

**X99-E Series**

**BIOS Manual**



**Motherboard**

**Copyright© 2016 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](mailto: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

|             |                                       |           |
|-------------|---------------------------------------|-----------|
| <b>1.1</b>  | <b>Knowing BIOS .....</b>             | <b>4</b>  |
| <b>1.2</b>  | <b>BIOS setup program .....</b>       | <b>5</b>  |
| 1.2.1       | EZ Mode.....                          | 6         |
| 1.2.2       | Advanced Mode .....                   | 7         |
| 1.2.3       | QFan Control.....                     | 10        |
| 1.2.4       | EZ Tuning Wizard .....                | 12        |
| <b>1.3</b>  | <b>My Favorites .....</b>             | <b>15</b> |
| <b>1.4</b>  | <b>Main menu .....</b>                | <b>17</b> |
| <b>1.5</b>  | <b>Ai Tweaker menu.....</b>           | <b>19</b> |
| <b>1.6</b>  | <b>Advanced menu .....</b>            | <b>39</b> |
| 1.6.1       | CPU Configuration .....               | 40        |
| 1.6.2       | PCH Configuration .....               | 42        |
| 1.6.3       | PCH Storage Configuration.....        | 43        |
| 1.6.4       | System Agent (SA) Configuration ..... | 46        |
| 1.6.5       | USB Configuration .....               | 47        |
| 1.6.6       | Platform Misc Configuration .....     | 49        |
| 1.6.7       | Onboard Devices Configuration.....    | 50        |
| 1.6.8       | APM Configuration .....               | 53        |
| 1.6.9       | Network Stack Configuration.....      | 54        |
| 1.6.10      | HDD/SSD SMART Information .....       | 54        |
| <b>1.7</b>  | <b>Monitor menu .....</b>             | <b>55</b> |
| <b>1.8</b>  | <b>Boot menu .....</b>                | <b>63</b> |
| <b>1.9</b>  | <b>Tool menu.....</b>                 | <b>68</b> |
| 1.9.1       | GPU Post.....                         | 68        |
| 1.9.2       | ASUS EZ Flash 3 Utility .....         | 68        |
| 1.9.3       | Secure Erase .....                    | 69        |
| 1.9.4       | ASUS Overclocking Profile .....       | 70        |
| 1.9.5       | ASUS SPD Information.....             | 71        |
| <b>1.10</b> | <b>Exit menu .....</b>                | <b>72</b> |
| <b>1.11</b> | <b>Updating BIOS.....</b>             | <b>73</b> |
| 1.11.1      | EZ Update .....                       | 73        |
| 1.11.2      | ASUS EZ Flash 3.....                  | 74        |
| 1.11.3      | ASUS CrashFree BIOS 3.....            | 76        |

# 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 **X99-E.CAP** for this motherboard.

---

## 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 1.1.6 Onboard buttons and switches in your user manual for information on how to erase the RTC RAM via the Clear CMOS button.
- The BIOS setup program does not support the Bluetooth devices.



Please visit ASUS website for the detailed BIOS content manual.

### BIOS menu screen

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

## 1.2.1 EZ Mode

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



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

Displays the system properties of the selected mode.  
Click < or > to switch EZ System Tuning modes

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

Selects the display language of the BIOS setup program

Creates storage RAID and configures system overlocking

Enables or disables the SATA RAID mode for Intel Rapid Storage Technology

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

Loads optimized default settings

Saves the changes and resets the system

Click to go to Advanced mode

Search on the FAQ

Click to display boot devices

Selects the boot device priority



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

## 1.2.2 Advanced Mode

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



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

The screenshot displays the ASUS X99-E Series BIOS Advanced Mode interface. The top status bar shows the time as 19:56 and the date as Sunday. The main menu bar includes options like My Favorites, Main, Advanced, Monitor, Boot, Tool, and Exit. The left sidebar lists configuration fields such as Target (CPU) Turbo-Mode Frequency, Target (Core) Frequency, Target (Cache) Frequency, and Target (Memory) Frequency. The central area shows the CPU Clock Ratio menu with options like Auto, Manual, and Type-Set Control. The right sidebar displays hardware monitoring data for CPU, Memory, and Voltage. The bottom status bar shows the BIOS version (V0804.0117) and copyright information. Red lines and labels point to various UI elements: Configuration fields, Pop-up Menu, Menu bar, Language, MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), Quick Note (F9), Scroll bar, Hot Keys, Menu items, General help, Last modified settings, Go back to EZ Mode, and Search on the FAQ. A note at the bottom right states: 'Displays the CPU temperature, CPU, and memory voltage output'.

## Menu bar

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

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

## Menu items

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

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

## Submenu items

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 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:



## Quick Note (F9)

This button above the menu bar allows you to key in notes of the activities that you have done in BIOS.



- The Quick Note function does not support the following keyboard functions: delete, cut, copy, and paste.
- You can only use the alphanumeric characters to enter your notes.

## Hot keys

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

## Scroll bar

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

## General help

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

## Configuration fields

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

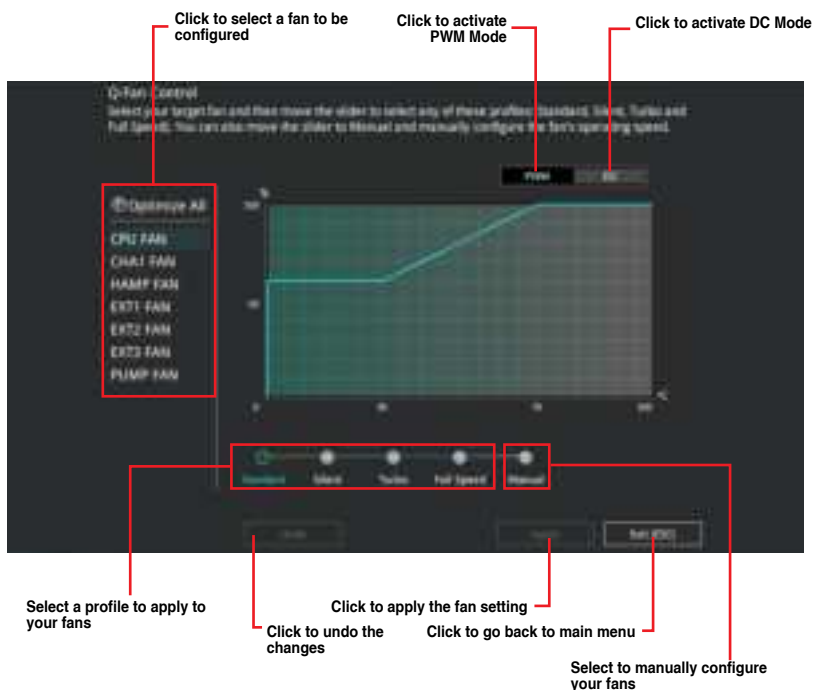
A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

## Last Modified button

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

## 1.2.3 QFan Control

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



## Configuring fans manually

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



To configure your fans:

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

## 1.2.4 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.



### OC Tuning

To start OC Tuning:

1. Press <F11> on your keyboard or click  from the BIOS screen to open EZ Tuning Wizard screen.
2. Click **OC** then click **Next**.
3. Select a PC scenario **Daily Computing** or **Gaming/Media Editing**, then click **Next**.



4. Select a Main Cooling System **BOX cooler**, **Tower cooler**, **Water cooler**, or **I'm not sure**, then click **Next**.



5. After selecting the Main Cooling System, click **Next** then click **Yes** to start the OC Tuning.

## 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 **RAID** then click **Yes**.



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

3. Check the available storage disk drives, 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.

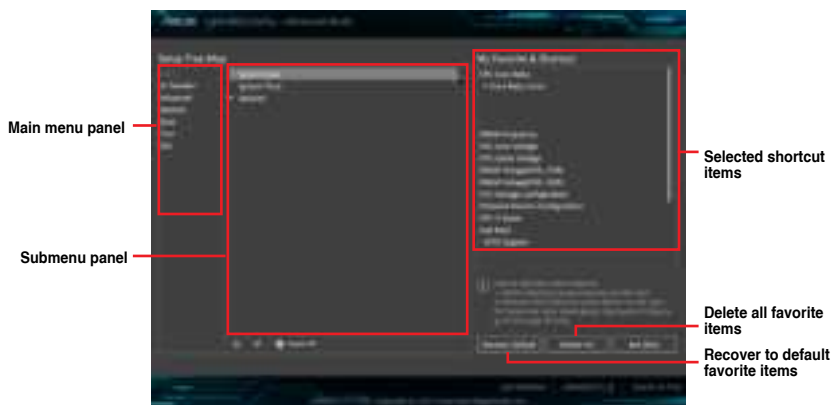


My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.

## Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click  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.



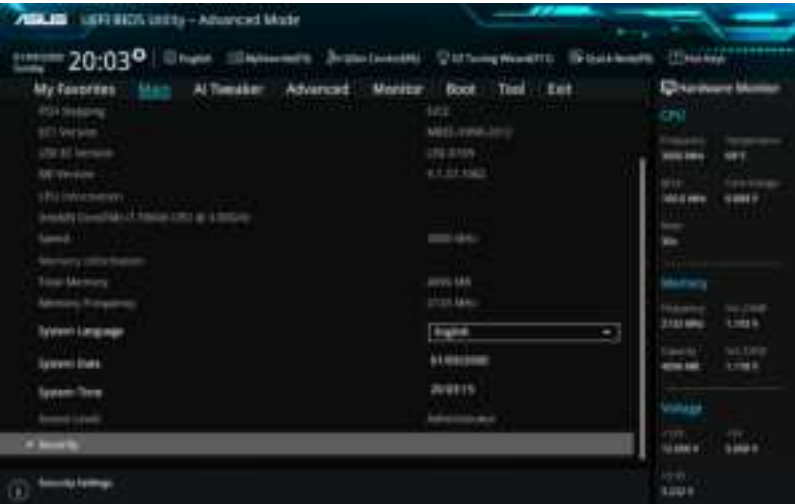
You cannot add the following items to My Favorite items:

- Items with submenu options
- User-managed items such as language and boot order

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 1.1.6 Onboard buttons and switches in your user manual for information on how to erase the RTC RAM via the Clear CMOS button.
- 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. Confirm the password when prompted.

### 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. Confirm the password when prompted.

To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password. 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. Confirm the password when prompted.

### 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. Confirm the password when prompted.

To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password. 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

This item allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Select any of these preset overclocking configuration options:

- [Auto] Loads the optimal settings for the system.
- [Manual] Automatically optimizes the CPU ratio and BCLK frequency.
- [XMP] If you install memory modules supporting the eXtreme Memory Profile (XMP) 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.



---

When the Ai Overclock Tuner is set to **[Manual]**, the following items appear.

---

### CPU Strap

This item allows you to select a strap close to your target BCLK (base clock) for an extreme overclocking, or leave it at **[Auto]** for the BIOS to upgrade.

Configuration options: [Auto] [100MHz] [125MHz] [167MHz] [250MHz]



---

The following item appears only when you set the CPU Strap to **[100MHz]**, **[125MHz]**, **[167MHz]**, or **[250MHz]**.

---

### Source Clock Tuner

This item allows you to select the source clock based on the assigned CPU strap for a better overclocking capability.

Configuration options: [8Ohm dbl] [70Ohm dbl] [60Ohm dbl] [50Ohm dbl]  
[40Ohm dbl] [30Ohm dbl] [20Ohm dbl]

### PLL Selection

This item is set to LC PLL by default for better stability. Select SB PLL when the BCLK (base clock) frequency is far away from 100 MHz. This may affect the function of other devices that need precise clock jitters.

Configuration options: [Auto] [LC PLL] [SB PLL]

### Filter PLL

Set this item to high BCLK (base clock) mode when using a very high BCLK to improve overclocking capability.

Configuration options: [Auto] [Low BCLK Mode] [High BCLK Mode]

### BCLK Frequency

This item allows you to set the BCLK (base clock) frequency to enhance the system performance. Use the <+> or <-> to adjust the value. The values range from 80.0 MHz to 300.0 MHz.



---

We recommend you to set the value based on the CPU specification, as high BCLK frequencies may damage the CPU permanently.

---

### Initial BCLK Frequency

This item allows you to set the initial BCLK (base clock) frequency to start overclocking to the assigned BCLK frequency. Use the <+> or <-> to adjust the value. The initial BCLK frequency cannot be less than 80.0 MHz.

### ASUS MultiCore Enhancement

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

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

## CPU Core Ratio

This item allows you to set the CPU core ratio limit per core or synchronize automatically to all cores.

Configuration options: [Auto] [Sync All Cores] [By Core Usage] [By Specific Core]



---

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

---

### 1-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 1-core ratio limit that must be higher than or equal to the 2-core ratio limit.

### 2-Core Ratio Limit

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



---

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

---

### 3-Core Ratio Limit

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



---

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

---

### 4-Core Ratio Limit

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



---

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

---

### 5-Core Ratio Limit

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



---

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

---

### 6-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 6-core ratio limit that must be higher than or equal to the 7-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]**.

---

### 7-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 7-core ratio limit that must be higher than or equal to the 8-core ratio limit.



---

If you assign a value for 7-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, 5-Core Ratio Limit, and 6-Core Ratio Limit to **[Auto]**.

---

### 8-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 8-core ratio limit that must be higher than or equal to the 9-core ratio limit.



---

If you assign a value for 8-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, 5-Core Ratio Limit, 6-Core Ratio Limit, and 7-Core Ratio Limit to **[Auto]**.

---

### 9-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 9-core ratio limit that must be higher than or equal to the 10-core ratio limit.



---

If you assign a value for 9-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, 5-Core Ratio Limit, 6-Core Ratio Limit, 7-Core Ratio Limit, and 8-Core Ratio Limit to **[Auto]**.

---

### 10-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a 10-core ratio limit that must be lower than or equal to the 9-core ratio limit.



---

If you assign a value for 10-Core Ratio Limit, do not set the 1-Core Ratio Limit, 2-Core Ratio Limit, 3-Core Ratio Limit, 4-Core Ratio Limit, 5-Core Ratio Limit, 6-Core Ratio Limit, 7-Core Ratio Limit, 8-Core Ratio Limit, and 9-Core Ratio Limit to **[Auto]**.

---

### AVX Instruction Core Ratio Negative Offset

This item allows you to subtract a value from your core ratio at which AVX applications run.

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

### Min. CPU Cache Ratio

This item allows you to set the minimum possible ratio on the Uncore part of the processor.

Use the <+> or <-> keys to adjust the value. The values depend on the CPU installed.

### Max. CPU Cache Ratio

This item allows you to set the maximum possible ratio on the Uncore part of the processor.

Use the <+> or <-> keys to adjust the value. The values depend on the CPU installed.

### Internal PLL Overvoltage

This item allows you to enable the internal PLL Overvoltage for K-SKU and X-SKU CPUs to get the extreme overclocking capability.

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

### BCLK Frequency : DRAM Frequency Ratio

[Auto] The BCLK frequency to DRAM frequency ratio will be set to the optimized setting.

[100:133] The BCLK frequency to DRAM frequency ratio will be set to 100:133.

[100:100] The BCLK frequency to DRAM frequency ratio will be set to 100:100.

### 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] - [DDR4-4000MHz]

### TPU

This item allows you to automatically overclock the CPU and DRAM frequencies and voltage for an enhanced system performance.

[Keep Current Settings] Keep the current settings without changing anything.

[TPU I] Applies air cooling overclocking conditions.

[TPU II] Applies water cooling overclocking conditions.



---

Ensure to use water cooling device before selecting [TPU II].

---

### EPU Power Saving Mode

The ASUS EPU (Energy Processing Unit) sets the CPU in its minimum power consumption settings. Enable this item to set lower CPU VCCIN and Vcore voltages and achieve the best energy saving condition.

Configuration options: [Disabled] [Enabled]

## DRAM Timing Control

The subitems in this menu allow you to set the DRAM timing control features. Use the <+> or <-> 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# PRE Time

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

#### DRAM RAS# ACT Time

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

#### DRAM COMMAND Rate

Configuration options: [Auto] [Timing 1T] – [Timing 3T]

### Secondary Timings

#### DRAM RAS# to RAS# Delay

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

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

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

#### DRAM REF Cycle Time

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

#### DRAM Refresh Interval

Configuration options: [Auto] [1] – [32767]

#### 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 CKE Minimum Pulse Width**

Configuration options: [Auto] [4] – [8]

**DRAM Write Latency**

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

**Third Timings****tRRDR**

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

**tRRDD**

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

**tWWDR**

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

**tWWDD**

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

**tRWDR**

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

**tWRDR**

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

**tWRDD**

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

**tRWSR**

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

**tCCD**

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

**tUWRDR**

Configuration options: [Auto] [0] - [3]

**tRWDR2**

Configuration options: [Auto] [0] - [31]

**tRWDD**

Configuration options: [Auto] [0] - [31]

**tRWSR2**

Configuration options: [Auto] [0] - [31]

**tWRDD2**

Configuration options: [Auto] [0] - [31]

**tCCDWR**

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

**tCCD\_L**

Configuration options: [Auto] [1] - [3]

## RTL IOL control

### **DRAM RTL INIT Value**

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

### **DRAM RTL (CHA D0 R0)**

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

### **DRAM RTL (CHA D0 R1)**

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

### **DRAM RTL (CHA D1 R0)**

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

### **DRAM RTL (CHA D1 R1)**

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

### **DRAM RTL (CHB D0 R0)**

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

### **DRAM RTL (CHB D0 R1)**

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

### **DRAM RTL (CHB D1 R0)**

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

### **DRAM RTL (CHB D1 R1)**

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

### **DRAM RTL (CHC D0 R0)**

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

### **DRAM RTL (CHC D0 R1)**

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

### **DRAM RTL (CHC D1 R0)**

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

### **DRAM RTL (CHC D1 R1)**

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

### **DRAM RTL (CHD D0 R0)**

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

### **DRAM RTL (CHD D0 R1)**

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

### **DRAM RTL (CHD D1 R0)**

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

### **DRAM RTL (CHD D1 R1)**

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

### **DRAM IOL (CHA D0 R0)**

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

### **DRAM IOL (CHA D0 R1)**

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

### **DRAM IOL (CHA D1 R0)**

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

### **DRAM IOL (CHA D1 R1)**

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

**DRAM IOL (CHB D0 R0)**

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

**DRAM IOL (CHB D0 R1)**

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

**DRAM IOL (CHB D1 R0)**

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

**DRAM IOL (CHB D1 R1)**

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

**DRAM IOL (CHC D0 R0)**

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

**DRAM IOL (CHC D0 R1)**

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

**DRAM IOL (CHC D1 R0)**

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

**DRAM IOL (CHC D1 R1)**

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

**DRAM IOL (CHD D0 R0)**

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

**DRAM IOL (CHD D0 R1)**

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

**DRAM IOL (CHD D1 R0)**

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

**DRAM IOL (CHD D1 R1)**

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

**IO control****MC Data VREF****MC Vref(CHA)**

Configuration options: [Auto] [50.000] - [99.911]

**MC Vref(CHB)**

Configuration options: [Auto] [50.000] - [99.911]

**MC Vref(CHC)**

Configuration options: [Auto] [50.000] - [99.911]

**MC Vref(CHD)**

Configuration options: [Auto] [50.000] - [99.911]

**RAM Data VREF****DRAM Vref(CHA)**

Configuration options: [Auto] [60.000] - [99.000]

**DRAM Vref(CHB)**

Configuration options: [Auto] [60.000] - [99.000]

**DRAM Vref(CHC)**

Configuration options: [Auto] [60.000] - [99.000]

**DRAM Vref(CHD)**

Configuration options: [Auto] [60.000] - [99.000]

**CTL Data VREF****DRAM Vref(CHAB) Sign**

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

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

**DRAM Vref(CHAB)**

Configuration options: [Auto] [0.00000] - [2.0000]

**DRAM Vref(CHCD) Sign**

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

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

**DRAM Vref(CHCD)**

Configuration options: [Auto] [0.00000] - [2.0000]

**Misc.****DRAM Eventual Voltage(CHA, CHB)**

Allows you to set the voltage for the DRAM on the left.

Configuration options: [Auto] [0.800] - [1.900]

**DRAM Eventual Voltage(CHC, CHD)**

Allows you to set the voltage for the DRAM on the right.

Configuration options: [Auto] [0.800] - [1.900]

**DRAM CLK Period**

This item allows you to set a DRAM clock period.

Configuration options: [Auto] [1] – [19]

**Memory Optimize Control**

This item allows you to optimize the memory control.

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

**Enhanced Training(CHA)**

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

**Enhanced Training(CHB)**

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

**Enhanced Training(CHC)**

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

**Enhanced Training(CHD)**

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

## **DRAM Training**

### **MemTest**

This item allows you to enable or disable the memory testing.

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

### **Attempt Fast Boot**

This item allows the portion of the memory reference code to be skipped when possible to increase boot speed.

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

### **Attempt Fast Cold Boot**

This item allows the portion of the memory reference code to be skipped when possible to increase boot speed.

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

## **DRAM Training**

[Auto]                      System automatically sets the status according to the installed DRAM.

[Ignore]                   System ignores the DRAM training test function.

[Enabled]                  System closes the DRAM channel when it has some issues.

[Smart]                     System automatically trains the DRAM for better stability.

### **DRAM SPD Write**

For advanced programming only. Enable DRAM SPD write to enable memory SMBus programming

Configuration options: [Disabled] [Enabled]

## External DIGI+ Power Control

### 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 9 to adjust the CPU power voltage from 0% to 125%.

Configuration options: [Auto] [Level 1] - [Level 9]



---

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

---



---

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

---

### CPU VRM Switching Frequency

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

Configuration options: [Auto] [Manual]



---

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

---



---

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

---

#### Fixed CPU VRM Switching Frequency (KHz)

This item allows you to set a higher frequency for a quicker transient response speed. Use the <+> or <-> to adjust the value. The values range from 300 KHz to 600 KHz with an interval of 50 KHz.



---

Do not remove the thermal module when the manual mode is selected. The thermal conditions should be monitored.

---



---

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

---

### **VRM Spread Spectrum**

This item allows to enhance the system stability.

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

### **CPU Power Phase Control**

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

|                               |                                                           |
|-------------------------------|-----------------------------------------------------------|
| <b>[Auto]</b>                 | Automatically set the phase control mode.                 |
| <b>[Standard]</b>             | The phase control will be based on the CPU command.       |
| <b>[Optimized]</b>            | Set to the ASUS optimized phase tuning profile.           |
| <b>[Extreme]</b>              | Set to the full phase mode.                               |
| <b>[Power Phase Response]</b> | The phase number will be adjusted by the current(A) step. |



---

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

---

### **CPU Power Duty Control**

DIGI + VRM Duty Control adjusts the current of every VRM phase and the thermal conditions of every phase component.

|                   |                                             |
|-------------------|---------------------------------------------|
| <b>[T. Probe]</b> | Select to set the VRM thermal balance mode. |
| <b>[Extreme]</b>  | Select to set the VRM current balance mode. |



---

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

---

### **CPU Current Capability**

This item provides a total power range for CPU overclocking. A higher value setting provides higher power consumption delivery and extends the overclocking frequency range simultaneously.

Configuration options: **[Auto]** **[100%]** **[110%]** **[120%]** **[130%]** **[140%]**



---

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

---

### **CPU Power Thermal Control**

Higher temperature provides a wider CPU power thermal range and extends the overclocking tolerance to enlarge the overclocking potential.

Configuration options: **[120]** - **[141]**



---

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

---

### DRAM Current Capability(CHA, CHB)

This item provides a total power range for DRAM overclocking. A higher value setting provides higher power consumption delivery and extends the overclocking frequency range simultaneously.

Configuration options: [100%] [110%] [120%] [130%]



---

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

---

### DRAM Current Capability(CHC, CHD)

This item provides a total power range for DRAM overclocking. A higher value setting provides higher power consumption delivery and extends the overclocking frequency range simultaneously.

Configuration options: [100%] [110%] [120%] [130%]



---

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

---

### DRAM Switching Frequency(CHA, CHB)

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

Configuration options: [Auto] [Manual]



---

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

---



---

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

---

#### Fixed DRAM-AB 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 300 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.

---

### DRAM Switching Frequency(CHC, CHD)

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

Configuration options: [Auto] [Manual]



---

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

---



---

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

---

#### **Fixed DRAM-CD 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 300 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.

---

#### **DRAM Power Phase Control (CHA, CHB)**

[Standard]            The phase control will be based on the CPU command.  
[Optimized]         Set to the ASUS optimized phase tuning profile.

#### **DRAM Power Phase Control (CHC, CHD)**

[Standard]            The phase control will be based on the CPU command.  
[Optimized]         Set to the ASUS optimized phase tuning profile.

### **Internal CPU Power Management**

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

#### **Enhanced Intel SpeedStep Technology**

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: [Enabled] [Disabled]

#### **Turbo Mode**

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

Configuration options: [Disabled] [Enabled]

#### **Turbo Mode Parameters**



---

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

---

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

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 Watts. The value indicates the maintained duration for the turbo ratio to exceed TPD(thermal design power).

Configuration options: [Auto] [1] - [127]

### Short Duration Package Power Limit

As 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 linger time.

Configuration options: [Auto] [1] - [4095]

### CPU Integrated VR current Limit

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

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

### CPU Internal Power Fault Control

#### CPU Integrated VR Fault Management

Disable this item to prevent FIVR(fully integrated voltage regulator) from tripping when doing over-voltage. It is recommended to disable this item when overcolocking.

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

### CPU Internal Power Configuration

#### CPU Integrated VR current Limit

Select balanced mode to improve power saving when the CPU is in a low power state. Select high performance mode to make the FIVR(fully integrated voltage regulator) work in high performance at all times.

Configuration options: [Auto] [High Performance] [Balanced]

## Tweaker's Paradise

The subitems in this menu allow you to access various tweaking options.



---

The subitems in this menu will vary per CPU model.

---

### Extreme Over-voltage

Enable this item to allow higher voltages for overclocking, but the CPU lifetime will not be guaranteed.

Configuration options: [Disabled] [Enabled]



---

This item can only be enabled when the onboard CPU\_OV jumper is switched on.

---

## CPU Core Voltage

Configures the mode of voltage fed to the cores of the processor.

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



---

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

---

### CPU Core Voltage Override

Allows you to configure the CPU Core voltage.

Configuration options: [Auto] [0.001] - [1.920]



---

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

---

### Offset Mode Sign

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

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

### CPU Core Voltage Offset

This item allows you to configure the CPU core voltage offset value.

Configuration options: [Auto] [0.001] - [0.999]



---

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

---

### Offset Mode Sign

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

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

### CPU Core Voltage Offset

This item allows you to configure the CPU core voltage offset value.

Configuration options: [Auto] [0.001] - [0.999]

### Additional Turbo Mode CPU Core Voltage

This item allows you to configure the CPU core voltage offset value.

Configuration options: [0.001] - [1.920]

## CPU Cache Voltage

Configures the mode of voltage fed to the uncores of the processor.

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



---

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

---

### CPU Cache Voltage Override

Allows you to configure the CPU Cache voltage.

Configuration options: [Auto] [0.001] - [1.920]



---

The following items appear only when you set the CPU 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 Cache Voltage Offset**

This item allows you to configure the CPU core voltage offset value.

Configuration options: [Auto] [0.001] - [0.999]



---

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

---

#### **Offset Mode Sign**

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

#### **CPU Cache Voltage Offset**

This item allows you to configure the CPU core voltage offset value.

Configuration options: [Auto] [0.001] - [0.999]

#### **Additional Turbo Mode CPU Cache Voltage**

This item allows you to configure the CPU core voltage offset value.

Configuration options: [0.001] - [1.920]

### **CPU System Agent Voltage Offset Mode Sign**

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

### **CPU System Agent Voltage Offset**

This item allows you to configure the amount of voltage fed to the system agent of the CPU including the PCI-E controller and the PCU(power control unit). Configure a high system agent voltage may enhance the overclocking capability.

Configuration options: [Auto] [0.001] - [0.999]

## CPU SVID Support

Disable this item to stop the CPU from communicating with the external voltage regulator.

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

## CPU Input Voltage

This item allows you to configure the input voltage for the CPU by the external voltage regulator.

Configuration options: [Auto] [0.800] - [2.700]



---

The following items appear only when you set the CPU SVID Support to **[Enabled]**.

---

### SVID Voltage Override

This item allows you to set a VCCIN for the CPU during initial part of POST. Use the <+> or <-> key to adjust the value. The values range from 0.001 V to 2.440V at 0.001V increment.

Configuration options: [Auto] [0.001] - [2.440]

## DRAM SVID Support

Disable this item to stop the DRAM from communicating with the external voltage regulator.

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

## DRAM Voltage(CHA, CHB)

This item allows you to configure the voltage for the DRAM on the left.

Configuration options: [Auto] [0.800] - [1.900]



---

According to Intel® CPU specifications, DIMMs with voltage requirement over 1.65 V may damage the CPU permanently. We recommend that you install the DIMMs with the voltage requirement below 1.65 V.

---

## DRAM Voltage(CHC, CHD)

This item allows you to configure the voltage for the DRAM on the right.

Configuration options: [Auto] [0.800] - [1.900]



---

According to Intel® CPU specifications, DIMMs with voltage requirement over 1.65 V may damage the CPU permanently. We recommend that you install the DIMMs with the voltage requirement below 1.65 V.

---

## PCH Core Voltage

This item allows you to configure the voltage for PCH(platform controller hub).

Configuration options: [Auto] [0.70000] - [1.80000]

## PCH I/O Voltage

This item allows you to configure the I/O voltage for PCH(platform controller hub).

Configuration options: [Auto] [1.20000] - [2.20000]

### **VCCIO CPU 1.05V Voltage**

This item allows you to configure the main power supply for the CPU REF.

Configuration options: [Auto] [0.70000] - [1.80000]

### **VCCIO PCH 1.05V Voltage**

This item allows you to configure the main power supply for the PCH REF.

Configuration options: [Auto] [0.70000] - [1.80000]

### **VTTDDR Voltage(CHA, CHB)**

This item allows you to configure the main power supply for the PCH REF.

Configuration options: [Auto] [0.20000] - [1.00000]

### **VTTDDR Voltage(CHC, CHD)**

This item allows you to configure the main power supply for the PCH REF.

Configuration options: [Auto] [0.20000] - [1.00000]

### **CPU Spread Spectrum**

This item allows you to enhance the BCLK overclocking capability or reduce the EMI (electromagnetic disturbance) generated by the BCLK. Set this item to [Enabled] for EMI reduction, or set this item to [Disabled] to enhance BCLK overclocking.

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

# 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 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.



### Hyper-Threading [ALL]

This item allows you to enable/disable the Hyper-Threading for logical processor threads.

Configuration options: [Enabled] [Disabled]

### Intel Adaptive Thermal Monitor

This item allows you to protect the CPU by decreasing its frequency as it reaches the thermal throttle point. The thermal monitor includes TM1 (Thermal monitor 1), TM2 (Thermal monitor 2), and EMTTM (Enhanced Multi-threaded Thermal Monitoring).

Configuration options: [Disabled] [Enabled]

### Limit CPUID Maximum

When set to [Enabled], this item allows the legacy OS to boot even without support for CPUs with extended CPUID functions.

Configuration options: [Disabled] [Enabled]

### Execute Disable Bit

Execute Disable prevents certain classes of malicious buffer overflow attacks when combined with a supporting OS (SuSE Linux 9.2, RedHat Enterprise 3 Update 3).

Configuration options: [Disabled] [Enabled]

## Intel Virtualization Technology

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

Configuration options: [Disabled] [Enabled]

## 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 Prefetcher

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]

## Boot Performance Mode

This item allows you to select the CPU performance state during system boot before the operating system takes control. The CPU runs at a selected performance ratio based on CPU configuration.

Configuration options: [Max Efficient] [Turbo Performance]

## Maximum CPU Core Temperature

This item allows you to set the maximum allowable temperature for CPU cores. The CPU will throttle or shutdown when it reaches this temperature to prevent damaging the cores.

Configuration options: [Auto] [60] - [100]



---

Do not set this value too high as high temperature may damage the CPU permanently.

---

## Active Processor Cores

The items in this menu allow you to enable/disable the cores of your CPU.

### Active Processor Core (0-9)

Configuration options: [Enabled] [Disabled]

## CPU Power Management Configuration

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

### Enhanced Intel SpeedStep Technology

This item allows your system to adjust the CPU's voltage and cores frequency, resulting in decreased power consumption and heat production.

[Disabled]      The CPU runs at its default speed.

[Enabled]      The system controls the CPU speed.

## Turbo Mode

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

Configuration options: [Enabled] [Disabled]

## CPU C-states

This item allows you to set the power saving of the CPU states.

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



---

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

---

### Enhanced C1 state

This item allows your CPU to reduce power consumption when the system is in idle mode.

Configuration options: [Enabled] [Disabled]

### CPU C3 Report

This item allows you to disable or enable the CPU C3 report to the operating system.

Configuration options: [Enabled] [Disabled]

### CPU C6 Report

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

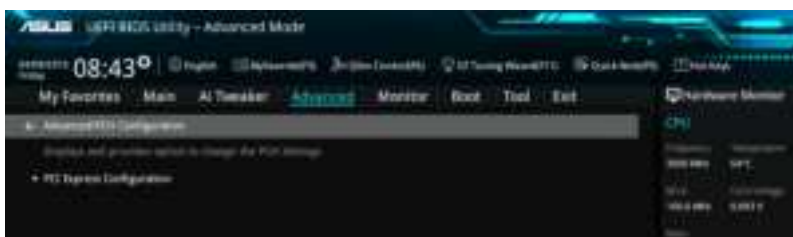
Configuration options: [Enabled] [Disabled]

### Package C State Support

This item allows you to set the C-state support for the CPU package.

Configuration options: [Auto] [C0/C1 state] [C2 state] [C6(non Retention) state] [C6(Retention) state]

## 1.6.2 PCH Configuration



### PCI Express Configuration

This item allows you to configure the PCI Express slots.

#### PCIEX1\_1/PCIEX1\_2 Speed

This item allows your system to automatically select the PCI Express port speed.

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

### 1.6.3 PCH Storage Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **[Not Installed]** if no SATA device is installed to the corresponding SATA port.

Scroll down to display the other BIOS items.



## Hyper kit Mode

Disable this option for M.2 devices. Enable this option for "ASUS Hyper kit" card.

Configuration options: [Disabled] [Enabled]

## SATAEXPRESS\_1 SRIS Support

When set to **[Auto]**, this item allows the system to automatically adjust the SRIS (Separate Reference Clock Independent Spread Spectrum Clocking Architecture) support for connected SATA Express devices. Set this item to **[Disabled]** to activate ASUS RUNWAY SATA Express bridge card

Configuration options: [Auto] [Disabled]

### S.M.A.R.T. Status Check

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]

## SATA Controller 1 Mode Selection

This item allows you to set the SATA configuration.

- |            |                                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [Disabled] | Disables the SATA function.                                                                                                                                                                                                                                                                                              |
| [IDE]      | Set to [IDE] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.                                                                                                                                                                                                              |
| [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. |
| [RAID]     | Set to [RAID] when you want to create a RAID configuration from the SATA hard disk drives.                                                                                                                                                                                                                               |



---

The following item appears only when you set the SATA Mode Selection to **[IDE]**.

---

### SATA6G\_1-6 (Gray)

These items display all connected devices to SATA6G ports. If some ports are not used, these items show **[Not Installed]**.

## Support Aggressive Link Power Management

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]

### 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]

## SATA Controller 2 Mode Selection

This item allows you to set the SATA configuration.

- [Disabled] Disables the SATA function.
- [IDE] Set to [IDE] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.
- [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.



---

Due to Intel® chipset specification, the SATA ports from controller 2 does not support Intel® Rapid Storage Technology including RAID configuration.

---



---

The following item appears only when you set the SATA Mode Selection to **[IDE]**.

---

### SATA6G\_7-10 (Black)

These items display all connected devices to SATA6G ports. If some ports are not used, these items show **[Not Installed]**.

## Support Aggressive Link Power Management

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]

### SATA6G\_7(Black) - SATA6G\_10(Black)

#### SATA6G\_7(Black) - SATA6G\_10(Black)

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

Configuration options: [Disabled] [Enabled]

#### Hot Plug

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

Configuration options: [Disabled] [Enabled]

## 1.6.4 System Agent (SA) Configuration



### DMI Configuration

#### DMI Gen 2

This item allows you to enable or disable the DMI Gen 2.

Configuration options: [Disabled] [Enabled]

### NB PCI-E Configuration

The items in this menu allow you to select the operating speeds of the PCIe slots.

#### PCIEX16\_1 Link Speed

This item allows you to select the operating speed of the PCIEX16\_1 slot.

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

#### PCIEX16\_2 Link Speed

This item allows you to select the operating speed of the PCIEX16\_2 slot.

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

#### PCIEX16\_3 Link Speed

This item allows you to select the operating speed of the PCIEX16\_3 slot.

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

### Intel VT for Directed I/O (VT-d)

The items in this menu allow you to configure the Intel® Virtualization Technology for Directed I/O (VT-d).

#### Intel VT for Directed I/O (VT-d)

This item allows you to enable/disable the Intel Virtualization Technology for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables.

Configuration options: [Enabled] [Disabled]

**MCTP**

This item allows you to enable or disable the MCTP.

Configuration options: [Disabled] [Enabled]

**ACS Control**

This item allows you to enable or disable the ACS Control.

Configuration options: [Disabled] [Enabled]

**1.6.5 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**.

**Intel xHCI Mode**

- [Auto] The xHCI is automatically enabled and runs at USB 3.0 mode when the xHCI driver is installed in the operating system.
- [Smart Auto] Upon detection, the xHCI driver supports the USB 3.0 mode during both POST and operating system.
- [Enabled] Enables the xHCI controller.
- [Disabled] Disables the xHCI controller.

## **EHCI Legacy USB Support**

- [Enabled] Your system supports the USB 2.0 devices in legacy operating systems.
- [Disabled] Your USB 2.0 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 2.0 devices at startup. If any USB 2.0 devices are detected, the xHCI legacy USB support is enabled.

## **xHCI Hand-off**

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

## **EHCI Hand-off**

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

## **USB Single Port Control**

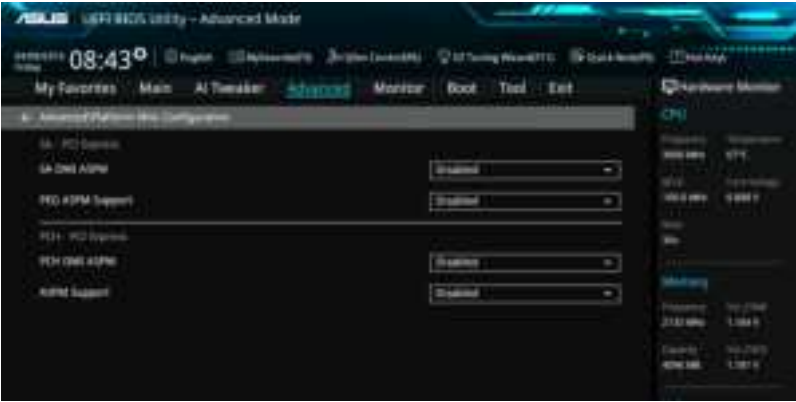
This item allows you to enable or disable the individual USB ports.



Refer to section **1.2.2 Motherboard layout** in your user manual for the location of the USB ports.

### 1.6.6 Platform Misc Configuration

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



#### SA - PCI Express

##### SA DMI ASPM

This item allows you to enable/disable the ASPM (L1) support for the downstream devices.  
Configuration options: [Auto] [Disabled] [L1 only]

##### PEG ASPM Support

This item allows you to enable/disable the ASPM support for the downstream devices.  
Configuration options: [Disabled] [L1 only]

#### PCH - PCI Express

##### PCH DMI ASPM

This item allows you to enable/disable the PCH DMI ASPM Setting.  
Configuration options: [Disabled] [Enabled]

##### ASPM Support

This item allows you to enable/disable the ASPM support for all downstream devices.  
Configuration options: [Disabled] [L1 only]

# 1.6.7 Onboard Devices Configuration

Scroll down to view the other BIOS items.



## HD Audio Controller

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

Configuration options: [Disabled] [Enabled]



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

### Front Panel Type

This item allows you to set the front panel audio connector (AAFP) mode to legacy AC'97 or high-definition audio depending on the audio standard that the front panel audio module supports.

[HD Audio] Sets the front panel audio connector (AAFP) mode to high definition audio.

[AC97] Sets the front panel audio connector (AAFP) mode to legacy AC'97

### SPDIF Out Type

[SPDIF] Sets to an SPDIF audio output.

[HDMI] Sets to an HDMI audio output.

## PCIEX16\_3 Slot Bandwidth

[Auto] The PCIEX16\_3 slot will run at X8 by default. The system will automatically detect the M.2 device and switch the bandwidth to M.2.

[X8 mode] The PCIEX16\_3 slot will run at X8 mode for high performance support with M.2 disabled.

### ASMedia USB 3.1 Controller

This item allows you to disable or enable the ASMedia® USB 3.1 controller of your system.

Configuration options: [Disabled] [Enabled]

### ASMedia USB 3.1 Battery Charging Support

This item allows you to disable or enable the ASMedia USB 3.1 battery charging support of your system.

Configuration options: [Disabled] [Enabled]

### RGB LED lighting

[On] LEDs will always light up at the S0(Working), S3(Sleep), and S5(Soft off) states, but not light up at the S5 state when "Erp Ready" is enabled.

[Off] LEDs will not light up.

### RGB LED lighting effects

This item allows you to select the RGB LED lighting effects.

Configuration options: [Auto] [Default] [Static] [Breathing] [Strobing] [Color Cycle]

### Intel LAN Controller

This item allows you to enable or disable the Intel LAN controller.

Configuration options: [Disabled] [Enabled]



---

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

---

### Intel Lan PXE Option ROM

This item allows you to enable or disable the PXE OptionRom of the Intel® LAN controller.

Configuration options: [On] [Off]

## Serial Port Configuration

The sub-items in this menu allow you to set the serial port configuration.

### Serial Port

Allows you to enable or disable the serial port (COM).

Configuration options: [Off] [On]



---

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

---

### Change Settings

This item appears only when you set the previous item to [On] and allows you to select the Serial Port base address.

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

## 1.6.8 APM Configuration



### ErP Ready

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

Configuration options: **[Disabled]** **[Enabled (S4+S5)]** **[Enabled (S5)]**

### 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]**

**[Disabled]** Disables Ring to generate a wake event.

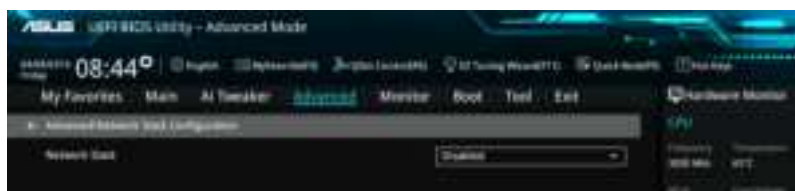
**[Enabled]** Enables Ring to generate a wake event.

### 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 Network Stack Configuration



## Network stack

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

Configuration options: [Disable] [Enable]



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

## Ipv4/Ipv6 PXE Support

This item allows you to enable or disable the ipv4/ipv6 PXE wake event.

Configuration options: [Disabled] [Enabled]

### 1.6.10 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.



NVM Express devices do not support SMART information.

# 1.7 Monitor menu

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

Scroll down to display the other BIOS items.



**CPU Temperature, Motherboard Temperature, PCIEX16\_1 slot Temperature, PCIEX16\_2 slot Temperature, VRM Temperature, PCH Core Temperature, T\_Sensor1 Temperature, EXT\_Sensor1-3 Temperature [xxx°C/xxx°F]**

The onboard hardware monitor automatically detects and displays the CPU, motherboard, VRM, PCH Core, and T-Sensor1 temperatures. Select **[Ignore]** if you do not wish to display the detected temperatures.

**CPU Fan Speed, CPU Optional Fan Speed, Chassis Fan 1 Speed, Water Pump Speed, HAMP Fan Speed, Extension Fan 1-3 Speed [xxxx RPM]**

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

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

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

## Optimize All

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

## CPU Q-Fan Control

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

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



---

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

---

### CPU Fan Step Up

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 the CPU Fan Profile to **[Manual]**.

---

### CPU Upper Temperature

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 54°C to 75°C. 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. The values range from 73% to 100%. 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. The values range from 40°C to 75°C.

### **CPU Fan Middle Duty Cycle(%)**

Use the <+> or <-> keys to adjust the CPU fan middle duty cycle. The values range from 60% to 100%.

### **CPU Lower Temperature**

Use the <+> or <-> keys to adjust the lower limit of the CPU temperature. The values range from 20°C to 75°C. 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. The values range from 60% to 100%. When the CPU temperature is lower than the lower limit, the CPU fan will operate at the minimum duty cycle.

## **Chassis Fan 1 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 Q-Fan Source**

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

Configuration options: [CPU] [MotherBoard] [PCIEX16\_1 Slot] [PCIEX16\_2 Slot] [PCH] [T\_SENSOR1] [EXT\_Sensor1] [EXT\_Sensor2] [EXT\_Sensor3] [Multiple Sources]



- For EXT\_Sensor1-3, connect a Thermistor cable to the EXT\_TS1-3 header then place the other end to the component to get the temperature.
- For Multiple Sources, select up to three temperature sources and the fan will automatically change based on the highest temperature.

### **Chassis Fan 1 Step Up**

This item allows you to set the value of the CPU 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 Step Down**

This item allows you to set the value of the CPU 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 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 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 four items appear only when you set Chassis Fan 1 Profile to **[Manual]**.

---

### Chassis Fan 1 Upper Temperature

Use the <+> or <-> keys to adjust the upper limit of the Chassis Fan 1 temperature. The values range from 45°C to 75°C. The Chassis Fan 1 will operate at the maximum duty cycle when the temperature source is higher than the limit.

### Chassis Fan 1 Max. Duty Cycle (%)

Use the <+> or <-> keys to adjust the maximum Chassis Fan 1 duty cycle. The values range from 60% to 100%. When the temperature source reaches the upper limit, the Chassis Fan 1-2 will operate at the maximum duty cycle.

### Chassis Fan 1 Middle Temperature

Use the <+> or <-> keys to adjust the middle limit of the Chassis Fan 1 temperature. The values range from 40°C to 75°C.

### Chassis Fan 1 Middle. Duty Cycle (%)

Use the <+> or <-> keys to adjust the Chassis Fan 1-2 middle duty cycle. The values range from 60% to 100%.

### Chassis Fan 1 Lower Temperature

Use the <+> or <-> keys to adjust the lower limit of the Chassis Fan 1 temperature. The values range from 20°C to 75°C. The Chassis Fan 1 will operate at the minimum duty cycle when the temperature source is lower than the limit.

### Chassis Fan 1 Min. Duty Cycle(%)

Use the <+> or <-> keys to adjust the minimum Chassis Fan 1 duty cycle. The values range from 60% to 100%. When the temperature source is under the limit, the Chassis Fan 1 will operate at the minimum duty cycle.

## Water Pump Control

This item allows you to set the water pump operating mode.

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



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

#### **Water Pump Temperature**

Use the <+> and <-> keys to adjust the upper limit of the water pump. The values range from 45°C to 75°C. The water pump will operate at the maximum duty cycle when the CPU temperature is higher than the limit.

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

Use the <+> and <-> keys to adjust the maximum water pump duty cycle. The values range from 60% to 100%. When the CPU temperature reaches the upper limit, the water pump will operate at the maximum duty cycle.

#### **Water Pump Middle Temperature**

Use the <+> and <-> keys to adjust the water pump middle temperature. The values range from 40°C to 75°C.

#### **Water Pump Middle Duty Cycle(%)**

Use the <+> or <-> keys to adjust the water pump middle duty cycle. The values range from 60% to 100%.

#### **Water Pump Lower Temperature**

Use the <+> or <-> keys to adjust the lower limit of the water pump temperature. The values range from 20°C to 75°C. The water pump will operate at the minimum duty cycle when the CPU temperature is lower than the limit.

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

Use the <+> and <-> keys to adjust the minimum water pump duty cycle. The values range from 60% to 100%. When the CPU temperature is lower than the lower limit, the water pump will operate at the minimum duty cycle.

## **HAMP Fan Control**

This item allows you to set the HAMP Fan operating mode.

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

### **HAMP Fan Q-Fan Source**

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

Configuration options: [CPU] [MotherBoard] [PCIEX16\_1 Slot] [PCIEX16\_2 Slot] [PCH] [T\_SENSOR1] [EXT\_Sensor1] [EXT\_Sensor2] [EXT\_Sensor3] [Multiple Sources]



- For EXT\_Sensor1-3, connect a Thermistor cable to the EXT\_TS1-3 header then place the other end to the component to get the temperature.
- For Multiple Sources, select up to three temperature sources and the fan will automatically change based on the highest temperature.

### High AMP Fan Step Up

This item allows you to set the value of the CPU 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]

### High AMP Fan Step Down

This item allows you to set the value of the CPU 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]

### HAMP 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]

### HAMP Fan Profile

This item allows you to set the appropriate performance level of the HAMP 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 four items appear only when you set HAMP Fan Profile to **[Manual]**.

---

#### HAMP Fan Upper Temperature

Use the <+> or <-> keys to adjust the upper limit of the HAMP Fan temperature. The values range from 45°C to 75°C. The HAMP Fan will operate at the maximum duty cycle when the temperature source is higher than the limit.

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

Use the <+> or <-> keys to adjust the maximum HAMP Fan duty cycle. The values range from 60% to 100%. When the temperature source reaches the upper limit, the HAMP Fan will operate at the maximum duty cycle.

#### HAMP Fan Middle Temperature

Use the <+> or <-> keys to adjust the middle limit of the HAMP Fan temperature. The values range from 40°C to 75°C.

#### HAMP Fan Middle. Duty Cycle (%)

Use the <+> or <-> keys to adjust the HAMP Fan middle duty cycle. The values range from 60% to 100%.

#### HAMP Fan Lower Temperature

Use the <+> or <-> keys to adjust the lower limit of the HAMP Fan temperature. The values range from 20°C to 75°C. The HAMP Fan will operate at the minimum duty cycle when the temperature source is lower than the limit.

### **HAMP Fan Min. Duty Cycle(%)**

Use the <+> or <-> keys to adjust the minimum HAMP Fan duty cycle. The values range from 60% to 100%. When the temperature source is under the limit, the HAMP Fan will operate at the minimum duty cycle.

## **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 assignment fan will be controlled according to the selected temperature source.

Configuration options: [CPU] [MotherBoard] [PCIEX16\_1 Slot] [PCIEX16\_2 Slot] [PCH] [T\_SENSOR1] [EXT\_Sensor1] [EXT\_Sensor2] [EXT\_Sensor3] [Multiple Sources]



- For EXT\_Sensor1-3, connect a Thermistor cable to the EXT\_TS1-3 header then place the other end to the component to get the 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 the 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 values range from 45°C to 75°C. 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. The values range from 60% to 100%. 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. The values range from 40°C to 75°C.

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

Use the <+> or <-> keys to adjust the extension fan middle duty cycle. The values range from 60% to 100%.

**Extension Fan 1-3 Lower Temperature**

Use the <+> or <-> keys to adjust the lower limit of the extension fan temperature. The values range from 20°C to 75°C. 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. The values range from 60% to 100%. When the temperature source is under the limit, the extension fan will operate at the minimum duty cycle.

**Allow Fan Stop**

This item allows your fans to run at 0% duty cycle when the temperature of the source drops below the lower temperature.

Configuration options: [Disabled] [Enabled]

**Anti Surge Support**

Enable this item for Over Voltage Protection (OVP) and Under Voltage Protection (UVP) functions. This causes the system to automatically shut down when the voltage exceeds the safe range that protects the motherboard's components.

Configuration options: [ON] [OFF]

**Chassis Intrude Detect Support**

This item allows you to enable or disable the chassis intrude detect feature.

Configuration options: [ON] [OFF]

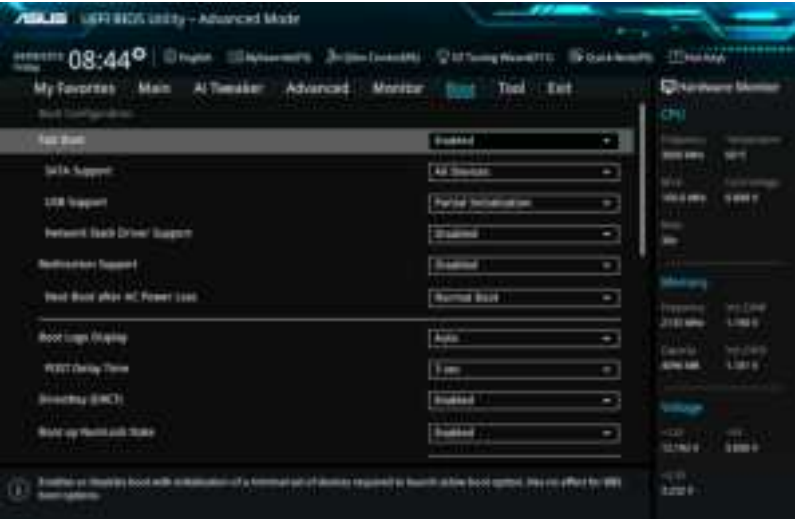
**CPU Temperature LED Switch**

This item allows you to enable or disable the CPU\_LED to indicate high CPU temperatures.

Configuration options: [ON] [OFF]

# 1.8 Boot menu

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



## 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]**.

## SATA Support

- [All Devices] All devices connected to SATA ports are available during POST. This process extends the POST time.
- [Hard Drive Only] Only hard drives connected to SATA ports are detected during POST.
- [Boot Drive Only] Only boot drives connected to a SATA ports are detected during POST.

## USB Support

- [Disabled] All USB devices will not be available until OS boot up for a fastest POST time.
- [Full Initialization] All USB devices will be available during POST. This process will extend the POST time.
- [Partial Initialization] For a faster POST time, only USB ports with keyboard and mouse connections will be detected.

## Network Stack Driver Support

- [Disabled] Select to skip the network stack driver from loading during POST.
- [Enabled] Select to load the network stack driver during POST.

## Redirection Support

This item allows you to enable or disable redirection support.

Configuration options: [Enabled] [Disabled]

## Next Boot after AC Power Loss

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

## Boot Logo Display

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



---

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

---

## Post Delay Time

This item allows you to select a desired additional POST waiting time to easily enter the BIOS Setup. You can only execute the POST delay time during normal boot.

Configuration options: [0 sec] - [10 sec]



---

This feature only works when set under normal boot.

---



---

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

---

## Post Report

This item allows you to select a desired POST report waiting time.

Configuration options: [1 sec] - [10 sec] [Until Press ESC]

## DirectKey (DRCT)

- [Disabled] Disables the DirectKey button. The system will only power on or off when you press the DirectKey button.
- [Enabled] Allows the system to power on and go to the BIOS Setup directly when you press the Reset button. Connect the 2-pin connector of the chassis reset button cable to the onboard DRCT header.

## Boot up NumLock State

This item allows you to enable or disable power-on state of the NumLock.

Configuration options: [Disabled] [Enabled]

## 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

This item allows you to set the display mode for Option ROM.

Configuration options: [Force BIOS] [Keep Current]

## INT19 Capture

- [Immediate] Executes the trap for INT19 immediately.
- [Postponed] Executes the trap during legacy boot.

## Above 4G Decoding

This item enables or disables 64-bit capable devices to be decoded in above 4G address space if your system supports 64-bit PCI Decoding.

Configuration options: [Enabled] [Disabled]

## 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

- [Auto] The system automatically detects the bootable devices and the add-on devices.
- [Enabled] For better compatibility, enable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.
- [Disabled] Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.



---

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

---

#### **Boot Devices 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: [Legacy only] [UEFI driver first] [Ignore]

#### **Boot from Storage Devices**

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

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

#### **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: [Legacy only] [UEFI driver first]

### **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 Secure Boot Keys**

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.

### Delete PK

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]

### Load Default PK

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



---

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

---

## KEK Management

The KEK (Key-exchange Key or Key Enrollment Key) manages the Signature database (db) and Revoked Signature database (dbx).



---

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

---

### Delete the KEK

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

Configuration options: [Yes] [No]

### Load Default KEK

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

### Append Default KEK

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



---

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

---

## DB Management

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

### Delete the db

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

Configuration options: [Yes] [No]

### Load Default db

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

### Append Default db

This item allows you to load the additional db from a storage device so that more images can be loaded securely.



---

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

---

## 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 GPU Post

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.



### 1.9.2 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.

### 1.9.3 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 > SATA Configuration > AHCI**.

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

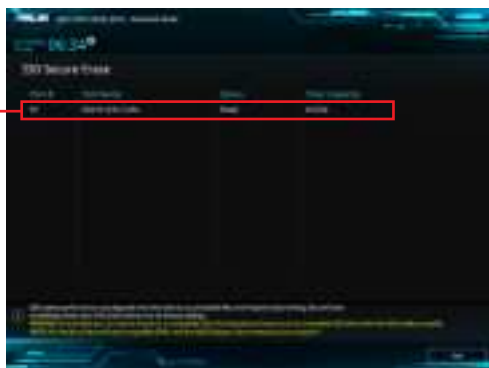


Check the ASUS support site for a full list of SSDs tested with Secure Erase. The drive may become unstable if you run Secure Erase on an incompatible SSD.



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

Displays the available SSDs

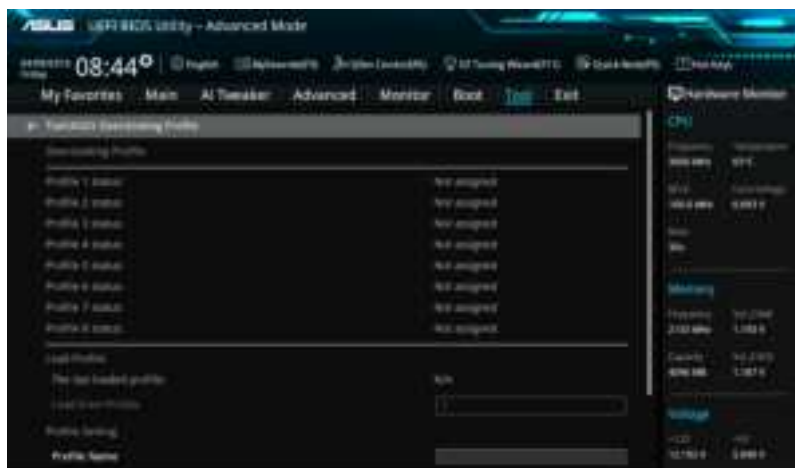


#### Status definition:

- **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.

## 1.9.4 ASUS Overclocking 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.

# 1.9.5 ASUS SPD Information

This item allows you to view the DRAM SPD information.





## 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 Utility** and press <Enter>.
2. Insert the USB flash disk that contains the latest BIOS file to the USB port.
3. Select **by USB**.



4. Press <Tab> to switch to the Drive field.
5. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
6. Press <Tab> to switch to the Folder Info field.
7. 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 Utility** and press <Enter>.
2. Select **by 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!

---