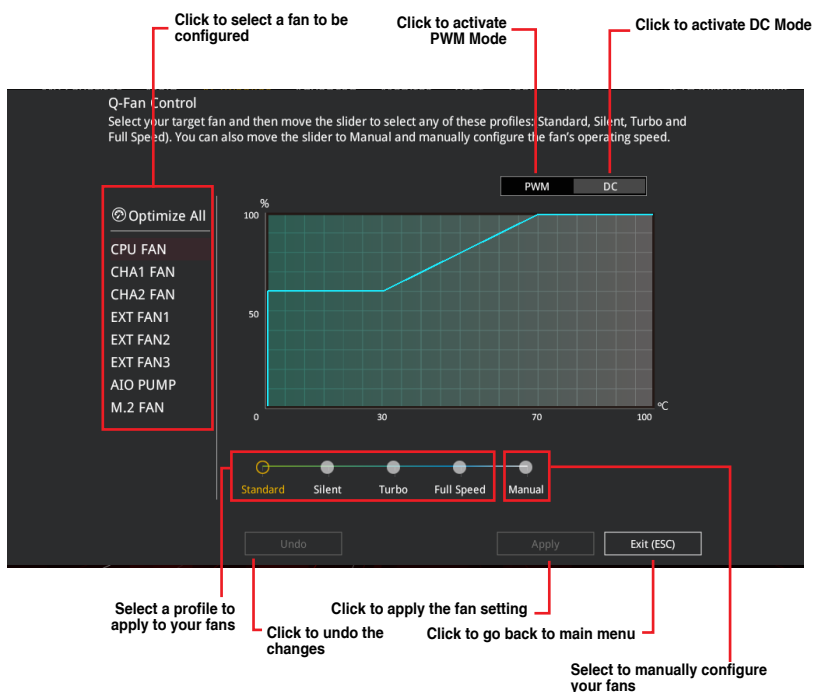
- Displays a quick overview of the system status (points to the Information section)
- Creates storage RAID and configures system overlocking (points to the SATA Information section)
- Selects the display language of the BIOS setup program (points to the English language selector)
- Search(F9) (points to the Search icon)
- AURA ON/OFF(F4) (points to the AURA ON/OFF icon)
- Displays the system properties of the selected mode. Click < or > to switch EZ System Tuning modes (points to the EZ System Tuning section)
- Enables or disables the SATA RAID mode for Intel Rapid Storage Technology (points to the Intel Rapid Storage Technology section)
- Displays the CPU Fan's speed. Click the button to manually tune the fans (points to the CPU FAN graph)
- Loads optimized default settings (points to the QFan Control button)
- Saves the changes and resets the system (points to the Save & Exit (F10) button)
- Click to go to Advanced mode (points to the Advanced Mode (F7) button)
- Search on the FAQ (points to the Search on FAQ button)
- Click to display boot devices (points to the Boot Priority section)
- Selects the boot device priority (points to the Boot Menu (F8) button)



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

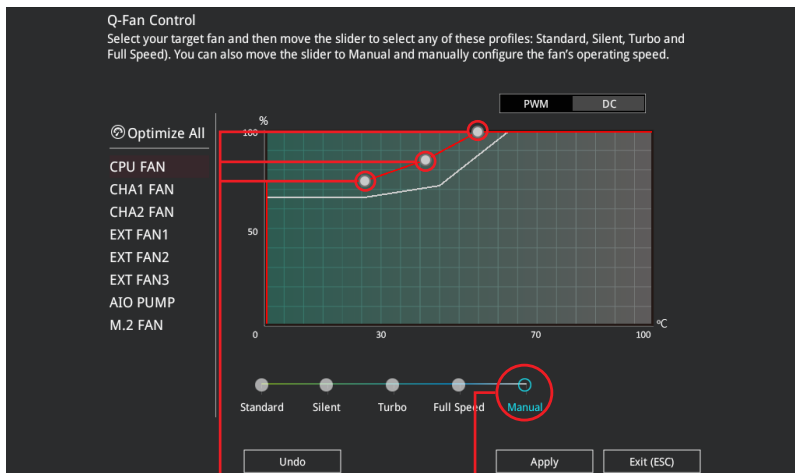
1.2.3 QFan Control

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.



Speed points

Select to manually
configure your fans

To configure your fans:

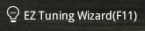
1. Select the fan that you want to configure and to view its current status.
2. Click and drag the speed points to adjust the fans' operating speed.
3. Click **Apply** to save the changes then click **Exit (ESC)**.

1.2.4 EZ Tuning Wizard

EZ Tuning Wizard allows you to easily overclock your CPU and DRAM, computer usage, and CPU fan to their best settings. You can also set RAID in your system using this feature.

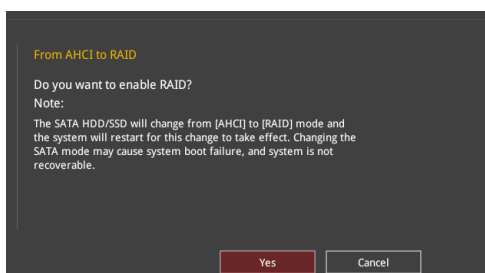
Creating RAID

To create RAID:

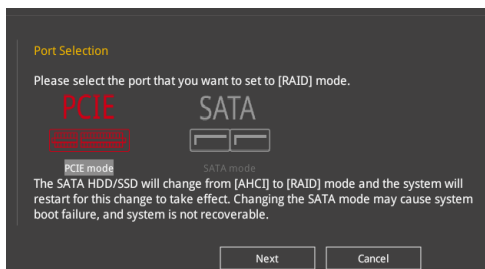
1. Press <F11> on your keyboard or click  from the BIOS screen to open EZ Tuning Wizard screen.
2. Click **Yes** to enable RAID.



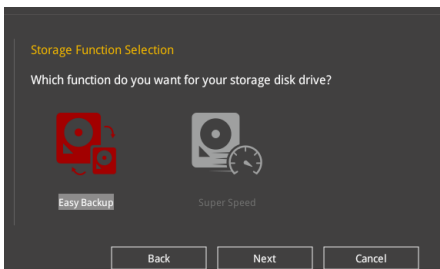
- Ensure that your HDDs have no existing RAID volumes.
- Ensure to connect your HDDs to Intel® SATA connectors.



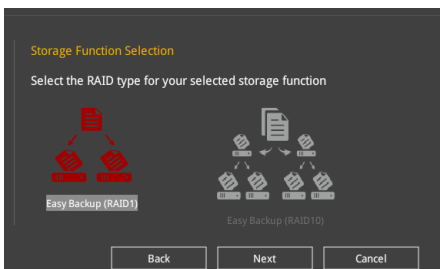
3. Select the port that you want to set to [RAID] mode, **PCIe** or **SATA**, then click **Next**.



4. Select the type of storage for your RAID, **Easy Backup** or **Super Speed**, then click **Next**.

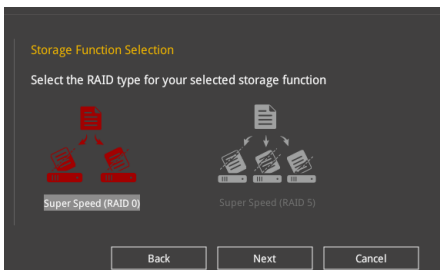


- a. For Easy Backup, click **Next** then select from **Easy Backup (RAID 1)** or **Easy Backup (RAID 10)**.



You can only select Easy Backup (RAID 10) if you connect four (4) HDDs.

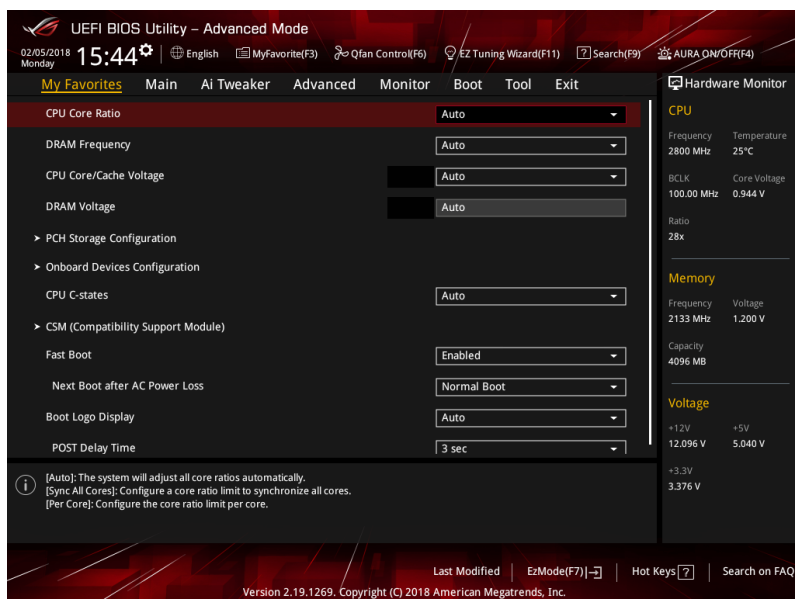
- b. For Super Speed, click **Next** then select from **Super Speed (RAID 0)** or **Super Speed (RAID 5)**.



5. After selecting the type of RAID, click **Next** then click **Yes** to continue the RAID setup.
6. After the RAID setup is done, click **Yes** to exit the setup then click **OK** to reset your system.

1.3 My Favorites

My Favorites is your personal space where you can easily save and access your favorite BIOS items.

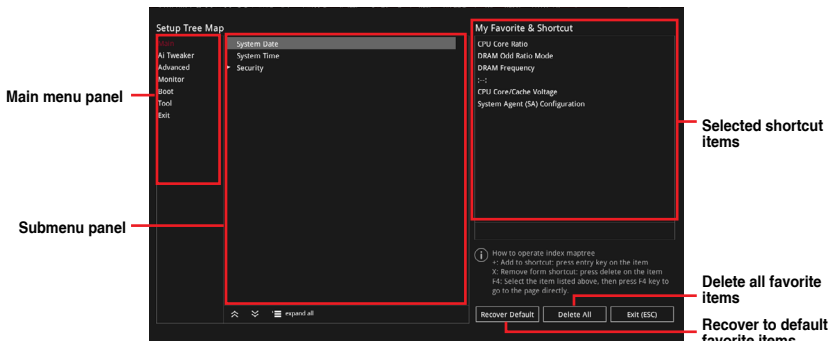


My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.

Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click **MyFavorites(F3)** 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.



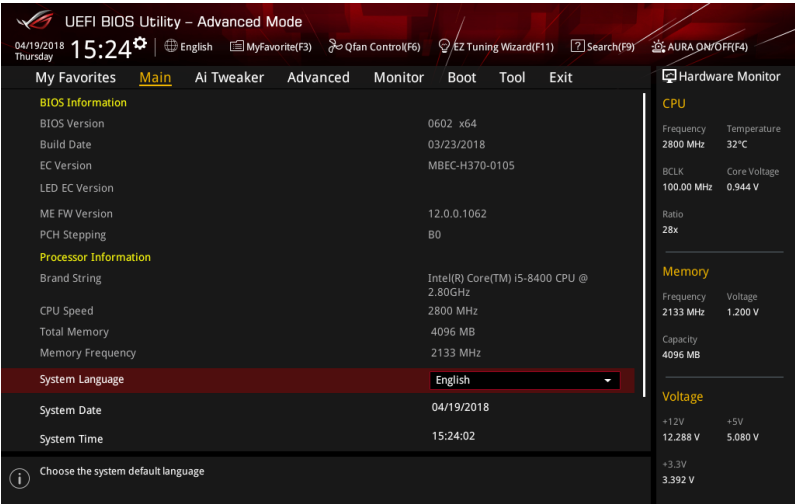
You cannot add the following items to My Favorite items:

- Items with submenu options
- User-managed items such as language and boot order
- Configuration items such as Memory SPD Information, system time and date.

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.

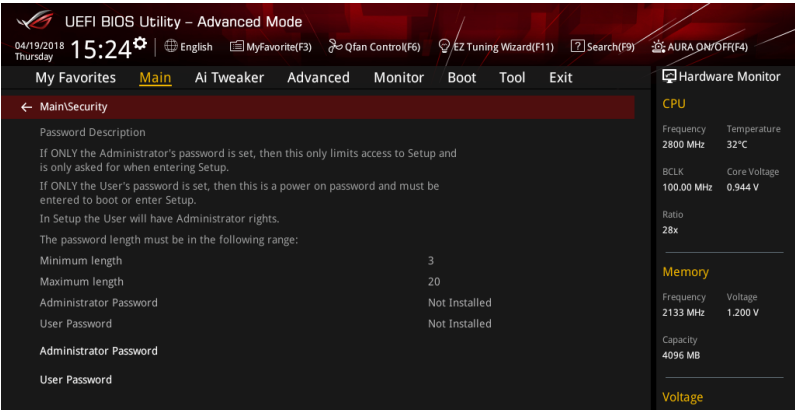
1.4 Main menu

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.



Security

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



- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **Jumpers** in your 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 overclocking-related items.

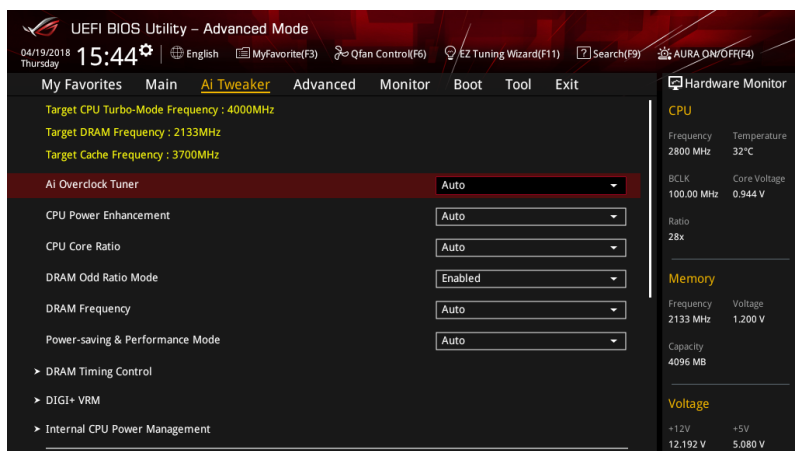


Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



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.



Ai Overclock Tuner

Allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Configuration options:

[Auto] Loads the optimal settings for the system.

[X.M.P.] If you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profiles supported by your memory modules for optimizing the system performance.



The [X.M.P.] configuration option appears only when you install memory modules supporting the eXtreme Memory Profile(X.M.P.) Technology.



The following item appears only when you set **Ai Overclock Tuner** to **[XMP]**.

XMP

This item allows you to select your eXtreme Memory Profile (XMP). Each profile has its own DRAM frequency, timing and voltage.

CPU Power Enhancement

This item allows you to enable or disable the CPU power enhancement.

Configuration options: **[Auto]** **[Disabled]**

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]** **[By Core Usage]**



When the CPU Core Ratio is set to **[Sync All Cores]** or **[By Core Usage]**, 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 **[By Core Usage]**, 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 lower 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 lower 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

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] [Max Power-Saving Mode] [Performance mode]

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

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

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: [Disabled] [Enabled]

SenseAmp Offset Training

Configuration options: [Disabled] [Enabled]

Early ReadMPR Timing Centering 2D

Configuration options: [Disabled] [Enabled]

Read MPR Training

Configuration options: [Disabled] [Enabled]

Receive Enable Training

Configuration options: [Disabled] [Enabled]

Jedec Write Leveling

Configuration options: [Disabled] [Enabled]

Early Write Time Centering 2D

Configuration options: [Disabled] [Enabled]

Early Read Time Centering 2D

Configuration options: [Disabled] [Enabled]

Write Timing Centering 1D

Configuration options: [Disabled] [Enabled]

Write Voltage Centering 1D

Configuration options: [Disabled] [Enabled]

Read Timing Centering 1D

Configuration options: [Disabled] [Enabled]

DIMM ODT Training*

Configuration options: [Disabled] [Enabled]



The following item appears only when you set **DIMM ODT Training*** to **[Enabled]**.

Max RTT_WR

Configuration options: [ODT Off] [120 Ohms]

DIMM RON Training*

Configuration options: [Disabled] [Enabled]

Write Drive Strength/Equalization 2D*

Configuration options: [Disabled] [Enabled]

Write Slew Rate Training*

Configuration options: [Disabled] [Enabled]

Read ODT Training*

Configuration options: [Disabled] [Enabled]

Read Equalization Training*

Configuration options: [Disabled] [Enabled]

Read Amplifier Training*

Configuration options: [Disabled] [Enabled]

Write Timing Centering 2D

Configuration options: [Disabled] [Enabled]

Read Timing Centering 2D

Configuration options: [Disabled] [Enabled]

Command Voltage Centering

Configuration options: [Disabled] [Enabled]

Write Voltage Centering 2D

Configuration options: [Disabled] [Enabled]

Read Voltage Centering 2D

Configuration options: [Disabled] [Enabled]

Late Command Training

Configuration options: [Disabled] [Enabled]

Round Trip Latency

Configuration options: [Disabled] [Enabled]

Turn Around Timing Training

Configuration options: [Disabled] [Enabled]

Rank Margin Tool

Configuration options: [Disabled] [Enabled]

Memory Test

Configuration options: [Disabled] [Enabled]

DIMM SPD Alias Test

Configuration options: [Disabled] [Enabled]

Receive Enable Centering 1D

Configuration options: [Disabled] [Enabled]

Retrain Margin Check

Configuration options: [Disabled] [Enabled]

Write Drive Strength Up/Dn independently

Configuration options: [Disabled] [Enabled]

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 overclocking capability.

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

Training Profile

This item allows you to select a DIMM Training Profile.

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

DLLBwEn

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

SPD Write Disable

This item allows you to enable or disable SPD write disable. For security recommendations, SPD write disable bit must be set.

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 overclocking 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%] [140%]



Configure higher values when overclocking or 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 **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.

CPU Power Duty Control

This item allows you to set the duty cycle of each VRM phase based upon current and/or temperature.

[T.Probe] Sets the buck controller to balance VRM FET temperatures.

[Extreme] Sets the buck controller to balance per phase current.



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

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

Disable this item to increase the temperature limit of the CPU VRM.

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



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

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 **Turbo Mode** to **[Enabled]**.

Long Duration Package Power Limit

As know 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

As know 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 know 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]

CPU Integrated VR Current Limit

This item allows you to configure a higher current limit to prevent a frequency or power throttling when overclocking.

Configuration options: [Auto] [0.125] - [1023.875]

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 Current Limit Max.

This item allows you to configure a higher current limit to prevent a frequency or power throttling when overclocking. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [0.00] - [255.50]

Min. CPU Cache Ratio

This item allows you to set the minimum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [8] - [40]

Max. CPU Cache Ratio

This item allows you to set the maximum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [8] - [40]

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 item appears only when you set **CPU Core/Cache Voltage** to **[Manual Mode]**.

CPU Core Voltage Override

Allows you to configure the CPU Core voltage. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [0.600] - [1.700]



The following items appear only when you set **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. Use the <+> and <-> keys to adjust the value.

Configuration options: [Auto] [-0.635] - [+0.635]

DRAM Voltage

Configuration options: [Auto] [1.000] - [1.800]

CPU System Agent/CPU VCCIO Voltage

Configuration options: [Auto] [0.700] - [1.15]

PCH Core Voltage

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

Internal PLL Voltage

Configuration options: [Auto] [0.900] - [1.845]

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.

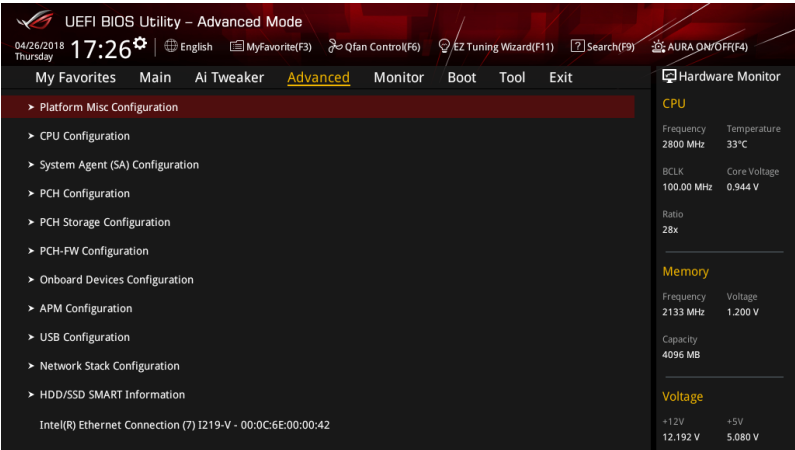
Configuration options: [Auto] [0] - [63]

1.6 Advanced menu

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

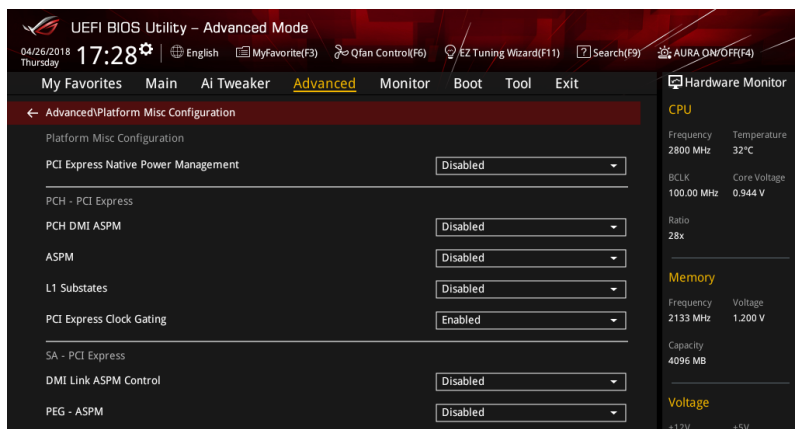


Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



1.6.1 Platform Misc Configuration

The items in this menu allow you to change the ASPM for PCH and SA PCI Express.



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 **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 select the 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 for each root port.

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.

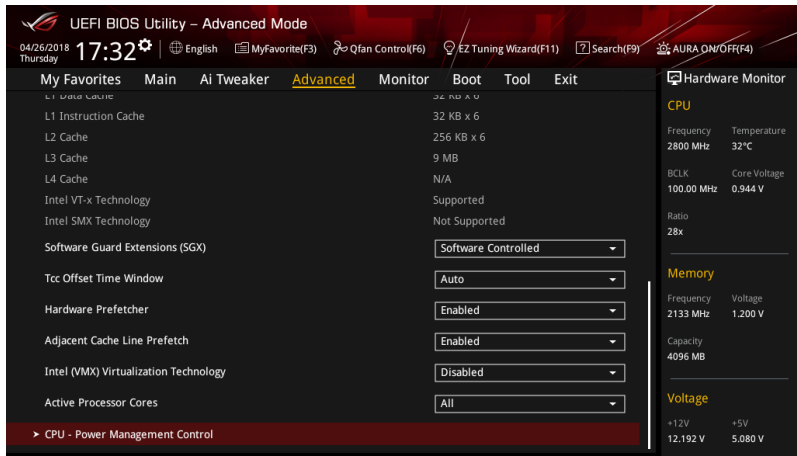
Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

1.6.2 CPU Configuration

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



The items in this menu may vary based on the CPU installed.



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] - [5]

CPU Power Management Configuration

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

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

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: [Disabled] [Enabled]

CPU C6 Report

This item allows you to disable or enable the CPU C6 report to the operating system.

Configuration options: [Disabled] [Enabled]

CPU C7 Report

This item allows you to disable or enable the CPU C7 report to the operating system.

Configuration options: [Disabled] [CPU C7] [CPU C7s]

CPU C8 Report

This item allows you to disable or enable the CPU C8 report to the operating system.

Configuration options: [Disabled] [Enabled]

CPU C9 Report

This item allows you to disable or enable the CPU C9 report to the operating system.

Configuration options: [Disabled] [Enabled]

CPU C10 Report

This item allows you to disable or enable the CPU C10 report to the operating system.

Configuration options: [Disabled] [Enabled]

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]

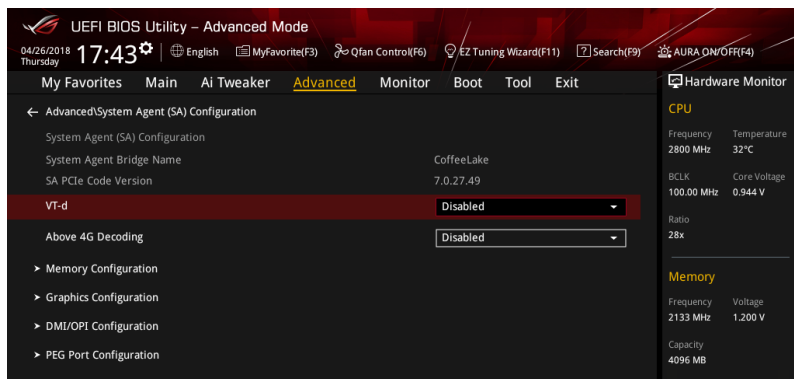
CFG Lock

This item allows you to disable or enable the CFG Lock.

Configuration options: [Disabled] [Enabled]

1.6.3 System Agent (SA) Configuration

The items in this menu allow you to adjust the Link Speed for PEG Port and Multi-Monitor.



VT-d

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

Configuration options: [Disabled] [Enabled]

Above 4G Decoding

Allows you to enable or disable 64-bit capable devices to be decoded in above 4G address space. It only works if the system supports 64-bit PCI decoding.

Configuration options: [Disabled] [Enabled]



This function is only enabled under a 64-bit operating system.

Memory Configuration

Memory Remap

Allows you to enable or disable memory remap above 4GB.

Configuration options: [Disabled] [Enabled]

Graphics Configuration

Primary Display

This item allows you to select the primary display from CPU and PCIe devices.

Configuration options: [Auto] [CPU Graphics] [PCIe]

iGPU Multi-Monitor

This item allows you to enable the iGPU Multi-Monitor. The iGPU shared system memory size is fixed 64 MB.

Configuration options: [Disabled] [Enabled]

DVMT Pre-Allocated

This item allows you to select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M] [256M] [288M] [320M] [352M] [384M] [416M] [448M] [480M] [512M] [1024M]

RC6(Render standby)

This item allows you to enable 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.

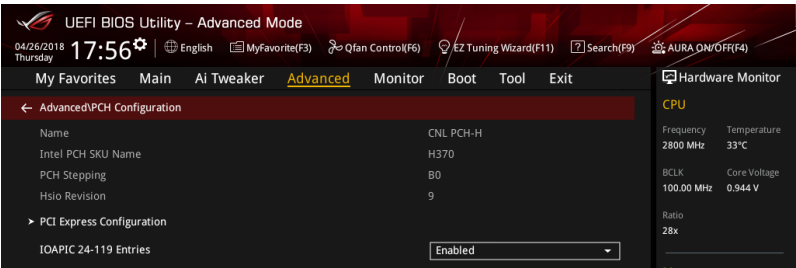
PCIEX16_1 Link Speed

This item allows you to configure the PCIEx16_1 slot.

Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

1.6.4 PCH Configuration

The items in this menu allow you to adjust the PCH PCI Express speed.



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

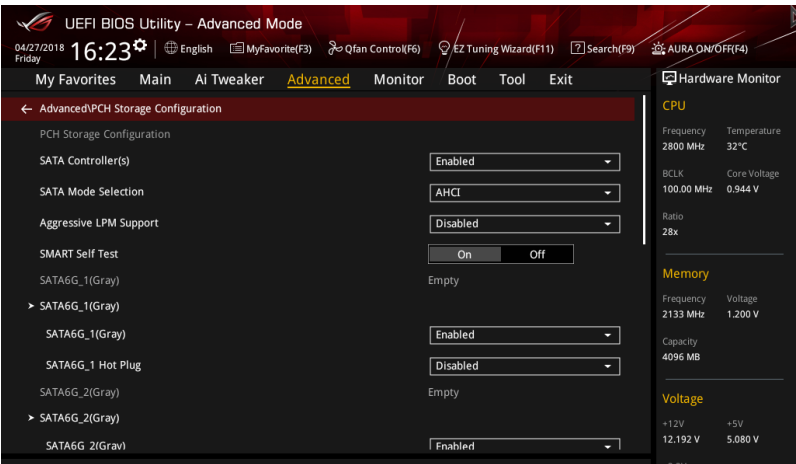
Allows you to enable or disable IOAPIC 24-119 Entries. IRQ24-119 may be used by PCH devices. Disabling those interrupts may cause certain device failures.

Configuration options: [Disabled] [Enabled]

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 **SATA Controller(s)** to **[Enabled]**.

SATA Mode Selection

This item allows you to set the SATA configuration.

[AHCI]

Set to [AHCI] when you want the SATA hard disk drives to use the AHCI (Advanced Host Controller Interface). The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.

[Intel RST Premium With
Intel Optane System
Acceleration (RAID)]

Set to [Intel RST Premium With Intel Optane System Acceleration (RAID)] when you want to create a RAID configuration from the SATA hard disk drives.

Aggressive LPM support

This item is designed for LPM (link power management) support with a better energy saving conditions. When disabled, the hot plug function of SATA ports are disabled.

Configuration options: [Disabled] [Enabled]

SMART Self Test

S.M.A.R.T. (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(Gray) - SATA6G_6(Gray)

SATA6G_1(Gray) - SATA6G_6(Gray)

This item allows you to enable or disable the selected SATA port.

Configuration options: [Disabled] [Enabled]

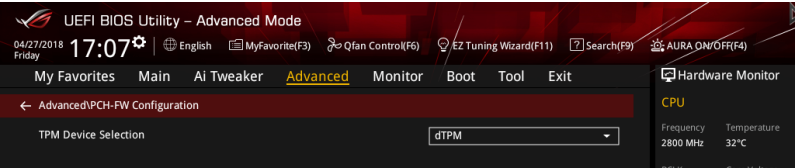
Hot Plug

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

Allows you to select the TPM device.

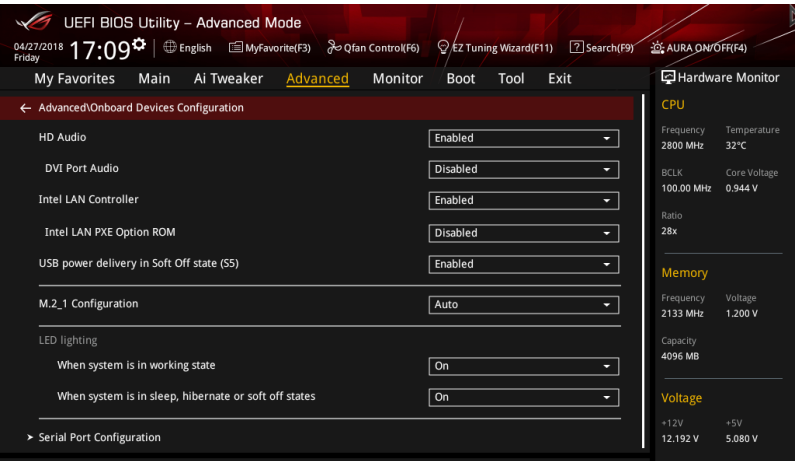
Configuration options: [dTPM 1.2] [PTT]



When [dTPM 1.2] is selected, PTT/dTPM will be disabled and all data saved on it will be lost.

1.6.7 Onboard Devices Configuration

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



HD Audio

This item allows you to use the Azalia High Definition Audio Controller.

Configuration options: [Disabled] [Enabled]



The following item appears only when you set **HD Audio** to **[Enabled]**.

DVI Port Audio

Configuration options: [Disabled] [Enabled]

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 **Intel LAN Controller** to **[Enabled]**.

Intel LAN PXE Option ROM

This item allows you to enable or disable the PXE Option Rom of the Intel LAN controller.

Configuration options: [Disabled] [Enabled]

USB power delivery in Soft Off state (S5)

This option allows you to enable or disable USB power when your PC is in the S5 state.

Configuration options: [Disabled] [Enabled]

M.2_1 Configuration

- | | |
|-------------|---|
| [Auto] | Auto-detects the M.2 device mode. If a SATA device is detected, SATA6G_2 will be disabled. |
| [SATA mode] | Only supports M.2 SATA devices. Please note that SATA6G_2 port cannot be used in this mode. |
| [PCIe mode] | Only supports M.2 PCIe devices. |

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]

When system is in sleep, hibernate or soft off states

This item allows you to turn the RGB LED lighting on or off when the system is in the sleep, hibernate or soft off states.

Configuration options: [On] [Off]

Serial Port Configuration

Serial Port

Allows you to enable or disable Serial Port.

Configuration options: [On] [Off]



The following item appears only when you set **Serial Port** to **[On]**.

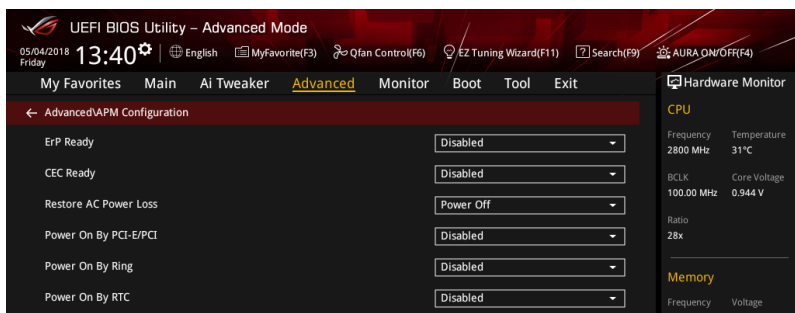
Change Settings

Allows you to choose the setting for Super IO device.

Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4]
[IO=2E8h; IRQ=3]

1.6.8 APM Configuration

The items in this menu allow you to set system wake and sleep settings.



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

Enabling this item allows your system to comply with 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/PCI

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 Ring

[Disabled] Disables the Ring devices to generate a wake event.

[Enabled] Enables the Ring devices to generate a wake event.

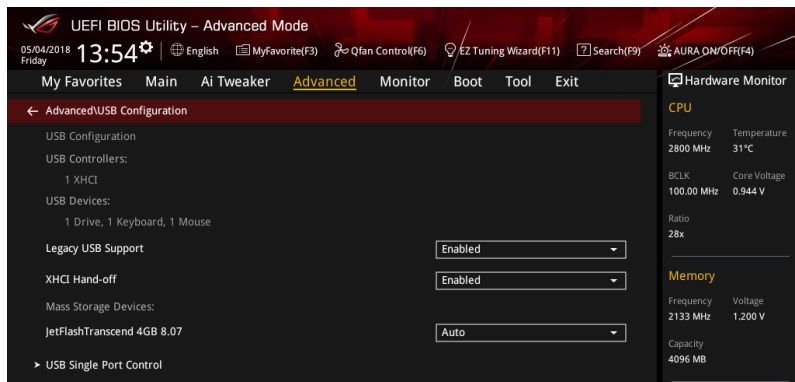
Power On By RTC

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 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



This item is set to **[Disabled]** by default for the EHCI (enhanced host controller interface) support by XHCI drivers in operating systems.

- [Disabled] Support XHCI by XHCI drivers for operating systems with XHCI support.
- [Enabled] Support XHCI by BIOS for operating systems without XHCI support.

USB Single Port Control

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



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

U31G2_3

Configuration options: [Disabled] [Enabled]

U31G2_4

Configuration options: [Disabled] [Enabled]

USB_5

Configuration options: [Disabled] [Enabled]

USB_6

Configuration options: [Disabled] [Enabled]

U31G1_5

Configuration options: [Disabled] [Enabled]

U31G1_6

Configuration options: [Disabled] [Enabled]

USB9

Configuration options: [Disabled] [Enabled]

USB10

Configuration options: [Disabled] [Enabled]

USB11

Configuration options: [Disabled] [Enabled]

U31G1_7

Configuration options: [Disabled] [Enabled]

U31G1_8

Configuration options: [Disabled] [Enabled]

USB14

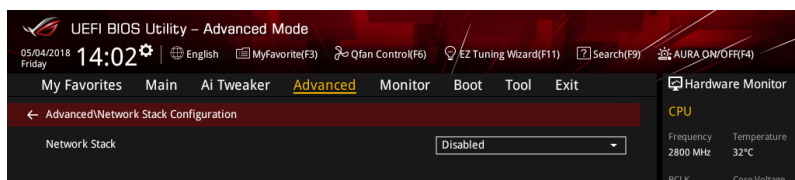
Configuration options: [Disabled] [Enabled]

U31G2_C12

Configuration options: [Disabled] [Enabled]

1.6.10 Network Stack Configuration

The items in this menu allow you to configure Ipv4 / Ipv6 PXE support.



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 **Network Stack** to **[Enabled]**.

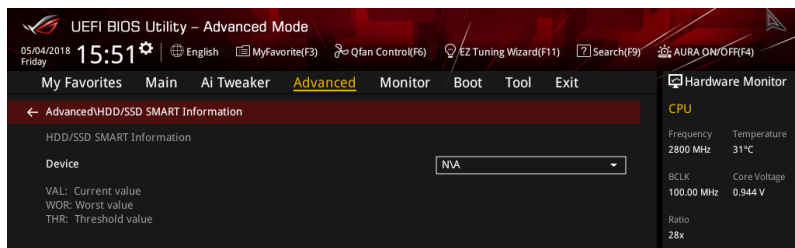
Ipv4/Ipv6 PXE Support

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

Configuration options: [Disabled] [Enabled]

1.6.11 HDD/SSD SMART Information

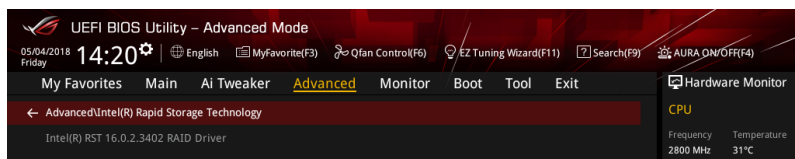
This menu displays the SMART information of the connected devices.



NVM Express devices do not support SMART information.

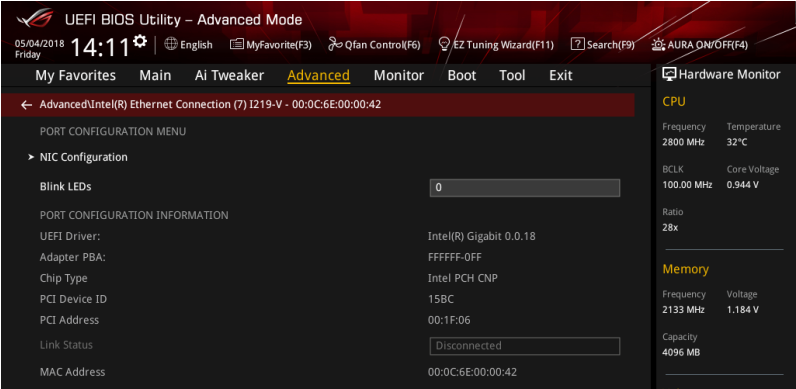
1.6.12 Intel(R) Rapid Storage Technology

Allows you to configure the view the RAID volumes and VMD controllers on the system.



1.6.13 Intel(R) Ethernet Connection (7) I219-V - 00:0C:6E:00:00:42

This menu allows you to configure the Gigabit Ethernet device parameters.



PORT CONFIGURATION MENU

NIC Configuration

The items in this menu allow you to configure the network device port.

Link Speed

This item allows you to specify the port speed used for the selected boot protocol.

Configuration options: [Auto Negotiated] [10 Mbps Half] [10 Mbps Full] [100 Mbps Half] [100 Mbp Full]

Wake On LAN

Enabling this item allows the server to be powered on using an in-band magic packet.

Configuration options: [Disabled] [Enabled]

Blink LEDs

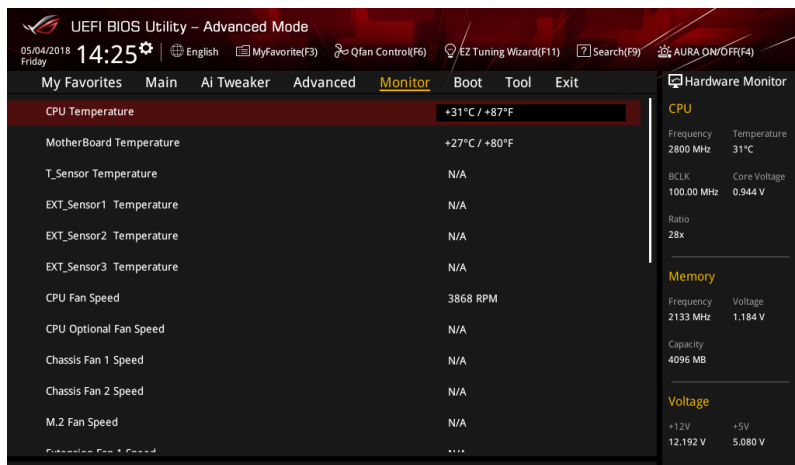
This item allows you to identify the physical network port by blinking the associated LED.

Configuration options: [0] - [15]

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, T_Sensor Temperature, EXT_Sensor1-3 Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the CPU, motherboard, T_Sensor, and EXT_Sensor1-3 temperatures. Select **[Ignore]** if you do not wish to display the detected temperatures.

CPU Fan Speed, CPU Optional Fan Speed, Chassis Fan 1-2 Speed, M.2 Fan Speed, Extension Fan 1-3 Speed, AIO PUMP Speed [xxxx RPM]

The onboard hardware monitor automatically detects and displays the CPU fan, CPU optional fan, chassis fan, M.2 fan, extension 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, CPU Graphics Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage, PCH Core Voltage, CPU System Agent/CPU VCCIO Voltage, DRAM 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 **CPU Q-Fan Control** to **[Auto]**, **[PWM Mode]**, and **[DC Mode]**.

CPU Fan Step Up

This item allows you to set the value of the CPU fan step up.

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 Step Down

This item allows you to set the value of the CPU fan step down.

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 **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] [T_SENSOR] [EXT_Sensor1] [EXT_Sensor2] [EXT_Sensor3] [Multiple Sources]



- For EXT_Sensor1-3, connect a Thermistor cable to one of these connectors, then tape the other end on a critical component to control its temperature.
- 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

This item allows you to set the value of the chassis fan step up.

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 Step Down

This item allows you to set the value of the chassis fan step down.

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.

Ext. Fan(s) Configuration



An ASUS FAN EXTENSION CARD is required to configure these items.

Extension Fan 1-3 Q-Fan Control

[Disabled]	Disable the Extension Fan Q-Fan control feature.
[DC mode]	Enable the Extension Fan Q-Fan control in DC mode for 3-pin extension fan.
[PWM mode]	Enable the Extension Fan Q-Fan control in PWM mode for 4-pin extension fan.

Extension Fan 1-3 Q-Fan Source

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

Configuration options: [CPU] [MotherBoard] [T_SENSOR] [EXT_Sensor1] [EXT_Sensor2] [EXT_Sensor3] [Multiple Sources]



- For EXT_Sensor1-3, connect a Thermistor cable to one of these connectors, then tape the other end on a critical component to control its temperature.
- For Multiple Sources, select up to three temperature sources and the fan will automatically change based on the highest temperature.

Extension Fan 1-3 Fan Speed Low Limit

This item allows you to disable or set the extension fan warning speed.

Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Extension Fan 1-3 Profile

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

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



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

Extension Fan 1-3 Upper Temperature

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

Extension Fan 1-3 Max. Duty Cycle (%)

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

Extension Fan 1-3 Middle Temperature

Use the <+> or <-> keys to adjust the middle limit of the extension fan temperature.

Extension Fan 1-3 Middle. Duty Cycle (%)

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

Extension Fan 1-3 Lower Temperature

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

Extension Fan 1-3 Min. Duty Cycle(%)

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

M.2 Fan Q-Fan Control

This item allows you to set the M.2 Fan operating mode.

- | | |
|------------|---|
| [Auto] | Detects the type of M.2 Fan installed and automatically switches the control modes. |
| [PWM Mode] | Enables the M.2 Fan Control feature in PWM mode for 4-pin M.2 Fan. |
| [DC Mode] | Enables the M.2 Fan Control feature in DC mode for 3-pin M.2 Fan. |
| [Disabled] | Disables the M.2 Fan Control. |

M.2 Fan Q-Fan Source

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

Configuration options: [CPU] [MotherBoard] [T_SENSOR] [EXT_Sensor1] [EXT_Sensor2] [EXT_Sensor3] [Multiple Sources]



- For EXT_Sensor1-3, connect a Thermistor cable to one of these connectors, then tape the other end on a critical component to control its temperature.
- For Multiple Sources, select up to three temperature sources and the fan will automatically change based on the highest temperature.

M.2 Fan Step Up

This item allows you to set the value of the M.2 fan step up.

Configuration options: [0 sec] [12 sec] [25 sec] [51 sec] [76 sec] [102 sec] [127 sec] [153 sec] [178 sec] [204 sec]

M.2 Fan Step Down

This item allows you to set the value of the M.2 fan step down.

Configuration options: [0 sec] [12 sec] [25 sec] [51 sec] [76 sec] [102 sec] [127 sec] [153 sec] [178 sec] [204 sec]

M.2 Fan Speed Low Limit

This item allows you to disable or set the M.2 fan warning speed.

Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

M.2 Fan Profile

This item allows you to set the appropriate performance level of the M.2 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 **M.2 Fan Profile** to **[Manual]**.

M.2 Fan Upper Temperature

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

M.2 Fan Max. Duty Cycle (%)

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

M.2 Fan Middle Temperature

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

M.2 Fan Middle. Duty Cycle (%)

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

M.2 Fan Lower Temperature

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

M.2 Fan Min. Duty Cycle(%)

Use the <+> or <-> keys to adjust the minimum M.2 Fan duty cycle. When the temperature source is under the limit, the M.2 Fan 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 **AIO PUMP Control** to **[Auto]**, **[DC mode]** or **[PWM mode]**.

PUMP Fan Q-Fan Source

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

Configuration options: [CPU] [T_SENSOR] [Multiple Sources]



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

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

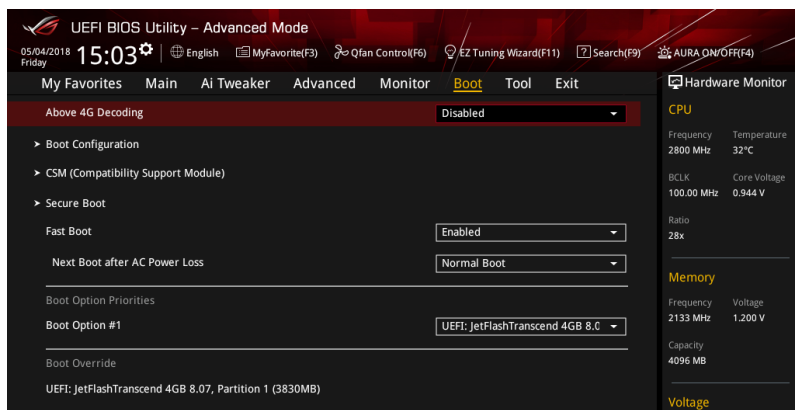
Use the <+> or <-> keys to adjust the lower limit of the AIO Pump temperature. The AIO Pump will operate at the minimum duty cycle when the temperature is lower than the limit.

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.



Above 4G Decoding

Allows you to enable or disable 64-bit capable devices to be decoded in above 4G address space. It only works if the system supports 64-bit PCI decoding.

Configuration options: [Disabled] [Enabled]

Boot Configuration

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 **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 select the state of the keyboard 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

[Enabled] The Option ROM Messages will be shown during the POST.

[Disabled] Only the ASUS logo will be shown during the POST.

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 **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] [UEFI only] [Legacy only]

Boot from Storage Devices

This item allows you to select the type of storage devices that you want to launch.

Configuration options: [Ignore] [UEFI only] [Legacy only]

Boot from PCI-E/PCI Expansion Devices

This item allows you to select the type of PCI-E/PCI expansion devices that you want to launch.

Configuration options: [Ignore] [UEFI only] [Legacy 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 the PK (Platform 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.

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 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.



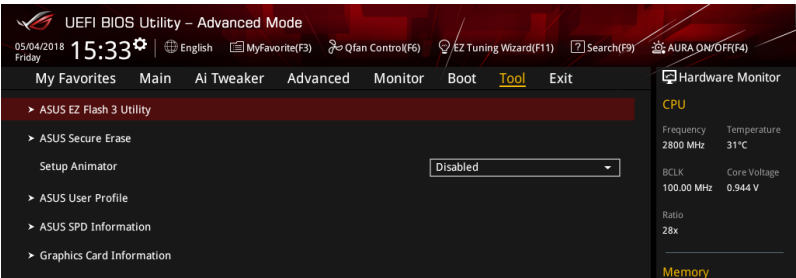
-
- To access Windows® OS in Safe Mode, press <F8> after POST (Windows® 8 not supported).
 - To select the boot device during system startup, press <F8> when ASUS Logo appears.
-

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.



Setup Animator

This item allows you to enable or disable the Setup animator.

Configuration options: [Disabled] [Enabled]

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.



Secure Erase is only available in AHCI mode. Ensure to set the SATA mode to AHCI. Click **Advanced > PCH Storage Configuration > SATA Mode Selection > AHCI**.

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



Secure Erase is only supported on selected SATA SSDs, and cannot erase NVMe storage devices.



- 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 **Motherboard layout** in your motherboard user manual.

Displays the available SSDs

Port #	SSD Name	Status	Total Capacity
P2	ADATA S596 Turbo	Frozen	64.0GB

SSD speed performance may degrade over time due to accumulated file and frequent data writing. Secure Erase completely cleans your SSD and restores it to its factory settings.
Warning: Erase and then use Secure Erase on incompatible SSD. Running Secure Erase on an incompatible SSD will render the SSD totally unusable.
NOTE: For the list of Secure Erase compatible SSDs, visit the ASUS Support site at www.asus.com/support

Exit

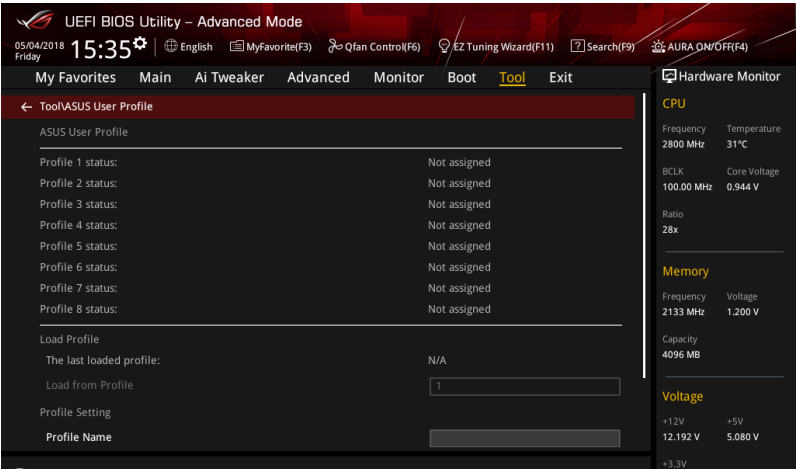


Status definition:

- **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.

UEFI BIOS Utility – Advanced Mode

05/04/2018 Friday 15:36 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA ON/OFF(F4)

My Favorites Main Ai Tweaker Advanced Monitor Boot Tool Exit

ToolASUS SPD Information

DIMM Slot Number

DIMM_A2

Manufacturer

Corsair

Module Size

4096MB

Maximum Bandwidth

2133MHz

Type

DDR4

Part Number

CMR16GX4M4B3200C16

Serial Number

D0000000

Product Week/Year

SPD Ext.

XMP

XMP Rev.

2.0

ASUS Checksum

47b9

JEDEC ID	JEDEC	XMP #1	XMP #2	JEDEC ID	JEDEC	XMP #1	XMP #2
Frequency(MHz)	2133	3200		ERRD_S	4	6	
Voltage(V)	1.200	1.350		ERRD_L	6	9	
tCL	15	16		trFC1	22	415	
trRD	15	18		trFC2	171	255	
trP	15	18		trFC4	118	175	
tRAS	36	36		tFAM	73	36	

CPU

Frequency

2800 MHz

Temperature

32°C

BCLK

100.00 MHz

Core Voltage

0.944 V

Ratio

28x

Memory

Frequency

2133 MHz

Voltage

1.200 V

Capacity

4096 MB

Voltage

+12V +5V

12.192 V 5.080 V

+3.3V

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.



This feature is only supported on selected ASUS graphics cards.

UEFI BIOS Utility – Advanced Mode

05/04/2018 Friday 15:36 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA ON/OFF(F4)

My Favorites Main Ai Tweaker Advanced Monitor Boot Tool Exit

ToolGraphics Card Information

GPU Post

CPU

Frequency

2800 MHz

Temperature

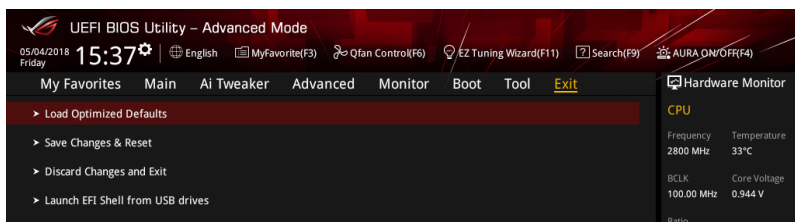
32°C

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 and 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.



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

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.



-
- 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.
-

1.11.2 ASUS EZ Flash 3

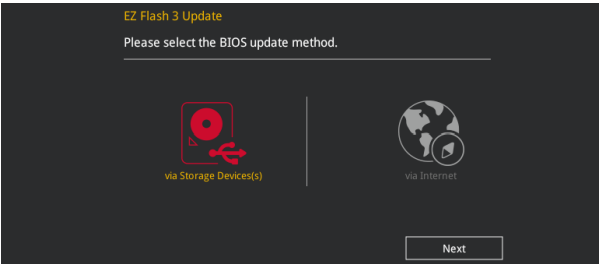
ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or an OS-based utility.



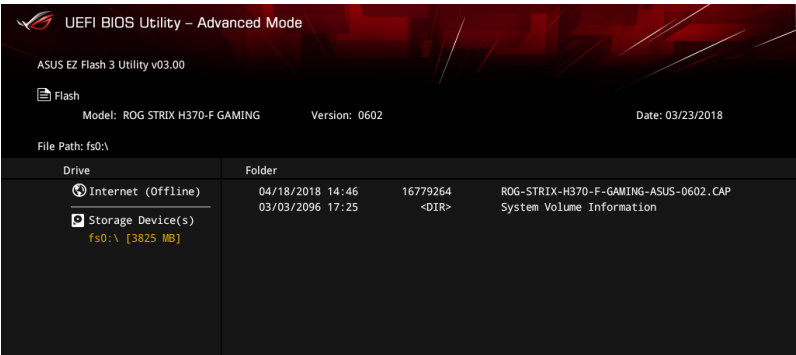
Updating through the Internet varies per region and Internet conditions. Check your local Internet connection before updating through the Internet.

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.





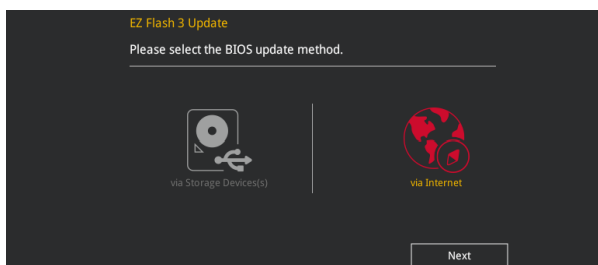
- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



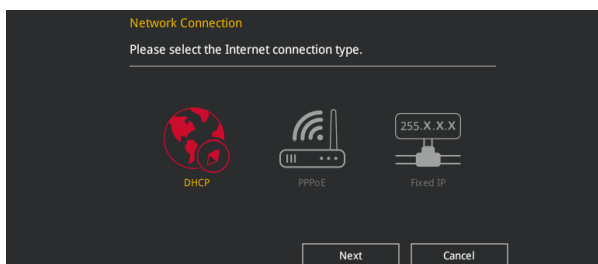
Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section **1.10 Exit Menu** for details.

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.



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.

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.



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